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FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

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The Primitive Romanesque Architecture of England.

IN Professor Baldwin Brown's recently-published volume* we have focussed what may be regarded as the latest consensus of expert opinion on what we prefer to call, with Professor Freeman, the Primitive Romanesque of England—one of the earliest and by far the best authenticated of the attempts (mainly, as we believe, independent attempts) to reproduce for ecclesiastical purposes the architecture of ancient Rome between the seventh and the eleventh centuries; possibly here and there, from traditions of Roman craftsmanship still surviving; largely from the precedent of Roman monuments still standing in abundance, at any rate in the earlier part of that period. By the eleventh century the problems of church building were possibly post-Conquest; of these examples the descriptions given are minute and scientific. The author's account of the criteria of our primitive Romanesque may be modified perhaps at some future time in detail, but is likely to remain the standard authority; we may venture to designate him the Rickman of Anglo-Saxon architecture.

This archaic style of ours is spread over a vast tract of time. Churches were built in Rome as early as the third century, and though Christianity was not formally recognised and accepted till 312. If, however, we take as the boundaries of the period the third and eleventh centuries, we have still the immense period of eight centuries to deal with. It is very difficult to realise that there were, and still may be, churches in England as much older than St. Alban's Cathedral, as St. Albans is older than the new Cathedral at Westminster. Since St. Albans we have had Early and Late Norman, and Semi-Norman; Early English, Decorated, and Perpendicular Gothic; Jacobean, Anglo-Italian, and Georgian; and all the Revivals. Naturally, one asks the archæologist to differentiate into well-marked periods those eight centuries before St. Albans. This is a large part of the task to which the author devotes his second volume—a very controversial task, bristling with difficulties, but conducted here with scrupulous accuracy and fairness.

Personally we find it difficult to make out more than three Anglo-Saxon periods; which may be put in non-chronological order thus: First, work done in or about the seventh century. Secondly, work which could not have been done except by people who were acquainted with Norman architecture, and therefore belonging to the latter half of the eleventh or the first half of the twelfth century. Thirdly, all the intervening work. Professor Baldwin Brown gives a different sub-division. His first period is from *c.* 600 to the first inroad of the Danes and the ravage of Northumbria, *c.* 800; his second, the epoch of the Danish wars; his third, from the reign of Edgar to the Conquest, *c.* 950 to 1066. To the first period he assigns fourteen or fifteen examples; to the second, perhaps fifteen; to the third, about one hundred and thirty. This last, moreover, he subdivides into three sub-periods, which correspond mainly to the revival in the latter part of the tenth century, church restoration under Canute, and church extension in the long and peaceful reign of Edward the Confessor (pp. II., 35, 298). For the arguments in favour of these attributions we must refer the reader to his volumes; they are too detailed and technical to be reproduced here.

To turn back to the simpler division suggested above. Of earlier than Anglo-Saxon work we have only one example. The Silchester building, whose foundations show nave and aisles, narthex, and apse flanked by two square chapels, which were perhaps sacristy and library, is certainly what we might expect to find in a Christian church of the fourth century; moreover, the apse is orientated to the *west*, like some of the fourth-century basilicas at Rome, and possibly the seventh-century crypt at Ripon. But St. Martin's and St. Pancras, Canterbury, and Reculver, are excluded in spite of considerable authority in their favour.

To the first Anglo-Saxon period, *c.* 600 to *c.* 800, belong (1) St. Martin's chancel—the nave, though still Anglo-Saxon, being later, for foundations of a narrower and earlier nave have been found inside it. (2) St. Pancras: south-east of the apse of St. Augustine's, Canterbury. (3) The foundations underneath the west front of Rochester Cathedral. Bede says a church was built at Rochester in 604. (4) Lyminge: foundations, 633. (5). The nave of St. Martin's, Canterbury. (6) Ythanchester, near Bradwell, Essex. (7) South Elmham, Suffolk: perhaps 670. (8) Reculver, "founded by the mass-priest, Bassa, in the year 669." (9) Brixworth, probably built by monks from Peterborough in 685. Mr. C. R. Peers forms a separate group of the above. They are all built on Roman sites; and all, except South Elmham, are of Roman material; all have or had a triple chancel arch; all had a short broad nave, and some have a western *porticus*; there is an approximation to Roman detail, and a total absence of every-

* "The Arts in Early England," by Professor G. Baldwin Brown. Vol. I. "The Life of Saxon England in its Relation to the Arts." Vol. II. "Ecclesiastical Architecture in England from the Conversion of the Saxons to the Norman Conquest." Murray. 1903.

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thing that is regarded as specially characteristic of Anglo-Saxon work—the long and short work, pilaster strips, balustered windows, &c. So remarkable are these characteristics that it may be asked whether there may not be a possibility that some of them may be, if not of the fourth century, at any rate before A.D. 598. For it by no means follows that when the Romans left the country, and Angles, Saxons, and Jutes arrived, British Christianity perished out of the land, and all the British churches were destroyed. As a matter of fact, Augustine found a flourishing ecclesiastical establishment, with its own bishops, in the West of England. At Canterbury he found a Christian church in use, and orders were then given not only to build but to *restore* churches, which implies the survival of churches of pre-Augustine date. It was natural that many should survive, with roofs perhaps decayed or burnt off, for a stone church is hard to destroy. Moreover, the Romano-British churches were in towns, and so, after the first sack, were little likely to be molested; for the Anglo-Saxons much disliked to live in towns: *e.g.* instead of occupying the comfortable Verulamium, they preferred to live on the wooded hillside on the north side of the river, the present St. Albans. Much church work, therefore, may well have survived in the deserted Roman towns. The amount of destruction wrought by the early Anglo-Saxon inroads generally seems to have been over-estimated. It must never be forgotten that in the eighth century Bede expressly says that there were still remaining "cities, lighthouse-towers, bridges, and paved roads." If that was the case in the bleak districts of remote Northumbria, where the Roman occupation was but partially effective, Roman buildings must have remained in very substantial abundance in the more Romanised parts of the country, *e.g.* in Kent, where the *pax romana* had prevailed for more than three centuries.

To the examples given above Professor Baldwin Brown adds the crypts of Ripon and Hexham, the date of which is definitely fixed; Escomb, Monkwearmouth, Jarrow, the foundations under the south transept of Peterborough, Corbridge, and the ruins of Stone-by-Faversham. He excludes Wing, which Mr. Micklethwaite regards as of the seventh century. Like Brixworth it is an aisled church; like Brixworth it has a polygonal apse, though that of Brixworth is internally semi-circular; it has a crypt, the vault of which, in the opinion of Mr. Hope, is a later insertion. It has, however, a balustered window of late appearance. If this window be regarded as a later insertion, the earlier date may be accepted. He also excludes North Elmham, Norfolk, of which a detailed account appeared in the *Builder* on March 14; on the ground that the moated mound which buried the older church was Norman, and that the church, therefore, is pre-Norman, but not pre-Danish. He is probably right in excluding Bradford-on-Avon. This, then, is the scanty list of the churches recognised to have been built soon after the Conversion. All have this very remarkable feature in common, that, though Anglo-Saxon churches, they are devoid of the best-known characteristics of Anglo-Saxon work; long and short quoins, double windows with midwall shafts, double-splayed lights, pilaster strips, hoodmoulds, and plinths. The existence of this as a separate category, and its early date, may be taken as established.

The author's second and third periods are characterised by the presence of a greater or less number of well-known characteristic features, such as those mentioned above; for the valuable and discriminating discussion of which reference must be made to the author's second volume. 1. Long and short work. 2. Pilaster strips; no buttresses. 3. Roman brick arches, doorways, and windows: *e.g.*, at Bridworth and Holy Trinity, Colchester; and adopted by the Norman builders of St. Albans. 4. Door hung against the inner face of the wall. 5. Pilaster in floor jamb bent round the arch. 6. Triangular arches to doorways and windows. 7. Small sham arches cut out of the solid. 8. Roman arches re-used. 9. Arches constructed with through stones and not with concrete centres. 10. Balusters; some turned in the lathe. 11. Windows high from the ground. 12. Double splay of window and midwall shaft. 13. Diagonal pilaster strips, perhaps in imitation of half timbered construction. 14. Rubble masonry, plastered over. 15. Use of big blocks, sometimes Roman. 16. Thin walls. 17. High walls, the masonry being often very good. 18. High pitch of roofs. 19. Bas-reliefs on slabs forming the jambs of doorways. 20. Impost frequent instead of capitals. 21. Preference for the portions or for the transept rather than the aisle; and 22. For the western tower, central towers being late also found, but late. The simultaneous presence of a considerable number of these features infallibly stamps a church as Anglo-Saxon, and after A.D. 800; but there are few of them that can be applied singly without the qualifications on which the author lays stress.

Leaving these examples—the great mass of Anglo-Saxon work—of the period 800 to 1066, we may draw attention to a few examples in which the resemblance to Norman work is very strong. The inference seems clear, though Professor Baldwin does not seem to draw it, that no such work can have been produced till the Normans had been long enough in the country to complete a considerable bulk of building; not only cathedrals and abbeys, but parish churches, which probably would be later. If so, Anglo-Saxon versions of Norman in our parish churches would hardly be produced much before the end of the eleventh century.

For building traditions die hard; and the Norman invaders were but a drop in a surrounding population of Anglo-Saxons. We can hardly conclude but that Anglo-Saxon methods of building would linger on, though with an admixture of Norman detail, in the more remote and old-fashioned villages, till well into the twelfth century, rather than the middle of the eleventh century, to which the author, Vol. II, 291, assigns them; *e.g.*, at Kirkdale, Kirk Hammerton, and Broughton, the arches are recessed in two orders; while numerous examples are illustrated of well-marked cubical and Corinthian capitals; often so distinct from the normal Norman forms that they plainly were not wrought by Norman masons, but at the same time forms that would not have been produced at all except for the presence of genuine Norman detail in the neighbourhood. Particularly significant is the west front of Branston, near Lincoln, where there are present together cubical, coniferous, and Corinthian capitals. It would be difficult to find, even in Norman work, such well-developed coniferous capitals in the eleventh century; and the Corinthian capitals could not be there but for those at Lincoln in Remigius' west front; while the doorway is Norman in its details, but in its general design it is not.

In addition to the first thorough-going attempt at classifying our Primitive Romanesque, Professor Baldwin Brown discusses at length what is always a perilous subject—that of origins. The favourite theory seems to have been that most of our seventh-century architecture is of Irish origin, as we now know certainly most of our seventh-century Christianity was. There seems hardly a shred of truth in the theory. The Irish were very religious people, and in some ways very artistic people, but very bad builders. It has never been proved that a single Irish church had a chancel or a radiating arch in the seventh century. How then could the Irish export to Brixworth, Reculver, and the rest what they had not got? The only important feature which might possibly be fathered on the Celtic missionary builders from Lindisfarne and Iona is the square east end. But very many of the early Anglo-Saxon churches would be of timber; built of beams resting on or mortised into a timber ground plate, and with such a construction an apse could not have been built, however much the builders might desire it. And the plan which was inevitable with this timber technique would become hallowed in time, and would be employed also in churches built in stone, especially where a stone replaced a timber church, as at York, Tynemouth, Lastingham, Wilton, and Chester-le-Street Everywhere, however, whether there was a pre-existing timber style or not, the normal type would be square ended.

A still more chimerical hypothesis appeals to Scandinavian influence. But the Scandinavians did not accept Christianity till *c.* 1,000, and in the seventh century had neither Christianity nor Christian architecture for export. Nor did the Vikings arrive in England till *c.* 800, by which time we had already built churches large and elaborate in plan.

Another theory carries us to Rome. And if we read, instead of Rome, "the Romanised parts of western Europe, especially Gaul," we must give it at any rate partial adhesion. There can be no doubt that non-vaulting builders could not have originated the apse; plainly it is an import from the Continent. And we cannot explain away passages like these in Bede: "Naitanus, King of the Picts, asked builders (*architectos*) to be sent to him from Gaul, to build a church of large blocks after the manner of the Romans." "Benedict Bishop in 675 went over to Gaul and brought back with him some masons to build him a stone church after the manner of the Romans, in which he ever took delight." Here then we have what Lord Bacon calls a *vera causa*.

But because we borrowed something from Roman work in Gaul and Italy, it does not follow that we did not borrow from, and develop, Roman work at home here in England. This is another *vera causa*. For Bede tells us that in his day even the North of England abounded in Roman buildings, as we have noted above. Nor is it by any means certain that traditions of Roman craftsmanship had wholly died out between the evacuation in the fifth century and the great epoch of church building in the

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seventh century. There may well have been desecrated or deserted churches still standing which had apses at the east; and to the west the *porticus*, which is such a peculiar and largely constant feature of our earliest churches—*e.g.*, St. Pancras, Canterbury; South Elmham; Wearmouth; Corbridge; at any rate, it is present in the form of a narthex in the Romano-British Silchester. Balusters with entasis and rings are carved on a Roman altar from Birrens, Dumfries. Roman shafts have been found in great numbers; some with the marks of the turning tool; one *in situ* behind a house in Watergate, Chester. Long-and-short work occurs in the amphitheatre of Verona; at Pompeii in Northern Africa; in mediæval buildings in the valley of the Loire; and in Normandy in the eleventh century, where the masonry is herring-boned, the quoins are long and short—*e.g.*, at Querqueville, Beuville, Lion-sur-Mère. It seems, then, to have been in use up and down the Roman Empire, and is hardly likely to have been absent from England. The curving of a pilaster or shaft round an arch is probably but an attempt to reproduce the Roman architrave moulding in the form of a hoodmould or roll. A roll moulding occurs abundantly on our Roman altars and tombstones. The alternation of triangular and semicircular arcading occurs in Classical work, and is very common in the Romanesque of Auvergne. Pilaster strips may be but a primitive and archaic attempt to get the decorative effects which the Romans had obtained by Ionic or Corinthian pilasters. Just as the pilasters of the Roman Porte d'Arroux, which is still standing, at Autun, inspired all the pilaster decoration of such great cathedrals as Autun and Langres, so it may well be that the pilaster decoration of Roman buildings still standing in the ninth and tenth centuries inspired the pilaster strips of our later Primitive Romanesque. In Germany, at any rate, the derivation of pilaster strips from such pilasters as those of Lorsch, c. 770, is exceedingly probable. This then, what may be called the autochthonous theory, is what we would venture to put forth as the main origin of our Early Christian architecture. Some influence must, of course, be assigned to Christian work in Gaul, with whose form of Christianity our own was closely connected. In other words, in spite of the imperfection nowadays of the architectural record of Roman England, we regard Anglo-Saxon as an independent attempt to reproduce Roman work existing in England in the seventh and later centuries, with some aid from Christian imitations of Roman work in Gaul, and not as a derivative from Ireland, Scandinavia, or Germany.

Professor Baldwin Brown, however, attaches great weight to the influence of Thuringia, Saxony, Westphalia, Rhenish Prussia, and the provinces of the lower Rhine, especially as regards the western towers and the pilaster strips in later Anglo-Saxon work, for which the reader is referred to the second chapter in his second volume.

It should be added that while the second volume is devoted to Anglo-Saxon architecture, the contents of the first volume are of a more general character, including valuable contributions on Roman Britain, on the Anglo-Saxon settlement, the Conversion, the Anglo-Saxon ecclesiastical system, and three very useful chapters on the parish churches. The volumes are light in the hand, excellently printed, and well illustrated. They form a treasure house on which all archæologists will draw in future for their knowledge of the work of our Anglo-Saxon forefathers.

NOTES.

A National College of Applied Science.

THE gift of £300,000, of which Lord Rosebery has this week informed the London County Council, is likely to mark a new departure in national education. There can be no doubt that the London County Council will agree to find the funds for the upkeep of the college, which will be built by the gift of the gentlemen who have authorised Lord Rosebery to make their generosity known to the public. There is equally no doubt that a site at South Kensington is assured, though it may be wished that it could have been in a more central position. Nor can we doubt that further gifts and endowments are likely to follow. A College of Applied Science is certain to appeal to modern ideas; and while Oxford may lament the absence of the pious founder, he will probably be found in evidence in the history of the new college. London, for its own sake and as the capital of the Empire, should long ago have possessed the finest technical school in the world, whereas the German College of Applied Science is the best in Europe. It is to be hoped that this college will be followed by others. There is no reason why there should not be a great Legal University and a great Academy of the Industrial Arts. London is remarkable for the want of centralisation in its education, and perhaps this bequest may mark the beginning of a new epoch in this respect.

The Chantrey Bequest.

WE have often adverted to the unsatisfactory manner in which the administration of the Chantrey Bequest has been carried out by the Royal Academy, and criticism of their action seems now to be taking a very decided form in the daily Press. Some of this criticism, no doubt, is too sweeping: the purchases have not all been mistakes. When, for instance, the Academy purchased Brett's "Britannia's Realm" they selected a work precisely meeting the terms of the bequest—an exceptionally fine work by one of the first painters of his day in that particular class of subject. But no doubt some pictures have been purchased which had no such claim; and to judge by their action, the Academy seem rather to have aimed at applying the fund towards purchasing the works of their own members, and distributing these favours equally all round; if A had a picture purchased this year, B must have his turn next year, and so on. This certainly cannot have been Chantrey's intention: works "of the highest merit" were to be purchased, executed by artists of any nation, provided that such artists resided in Great Britain during the execution of the work. Obviously, membership of the Royal Academy was not to be any factor in the case. This year the works purchased are Mr. Adrian Stokes's "Autumn in the Mountains," Mr. David Murray's "In the Country of Constable," Mr. Armstead's statue "Remorse," and Mr. Colton's group "The Springtide of Life." Against the purchase of Mr. Murray's work we protest: it is a weak landscape, both in itself and in comparison with others in the exhibition. The others are all good works; whether they are of sufficient importance to come quite up to Chantrey's intended standard may be a question. Both Mr. Stokes and Mr. Colton have done finer things than these that are now purchased. The artists are all Academicians except Mr. Stokes—who, one would have thought, ought to have been elected long ago, if artistic merit is the sole qualification.

The Forth and Clyde Ship Canal.

ONE of the most important engineering works in contemplation at the present time is a scheme for the connexion of the Forth and Clyde by means of a ship canal. Apart from passenger services, there is already a considerable amount of goods traffic on the Forth, along the upper reaches of which are to be found numerous iron foundries and other manufacturing establishments, especially in the vicinity of Stirling, while the industries centred about the Clyde are still more important. Small as the distance is between the two rivers, it is sufficient to constitute a somewhat serious obstacle to the economical conveyance of manufactured products, and merchandise generally, from the east to the west and *vice versâ*. Existing railway facilities may be sufficiently convenient for communication between cities such as Edinburgh and Glasgow, but when delivery has to be effected at ports on the opposite coast of Great Britain, the cost of transhipment is so heavy that it is frequently cheaper to consign goods by steamer, thus involving considerable delays, owing to the unavoidable length of the sea voyage. The scheme to which we now refer is one intended to connect the Firth of Forth and the Firth of Clyde in the following manner. It is proposed that the canal shall start from Alloa on the eastern side, passing to the north of the links of the Forth and northward of the town of Stirling. Continuing along the valley of the Forth in the direction pursued by the railway between Stirling and Dumbarton, a deep cutting will take the canal into Loch Lomond, near Buchanan Castle. Navigation will then be conducted on Loch Lomond to Tarbet, near the upper end of the loch, and a second cutting will take the canal to Arrochar, at the head of Loch Long, which will be the outlet on the west. As our readers are aware, Loch Long is an arm of the sea providing good anchorage, and is navigable for all classes of vessels. The chief distances are as follows:—From Alloa to Loch Lomond, 28 miles; Loch Lomond to Tarbet, 14 miles; Tarbet to Arrochar, 1¾ miles. The actual cutting amounts to 29¾ miles, and the chief engineering difficulties will be found near Loch Lomond, where a cutting of considerable depth will be necessary, and again at the narrow neck between Loch Lomond and Loch Long. Messrs. D. & A. Stevenson, the well-known civil engineers of Edinburgh, are now engaged upon the necessary plans, and it is expected that they will be lodged in November for the purpose of securing Parliamentary powers for the scheme. If carried out, the new canal will shorten the passage between the Clyde and ports on the east coast by something like 530 miles.

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Radium: Further Investigations.

THE current *Journal of the Franklin Institute* contains an interesting account of the recent developments of the properties of radium and some other radio-active bodies. We do not find a great deal that is new to scientists on this side of the Atlantic, but there are just a few points which may be considered. Radium in a pure state is a very difficult and costly substance to procure, and this accounts for the slow progress made in investigating its properties and uses. Professor Currie, on being asked whether 5,000*l.* would purchase a tiny tube of pure radium he had made, replied in the negative, but he stated that very shortly radium would be placed on the market at a cost of 30,000 fr. per gramme. We quote these figures to show the impossibility of any but exceedingly rich persons and institutions doing any original work with radium and its compounds until the material is obtained in larger quantities. As we have said on a previous occasion, we are by no means sure that radium can do as much as was claimed for it at first, but there is no doubt that glass, porcelain, paper and other substances are changed in colour by its action. None of the rays from radium can be refracted, reflected, or polarised, showing that they are not light waves. Professor Thomson has called attention to the effect which radium produces of colouring glass in which it is placed, a deep violet colour, and he states that if this colouring went entirely through the glass, and he thought it did, there was, perhaps, a reaction when the rays appeared on the outside of the glass which caused destruction of the glass itself, and lessening in the weight of the glass envelope, and not of the radium itself. We have yet to learn, however, that the statements of M. and Mme. Curie, to the effect that pure radium, although an active body, loses none of its energy, and remains the same weight throughout a great period of time, are incorrect. As we have interpreted the laws of Nature up to the present, there must be some waste where energy is employed, and it is difficult to believe this new view, in spite of its having been confirmed. Professor Thomson's statement is based on that of Professor Becquerel, and the latter's observations arise merely from his examination of the deflectable rays from radium, which form only a part of the rays given out from the element.

Workmen's Compensation.

ANOTHER case relating to workmen's compensation has reached the House of Lords (Abram Coal Co. *v.* Southern), and it was taken to the highest tribunal as a test case, as the coal company had agreed to pay the compensation, whatever the issue might be. The point for decision was—what was embraced by the word "earnings" in the Act. Certain deductions were made from the sum which represented the wages of the workman for the following purposes: for the check-weigh fund, for sharpening picks, and for the maintenance of lamps and the supply of oil; and it was argued that these deductions must be taken into consideration in arriving at the amount of compensation. The House of Lords affirmed the judgment of the County Court Judge and the Court of Appeal that these sums should not be deducted. The case, however, is not of very great importance, as it appears that lamps and picks in proper working order form part of the equipment of a miner, and have to be supplied at his cost, and therefore the sums deducted in respect of these items were of as much benefit to the workman as if the amounts had been paid directly to him. The Report is silent as to the nature of the check-weigh fund; if the purposes to which that fund is applied are of mutual benefit to the employer and the workman, it would be more difficult to draw any general principle from the decision. The House of Lords were unanimous in holding that the Truck Acts offered no analogy.

One House or Two.

THE case of The Ilford Park Estates, Ltd., *v.* Jacobs is an important decision in connexion with the structure of a building. The defendant held land under a conveyance which contained a covenant restraining her from erecting houses of less value than 300*l.* each, or from erecting more than one house on each plot. The defendant was erecting what was alleged to be two houses; they were, in fact, two semi-detached houses, only, instead of being detached vertically, they were separated horizontally. The plans showed a building on two floors: on the ground floor a tenement complete in itself, with its own front door, with another tenement over it, to which access was obtained through a separate front door giving on to a staircase which was separated from the lower tenement by a brick wall; thus there was no internal communication. The learned Chancery Judge found this to constitute two separate houses, and their erection to be a breach of the covenant. It is curious in how many connexions this question continuously arises, and how conflicting the decisions of the Courts have been on the point. Thus, in connexion with the question of drainage and the repair of drains, this question has been variously decided (*see* our Note to the cases of Humphrey *v.* Young and Hedley *v.* Webb, in the *Builder* of November 15, 1902). The same point practically arises under the Public Health (London) Act in enforcing the provisions of the Sanitary Authority in reference to the number of persons who may inhabit a "house" let in lodgings, and in this connexion again there is a conflict of authority (see the *Builder*, April 18, 1903), and the question has also arisen under the Revenue Statutes relating to inhabited house duty. Even for the purposes of a covenant in a lease there is considerable doubt whether "flats," as usually constructed, form one or more buildings, although the authorities tend to show that in the absence of internal means of communication they are to be considered as separate buildings. It is to be hoped that this point may either soon come before the House of Lords in a form which will enable a decision to be given on the point in all its relations, or that the question may be set at rest by legislation.

Forecourts to Shops.

AT the Bow-street Police-court last week the police-magistrate had to decide an important point to a certain class of shopkeepers. The defendants were a firm of furniture dealers who were summoned for obstructing the pavement by exposing furniture for sale in front of the shop. The contention of the Commissioner of Police was that since the railings had been removed which had enclosed this forecourt it had become part of the pavement dedicated to the public. Evidence was offered, however, to show that the defendant was liable for its repair, and that he had continuously used it, and the magistrate held there was no evidence to show dedication to the public. It is apprehended that the continuous user is the real point in the case, and that if shopkeepers throw their forecourts into the pavement and neglect for twenty years to exercise acts of ownership over them, the mere fact of the local authority not being liable to repair would not be sufficient to exclude the public right.

Sewers and Drains.

THE Report, which we gave last week, of the interview of a deputation with the President of the Local Government Board on the subject of the law as to sewers in London, is worth some further comment. It is quite clear that the decision in Silles *v.* The Fulham Borough Council makes it necessary that the law should be altered by Parliament. A sewer, in principle, should only be a main drain constructed by a municipal body. Nothing can be more obvious than that a double drain—that is, one to which two houses have communication — is not really a sewer proper. The construction of technical Acts of Parliament passed without reference to all the circumstances which may arise is admittedly difficult, and the fact that new circumstances are year by year arising in regard to local government renders it necessary that the statute law on this subject should be revised from time to time. The question of what is called combined drainage is one of these circumstances, and we have no doubt that it can be dealt with by Parliament, and that the Local Government Board should draft a measure to meet the point without delay, and use their best efforts to pass it into law next session.

Electric Supply in London.

A REPORT has been issued by the Town Clerk of Camberwell with reference to the application of the London Electric Supply Co. for orders enabling them to enter into competition with the County of London and Brush Provincial Electric Supply Co. in a portion of the district of Camberwell. The Board of Trade refused to sanction the application, and in answer to a question addressed by Dr. Macnamara to the President of the Board of Trade, it was stated that several necessary points had been omitted from it. The London Electric Supply Company's solicitors affirm that this is not the case, and that they have complied with all the regulations. There seems no doubt that their statement is correct, and considering the high price charged by the Brush Company in the districts and the usual procedure by the Board of Trade, which generally allows two companies to compete in any district, we think that the London Electric Company have been somewhat harshly dealt with. This case seems to show that there is ample room for inquiry into the present methods of administering the Electric Lighting Acts, particularly with regard to the London boroughs.

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Injury to St. John's Wood.

UNDER this heading a few gentlemen residing in the neighbourhood of Grove End-road write to the *Times* protesting against the proposal to erect a block of workmen's dwellings on a garden site of three acres in Grove End-road, of which Lord Howard de Walden has acquired the freehold. We entirely sympathise with them in what we regard as a most just cause of complaint. Grove End-road is a residential neighbourhood of detached houses with trees and gardens, and the erection of such a building as is threatened must entirely change its character and destroy its desirability as a residential quarter. However desirable it is to increase the number of well-planned artisans' dwellings, there is a fitness of things to be considered in regard to their locality, and it is very unfair to the residents in such a neighbourhood to destroy its amenity in this manner.

Fine Art Society.

A SMALL collection of water-colour drawings of English and Welsh landscape, by Mr. Alfred Powell, is on view at the Fine Art Society's Gallery. These are highly finished drawings, of what may be called a very pretty character, but somewhat conventional in style. Among those which show more breadth of treatment are "On the Common, Bournemouth" (6), "Beeston Woods, Sheringham" (12), and "Moorland, Goathland" (22). All these are very well composed, a quality which belongs to some of the others also; but the type is of rather the popular than the artistic order.

Society of Arts Conversazione.

THE gardens of the Botanic Society, on Tuesday night, presented a fairy scene of thousands of coloured lights, contrasting most effectively with the dark masses of trees in the dim light of the summer night. The Society of Arts gave its annual conversazione here, which was very largely attended. The sight of the gardens themselves, lit up in this way, was worth coming for, but there were other contributions to the entertainment. In one tent was a beautiful collection of roses sent by Messrs. Paul & Sons, of Waltham Cross, and in the corridor from the north entrance to the large conservatory a number of Japanese dwart trees formed a very interesting exhibit. These little trees, looking so exactly like large forest trees in miniature, have a most characteristic appearance, and remind one curiously of the foliage accessories in Japanese pictures. Besides a band on the lawn, there was a concert going on in the club pavilion, in which the performances of a company of hand-bell players were really artistic in their way. The real enjoyment of the evening, however, lay in the spectacle of the lighted garden itself. There could not have been better weather for this kind of Arabian Nights' entertainment.

Architectural Association Annual Excursion.

THE arrangements for the Annual Excursion of the Architectural Association are now complete, Worcester having been selected as headquarters. It is about eighteen years since the last visit to this district, but it has been found possible to compile a programme in which only a few of the places then visited are now included; not but that old members would willingly revisit many of them again and again. Amongst the places to be visited are the following:—Huddington Court; Mere Hall; Westwood; Eastington Hall; Birts Morton Manor; Great Malvern Priory; Hampton Lovett, with its memorial to the original of Sir Roger de Coverley; Harvington Hall, with its secret hiding places; Chaddesley Corbet; Grafton Manor; Bredon and Overbury villages (both full of good work, old and new); Woollas Hall; the Littletons and their charming manor houses; and Evesham with its old world streets and churches. The country is beautiful and the work very good, so that, if the weather be fine, any intending excursionist may be assured of a delightful week. We are reminded that it will greatly assist the honorary secretaries if names are forwarded at once. The numbers have to be limited to thirty, and no time should be lost. The secretaries are—W. Talbot Brown Wellingborough, Northants; and A. W Hennings, 9, Ely-place, Holborn, E C.

Victorian Institute of Architects.

WE are glad to receive the first number of Vol. I. of the "Journal of Proceedings of the Royal Victorian Institute of Architects." It is printed and arranged in an artistic manner, and makes a very good appearance. From the Report of the Council for 1902-3 we learn that the number of members is at present 108. An extract from the Report is given on another page, under the head of "Architectural Societies." From the Literary Committee's Report we see that for the meetings the plan has been adopted as far as possible of having two short papers for one evening instead of one long one. Among the subjects treated during the Session were "Modern Architectural Design," "The Education of the Handworker," "Art Metal-work," "Technical Education," &c. There has been an effort to form a Federation of the various Australian Institutes, which however at present seems to have failed.

FURTHER NOTES ON ACADEMY PICTURES.

As we observed at the end of our former article on the Academy Exhibition, there are a good many pictures worth notice and attention besides those which we had space to comment on at the time.

First among these, in the order of hanging, is Mr. Wetherbee's charming little old-world pastoral "The Music of Pipe and Brook" (11), a landscape that seems to belong to the antique world as much as the figure of the frankly nude shepherd who sits and pipes in the foreground; not quite such a good figure, by the way, as those in Mr. Wetherbee's last-year pictures. Of course a too realistically painted figure in the foreground would destroy the balance of the whole; but in harmonising it with the landscape the figure has been allowed to run into rather too shapeless a mould; a little more of modelling would not have hurt the general effect. Mr. Swan's "Iris" (64) in the same room will be looked at because it is his; it is a play of colour of flowers, birds, and drapery about a rather weakly conceived figure—a fancy somewhat too fanciful to be quite satisfying.

In the second room Mr. Clausen's "Dusk" (66) does not answer to its title. There is a flame of sunset burning in the sky and too much light and colour generally for dusk; perhaps the effect of dusk seems intended to be conveyed in the general shapelessness of things. The large lump of something in the middle is apparently the silhouette of a haystack seen at an angle; but if we could see as much of the colour as that we could certainly distinguish the front from the side in the perspective. However, this is an interesting little picture in colour and sentiment, more so than the more ambitious work over it, "St. Cecilia" (65), a very weak treatment of a great subject. Mr. H. W. B. Davis's "Apple-blossom" (74) is charming, but far too near being a replica of one which was in the large room some years ago, almost the same composition and the same tree in the foreground. Sir W. Richmond's "Phaeton: Sunrise" (84) is a curious attempt to paint flashing light, to dazzle our eyes with the "burning axle-tree" of the chariot of the Sun; and it is successful, it really does dazzle. It is probably to give the more effect to this central point of light that the horses of the Sun, which rear and prance over the clouds, are kept rather flat and dead in pale colouring. This picture of mythical sunrise is balanced — evidently with intention—by Mr. Arnesby Brown's material sunrise, "The Coming Day" (94), most notable perhaps for the truthful effect of the level light and the shadows among the foreground vegetation; as a whole it is hardly one of the painter's best works. Mrs. Corbet interests us by a small sunset view of Athens (78). "By the Sea" (104) is an admirably painted miniature nude by Mr. W. A. Breakspear; Mr. van Havermaet's small interior, "The Restorer" (103)—an old man, who does not seem as if restoring pictures were a profitable occupation, putting touches to a Madonna on a triptych—is an interesting work; and near this Sir E. A. Waterlow shows his diploma picture, "On the Banks of the Loing" (116), a small landscape in which the artist seems to have been thinking of Corot, and to some purpose. Mr. La Thangue's "A Provençal Winter" (133), all flowers and oranges and sunlight is (perhaps intentionally) rather a translation into a painter's effect than a transcript from Nature.

In the large room Osman Hamdy's large and violently coloured picture "La Génèse" (135), representing a woman clad in bright yellow sitting in front of a system of bright blue Turkish bracketed decoration, has been a puzzle to every one—a puzzle we do not profess to unravel. It may be admitted that it is a picture you cannot pass over. What has Mr. Charlton been thinking about with his cavalry horses in the battle picture "Rossbach" (136)? Since the photography of animals in motion we constantly see experiments in painting the action of horses, but seldom such an odd one as this, with several horses each with one foreleg flourished with a kind of exaggerated stage action. "British Wild Cattle" (149) by Mr. Davis—some of the Chillingham herd, we presume—is a masterly painting of white cattle in strong sunlight. Mr. Robert Fowler surprises us this year with a large landscape, "Summer Afternoon: Conway" (158), of very peculiar colouring, illustrated by a bad misquotation—"The glory falls on castle walls," from one of the finest and (we should have thought) best known of Tennyson's lyrics. The tricks that painters play with their poetry quotations are endless; but in this case copies of Tennyson are at all events easily procurable, and the painter need not have damaged a great line by a great poet who was very particular in his use of words. Two other landscapes, hung rather high in this room, seem to have qualities; Mr. Westley Manning's "The Golden Hour" (200) and Mr. Sheard's "Autumn Gold" (208); both these painters, we should think, show promise of doing more in landscape. We are afraid that an old favourite, Mr. Leslie, really will not do in his picture of "The Lily Pond" (196); the grass bank is like a piece of green cloth. There is Mr. Abbey's only picture in the same neighbourhood, "Pot-pourri" (209), an interior in light greyish tones which set off the brilliant colour of the masses of flower-petals which some girls are making into pot-pourri: a pleasant bit of artistic effect, though there is nothing to call a subject in the picture.

In Room IV. Mr. Melton Fisher's "The Chess Players" (221) is also a picture treated purely as a bit of artistic effect, and a very good one; and Mr. Davis's "Souvenir of the French Coast" (229) is a beautiful landscape in its quiet way: a scene on the coast, on low undulating land, looking out towards the sea. The expression of calm and repose about this, and the French feeling in it too, to be realised but not defined, give a great charm to it. Mr. Stanhope Forbes's "Nomads" (258), a party of travelling vagrants fixing their camping gound, is of course good in a sense, but does not interest us. A more than usually excellent portrait of a gentleman by Mr. Ouless (260) claims recognition; and there

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is a noteworthy landscape by Mr. Adrian Stokes, "Autumn in the Mountains" 276), a picture painted in a series of receding planes, light-brown, dark-brown, purple, white, all very clearly cut out, and crossed vertically by white stems of trees which break into golden leafage at the top. It is a curious picture, and, like Mr. La Thangue's before referred to, seems rather a translation than a transcript. Mr. Sims's "Water Babies" (271), a seashore scene, is good in colour and in the treatment of the distant portion of the sea; and Miss Gray has produced a small picture with a thought in it—"The fool hath said in his heart, There is no God" (265), a small landscape in which a dejected-looking man in a mediæval Doctor's gown muses by the side of a brook. We should expect to hear of the author of this again.

Is this a section of an immense ironclad, No. 304 in Gallery V.? That is the first impression it gives, but it is Mr. Albert Goodwin's conception of "The Gate of the Inferno." It is not what people call "convincing" in that sense, but it is a powerful grim conception, and the general dingy blackness of everything, and the chains stretching, one does not know why, from one point to another, have a weird effect; it seems however rather an attempt than a success. Curious is the contrast with the work next it; Mr. Wyllie's "June 1st, 1902: Peace Proclaimed" (305). How is this illustrated? Not by battleships or any other such demonstration; by a picture of a quiet nook in a summer field, with its grasses and field flowers and hedge, through a slight break in which a glimpse of distant sea is visible. In connexion with the title, this little picture is a real poem.

In Gallery VI. Mr. Nowell's "Colin and Wilfrid Nowell" (341) is a portrait group of two dear little boys, painted in a broad and what may be called rather soft style of execution, so that the figures have the effect of being finished yet without being too hard and precise a texture. Miss Kemp-Welch, in "The Incoming Tide" (356), has tried a new class of subject, sea-water and sea-gulls; so far, it is hardly so effective or so complete in itself as her horse pictures, but it is always interesting to see that an artist who has made a decided success in one particular type of picture is desirous not to remain in a groove. Mr. Phillips Fox's "A Love Story" (372), a life-size picture, in a broad rather flat style, of a girl reclined in a hammock reading, has a distinctly artistic quality.

Was it worth while for so clever a painter as Mr. Byam Shaw to spend so much labour on a humorous rendering of Æsop's fable of the man and his son who carried the ass? (390) There is a great deal of humour in some of the faces, especially in that of the bearer himself, in his fatigue and perplexity; but the whole picture is too like an elaborate joke. In the same gallery Mr. Arthur Meade's "A Windswept Shore" (419) is a good coast scene; and Sir Harry Johnston's "Marabou Storks" (438) shows a very powerful and minute realistic study of one of these birds flying across in the foreground of the picture, with the sky and landscape seen behind.

In Gallery VIII. Mr. Clausen's "The Haymakers" (442) is an effective study of figures seen under a special condition of light. Mr. R. G. Goodman's "Old England's Shore" (474), the chalk cliffs of the South Coast as seen from the sea, is open to the objection that the rippling water is rather mechanically treated, though this effect is perhaps possible under some conditions of wind; but the intended effect has been carefully worked out, and the picture is one of considerable promise.

Gallery IX., the room devoted, as usual, mostly to small pictures, is often passed over with little attention by visitors, though frequenty, as is certainly the case this year, it contains works of no little beauty and interest. Among these are two beautiful pictures by Mr. Arnesby Brown, which exhibit his qualities as a painter better than the larger one in Gallery II.; these are "Between the Showers" (523), a country road scene with figures of children, and "The Pool" (545), a landscape with cattle. Mr. La Thangue's "At a Provençal Spring" (528), *i.e.*, a spring of water, at which a child is filling a vessel, is another good work. Mr. Frank Dicksee exhibits, under the title "One of Our Conquerors" (534), a three-quarter portrait of a remarkably pretty girl. Then there is Miss Fortescue-Brickdale's very fine and unusual picture "Rosamond" (538), a mediæval fancy which plays upon the origin of the name—"rosa mundi"; in the upper and larger portion is a figure of a young woman in a crimson dress, in an interior full of mediæval detail; the lower portion forms a kind of triptych in which the centre compartment represents a funeral procession in the interior of a convent, the two side compartments showing a decorative design of red roses. As with some others of this gifted artist's pictures, it is not easy to define what is the exact thought underlying it; but it is in any case a picture quite out of the common run. Among other works worth notice in the room are Mr. Lionel Smythe's little sketch "On the Cliffs" (576), Miss Rischgitz's still life painting (580) and another good work of the same class by Mr. W. J. Marten (644); Mr. Logsdail's "On the Loggia of the Doge's Palace—Seventeenth Century," a view painted from within the famous arcade, with a single figure in the dress of the assumed period; Mr. Stanhope Forbes' bright picture "The Haycart" (601), a study of open-air effect; Mr. Clausen's "The Village at Night" (607), a real night effect; Mr. Edward Stott's "Echo" (616); Mr. Joseph Clark's little *genre* picture "Left in Charge" (635); and Mr. Fred Hall's "The Duck-pond" (636), in which the principal object of interest is a delightful old tumble-down thatched barn, which forms the background of the scene. Mr. Lybaert's picture, "Life's Frailty" (531) is pretty much a repetition of the type of thing which he has already exhibited for two years in succession; a stiffly-painted figure of rather mediæval type with a background of foliage. His first work exhibited at the Academy attracted a good deal of notice from its extremely minute and careful finish, but it is not a type of picture that will bear constant repetition. Another exhibitor, Mr. Barraud, has made rather a hit, humorous or pathetic according to the light in which we may regard it, by a picture of a young painter in his studio gazing sadly upon his returned picture, the title of the work being "The President and Council Regret." This direct appeal seems to have touched the hearts of the Hanging Committee, since the picture is hung, and it cannot be said to have very high merits in the purely artistic sense.

In Gallery X. Mr. Muat Loudan's painting, with a couple of lines of verse for the title (654), ought perhaps to have been included among the important pictures of the year, for it is a fine and rather remarkable work both in conception and colour. It shows two young women in richly brocaded dresses seated beneath trees, one with a book; with them is grouped a peacock, and behind is a landscape with masses of trees and a fine bit of sky, the whole painted in warm and rich tones and with a kind of texture rather suggesting the effect of tapestry. The key to the intention is supposed to be given in the quoted lines—

> "Alas! that Spring should vanish with the rose,
> That youth's sweet-scented manuscripts should close,"

but in reality this is an artist's study in colour and composition, to which the spectator may give his own meaning. Mr. Goetz's "Vox Humana" (664) has a very serious aim, but it is important rather from its meaning than from its artistic quality. "Wayfarers" (667) a small landscape with sheep, by Mr. Hartley, and "The Parting of the Ways" (668), are both pictures with something to consider in them. A more important work is Mr. Fulleylove's interior of "The Dome of the Rock" (672), the largest architectural painting of his that we have seen; a very carefully executed picture, excellent, as an architectural subject, both in texture and perspective. Mr. R. H. Brock's "A Hot Day" (673) is a bright landscape with horses, which fully expresses its title and has a great deal of merit. A work of more serious meaning is Mrs. Hunter's pathetic picture "The Road-mender" (693), a fine study of a type of humble artisan, and with an effectively treated landscape behind.

In Gallery XI. is a large and fine landscape by Mr. David Farquharson, "Winter" (736), a scene by a lake with a background of snow-clad hills, which occupies not unworthily the central position in the room. Mr. Spenlove's "The Pilot's Funeral, Southwold" (742) is another winter picture with human interest in addition; a serious and rather touching work. "On the Sand-dunes" (757) is one of Mr. Blinks's unsurpassable pictures of sporting dogs; he shows us how the painting of dogs can be made of real artistic interest and power, while another painter in the same gallery shows us how "The Three Graces" (744) can be rendered ludicrous when depicted as three rather plump commonplace nude figures with very short legs. It is not so much the question, *what* is painted, but *how* it is painted, that settles the artistic value and status of a picture.

LETTER FROM PARIS.

THE thirty-first Congress of French architects was held in June at Nantes, with visits to Angers, Mans, and termination of the proceedings at Paris. At the meetings at Nantes, a paper was read by M. Etéve on the life and works of the best known architects of Nantes. A discussion took place concerning the questions of public competitions, and the regional schools of architecture. A vote was passed that the juries of the future schools of architecture should be composed of a majority of the eminent architects belonging to the region in which the school was established. M. Bartaumieux read a paper on the manner of forming and using the official price-book published by the Société Centrale, and the manner of preparing similar price-books for the provinces It was announced that a school of decorative arts would be opened at Nantes, and that a school of architecture would be adjoined. Visits were made to buildings of interest at Nantes, Le Mans, Angers, and Paris, where the proceedings were terminated at the Ecole des Beaux-Arts. M. Charles Lucas read a paper on the life and works of the late M. Achille Hermant, architect, and the various awards made each year by the Société Centrale des Architectes were distributed under the presidency of the Minister of Fine Arts represented by M. Roujon. The medal of honour was awarded to M. Bouchot, architect, of Paris, and a silver medal to M. Fournereau-Yon, of Paris. Silver medals for domestic architecture were awarded to M. Parent, of Paris, M. Bouwens van der Boyen, of Paris, M. Libaudière, of Nantes, and M. Cordonnier, of Lille. The silver medal for archæology was given to M. Charles Nizet, architect, of Paris; for jurisprudence, to M. Harmand, advocate. The medals of the Ecoles de France at Athens and Rome were carried off by M. Durrbach, professor at Toulouse, and M. Benjamin Chaussemiche, architect, at Paris. M. Brunet and M. Nodet, both architects at Paris, received the grand medal for their studies of French monuments, and a large number of awards were made to pupils of the various schools of architecture and decorative art, and to other persons connected with architecture and building.

A new large pavilion has been added to those existing on either side of the Hôtel des Invalides. This new building, which has been carried out by the "génie militaire," is exactly similar in its lines of architecture to the older pavilions erected in the seventeenth century in the garden of the Governors, and will contain the services of the central pharmacy of the Army, which will be transferred there from its present quarters on the Quai d'Orsay.

M. Buquet, the architect to the Chambre des Deputés at Paris, is now completing a large model of the enlargements and improvements he contemplates making to the Salle des Séances at the Palais Bourbon. The new parliament hall will contain 622 seats instead of the present inferior number, the number of entrances will be increased, and two stories of galleries for the public will surround a portion of the auditorium. The three large wall-panels which will occupy the side behind the president's seat, will be decorated with paintings, and it is proposed to ask MM. Bonnat, Jean Paul Laurens, and Cormon to design compositions to fill these.

M. Bouvard, Directeur des Services d'Architecture de la Ville de Paris, has terminated his scheme for the setting out of the immense surface of vacant ground on the Champ de Mars. About 300 ft. on either side facing the Avenue de la Bourdonnais and the Avenue de Suffren, will be allotted for building purposes. There will be no restriction as to the style of architecture to be adopted for the future houses, but the buildings will all have to be of a uniform height, and a certain space must be left for gardens enclosed by railings in front of each façade. Ten streets, five on each side, will form the communication between these houses and the two exterior avenues, and in the centre, reaching from the Pont d'Iéna to the Ecole Militaire, a wide avenue decorated by gardens, statues, and fountains will be formed. The Pont d'Iéna will be widened, and the

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river quays will be decorated in the style of those opposite the Cours la Reine.

The Compagnie des Omnibus has submitted to the Prefet a scheme for the transformation of thirty lines of tramways at Paris into electric traction lines on the trolley system. The scheme and the required legal notices to the public advertised during a month in all the Mairies of the districts of Paris were apparently kept very quiet, for the general public seems to have been almost ignorant of the proposed transformation until a few days before the expiration of the legal limit on June 26, when the matter was taken up by one of the principal newspapers, and attention drawn to the proposed adoption of the trolley system and the consequent disfigurement of most of the charming avenues of Paris. The alarm being raised, the public was enabled during the last few days to organise protests against the scheme, and it is now probable that the whole matter will fall through.

The inauguration of the monument to Charles Garnier was not merely an official celebration but a kind of family fête. Carpeaux' bust, which recalls so well the *spirituel* features of Garnier, seemed to smile down upon a collection of old friends, old pupils, all those who had known Garnier, assembled together to do honour to his memory. Mme. Garnier, the widow of the eminent architect, occupied a seat on the right of the Minister. M. Alfred Normand spoke on behalf of the Subscription Committee; or rather, his discourse was read by his son, M. Charles Normand, to whom succeeded M. Moyaux, speaking in the name of the Société Centrale. M. Pascal then gave a sketch of the history of the carrying out of the Opera House, in which he had been a collaborator; and M. Larroument followed on behalf of the Académie des Beaux-Arts, speaking of the works of the deceased artist, and expressing a hope that the municipality would give his name to some street near the Opera House, and not exile him to the site of an ancient prison for criminals "qui n'eurent jamais, avec Charles Garnier, rien de commun." Finally, the Minister of Fine Arts saluted, in the name of the Government, the name and memory of an artist who was, he said, one of the glories of France.

Simultaneously with the ceremony at the monument, an exhibition was opened in the Rotunda of the Opera House, containing numerous portraits of Garnier, autographs, caricatures and water-colours by the late architect. There were also models of his principal works, including the observatory at Nice, the theatre at Monte Carlo, the Villa Bisshoffsheim, and his own villa at Bordighera.

The prolongation of the underground railway from L'Etoile to the Trocadéro is being proceeded with. A provisional terminus will be made there, and the commencement of another line of some importance, as it will form the circle railway of the left bank. Its construction presents a good many material difficulties, though there is no reason why it should not be completed by the end of 1905. This intended line, after having crossed the Seine at Passy on a two-story viaduct (estimated to cost 7,000,000 fr.), will gain the Rue de Vaugirard (still in the open), and will then be prolonged by a tunnel to the valley of the Bièvre. It is here that the principal difficulties will be encountered, from the quarries, the catacombs, and the canals taking the water of the Vannes to the Montsouris reservoirs. After emerging from this tunnel portion, the line will be continued on a viaduct to the Place d'Italie. A last viaduct, starting from this point, will cross the Orléans railway station and the Seine, and will eventually join the right-bank circular railway at the Place de la Bastille.

M. Guillaume, the Director of the Ecole de Rome, has at last completed the statue of Thiers which the Government commissioned from him years ago. The former President of the Republic is represented standing by the Tribune. The statue, in white marble, is on a pedestal of grey marble decorated, at the angles, with figures representing History and Eloquence. It is not known yet where the monument will be placed; unless room is found for it in what seems its proper place, the Chamber of Deputies.

M. Sandier, the Art Director at Sèvres, has completed the model to ½-in. scale for the tower, of which we have spoken before, which it is proposed to raise on the heights of St. Cloud, where there formerly stood the so-called "Lantern of Diogenes," destroyed in the war of 1870. The tower is to form a kind of illustration of the progress made in the art-work carried on at Sèvres. The theme of the decorative treatment is the forest, its legend and its fauna and flora. The colour effect is to be of a clear and bright description; white porcelain, turquoise blue, rose, coral, and emerald green. It will be composed of 30,000 pieces of ceramic ware, which will take five years to prepare. It is hoped that the necessary vote of funds by Parliament will admit of the work being commenced in the early part of next year.

M. Albert Besnard has been appointed by the Government to execute the ceiling decoration of the new Salle de Spectacle of the Théâtre Français.

The Minister of Public Works has inaugurated the new thermal establishment at Vichy, comprising the Casino, theatre, and trink-hall. The Minister warmly complimented the architect M. Charles Le Coeur, and awarded the "palmes academiques" to MM. Seguin, sculptor; Rudniki, decorator; and Simon, Woog, and Gaudron, inspectors and clerk of the works.

At the last meeting the Académie des Beaux-Arts awarded the Prix Deschaumes, of the value of 20*l.* to M. Patrice Bonnet, pupil of M. Esquié.

M. Quentin-Bauchart is terminating an important report concerning the reorganisation of the service of the Beaux-Arts de la Ville de Paris. He is adding to this report an interesting history of the service of Fine Arts and the Town Museums, necessitating much research, for a large proportion of the documents concerning this service was destroyed during the Commune in 1871. M. Bauchart proposes an innovation consisting in the creation of a Direction des Beaux-Arts, with a director having the title of Inspecteur-en-Chef, and two collaborators entitled Inspecteur and Inspecteur Adjoint.

The thirteenth annual competition in decorative composition organised by the Société d'Encouragement à l'Art et à l'Industrie, has just been decided at the École des Beaux-Arts by the jury presided over by M. Roty, the well-known artist in medals. The first prize of 20*l.* was awarded to M. Fournier des Corats, modeller, pupil of the École des Arts Decoratifs, at Paris.

By decree of the Ministre de l'Instruction Publique on the proposal of M. Roujon, Directeur des Beaux-Arts, M. Emile Bertone, architect, Inspector of Museums and member of the jury of the École des Beaux-Arts, is to be sent on a mission to England for the purpose of studying the Palmyrian fragments exhibited at the British Museum.

By decree of June 15, M. Gustave Rives, the well-known architect of the French Touring Club, has been nominated member of the commission formed by the Minister of the Interior to study the question relating to the circulation of motor-cars.

Amongst the proposals made to the Prefecture for the utilisation of the ground left vacant by the old Cirque des Champs Elysées may be mentioned that made by MM. Loviot and Cassien-Bernard, two well-known architects, to erect a concert-hall to hold 1,500 persons, with annexes for a buffet and a postage-stamp exchange. Another scheme submitted by MM. Remy-Duhart and Duncan-Wagner, is for the construction of a Palais des Sports.

The Paris Municipal Council has decided to enlarge the Boucicaut Hospital by adding a number of isolated pavilions.

The death is announced, at the age of forty-six, of the painter Georges Callot. He was a pupil of the Ecole des Arts Decoratifs and of the Ecole des Beaux-Arts, and since 1877 exhibited regularly at the Salon, where he obtained a third medal in 1882 and a second medal in 1888, and a gold medal and the Legion of Honour in the Exhibition of 1900. He was an artist of most delicate and refined talent. He was a member of the New Salon from its commencement, where he exhibited some nude studies of powerful and individual style; but for the last ten years he had turned his attention more especially to portrait painting, especially in pastel, in which he had gained a well-deserved reputation. The Municipality of Paris commissioned from him, for the Salon des Lettres at the Hôtel de Ville, a decorative panel symbolising Philosophy. He executed important decorative paintings also at Arras and Oloron, and also in various private houses in Paris. Various provincial and foreign art museums possess examples of his work.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

HARROW-ON-THE-HILL.

HARROW-ON-THE-HILL was the scene of the second summer visit on Saturday, June 27, when a body of some eighty members were conducted to the parish church, to the numerous buildings which comprise the great public school, and finally to a small modern house and garden. Brilliant weather added to the success of the outing.

Mr. Arnold Mitchell received the party, and first drew attention to the more important features of the Church of St. Mary, with its well-known lead-covered spire. Examples of the various phases of English Gothic building were pointed out, and not the least interesting reference was to the incident leading to the discovery of some fine thirteenth-century lancets in the south aisle of the chancel during the early progress of a proposed addition to this part of the church, a work consequently abandoned. The Norman font and fifteenth-century open timber roofs attracted much notice. We published a historical description of the church, together with some sketches, on January 26, 1895. Of the modern work, the delicate chancel fittings by Mr. Aston Webb were admired, and more especially his remodelling of the beautiful seventeenth-century pulpit.

At this stage of the proceedings the members were taken, under the guidance of Mr. B. P. Lascelles, librarian to the school, to the red brick buildings forming the early part of the famous institution. In the west wing is located the original room built in 1612 by John Lyon, the founder, and presently known as the "old fourth form room"; the early arrangement of the benches and desks for masters and pupils still remains, and also the wall panelling of a later date, which has been completely covered with names carved by the pupils of many generations; the handiwork of Byron, Sheridan, Peel, and others excited much curiosity. From 1612 to 1820 the whole of the work of the school was carried on in this room until, at the latter date, the addition, containing the old speech room and forming the east wing, was made, with large stone oriel windows amongst other features; this oriel proved to be a sore temptation to the Governors, for it was repeated, without any acquisition of floor space, in Lyon's original structure, and again quite recently, and also without practical purpose, in the new art school, and is evidently considered a "pretty" feature.

The present speech room, a brick and stone Gothic building erected from designs by the late W. Burges, was next visited; the sloping nature of the site appears to have determined the type of plan—a theatre—so well adapted to its purpose. The accommodation is large enough to seat the six hundred boys, besides a considerable number of parents and friends, and is arranged in tiers semi-circular in plan, whilst the stage is built on the east side, and provided with a large organ. The interior was intended to be covered with frescoes, but the boarded panelled ceiling and wooden groined vaulting are left untouched. Here, as in most buildings upon the hill which stands on the London clay formation, great precautions have been taken in the large concrete foundations to prevent sliding movement.

At the Art School, built in recent years from Mr. C. J. Marshall's design, the party of members was received by Mr. Hine, the art master, who described the structure and its uses, and added some remarks upon the lighting of studios. This building is intended for the efficient teaching of the fine arts at one of the greatest English educational establishments, and although fulfilling some minor requirements, it falls far short of being a successful work in the purpose of its erection. This is chiefly due to the style selected being similar to that employed by the founder, plus the "Gothic Revival" oriel window already referred to. Art teaching is, of all things, modern, and in sacrificing utility to tradition, Harrow cannot be congratulated upon the result; surely there was a lesson at hand, for did not John Lyon build honestly and according to his necessities?

Mr. Lascelles continued his valuable descriptions of the respective buildings, calling attention at the same time to a success here and a defect there in the practical working of the departments. At the Music School reference was made to the troublesome question of acoustics in the Central Hall, and to the

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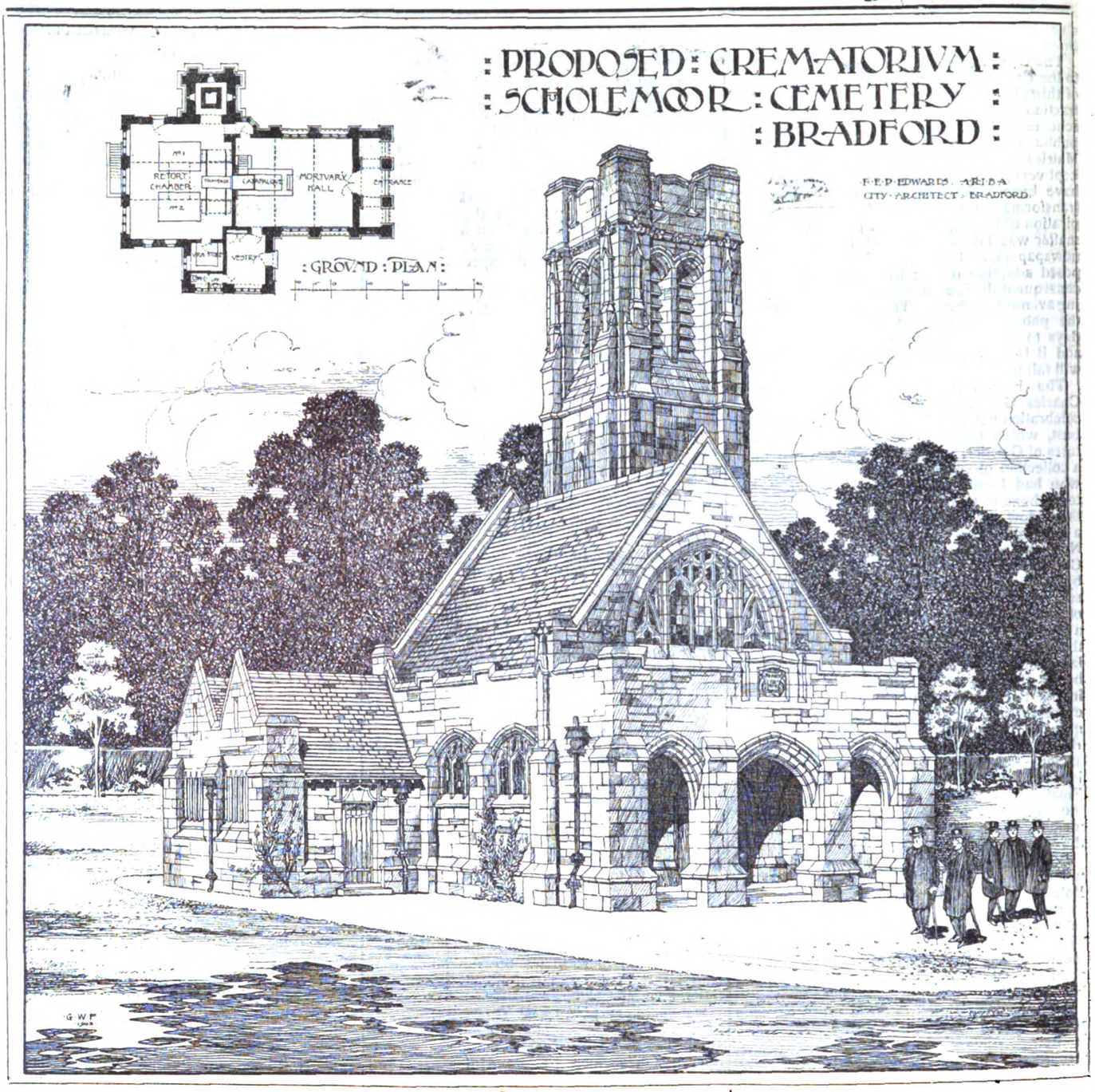

methods employed by the Governors to arrest the echo. Designed by Mr. E. S. Prior, this is a most pleasing work in red brickwork, with large tiled roofs, and, while possessing quite a modern character, is thoughtful and refined, and worthily takes its place with the more important buildings of the school. Roughly speaking, the plan consists of a large central hall, used for concerts or examinations, upon either side of which are placed two floors of practising-rooms. We published a view, together with a plan and description, of this work in our issue of October 25, 1890.

A hurried inspection was afterwards made of the Butler Museum, a three-storied brick structure, the work of Mr. Basil Champneys; the museum is placed in the top floor, whilst the remaining stories contain classrooms, and all are approached by an external open staircase. This is also an admirable piece of modern design, and a practical working building, but, in placing the museum high up, certain facilities for repairs, hoisting and storing cases, appear to have been overlooked.

Going to the Vaughan Library—an ornate Gothic work, built with a perfect medley of materials by the late Sir Gilbert Scott, and containing 12,000 volumes—the school chapel and the head-master's garden were passed. The former, also by Scott, is in a kind of French Gothic style, and is now receiving some additions by Mr. Aston Webb as a memorial to the old boys who fell in the late war. Besides new porches, these additions are in the nature of north and south transepts to the choir, and cannot be said to be successful in the effect seen from the terraced garden below; the spectator feels that aisles would have been more satisfactory.

The visitor to Harrow will not fail to observe that the nineteenth century Gothic revival has gained a large hold upon the architectural features of the place, and that too much effort has been made to "harmonise" the modern buildings with the old, and it was therefore with some relief that the large party of members turned to inspect "The Orchard," a house recently built by Mr. Arnold Mitchell for his own residence. In the recent rapid development of Harrow, the owner was fortunate in securing a small triangular plot upon which he has erected a charming and essentially modern house and garden. It is not too much to say that the architect has made use of every square inch of the site, even the old boundary wall on the road side has been utilised as an external wall to the offices which are placed in the back part of the house. Perhaps the feature of the dwelling is the *en suite* arrangement of the drawing and dining rooms which extend to the full length of the house, and afford a most pleasing vista through the open double folding doors which separate the two rooms. The space at our disposal will not permit of a detailed description of the interior, upon which the closest care and thought have been bestowed with a completely successful result. Simplicity is the dominant note of the exterior, the roofs are covered with a heavy Yorkshire stone slate of a deep colour and the first-floor story hung with the same material; the colour effect is satisfactory, but the large courses quite disturb the scale of the fronts, which has been consistent throughout the other parts of the work; moreover, the use of this material in Middlesex, in conjunction with the brickwork of the ground floor and the chimneys, appears to be in the nature of affectation. Tea was kindly provided for the guests by Mr. Mitchell in the garden, which is laid out in a formal manner, with terraces and walks arranged according to the sloping and irregular form of the site; this concluded a thoroughly enjoyable and interesting excursion.

PROPOSED CREMATORIUM, BRADFORD.

THE plans for this have been already adopted, and the building will be erected by the Corporation in the unconsecrated portion of Scholemoor Cemetery, and will consist of a mortuary chapel containing a catafalque, and suitable for the accommodation of mourners and the holding of funeral services.

The entrance is through an open narthex, and a vestry or waiting-room is provided adjoining the chapel. The retort chamber is placed at the rear, and is covered with a lead flat having a central lantern for light and ventilation. Space is provided for furnaces in duplicate, only one of which will, however, be erected to begin with. The gases from the retorts will be conducted by the main flue in basement to the upcast shaft constructed within the tower.

The type of furnace to be adopted is not yet definitely decided upon, and inquiries are now being made as to the form of retort from

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which the best results have been obtained, both in this country and in America.

The materials will be local wallstones with ashlar dressings, plastered on the inside. The roofs will be of open timber, and covered with Westmoreland slates. The estimated cost is 5,000*l*.

The architect is Mr. F. E. P. Edwards, the City Architect of Bradford.

ENGINE FOUNDATIONS.

IN reference to our Note recently on "Engine Foundations" (see *Builder* of June 20, p. 629), a correspondent, an architect, asks for answers to the following questions:—

1. The names of buildings in which experience has been gained of the advantage of placing engines upon brick foundations?

2. In what respect does the weight of the engine govern the foundation to be used?

3. In the case of a large block forming engine foundations, how is the bottom to be dome shaped, and what rise should be given in the centre, say, of a block 84 ft. wide and 100 ft. long?

4. Could you inform me how you have ascertained that there is a tendency for concrete to sink in the centre when filled in to a broad and deep foundation?

5. What treatment of the earth is adopted to enable asphalt to be laid before the concreting starts on the dome-shaped bottom recommended?

The following are our answers to the questions asked, which may be of interest to others besides our correspondent:—

1. There are no buildings where definite investigation has been made for the purpose of determining the relative merits of brick and concrete for engine foundations, but there are plenty of places where each kind of foundation is to be seen for the formation of independent opinion. Concrete is extensively adopted in the present day, especially for large engines in power stations. Opinion is by no means unanimous as to the preference for brick suggested in our "Note," but some engineers are decidedly in favour of that material. Our correspondent would probably be interested in a paper by Mr. J. Young, read last year before the Scottish Association of Municipal Engineers and Surveyors, in which the claims of brick are fully discussed. In this connexion it may be mentioned that while the modulus of elasticity of well-made brick should be a fairly constant quantity, that of concrete is very uncertain, and is high or low according to the proportions adopted and the care exercised by the workmen employed. Moreover, the type of engine to be fixed must always be borne in mind, as the adoption of concrete may sometimes be indicated by the design and construction of the engine.

2. The weight of the engine necessarily governs the weight of the foundation, as stability cannot be ensured unless the foundation be of adequate weight. It is also necessary to provide a foundation with the mass requisite for absorbing the vibrations due to the rapidly moving parts of a heavy machine.

3. It was not suggested in our previous "Note" that a dome-shaped surface should be given to a large area, upon which several large engine foundations, consisting of isolated piers, might be built. That would obviously be unnecessary, as the stability of a large and comparatively thin concrete slab would not be appreciably affected by slight convexity of the under side. The safeguard mentioned merely applied to foundations in a single block formed entirely of concrete, its intention being to add to the stability of a comparatively small and relatively high block by ensuring for it a perfectly level bottom.

4. When concrete is deposited on compressible soil it naturally tends to sink towards the middle, although the upper surface, being finished level, will not afford any evidence of the depression underneath. The most probable explanation is that part of its weight at the outer edges is carried by adjoining soil upon which no load is directly placed, but to which pressure is communicated proportionately to the natural angle of repose, while the earth under the middle part receives no such outside aid. Consideration may also be given to the laws which govern the deflection of beams and create the tendency exhibited by a concrete floor, or a sheet of flexible material held all round its edges, to sag in the middle.

5. Asphalt or bitumen sheeting, such as is employed in connexion with the construction of reservoirs and similar works, can be laid on any soil that has been properly dressed. The sheets are joined by passing a heated tool over the jointing width, and the surfaces are pressed together until they are thoroughly jointed. In large areas, care must be taken to stretch the material before the joints are made, so as to prevent unevenness. Judging from the dimensions of the building mentioned by our correspondent, we think it probable that engines of considerable size are in contemplation. The construction of the basement floor, and of the independent piers or foundations for supporting the machinery, will consequently require the most careful consideration, and the matter is certainly one upon which our correspondent will do well to invite the co-operation of a civil engineer.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

THE annual meeting of the members of this Association was held at the Town Hall, Kensington, on Thursday, Friday, and Saturday, June 25, 26, and 27.

Bacterial Treatment of London Sewage.

In continuation of our report, Professor Frank Clowes, D.Sc. (Lond.), F.I.C., contributed a paper on the "Experimental Bacterial Treatment of London Sewage." After a description of previous methods adopted in the treatment of the sewage of London, and a general history of experimental bacterial treatment, Professor Clowes said the London County Council commenced its experimental bacterial treatment in May, 1892, under the advice and superintendence of his predecessor. These early trials, on a small scale, were eminently successful, and they led to the construction of an acre coke-bed at Beckton in 1893. This bed was still in operation, treating intermittently the effluent for the settling channels. The effluent which was discharged from this bed showed an average purification of over 90 per cent., as compared with the original sewage, the purification being measured by determination of the amounts of putrescible organic matter present as measured by the oxygen which this matter takes from permanganate. This experimental work came under his direction in September, 1898, and he had to acknowledge the very effective carrying out of the experimental work by the assistant chemists at the outfalls (Messrs. J. W. H. Biggs and E. B. Pike), and the co-operation of the superintendents (Messrs. Beal & Stokoe). Experimental brick and iron tanks, of smaller dimensions, for the reception of fragments of coke and other materials, were at once brought into use, and it was decided to settle, amongst other questions: (1) What appeared to be the most suitable material; (2) whether there was any limit of depth of bed; (3) whether crude, unsettled sewage could be treated; (4) what were the advantages of preliminary sedimentation; (5) whether the effluent was aërated and permanently non-putrescible; (6) what was the permanency of the purification and of the beds; and (7) whether intermittent treatment was the most suitable means to be adopted. The general results were as follows:—Material for Forming Bed.—It appeared that hard coke gave a somewhat higher degree of purification than any other material. It was used in fragments of about the size of a walnut. Depth of Bed.—The depth of a particular bed was gradually increased from 4 ft. to nearly 12 ft., and the purification effected was carefully measured. It was found that a somewhat better purification was obtained as greater depths were reached. It was evident that there was no advantage in limiting the depth of the bed, and this was of great importance where land was expensive. Further, it was found that even the 12-ft. bed became readily aërated in the resting intervals between the fillings. Treatment of Crude Sewage.—For some time the beds were supplied with unsedimented sewage, and were found to yield a satisfactory effluent. But the capacity of the beds rapidly diminished during this period, and on examination the coke was found to be coated with grit from roadway wear and tear, and with chaffy matter derived mainly from horse dung. The treatment of crude sewage was therefore stopped, not because it ceased to be purified, but because the capacity of the beds became seriously reduced. Treatment of Sedimented Sewage.—In later experiments the sewage was passed through a settling tank of such capacity that its passage through the tank required five hours. The inflow and outflow pipes dipped below the surface of the contents of the tank, so as to secure non-disturbance of its surface. The settlement of the sewage which took place in this tank prevented altogether the choking of the coke-beds. It was found that the uncovered settling tank formed a scum upon its surface which, when unbroken by wind or rain, often attained considerable toughness and thickness. This covering of scum had some advantages, but was by no means necessary. Arrangements were made for measuring accurately the suspended matter which passed into this tank in the sewage, and the amount which remained at the bottom of the tank after six months' working. It was found that an average of about 50 per cent. of the sediment had been resolved by bacterial action into the gaseous and liquid state. This was an important reduction in the amount of the sludge, and the decrease would be undoubtedly larger still if grit and mineral matter had been prevented from entering the settling-tank by the passage of the sewage through preliminary grit-chambers. Condition of the Effluent.—The effluent flowing from the coke-beds was found to contain and to retain dissolved oxygen. This was proved by chemical examination, and by the fact that fish lived in it for long periods. The effluent was also examined by exposing it in an incubator for many days to a summer temperature (80 deg. Fahr.); it was found to remain inoffensive under this severe test. Permanence of the Material and of the Purifying Power of the Beds.—The hard coke used in some of the small experimental beds had been in use for four years, and appeared to be still in every way suitable for use. The purifying power of a bed seemed to rather increase than to diminish with the age of the bed, provided the bed was worked in a rational and proper manner. The Advantage of Intermittent Over-Continuous Treatment.—The method of using the beds had usually been known as intermittent. When they had been fully worked they had received four fillings in the twenty-four hours; this meant that the bed had been filled with settled sewage in about an hour, the sewage had remained in the bed for two hours, it had then been allowed to flow away from below and empty the bed in about an hour, the bed had then been left full of air, or "resting," for about two hours. The above cycle was repeated three times in the twenty-four hours. The results obtained in this way were compared as regards the degree of purification effected, and the amount of sewage disposed of in the twenty-four hours, with the method of continuous feed, in which the sewage never filled the bed, but continually entered at the top and flowed away from below. It was found that when a corresponding degree of purification was effected the amount of sewage dealt with by continuous feeding was considerably less than that dealt with by intermittent feeding. It was concluded, from the experience obtained from these experiments, that, provided a settling-tank and coke-bed bacterial plant was properly constructed and properly worked, a very uniform and satisfactory purification of the sewage was effected, and a very large proportion of the suspended matter was disposed of; and, further, that the process was one which required little cost in maintenance. A purely domestic sewage, when treated by these processes, was found to yield no sludge, and the process was found to dispose, to a great extent, of the bacteria, since the effluent contained only a small percentage of the number originally present in the sewage.

Professor H. Robinson, Westminster, said if members of the Association were to take the trouble to refer to the third report of the London County Council they would find the conclusions published there were absolutely at variance with each other. They might take it as a general statement, borne out by the report, that whereas one claimed that the contact bed was absolutely successful, the other pointed out that the effluent from the contact beds they were utilising was little less than crude sewage, slightly diluted. There was such a difference between the two experts that he hoped an explanation could and would be given. He was speaking in the presence of many who were interested like himself in the sewage question, and he said the literature they had had thrown upon them in the last two years,

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instead of assisting them, had caused embarrassment and confusion almost incredible. He was of opinion that the contact method as it stood was not the method which would be in use many years longer. The object of these observations was to remove some of their difficulties and clear away that annoyance which they felt when they read official documents of conflicting opinions. He did not intend to refer to the Royal Commission's report, as that matter was *sub judice;* but he took part in a discussion some few months ago, and he hoped what he said then would have the effect that the Royal Commissions would devote some of their time to giving practical conclusions, instead of publishing Blue-books of no practical results whatever.

Mr. Cooper, Wimbledon, expressed surprise at Dr. Clowes advocating an increase in the depth of filtering beds. When one got careful analyses taken from the different parts of beds, as was done by the Massachusetts State Board, they would find that a great part of the work was done at the surface. With the bed at Barking the water was only allowed to come within a few inches of the surface. So there was no surface work done there at all. If these experiments were made in a bed in which the water was not allowed to rise to the surface, he did not wonder at Dr. Clowes coming to the conclusion that if he deepened his bed he would get an equivalent for every foot of depth. To his mind that was a totally erroneous view to take. What was the use of the various systems which had been devised for distributing the sewage over the area of the beds in the form of a spray? It was because the sewage was aërated before it went on to the beds, and so they got a maximum of work done. At the surface they had the sun, the wind, and the air all helping them in treating their sewage. That was why they ought to take every advantage of bringing their sewage into contact with the surface.

Mr. E. J. Silcock, Leeds, said that Dr. Clowes' experience that coke was the best material and gave a degree of purification in excess of that obtained by any other material, was not the universal experience. Other materials had been tried in other places, and the degree of purification had been quite as good as obtained from coke, and they knew there were very great drawbacks in the use of coke, because it broke down and became small in size with age. The next point was with regard to contact beds *versus* continuous filtration. Dr. Clowes had not been good enough to give them any evidence on which he based his conclusion that contact beds were better than continuous filters, and to convince them he would have to give them some evidence on that subject. Contact beds did undoubtedly lose capacity. Those who had had any experience with contact beds would know that even with a septic tank of greater capacity than that mentioned by the author—five hours sewage capacity—there was a certain amount of material going into the beds which, after being acted upon, became inert, and remained and choked the capacity of the beds. The object of the continuous filter was this, that by having the material of a very much larger size than the contact beds this material was washed through the filter, which did not lose its capacity, but went on purifying the sewage without depreciating in value. That was the strong point in favour of the continuous *versus* the contact system; and the result of the experiments which had been carried out, proved up to the hilt that a proper degree of purification could be obtained by continuous filtration, and if that could be done without loss of capacity it seemed to him to "knock on the head altogether" the contact system.

Mr. A. Creer, York, said he had been experimenting for three years with filters of one kind or another. First of all, he put down an ordinary septic tank, with filter beds. These were not as satisfactory as they might have wished. He then tried contact beds, and his experience of contact beds was that they were very satisfactory. The only objection he had was that for the area covered he could only get such a small number of gallons per twenty-four hours through them. He then tried the continuous filter with a radiating distributor, and that had been at work three years, giving excellent results. With regard to the point raised by Mr. Silcock as to the disintegration of the material, about twelve or fifteen months ago, when the filter was off for the construction of a grit tank, he took the opportunity of opening it out, and he found at the bottom of the filter an accumulation of about 6 in. of fine black ash.

Mr. Watson, Birmingham, was rather surprised at Dr. Clowes' statement that the treatment was able to produce an effluent which by chemical examination was found to be practically non-putrefactive and able to sustain fish life. He was rather surprised at this, as he had under his charge about four acres of beds constructed very much as these beds were. They were filled, for the most part with coke, and he found that the result of treating the raw sewage was something like 50 per cent. of purification. By being careful of the quality of the sewage put on those beds they could obtain something like 60 per cent. of purification, but that 60 per cent. did not yield a non-putrefactive effluent. It might yield an effluent which was perfectly good enough for a tidal river like the Thames at Barking or Crossness, but it would not be good enough for a sewage filtrate passing into a stream like the river Tame, at Birmingham.

The Scott-Moncrieff System.

Mr. W. D. Scott-Moncrieff then presented a paper relating to the system associated with his name. He said that in a purely natural process there were only two lines upon which original research could move—the one being an investigation of the facts, and the other a development of means for applying them. Where the discovery was novel, the facts few, and the means of utilising them comparatively simple, the labours of one man might be associated with them, and the system or method might be called by his name. When, however, his discoveries involved the invocation of natural forces that required the labour of many lifetimes to elucidate, he would be a bold man, indeed, who could speak of his process or system in such a connexion. It was a sufficient source of satisfaction to know that the first report upon his early experiments was the first literature on the subject of the bacterial treatment of sewage upon the lines that were now generally accepted as final. Müller had anticipated him in the suggestion of utilising what he spoke of as "yeast-like organisms" for the purification of sewage, and Mouras had developed what was now spoken of as hydrolysis in a resolving tank or chamber, but neither of them had looked upon this process as only preliminary to nitrification under wholly different conditions. On the other hand, Warrington and the Massachusetts Board of Health had both overlooked the importance of the anaerobic fermentation as an almost essential factor in the natural sequence of mineralisation, while Adeney did not suggest that the process of nitrification could be carried out unaided by chemicals of any kind. The name of the author might possibly be associated with this sequence of anaerobic followed by aerobic fermentation, but even if he were to lay claim to such a discovery his individual labours were trifling compared with the work of others who had made innumerable contributions to the subject in many different directions. One peculiarity of the sewage problem had been that its solution had been the pressing need of modern civilisation, and the scale upon which it had to be carried out had made the discoveries of the laboratory comparatively unimportant unless means could be devised for applying them to vast volumes of sewage. The consequence of this had been that millions of money had been spent upon schemes that were defective in principle at the outset, because there was no available knowledge as to how the theory and practice of bacterially treated sewage could be successfully combined so as to cope with the cases of great urban or even of small village communities. Speaking for himself, the author could only say that years passed between his first experiments and the time when he last began to grasp the main features of the problem, and even when he had done so, and was able to establish his position by absolute proofs, the mechanical difficulties that confronted him appeared almost insuperable. What the author thought he had some good reason to complain of was that for several years he had been arguing the necessity for more scientific methods, and that he had neither support or encouragement of any kind, while all the time great sums of money were being spent upon professional advice which was often worse than valueless. The most successful detritus tank known to him was not designed as a detritus chamber at all, but as a tank for the deposition of sludge from chemically-treated sewage. By ceasing to use chemicals of any kind, it became a detritus chamber, in which, on account of its great dimensions, anaerobic fermentation went on naturally before the sewage passed to the resolving tanks, which were also designed for chemically treated sewage. The hydrolysis in this case was so complete that at the end of two years there had been practically no deposit in the resolving tanks of any kind. They were to be seen at the Birmingham sewage works, and no doubt the engineer, Mr. Watson, would be pleased to give them all particulars. Coming now to the question of aerobic filtration, the author found himself upon different ground. The oxidising of organic nitrogen in solution into inorganic nitrogen was a more difficult process than the changes which were produced by anaerobic fermentation in a tank. The author maintained that wherever the percentage of oxidised to unoxidised nitrogen in an effluent was as high as the water of the Thames above the intake of the water companies they were safe in ignoring all other conditions, and that where such a ratio existed other substances, such as ammonia and albumenoid ammonia might be safely disregarded, because when the ratio referred to was sufficiently high they would be rapidly oxidised by the available oxygen in the effluent. The knowledge which was absolutely necessary in order to the successful design of bacterial plant for the purification of any particular sewage was as follows:—1. It is necessary to know the best period during which the anaerobic or putrefactive fermentation should be carried on. It is upon this information alone that the proper dimensions of the tanks for any particular sewage can be stated with confidence, and ignorance of this important factor makes the dimensions of the tanks a mere question of guesswork. 2. The necessary quantity of air must be known which is necessary when favourable bacterial conditions are present, in order to oxidise the organic matter, or, in other words, to take full advantage of the life processes of the organisms which are available. 3. When the proper period of anaerobic fermentation and the proper quantity of air have been ascertained, it is necessary to know the proper depth of filter, because, as in the case of the resolving tanks so in that of the filters, ignorance is productive of nothing but speculation. It may often happen that twice the necessary amount of filtration may be provided for because of an insufficient air supply; or in other words, that half the capacity may be sufficient when the optimum air supply is available. 4. The optimum quantity of liquid for each discharge must be ascertained. 5. The proper period of rest between each discharge, in order to prevent the deterioration of the filters by gelatinous growths, must be found by actual experiment.

Mr. Watson, Birmingham, said he could not but think that Mr. Scott-Moncrieff was now opening up a system whereby they would be able to draw upon each other very much more intelligently than they had in the past. He knew some people said they produced a certain effluent of a certain quality, and they were very proud of it. They might be very proud of it, but they did not hear from them the constituents of the sewage as it came on the beds, or how it had been treated, whether expensively or inexpensively. As a matter of fact, they did not know what their neighbours were doing, because they did not have the proper means of comparison. For instance, take the Manchester sewage. They were told that at Manchester they were able to purify efficiently and to produce a non-putrefactive effluent with little more than one contact after the sewage had been treated in the open septic tank, but they did not all understand that the sewage, as it came on to the Manchester works, was a very mild sewage. The average oxygen absorbed in four hours was equal to 9 parts per 100,000. In the case of the sewage he had to deal with at Birmingham the oxygen absorbed in four hours was 18 to 19 parts per 100,000. They could not be expected to get as good an effluent as Manchester, and certainly it could not be done at the same cost. Therefore, if they had a system such as Mr. Scott-Moncrieff had illustrated in his paper, they would be able to understand much more readily what they were doing. They would be able to have the rate of discharge, the intervals of feeding, the cubic feet of air per hour, and the depth of filter to bring about a certain result. While he could not agree with Mr. Scott-Moncrieff altogether,

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for he foresaw some practical difficulty in the way of dealing with all sewages in this manner, yet he agreed with him in the main. He did not quite agree with him when he said that a sewage which required a greater depth than 6 ft. was past praying for. He thought the better way would be to have more than one bed, and it might be found that to have two beds of medium depth which would admit air freely would be better than one of greater depth.

The President (Mr. Weaver) said he was voicing the views of the members when he expressed the thanks of the Association to Mr. Scott-Moncrieff for the paper which he had prepared and placed before them. It was very kind of a gentleman outside their own ranks to prepare a paper to show how they could do by a scientific formula what they now did by rule of thumb.

A vote of thanks having been unanimously passed,

Mr. Scott-Moncrieff said he was afraid that the paper was something like certain music that was spoken of as the music of the future. But this question of sewage treatment had gone on sufficiently long in a muddle-along fashion, and the sooner all of them sat down, either to study this paper very carefully or to devise some other method of putting it on a more scientific footing, the better for all concerned.

Tree Planting.

Mr. Francis Smythe, Finchley, said the planting of trees in streets and public places was now receiving the attention of local authorities it deserved, and had during late years made such progress that the up-to-date municipal engineer must necessarily add arboriculture to the many subjects of which he must make himself proficient. Trees had a greater effect upon the health of human beings than most people had any idea. Although the inhabitants of a well-governed town lived under much superior sanitary conditions than those generally in rural districts, the normal death rate of towns, as a rule, rises in proportion to the density of its population, and generally exceeds that of the country districts, carbonic acid gas being one of the elements which contribute to the cause. While in the air of rural districts there was but a trace, in some towns it existed to the extent of as much as ·050 per cent. He need hardly point out that this gas, even in the smallest quantity, was inimical to human life, and every means adopted with a view to its elimination from the atmosphere must have the effect of increasing the health of a population. Carbon combined with water formed the greatest proportion of the constituents of plant life, and as carbon could only be assimilated by plants in a soluble form carbonic acid gas was absorbed by them in considerable quantities, not only by means of their roots, but to a much greater extent by the pores of their leaves. In the process of assimilation, the carbonic acid gas was decomposed by the action of light, the carbon was retained, and oxygen, which was conducive to health, was thrown off. Although at night a reverse action takes place, the leaves excluding the carbonic acid gas absorbed by the roots, the amount of gas thrown off at night had but a very small ratio to the amount of oxygen excluded during daytime. Another constituent absorbed by trees was ammonia, which was more prevalent in populated places, especially manufacturing districts, than in the country, due to the decay of a greater amount of organic substances in a confined area. When the enormous area of leaf surface of a single full-grown tree was considered, it could be better understood what effect the process described had upon the atmosphere. Before deciding what trees to plant, the author advised that a close inspection be made of all existing trees in the neighbourhood, and those in a flourishing state suited for road work be noted, and planted. He suggested the following trees as being suitable for road planting, with the soils most congenial to their growth; they were also given in the order of preference: this was, however, subject to the circumstances of locality, position, &c.; the first, the plane, being undoubtedly the finest tree for road planting where the subsoil and other conditions were suited to its growth:—

Plane occidentalis...	London	Heavy soil
„ acerifolia	„	„
Maple	Norway	Any soil
Sycamore	„	„
Oak	Turkey	Any soil
„	English	Heavy soil
Poplar.....	Canadian.....	Any soil
„	Ontario	„
„	Balsam	Heavy soil
„	Black Italian ...	Any soil
„	Lombardy	„
Elm.....	Camperdown ...	Heavy soil
„	Scotch or Wych	„
Lime	European	Light soil
„	Crimean	„
„	Red twigged ...	„
Birch	Common	Any soil
„	Silver	„
Ash	Common	„
Willow	„	Moist soil
„	Huntingdon ...	„
„	White	„

There were also several handsome flowering or berried trees most suitable, so far as growth was concerned, for planting on roads, but their flowers and berries were fatal to their use, on account of the havoc done to the foliage by children trying to obtain the flowers and berries. Apart from the nature of subsoil, the character of the locality had to be taken into account. There were also some trees that would not thrive on a chalky subsoil.

Trees for manufacturing or smoky districts: planes, Norway maple, sycamore, poplars, ash. Trees for cold, exposed positions: all the trees mentioned except planes and limes. Trees for seaside: sycamore, Norway maple, Turkey oak, Camperdown elm, grey poplar, white willow, common ash. Trees for chalk soils: Norway maple, sycamore, poplars, birch, ash. One of the great mistakes made in planting trees in roads was that they were invariably planted too close; they should never be less than 25 ft. for birch, some kinds of willows, and small growing trees, and at least 35 ft. for the larger kinds, otherwise, when full-grown, the branches interlaced with one another, and the symmetry of the trees was destroyed.

Visit to Conyer, Sittingbourne.

On Saturday about 200 members and friends went by special train to Conyer, near Sittingbourne, to inspect the new brickmaking plant erected on the works of Messrs. Eastwood & Co., Ltd.

Proceeding from Teynham Station the ordinary method of making stock bricks was seen in a yard close by. Here the bricks are made by hand and burnt in clamps. But the principal object of the journey was to see the new plant, whereby the "stocks" are turned out by machinery. It has been held for years that whilst most brick earths can be successfully dealt with by machinery, a true stock brick cannot be made otherwise than by hand. This view has been so firmly rooted in the minds of Sittingbourne makers that it was with considerable diffidence that Messrs. Eastwood & Co. ventured to step off the beaten track and commence making machine stocks.

The brickearth used at Conyer is conveyed some 2½ miles to the yard. It is an excellent loam, and appears to be chiefly derived from the Thanet sands, judging from its mineralogical characteristics. The chalk is just below. After being washed, the earth, for the most part suspended in water, is conveyed to the brickyard through pipes. There it is allowed to settle, and "breeze" is added. In due course the prepared brickearth is dug from the shallow pits and placed in light, iron trucks, when the latter are drawn by steel cable up an inclined plane to the pug-mill. The earth is tipped into the mill, and a few moments suffice to convert it into raw bricks. The machine used is of an ordinary vertical type, and the bricks, as made, are taken off the table by hand and placed on trolleys ready to be run into the "drier."

We may pause in our description for a moment to consider that artificial drying of stock bricks has not hitherto been resorted to in the Sittingbourne district so far as we are aware. The usual method is to dry the bricks in the open in "hacks." In this method they are stacked one upon another to the height of some 3 ft., and covered over when necessary by "hack" covers. There they remain until dry, and, of course, the time occupied in drying is dependent on the weather. In a very favourable season a few weeks suffice to effect natural drying, but not unfrequently months are required.

By the process which the Association of Municipal and County Engineers saw at Conyer on Saturday the drying is effected in twenty-two hours. The installation which Messrs. Eastwood put up as a kind of experiment was in working order when we saw it last autumn, but since then the plant has been added to so that treble the number of bricks are made per day. The first plant made 20,000 bricks per day; the additions, which are not yet quite in working order, will enable another 40,000 bricks per day to be turned out. But to return to the drying process, which is quite a novelty so far as England is concerned. The bricks coming from the press are placed on trolleys, as previously explained. They are then run to the drying apparatus close by. The latter, in the first-put-up installation, consists of three long tunnels into which the raw wet bricks are wheeled, automatically in turn. At the entrance of these tunnels the wet bricks are subjected to a temperature not much above that of the air outside. As they are pushed in, the temperature rises until towards the centre of the tunnels a heat of as much as 220 deg. Fahr. is obtained. On being pushed farther, the bricks are subjected to a gradually decreasing temperature until they arrive at the delivery end of the tunnels. When they come out the bricks are still quite warm and are not yet cool enough to handle. The drier is constructed on an ingenious principle, in which fans play an important part. The object of subjecting the bricks to a temperature in the neighbourhood of the boiling point is that whatever water there may be in the bricks shall be driven out. The actual temperatures along the tunnels are ascertained from thermometers inserted in holes in the top of the drier. The new drier for the larger installation is similar in every respect so far as we could see to that in the older one, except that there are more tunnels.

The bricks, as they come from the drier, are sent by a lift to the entrance of the kiln. The latter is also a novelty for the district. It is common knowledge that Kent stock bricks have always been burnt in clamps, and the makers have always been under the impression that stocks could not be burnt in kilns. This installation of Messrs. Eastwood, however, proves that stocks can be burnt in kilns. In the kilns in operation last Saturday, the bricks are packed on a trolley in somewhat the same fashion as they would be if they were to be stacked in a clamp. The trolley floor is made of firebricks, and these rest on an iron frame or floor. When ready the trolley is pushed in the kiln, which is in the shape of a very long tunnel. The temperature at the entrance of the kiln is very low, so that the bricks have an opportunity of gradually becoming accustomed to the great heat to which they are subjected when they get near the centre of the tunnel. There they become fully burned, and then pass slowly away to the delivery end of the kiln, much in the same way as already described with reference to the drier. The process of burning occupies about three days. The ironwork of the trolley is protected in the kiln by being run in wide grooves arranged in such a manner as that the heat does not get at them, otherwise this system of burning would be practically impossible.

The bricks, of which several thousands are stacked in the yard, seem to be of good colour and shape. The latter is assured from the circumstance that the bricks are pressed on being made in the machine. On the whole we like these bricks, and, as we remarked on a previous occasion, their sandy face is much to their advantage.

The main point for the engineers to consider, however, is that the stock bricks can now be made in about a week, instead of several weeks or months, and quick delivery is well assured.

THE STANDARDISING OF BRICKS.

THE standardising of bricks still occupies the attention of the trade generally and those members of the Royal Institute of British Architects who took up the matter originally. One of the most interesting meetings which took place at the Agricultural Hall during the Building Trades Exhibition week was devoted to this matter. By the kindness of Mr. Greville Montgomery, the energetic organiser of the exhibition, a number of gentlemen representing the trade in all parts of the country met together on Friday, the 19th ult. After having enjoyed Mr. Montgomery's hospitality at luncheon they adjourned to the conference. Amongst those attending the meeting may be mentioned Mr. Anderson (Gloucester), Mr. H. H. Bartlett (Messrs. Perry & Co.), Mr. Broad (Tamworth), Mr. T. Blashill, Mr. Collier, J.P. (Reading),

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Mr. Max Clarke, Mr. Bernard Dicksee, Mr J. C. Hill (President Clayworkers' Institute), Mr. E. R. Hewitt, Mr. Jeffrey (Gloucester), Mr. T. N. Jackson (Messrs. Read & Rilly), Mr. W. F. King (President Builders' Institute), Mr. R. Leah (President Manchester Brickmakers' Society), M. Arthur Metz (Président de L'Union Céramique de France), Mr. Greville Montgomery (Editor *Clayworker*), Mr. Perkins (Chairman Wigan Brickmakers' Association), Mr. George Pearson, Mr. H. D. Searles-Wood, Colonel Trollope, Mr. A. T. Walmisley, and Mr. G. E. Wragge (Messrs. Eastwood & Co).

Mr. Thomas Blashill took the chair, and opened the meeting by observing that the last conference took place in that room just two years ago. Since then many meetings had been held, and the details of the proposals had been discussed by architects, engineers, builders, and brickmakers, primarily to decide whether any standard should be adopted, and, if so, what that standard should be. All sorts and classes of bricks had been measured and compared with a view to adopting a standard which would meet with general acceptance. As regards the views held, it appeared there was a general feeling that if a standard could be adopted it would certainly tend to better work, and save complications where different classes of bricks were used in the same building, besides being an advantage to the makers, who would then all be working on an agreed method so far as size went. At the same time, it was not suggested that any architect or maker should not make or use any special bricks for particular work. He called on Mr. Searles-Wood, one of the Hon. Secretaries of the Royal Institute of British Architects' Science Committee, to read the proposed standard.

Mr. Searles-Wood read a letter from Mr. Vaughan, President of the Belfast Brickmakers' Association, approving of a suggested standard size, which was also approved by the Ulster Society of Architects. The standard proposed is to be as follows :—

"*Standard Size of Bricks.*

1. The length of the brick should be double the width, plus the thickness of one vertical joint.

2. Brickwork should measure four courses of bricks and four joints to a foot.

Joints should be ½ in. thick; and an extra ⅛, making ⅝, for the bed joints to cover irregularities in the bricks. This gives a standard length of 9¼ in. centre to centre of joints.

The bricks to be measured in the following manner :—

A. Eight stretchers laid square end and splay end in contact in a straight line to measure 72 in.

B. Eight headers laid side to side, frog upwards, in a straight line to measure 35 in.

C. Eight bricks, the first brick frog downwards, and then alternately frog to frog and back to back, to measure 21½ in.

A margin of 1 in. less will be allowed as to A, and ½ in. less as to B and C.

This is to apply to all classes of walling bricks, both machine and hand made."

The only alteration shown by this list from that proposed two years ago, was the paragraph as to the "margin" to be allowed.

Mr. Collier made some observations as to the desirability of establishing a standard, particularly as it would be a great benefit to the manufacturer of terra-cotta, who would then be able to make and stock the latter materials with the knowledge that it would work in with the brickwork. At the same time, so much depended upon how far architects and engineers would go in specifying and demanding the standard sizes that he hoped a clear opinion on this point would be expressed.

In reply to this, Mr. Blashill said he would not make any promises, but he thought the Institute of Architects would bring the matter before all the members advising the insertion of the standard sizes in all specifications. As to the engineering profession, they would, he thought, adopt the standard sizes in what might be termed "architectural work," but for large engineering jobs the matter was not of such importance to them, and probably time would be required before these works could be brought into line.

Mr. Hill said the Clayworkers' Institute had fully considered the suggested sizes, and it agreed with them in every detail. He, speaking particularly for the great industry carried on in the Fletton district, wished particularly to impress on the architects that they should not only adopt the standard sizes, but see that they got bricks of those particular sizes.

Mr. King followed with some remarks showing that the Institute of Builders, as a body, approved of the suggested sizes. He presumed the sizes were not meant to apply to the North of England.

The President of the Manchester Brickmakers' Society said that in the Midlands facing bricks were made over 3 in. thick, and he thought the size of the facing bricks should have been decided before that of the ordinary bricks.

The Chairman called on Mr. Max Clarke, Joint Hon. Sec. to the R.I.B.A. Science Committee, to deal with the last speaker's remarks as to facing bricks, which he did by explaining that the question had been fully considered, and it had been decided that, considering the millions of building or common bricks which were in daily use compared with the thousands of facing bricks, the latter need not be dealt with just at present, but it was hoped they would fall into line as by degrees the standard size came into universal use, not only in the London and Southern districts, but eventually all over the United Kingdom. He pointed out that it was no new subject they were engaged upon, as by an ordinance in 1579, the regular size of a brick was 9 in. by 4¼ in. by 2¼ in. An (Public) Act of Parliament, 12th Geo., 1st Cap. 35, gave the minimum size of bricks when burnt as 9 in. long, 2½ in. thick, and 4¼ in. wide, and the Act of 17th Geo. 3, Cap. 42, stated that all bricks made for sale were to be not less than 8½ in. long, 2½ in. thick, and 4 in. wide. [These quotations caused considerable amusement to the meeting, and in reply to some comments, Mr. Max Clarke pointed out that as far as he knew the above sizes were only intended to apply to the London district.]

Mr. A. T. Walmisley said that the engineering profession would welcome any standard size which would relieve all parties from the state of uncertainty which at present existed.

M. Arthur Metz, speaking in French, said his countrymen had not yet discussed the matter which was engaging the attention of the meeting, but he hoped they would do so shortly and arrive at a decision similar to that proposed.

Other speakers followed, all in terms of agreement with the proposed standard, but many suggesting that difficulties would arise in departing from local customs. One speaker desired that the sizes would be such that the work, when finished, should be some even measurement, so that all work could be converted into cubic yards when required; but it was decided, after discussion, that the sizes proposed were the best all round which could be adopted.

On the resolution being put from the chair, it was discussed at what date the proposed standard size should come into effect. On this point considerable difference of opinion arose, it being pointed out by Mr. Wragge that most of this year's stock bricks would be made before the standard size could come into effect, and ultimately the proposal of Mr. Collier was adopted that May 1, 1904, should be fixed as a convenient date for the standard size to come into operation.

Votes of thanks to Mr. T. Blashill and Mr. Greville Montgomery concluded the proceedings.

[We may point out how entirely negative all these proceedings will be if architects do not take the matter up cordially and with a clearly defined object of removing the state of uncertainty which at present exists in the mind of all practical men. What is going to be the height of your courses of brickwork in the proposed building, or what will be the actual dimensions of walls? Say, 1½, 2, 2½, and 3 bricks in thickness, the designer, draughtsman, and quantity surveyor would all be relieved of one of their many troubles if the work was to go on now, so that standards were settled for the thickness of walls and the height of each course or number of courses. If all this were done for the average class of work, a step in the right direction would be made, a saving of brain-worry and money would be achieved much to be desired by all, leaving the few who wish to use "Special," as differing from "Standard," bricks to carry out their own designs and inclinations.]

WINDOW, ST. PAUL'S CHURCH, CLIFTON.—This stained-glass window was unveiled and dedicated at the morning service on the 24th ult. The centre light contains the figure of our Lord as "the Good Shepherd." The two side panels have been filled entirely with flowers. Both the window and the brass tablet were designed and erected at the studio of Messrs. Joseph Bell & Son, Bristol.

ARCHITECTURAL SOCIETIES.

ROYAL VICTORIAN INSTITUTE OF ARCHITECTS.—The following is an extract from the Report of the Council of the Victorian Institute for 1902-3, in the first issue of its *Journal of Proceedings*. It shows in what subjects the Institute has been taking action during the session :—

"*Public Work.*—The Minister for Home Affairs (Sir W. Lyne), having expressed the opinion that designs for the Commonwealth public buildings should be called for by competition, your Council expressed its appreciation of the action taken by the Minister; and, communicating with the other State Institutes, letters were forwarded to Sir William endorsing the Ministerial proposals.

In the earlier part of last year your Council and a Committee appointed by it, devoted much time to the consideration of regulations for hotels and boarding-houses proposed to be issued by the Board of Public Health. Whilst agreeing with the proposal that new buildings for these purposes should be constructed to ensure the maximum of safety to the inmates it was felt that existing buildings were entitled to more consideration than the proposal of the Board's officers seemed to suggest. In so drastic a manner were the proposed regulations framed that it was believed very few of the existing buildings could be reasonably altered to suit the regulations, while many of such buildings would have to be reconstructed. Even for new buildings some of the requirements seemed to be unreasonable, and others impracticable. Your Council formulated its views, after meeting in conference with the chairman and officers of the Board of Public Health and with the Property Owners' Association (called into existence to consider the Board of Health suggested regulations from the owners' standpoint), and afterwards forwarded its recommendations to the Board, many of which were favourably considered by that body, which has apparently up to this date not taken any further steps in the matter.

An application by the officers of the Camberwell Presbyterian Church for your Council to appoint an adjudicator upon the designs for the new church buildings resulted in Mr. Thomas Watts (President) being asked to undertake the duty.

The services of your Council have been accepted by the Committee of the Melbourne Hospital to assist in drafting the conditions for the proposed new building upon the present site. Your Council is desirous, in the interest both of the public and the profession, to consult with public bodies for the purpose of drafting the conditions of competition for proposed works, which can only be satisfactorily prepared by those with practical knowledge in the architectural profession. It is felt that fair conditions lead to a better class of architects competing, and hence a better type of design submitted; and it is needless to point out that the adjudication upon designs submitted demands *that* special skill which only a practitioner can possess.

The subject of trade discounts and commissions being brought under the notice of your Council, after long consideration an informal conference with the President and Officers of the Builders' Association was held, when the views of all parties were freely exchanged. Your Council, after further deliberation, resolved "That we cannot interfere with the purchasing power of the contractor according to trade custom." The discussion and conference cleared away the mist by which the question was surrounded, and will probably lead to a better understanding upon the relations of architect, builder and merchant.

The South Australian Institute of Architects obtained permission from your Council to incorporate in the new conditions of contract which the sister Institute intended to issue, such clauses as it desired of our R.V.I.A. Conditions, and tendered its thanks for the privilege granted. After printing, it forwarded a copy to this Institute, together with a statement of new suggestions which had been included in such conditions.

Educational.—The Royal Commission on the University of Melbourne having desired to receive the evidence of the Institute upon the subject and teaching of Architecture (Historical and Practical) given at the University, your Council on various occasions has considered the subject, and has appointed Messrs. Oakden, D'Ebro, and Little to present its views

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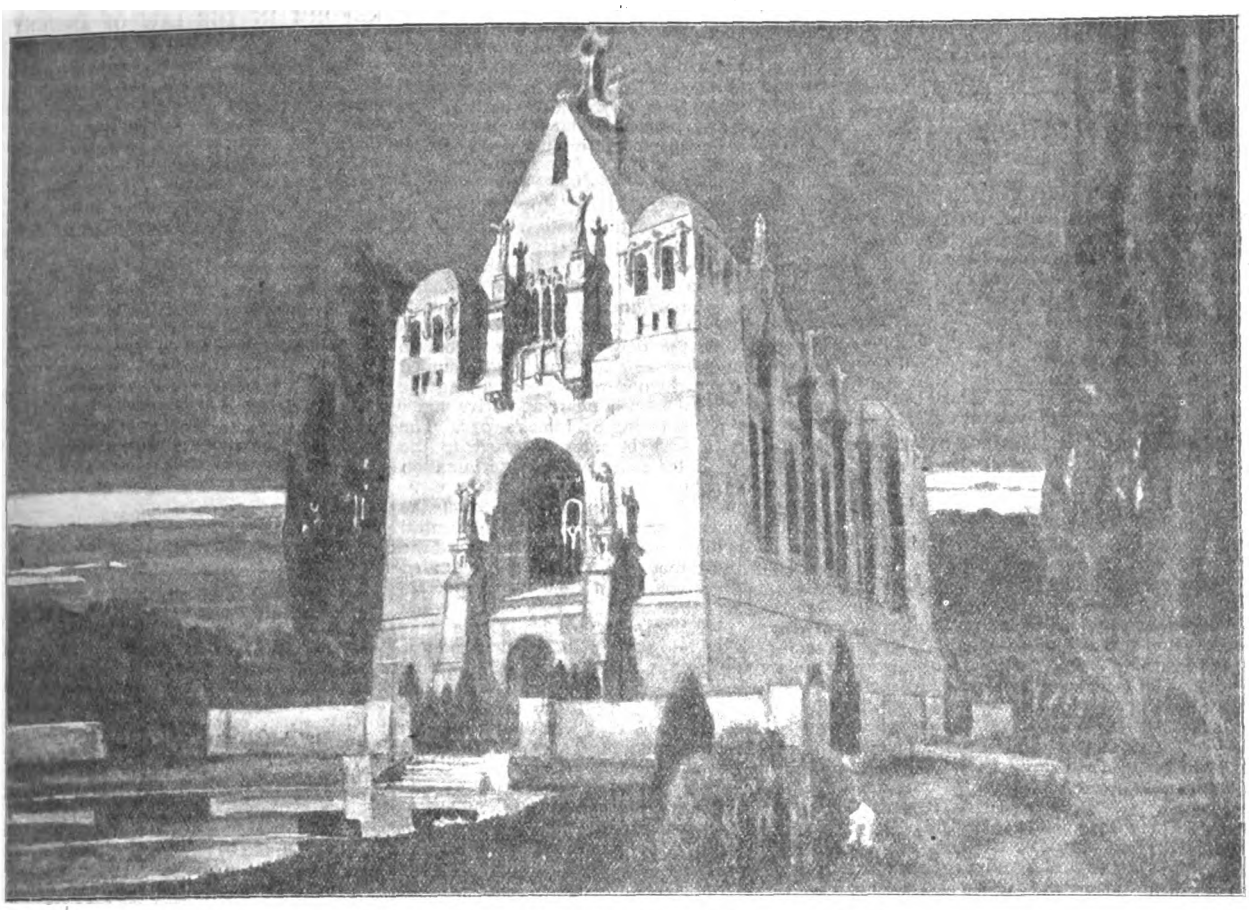

A Church in a Lonely Place. By Herr W. Thurm, Architect.

(Reproduced from the *Architektonische Rundschau.*)

before the Commission when called upon to do so.

At the request of the Royal Institute of British Architects, your Council granted the use of its room for the holding of an examination for qualifying for candidature as Associate of the parent Institute, and appointed a Committee to conduct same. Although many inquiries had been made, only one candidate (Mr. C. H. Ballantyne, Student of this Institute) entered and subjected himself to examination. The papers were forwarded to London, and your Council was greatly pleased to learn that the candidate had succeeded in satisfying the examiners, and is now qualified for candidature in the British Institute. Probably in June, 1904, another examination may be held, and it is hoped that the example of Mr. Ballantyne may be followed, and the privileges attaching to membership with the chief Institute of the world may be more eagerly prized."

A CHURCH IN A LONELY PLACE.

THIS rather poetic architectural composition, by a German architect, Herr Thurm, is slightly reduced from an illustration which appeared recently in the *Architektonische Rundschau*.

HAMPSTEAD HEATH AND THE TWOPENNY TUBE.

THE Committee for the extension of Hampstead Heath are asking for subscriptions towards the purchase of Wylde's Farm and the meadows lying on the north-west boundary of the Heath, under the following circumstances :—

The Tube Railway, under the Charing Cross, Euston, and Hampstead Railway Acts of 1902-3, plan to have a station on the edge of the Heath, by which thousands of persons, from all parts of London, will be brought out of town for twopence to enjoy fresh air and beauty. The land is thus made valuable for building, and plans have already been prepared, laying the fields out in small streets with small houses. The object of the Committee is to secure 80 acres adjacent to the station and to add them to the Heath. This is desirable for five reasons, which are thus stated in the Committee's circular :—

"1. The view from the Spaniards-road and the north-west heath, the beauty of which is far-famed and unique, would be retained, whereas the buildings proposed would render the foreground ugly and the air smoky.

2. If these singularly beautiful fields could be kept as an open space, the many thousands of people who will, it is hoped, be brought by the Tube, would be landed at once in the midst of the country and its influences, and would find a large area of public space round the station, over which they could scatter instead of being confined to one particular route.

3. The development of the tube and electric tramways will bring a large population to inhabit the neighbourhood of Finchley-road. The extension of the Heath in this direction will be for the recreation of such inhabitants, and for the general health of the community.

4. The Heath, which is very narrow near the proposed station, is peculiarly lovely on account of its verdant wildness, the undulation of its surface, and the outlook it affords over the country to the distant hills. The necessary trampling of many passengers from the station will turn this beauty into barrenness, unless the crowds can be spread over the large space it is proposed to secure.

5. There is a great and growing need for playing fields within a short journey of the metropolis. Parts of the proposed space might be made fit for games, and so open to Londoners new opportunities for healthy recreation and manly sports."

The Eton College Trustees, to whom the land belongs, have met the Committee in a generous spirit; but the total cost of the land will be 48,000*l*., and, if all this money cannot be raised, the Committee must regretfully purchase a smaller portion, excluding the high land, which will be then used for building purposes. There is reason to believe that the London County Council and other administrative bodies will give towards the purchase-money, after the public have shown their interest in the scheme by financial support. Unless these fields can be purchased now the opportunity will be lost for all time of increasing an open space which the advent of the tube converts from a matter of local to Metropolitan interest. It is for the sake of Londoners, and for future generations, that this extension is needed.

Promises of subscriptions or cheques may be sent to the hon. secretary, Mrs. S. A. Barnett St. Jude's Cottage, Spaniards-road, Hampstead Heath; or direct to the London and South-Western Bank, 28, High-street, Hampstead.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses :—

Lines of Frontage and Projections.

Lewisham.—That the Council do make no order on the application of Mr. N. McDougall for consent to the erection of a house to abut upon the south and west sides of Overcliff-road, Lewisham.—Agreed.

Lewisham.—That the Council do make no order on the application of the Maypole Dairy Co., Ltd., for consent to the retention of a wooden pilaster erected in front of No. 74, Rushey-green, Catford.—Agreed.

Strand.—Permission to retain two showcases in front of No. 153, Oxford-street (Messrs. Truslove, Hanson, & Comba, Ltd.).—Refused.

Width of Way and Construction of Buildings.

St. Pancras, East.—The retention of a shed at the rear of No. 120, Camden-road, St. Pancras, abutting upon Sandall-road mews (Mr. R. Midworth for Mr. B. Douthwaite).—Consent.

Formation of Streets.

Lewisham.—That an order be issued to Mr. G. Lawrence, sanctioning the formation or laying-out of a new street for carriage traffic in continuation westward of Winchfield-road, Lower Sydenham.—Agreed.

Wandsworth.—That an order be issued to Mr. E. B. l'Anson, sanctioning the formation or laying out of a new street for carriage traffic, on the Mortimer estate, Streatham, to lead from Streatham High-road to Garrard's-road (Mr. C. Mortimer).—Agreed.

Hackney, North.—That an order be issued to Messrs. Boehmer & Gibbs refusing to sanction the formation or laying out of new streets for carriage traffic to lead from Stamford-hill to Dunamure-road, Hackney (for Mrs. F. A. Cave).—Agreed.

Lewisham.—That an order be issued to Messrs. Eastman Brothers refusing to sanction the forma-

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tion or laying out of a new street for carriage traffic to lead from Dartmouth-road to Sydenham Hill-road, Lewisham (for the Building Estates and Property Association, Ltd., and Mr. E. C. Christmas).—Agreed.

Illustrations.

SCULPTURE: "MUSE EXILÉE."

THIS alto-relief, by M. Champeil, was mentioned in the review of French art of the year in our issue of May 30 as one of the most beautiful works of sculpture in this year's Salon. It is not only a fine piece of design and modelling, but also expresses a fine poetic idea—the melancholy of genius exiled from its native land.

DESIGN FOR LIVERPOOL CATHEDRAL.

WE give this week illustrations of the remarkable and original design by Mr. C. A. Nicholson, one of the five architects selected to enter into the second competition for Liverpool Cathedral.

Mr. Nicholson sends us the following summary of his intentions in the design:—

"In view of the fact that large unobstructed areas have been successfully enclosed by the builders of St. Sophia, of Gerona, of Ely, of Florence, and of St. Paul's Cathedrals, it was felt that it would be a confession of incompetence to shirk the constructive and artistic difficulties of the problem set by the Cathedral Committee and their assessors, the nature of which problem is now familiar to the readers of the *Builder*. In the design now illustrated the device adopted to fulfil the Committee's requirements was the provision of a nave 55 ft. wide between spandrels leading into a hexagon described about a circle 90 ft. diameter with radiating transepts and a choir beyond. The nave and choir are a little over 100 ft. in internal height, this being considered sufficient for effect. The lantern vault is kept low (155 ft.) for acoustic reasons, but room is provided for a ring of windows above the great arches. The peculiar treatment of the transepts was adopted mainly in order to obtain good abutments for the six lantern arches, but it was also thought that the simple apsidal forms of their clearstories, in conjunction with the more intricate arrangement of their lower parts, would conduce to the acoustic properties of the church.

The principal effect aimed at internally was a contrast between the sober and massive nave and the open and brightly lighted crossing. The choir is well lighted also, with large clearstory windows, and it expands behind the high altar into a transverse morning chapel suggested by the nine altars at Durham. This treatment was adopted with the purpose of avoiding a gloomy and confined effect like that of the sanctuary of St. Paul's. It was proposed that the reredos should take the form of a tall detached triptych with low walls and iron screens on each side. The choir was to be fitted with low-backed stalls and iron parcloses, since close canopied stallwork seems to the designer to be an anachronism borrowed from the 'pre-hot-water-pipe' period. As the axis of the cathedral was to lie north and south, no great window was designed to close the choir vista. The end windows are small, and are arranged under recessed arches to avoid an unpleasant glare in the eyes of the congregation. Two large stair turrets flank the end of the choir, one of these containing the bell for the morning chapel.

The vestries and chapter-house are built round a cloister with southern aspect at the end of the cathedral, the library and choir practice-room are on the first floor on opposite sides of the cloister, and below the left transept and choir aisle a large crypt is provided containing the heating-chamber, workshops, blowing engines, stores, vergers' rooms, and choir vestry. Another crypt, under the chapter-house, is intended to contain a second heating-chamber and a storeroom for bicycles, with entrance to St. James's-road.

The principal organ is planned at the end of the nave in a gallery over the main entrance; there is a smaller organ in the choir. The bases of the two entrance towers are appropriated as a baptistry and a mortuary chapel respectively.

A dimension of 21 ft. between centres of bays has been adhered to throughout the design. This unit of proportion is adopted at St. Albans, Durham, Salisbury, Westminster, and Winchester. At York, where the bays are spaced 28 ft., the internal effect has been considered lean and poor. Amiens is set out with bays of 24 ft., but there the height is much greater than was proposed in this design. And it is universally conceded that Italian churches lose in scale owing to the unduly wide spacing of their piers.

Externally it was proposed to finish the cathedral with a traditional English group of three towers, the central lantern forming the dominant feature of the design. This was arranged at the end of one of the side streets, along which a good view of the cathedral could have been obtained from the lower parts of the city. One of the entrance towers was intended to be the belfry, the other to contain a clock and chimes. The church was planned so as to leave a good open space facing the principal entrance, with a carriage drive under a covered porch facing St. James's-road. The chapter-house was brought forward to the road line in order to make a bold termination to the group of buildings.

The chief difficulty in the design of the exterior has been the treatment of the central tower. Its diameter being very great, and the length of the cathedral being expressly limited to 450 ft., this feature necessarily overpowers the rest of the building (especially when drawn in elevation). In order to bring it as far as possible into scale with its surroundings its plan approaches nearly to a circle, and the tower proper is crowned with a smaller lantern, sufficiently large to take its place in the general grouping of the cathedral as seen from the high ground of Hope-street, or from distant points of view.

The design of this tower is felt to be crude in many respects, but a satisfactory solution of so difficult a problem could hardly have been arrived at in the six months or so in which competitors were expected to mature their ideas.

In so large a church special provision has to be made for access to roofs, gutters, and windows, for purposes of inspection, cleansing, and repairs; convenient stores must be arranged for scaffolding materials and the like; the best positions must be found for heating-chambers, lavatories, cloakrooms, and housemaid's cupboards—all of which details, though not apparent upon the surface, are yet very essential to the durability and comfort of the building.

The design was intended to be executed in incombustible materials with concrete external roofs, double roofs being considered necessary in the English climate. The lantern tower is designed with certain uncommon, though not original, features. The upper lantern is carried on a cone, the base of which is well tailed down by the vertical drum of the tower, the weight of which is some six times that of the upper lantern. The resultant thrusts are almost vertical in direction, but as an extra precaution pendentives are introduced between the lantern arches. The weight of these acts in opposition to the spreading tendency of the cone, while, owing to their circular plan, it is impossible for them to collapse inwards.

The thrusts at the haunches of the pendentives and main lantern arches are well provided for by the radiating walls of the transepts, which are subdivided at the level of the aisle roofs, and the lower portions of which are pierced so as to form a narrow aisle round the transepts.

It was proposed to build the cathedral mainly of cast concrete blocks similar to those being used in the harbour works at Dover. The exterior would have been faced with Darley Dale stone, the interior with red Runcorn; the sloping roofs covered with cast lead upon boards and creosoted bearers laid over the concrete, the flats and gutters with asphalt.

The cathedral was designed to seat 3,000 persons in the open central area, the positions of the seats being shown in the plan. Upon special occasions from 6,000 to 8,000 could be accommodated in different parts of the church, the nave triforia, the aisles, and the lower part of the nave being all available for congregational purposes."

CITY ORTHOPÆDIC HOSPITAL.—The Committee of Management of the City Orthopædic Hospital are carrying out considerable improvements and additions to the premises in Hatton-garden, consisting of new isolation ward, registration and consulting rooms, and nurses' cubicles. The architect is Mr. F. T. W. Goldsmith.

REFORM IN THE LAW OF ANCIENT LIGHTS.

THE following is the text of the Ancient Lights Bill, to amend the law relating to easements of light, brought in by Mr. Fletcher Moulton, Mr. Haldane, Mr. Robson, Mr. H. D. Greene, and Mr. Herbert Robertson, which was read a first time in the House of Commons on the 22nd ult. The Bill is the result of the labours of the Joint Committee of the Royal Institute of British Architects and the Surveyors' Institution:—

"Be it enacted by the King's Most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

Part I.—Preliminary.

1. (1) This Act may be cited as The Ancient Lights Act, 19 .

(2) This Act shall come into operation on the day of 19

This Act does not extend to Scotland or Ireland.

Part II.—Definitions.

2. (1) In this Act unless a contrary intention appears:—

(i.) Tenement includes land, also any dwelling-house, workshop, or other building.

(ii.) Window includes any aperture for the purpose of admitting light.

(iii.) Street means and includes any highway, road, bridge, lane, mews, footway, square, court, alley, passage, whether a thoroughfare or not, and a part of any such highway, road, bridge, lane, mews, footway, square, court, alley, or passage.

(iv.) Owner includes every person in possession or in receipt of the rents and profits of a tenement and having an interest in such tenement not less than as a tenant thereof from year to year.

(v.) Occupier does not include a lodger.

(vi.) The tribunal of appeal means the tribunal of appeal constituted by this Act.

(2) In this Act if two tenements are so situated that the owner of the first is entitled to a right to light passing over the second, the first tenement is called a dominant tenement, and the owner thereof a dominant owner; and the second tenement is called a servient tenement, and the owner thereof a servient owner; and the first tenement is referred to as being dominant over the second, and the second tenement as being servient to the first.

Part III.—Limitation of the Amount of Light of a Dominant Owner.

3. (1) From and after the commencement of this Act an owner of a dominant tenement shall, subject as herein provided, be entitled to such amount of light passing over the servient tenement as is reasonably necessary for the comfortable use and enjoyment of the dominant tenement if a dwelling-house, or for its beneficial use and occupation if used as a place of business or for any other purpose than a dwelling-house, and he shall not be entitled to any extraordinary amount of light necessary for any particular purpose, trade, or occupation.

(2) Nothing in this section shall confer on the owner of any dominant tenement over the tenement servient thereto any right to a greater amount of light than he would have possessed if this Act had not passed.

(3) This section shall not apply to a tenement in which a trade or occupation requiring an extraordinary amount of light has been continuously carried on for ten years during the continuance of such trade or occupation.

(4) This section applies only when the right of the dominant owner to the light passing over the servient tenement becomes absolute and indefeasible after the commencement of this Act.

Part IV.—Obstruction of Light by Notice in Place of Physical Obstruction.

4. (1) The owner of a tenement which is not at the time servient to another tenement, but over which such other tenement would, in course of time, become dominant, may serve upon the occupier of and upon any other persons whom he knows to be interested in the tenement which would become so dominant a notice (in this Act called an Obstruction to Light Notice).

(2) An obstruction to light notice shall be in writing in the form contained in the first Schedule to this Act or as near thereto as circumstances will permit, and shall be accompanied by a plan and section or elevation showing the windows the access of light through or to which is to be deemed obstructed.

(3) On and after the day of service of an obstruction to light notice the access of light to the windows mentioned in the obstruction to light notice shall be deemed to be obstructed in like manner as if the same were actually and physically obstructed.

(4) Any person aggrieved by an obstruction to light notice shall be entitled to the like relief so far as may be as he would have been entitled to if the access of light to the windows mentioned in the obstruction to light notice had been actually

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and physically obstructed by the person serving the notice.

(5) An obstruction to light notice shall, subject to any relief which may be granted before the expiration of one year from the day of service thereof by a Court of competent jurisdiction be deemed to be, and shall have the like effect as an interruption within the meaning of Section 3 of the Prescription Act, 1832, which has been submitted to or acquiesced in for a year.

(6) On the sale of any tenement it shall be the duty of the vendor to disclose any Obstruction to Light Notice which may have been served in respect of that tenement.

(7) It shall be the duty of any person who may receive an Obstruction to Light Notice under this Act in respect of a tenement which he holds as occupier or lessee for a term of years or for lives to forward or deliver such notice forthwith to his next superior landlord.

Part V.—Right to Light Passing over Streets.

5.—No title shall be acquired by prescription under the Prescription Act, 1832, or at Common law or otherwise by the owner or any building which shall have been erected after December 31, 1890, and which abuts on any street to a right to light passing over a tenement on the opposite side of that street.

Part VI.—Provisions for Certificated Plans of Buildings About to be Taken Down.

6. (1) The owner of a building which is intended to be taken down and rebuilt may cause plans, sections, and elevations of such building to be prepared, and may make application to the official surveyor for an inspection and survey of such building and for a certificate of the correctness of such plans, sections, and elevations, and such application shall be dealt with as hereinafter provided.

(2) Every such application to the Official Surveyor shall be accompanied by a payment of the sum payable in accordance with the table of fees contained in the Schedule to this Act, and such sum shall be his fee for the inspection and survey and for the grant or refusal (as the case may be) of the certificate, and it shall not be lawful for the Official Surveyor to demand or receive any further fee or payment in respect thereof.

(3) The official surveyor shall either grant a certificate that in his opinion the plans, sections, and elevations are correct, or he shall refuse to grant such certificate, in which case he shall state the grounds of such refusal, and such certificate or refusal shall be in the form set out in the schedule to this Act, with such modifications, if any, as the circumstances may require.

(4) Where the Official Surveyor refuses to grant a certificate applied for under this Act the applicant may if he think fit cause fresh plans, sections, and elevations to be prepared, having regard to the objections stated in the form of refusal, and may thereupon make a further application to the Official Surveyor to inspect and survey the building.

(5) If the Official Surveyor on re-inspection and resurvey be of opinion that the fresh plans, sections, and elevations are correct, he shall grant a certificate under this Act with respect thereto.

(6) Where the official surveyor refuses to grant a certificate under this Act it shall be lawful for the applicant, at any time within fourteen days after the date of such refusal, to make application to the tribunal of appeal by way of appeal against such refusal, and such appeal shall be accompanied by a copy of the form of refusal by the official surveyor.

(7) A certificate granted under this Act shall be conclusive evidence of the correctness of such plans, sections, and elevations in any actions or matter relating to the right of the owner of such building to light.

(8) In this section the Official Surveyor means, in the case of a building situate in the county of London, the district surveyor appointed to the district in which such building is situated, and in the case of a building situated in any other county, but not within a borough, the county surveyor, and in the case of a building situated in a borough, the borough surveyor.

(9) The Official Surveyor shall keep a register of such drawings, and shall thereupon be entitled to demand and receive the further fees set out in the Schedule to this Act. Such drawings shall be deposited at the Town or County Hall, and be open to public inspection on payment of a fee, as set out in the Schedule to this Act.

Part VII.—Statement of Claims Arising out of Rights to Light.

7. (1) Where a servient owner is erecting or intends to erect any new building or alter any existing building on his tenement he shall at the request of the dominant owner give facilities to the dominant owner or any person duly appointed on his behalf to inspect, the plans, elevations, and sections of such intended new building or alteration, if any, and if there be no such plans, elevations, and sections, shall give such information relating to such intended building or alteration to the dominant owner as the dominant owner may reasonably require.

(2) A dominant owner who has made such request as aforesaid may at any time within seven days after inspecting such plans, elevations, and sections, or receiving such information serve upon the servient owner a notice of his objections or the terms on which he is willing to permit the servient owner to erect his building. Such notice shall be in writing and sent by registered post or served personally.

(3) Such notice shall contain particulars of the estate or interest claimed by the dominant owner in the dominant tenement and also the name and address of a surveyor who will act on behalf of the dominant owner in case a difference between him and the servient owner should arise.

(4) If the servient owner shall within seven days after the service on him of such notice serve the dominant owner with notice in writing that he accepts the terms of such notice, there shall be deemed to be an agreement between the dominant owner and the servient owner that the servient owner will fulfil the requirements of such notice.

(5) If the servient owner is not willing to accept the terms of such notice, he shall within seven days after the service on him of such notice serve notice in writing that he refuses the terms of such notice, and shall state the name of a surveyor who will act on his behalf.

(6) In this section the expressions dominant owner and servient owner include respectively persons claiming to be such respectively.

8. (*a*) Unless the servient owner shall have accepted the terms of the notice the two surveyors so appointed shall, within ten days of the appointment of the last of them, meet together and endeavour to determine the questions in dispute arising out of the said notice, and shall, before entering upon such questions, appoint by writing under their hands an umpire to whom the matter shall be referred in case such arbitrators fail to agree.

(*b*) The umpire shall be a member of the Royal Institute of British Architects or of the Surveyors' Institution.

(*c*) The umpire shall view the site and the dominant and servient tenements and make his award within twenty-one days after the original time appointed by this Act for making the award by the arbitrators has expired.

9. The arbitrators or their umpire may by their award decide any of the following matters, namely:—

(*a*) The right of the owner of the tenement who proposed to build to carry out his intended works.

(*b*) The alteration, if any, necessary to be made in carrying out the intended new buildings or alterations so as to prevent or lessen obstruction to the lights of the tenements, as set out in the notice of objection.

(*c*) The amount, if any, of compensation of every description to be made to the owner, lessee, or occupier.

(*d*) The alterations, if any, to the adjoining premises by light reflecting surfaces, enlargement of lights, heightening of premises, or other means.

(*e*) The amount of costs to be paid by either party.

(*f*) Any other matter necessary to enable the difference between dominant and servient owners to be determined.

10. In the event of either party neglecting to appoint a Surveyor within the prescribed period, or of the unwillingness of the umpire appointed to act, and no other umpire being agreed upon within a period of ten days from his refusal to act, either party may apply to the President for the time being of the Royal Institute of British Architects, or the President for the time being of the Surveyors' Institution who shall forthwith appoint an umpire.

11. Any award given by such arbitrators or their umpire shall be conclusive and shall not be questioned in any Court with this exception, namely, that either of the parties to the difference may appeal therefrom to the tribunal of appeal within fourteen days from the date of the delivery of the award, and the tribunal of appeal may, subject as hereafter in this section mentioned, rescind the award or modify it in such manner as it thinks just.

12. If the appellant from any such award where the amount awarded exceeds 500*l.* in money, damages, or cost of works, or where the interference with the proposed works exceeds 500*l.* refuses to accept the decision of the tribunal of appeal and gives security to be approved by the members of that tribunal to prosecute his appeal within one month from the publication of such decision and to abide the event thereof, all proceedings in the tribunal of appeal shall thereupon be stayed, and the appellant may bring an action in the High Court against the other party to the difference.

13. The plaintiff in such action shall deliver to the defendant an issue without pleadings whereby the matters in difference between them may be tried, and the form of such issue in case of dispute or in case of the non-appearance of the defendant shall be settled by the High Court, and such action shall be prosecuted and issue tried in the same manner and subject to the same incidents in and subject to which actions are prosecuted and issues tried in the Commercial Court of the High Court, or as near thereto as circumstances admit.

14. If the parties to any such action agree as to the facts a special case may be stated for the opinion of the High Court, and any case so stated may be brought before the Court in like manner, and subject to the same incidents in and subject to which other special cases are brought before such Court, or as near thereto as circumstances admit, and any costs that may have been incurred in the tribunal of appeal by the parties to such action as is mentioned in this section shall be deemed to be costs incurred in such action, and be payable accordingly.

Part VIII.—Constitution of Tribunal of Appeal.

15. For the purpose of this Act a tribunal of appeal shall be constituted as follows:—

Three members shall be barristers-at-law, and shall be appointed by a Secretary of State.

Three members shall be appointed by the Council of the Royal Institute of British Architects.

Three members shall be appointed by the Council of the Surveyor's Institution.

16. A member of the tribunal of appeal shall be appointed for a term of one year, and at the expiration of his term of office shall be eligible for re-appointment.

17. The Lord Chancellor may remove for inability or misbehaviour any member of the tribunal of appeal.

The tribunal of appeal may act notwithstanding any vacancy in their body, but not less than three members, of whom one shall be a barrister-at-law, shall attend at the hearing of any case.

18. The tribunal of appeal may hold sittings in any part of England in such place or places as may be most convenient for the determination of proceedings before them.

19. Upon the occurrence of any vacancy in the tribunal of appeal or during the temporary absence through illness or other unavoidable cause of any member thereof a Secretary of State, the Council of the Royal Institute of British Architects, or the Council of the Surveyors Institution (as the case may be), whichever of them shall have appointed the member of the tribunal whose place shall be vacated, shall appoint forthwith a fit person to be a member (either temporary or permanent) of the tribunal in place of the member whose place is vacated or who is temporarily absent as aforesaid.

20. There shall be paid to each member of the Tribunal of Appeal such fees as a Secretary of State shall, with the concurrence of the Treasury, determine.

21. It shall be lawful for the Tribunal of Appeal to appoint such clerks, officers, and servants as they may find necessary, who shall be paid such salaries as shall be determined by a Secretary of State, with the concurrence of the Treasury, and to provide offices.

22. The members forming for the purposes of each case the tribunal of appeal shall personally visit the tenements both of the appellants and the respondents.

23. The tribunal of appeal shall, subject to the provisions of this Act, have jurisdiction and power to hear and determine appeals referred to them under this Act, and shall have power to determine whether and if so to what extent the proposed new buildings should be amended or the dominant premises altered.

24. For all the purposes of and incidental to the hearing and determination of any appeal, the tribunal shall (subject to any rules of procedure duly made) have power to hear the parties interested either in person or by counsel as they may think fit, and to administer oaths and to hear and receive evidence, and require the production of any documents or books and to confirm or reverse or vary any decision and make any such order as they may think fit, and the costs of any of the parties to the appeal shall be in the discretion of the tribunal of appeal.

25. The tribunal of appeal may from time to time, subject to the approval of the Lord Chancellor, make regulations consistent with the provisions of this Act as to the procedure to be followed in cases of appeal to the tribunal of appeal, including the time and notice of appeal, and as to fees to be paid by appellants and other parties.

26. Any order of the tribunal of appeal may be enforced by the High Court as if it had been an order of that Court.

27. In any action by a dominant owner against a servient owner, in which an injunction is claimed, notwithstanding that an injunction may by an interlocutory order have been already granted upon the application by motion of the servient owner, either party may apply to a Judge of the High Court either to hear such action with assessors or to refer the matter to arbitration in accordance with the provisions hereinbefore contained. If on the hearing of such application the Judge shall be of opinion that the claim may be reasonably satisfied by damages, he may on his own motion refer the case to arbitration, and if on such hearing he shall be of opinion that the action for an injunction has been unreasonably or unnecessarily commenced, he may order the party bringing such action to pay the costs of the defendant on such scale as he may deem fit."

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THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Wandsworth Borough Council 1,600*l.* for development of wharf; Battersea Borough Council 1,252*l.* for paving and other works; Southwark Borough Council 4,600*l.* for paving works; and Wandsworth and Clapham Guardians 4,200*l.* for poor law purposes. Sanction was also given to the following loans: Southwark Borough Council 500*l.* for street lighting, and 208*l.* for paving works; and Hackney Borough Council 26,575*l.* for street improvement.

Housing. — The recommendations of the Housing of the Working Classes Committee contained in the two following paragraphs were agreed to:—

"We submit working drawings, specification, bills of quantities, and estimate of 37,345*l.* in respect of 141 cottages [see next column] for the working classes to be erected on Section A, which consists of about five acres of the south-western portion of the White Hart-lane Estate, Wood Green. The estimate is made up as follows:—Erection of 141 cottages, 35,570*l.*; architect's expenses, supervision, quantity surveyor's charges, articles bought direct and incidentals, 1,775*l.* The cottages consist of three classes, particulars of which are given in the following table:—

Number, class, and type.	Number of persons provided for.	Area of Living room.	First Bedroom.	Second Bedroom.	Third Bedroom.	Parlour.	Kitchen.	Scullery.
		sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.
8 1st, A	80	147	104	98	98	132	-	35
12 1st, B	120	144	151 & 131	98	98	117 & 98	—	28
12 1st, C	96	144	131	98	—	93	—	28
9 2nd, A	54	158	112	146	—	-	74	—
28 2nd, B	168	146	115	96	—	—	74	—
28 2nd, C	224	146	115	96	96	—	74	—
8 3rd, A	48	148	96	96	—	—	—	28
36 3rd, B	216	144	96	96	—	—	—	28
	1,006							

The average numbers of persons and cottages per acre are 21·5 and 30·48 respectively. It will be observed that we propose a variety of types in each of the three classes of cottages. Having regard to the fact that this is the first section to be developed, we think that the experience to be gained by the building of these varieties will be valuable in determining the best and most suitable class of cottage to be provided on the bulk of the estate. In order to facilitate the commencement of building operations we invited tenders for the erection of the cottages, and these were received and referred to us by the Council on May 26, 1903. We have the tenders now under consideration, and hope to be able to recommend one for acceptance at the meeting of the Council on June 30. We recommend—'That the estimate of 37,345*l.* submitted by the Finance Committee be approved, and that expenditure up to the amount of the estimate be sanctioned in connexion with the erection of 141 cottages on Section A of the White Hart-lane Estate, Wood-green.'

We submit working drawings, specification, bills of quantities, and estimate of 16,160*l.* in respect of the erection of Barnaby-buildings, Leroy-street, Bermondsey. The estimate is made up as follows:—Erection of buildings, including all foundations, 14,860*l.*; architect's expenses, supervision, quantity surveyor's charges, articles bought direct and incidentals, 1,300*l.* The dwellings will consist of two blocks of buildings each five stories in height, and will provide accommodation for 400 persons in forty tenements of three rooms and forty tenements of two rooms. The buildings are intended to provide for the rehousing of the 291 persons of the working class displaced by the carrying into effect of the Long-lane and Tabard-street improvement. Considerable difficulty was experienced in designing these buildings so as to comply with the Council's standing orders, and on November 19, 1901, the Council decided that a sum of 1,432*l.* only should be charged against the dwellings in respect of land. The heavy rates obtaining in the Metropolitan Borough of Bermondsey have, however, conduced to render the task of designing these dwellings a matter of great difficulty even with this reduced charge. In these circumstances we have thought it well to invite tenders for the building of the dwellings, and we hope that it may be possible to obtain a definite price at which they can be built without involving a charge on the county rate. These tenders were referred to us by the Council on May 26, 1903, and we hope to be able to recommend one for acceptance at the meeting of the Council on June 30. We recommend—'That the estimate of 16,160*l.*, submitted by the Finance Committee, be approved, and that expenditure up to the amount of the estimate be sanctioned in connexion with the erection of Barnaby-buildings, Leroy-street, Bermondsey, for the rehousing of persons displaced by the carrying into effect of the Long-lane and Tabard-street improvement.'"

They also reported as follows:—

"On May 26, 1903, the Council referred to us the following tenders for the erection of 141 cottages on Section A of the White Hart-lane Estate, Wood-green [see previous column]:—

Mr. H. Lovatt	£36,000	0	0
Messrs. Martin, Wells, & Co.	39,459	0	0
Messrs. Willmott & Sons	37,915	0	0
Mr. A. Porter	37,907	0	0
Messrs. Kirk & Randall	38,311	0	0
Messrs. Haines & Co.	38,066	15	9
Messrs. H. Wall & Co.	39,338	16	1
Messrs. McCormick & Sons	40,398	0	0
Mr. B. E. Nightingale	40,500	0	0
Messrs. Peerless, Dennis, & Co.	40,787	0	0
Mr. S. E. Moss	41,109	0	0
Mr. H. L. Holloway	41,440	0	0
Messrs. Thompson & Co.	41,686	0	0
Messrs. C. B. Roberts & Co.	42,396	0	0
Messrs. Perry & Co.	43,434	0	0
Messrs. Shurmur & Son	45,587	0	0
Mr. L. F. Lamplough	44,100	0	0
Messrs. J. Barker & Co.	44,300	0	0

The Architect's estimate amounted to 40,676*l.*, and Mr. Lovatt's tender therefore shows a considerable saving. It appeared, however, that unless the cottages could be built for the sum of 35,570*l.* this section of the estate could not be self-supporting. We therefore instructed the Architect to modify the details of the cottages so as to secure the reduction of Mr. Lovatt's tender to this amount. A reduction to 35,519*l.* 15*s.* has now been effected in agreement with Mr. Lovatt, and as this firm has frequently done work for the Council, notably in the erection of the superstructure of the Heath Asylum, Bexley, we recommend—'That the reduced tender of Mr. H. Lovatt, amounting to 35,519*l.* 15*s.*, for the erection of 141 cottages on Section A of the White Hart-lane Estate, Wood Green, be accepted; that the Solicitor be instructed to prepare and obtain the execution of the necessary contract; and that the seal of the Council be affixed to such contract when ready.'"

Mr. Dew said that if the work could not be given to the Works Department, it was a pity to give it to a provincial contractor, as in doing so they would lessen the supervision of the work, and as there were a large number of London carpenters and joiners who could not find employment. Every time work was given to a provincial contractor the housing difficulty was aggravated. He thought that the contractor in this case should do what was being done in connexion with the Tooting Housing Scheme, and put up joiners' shops on the estate so as to ensure proper supervision. He formally moved to that effect.

Mr. R. Williams seconded.

Mr. Torrance said that in this matter London and England were one and inseparable. If there was one part of England more than another which depended on the whole country it was London itself.

Mr. Howell J. Williams said it was largely a matter of rates and taxes. Country builders were invading London because of the lower rates and taxes in the provinces. If joiners' shops were erected on the site there would be difficulty as to beneficial occupation, and if the amendment were agreed to Mr. Lovatt would not be able to carry out the work at the price of his tender.

The amendment was lost, after which the recommendation of the Committee was carried.

The Committee also reported as follows:—

"On May 26, 1903, the Council referred to us the following tenders for the erection of Barnaby Buildings, Leroy-street, Bermondsey:—

Messrs. Smith & Son	£15,300
Messrs. Holloway Bros.	15,816
Mr. H. L. Holloway	15,847
Mr. A. Porter	15,884
Messrs. F. & T. Thorne	16,472
Messrs. Leslie & Co.	16,660
Messrs. Stimpson & Co.	16,780
Messrs. F. & H. F. Higgs	16,935
The General Builders, Ltd.	18,997

The Architect's estimate amounted to 15,800*l.*, and Messrs. Smith's tender therefore shows a saving. It appeared, however, that unless the buildings could be built for the sum of 14,860*l.* they would not be self-supporting. We therefore instructed the Architect to modify the details of the dwellings so as to secure the reduction of Messrs. Smith's tender to this amount. A reduction to 14,787*l.* 0*s.* 7*d.* has now been effected in agreement with Messrs. Smith. The result of the usual inquiries with regard to this firm is satisfactory, and we recommend—'That the reduced tender of Messrs. W. Smith & Son, amounting to 14,787*l.* 0*s.* 7*d.*, for the erection of Barnaby-buildings, Leroy-street, Bermondsey, be accepted.'"

The recommendation was agreed to.

Ventilation of Sewer.—The Main Drainage Committee recommended, and it was agreed—

"That the expenditure of a sum not exceeding 1,200*l.* be sanctioned in respect of the erection of twelve ventilating columns along the lines of the Hackney Wick to Abbey Mills relief sewer and the Hackney Wick branch sewer; that the columns be obtained of Mr. Joseph Aird at a cost of 30*l.* each; and that the work connected with the fixing of the columns be carried out by the Works Department as a jobbing work."

Southern Outfall Sewer: Deptford Pumping Station.—The same Committee recommended, and it was agreed—

"That the expenditure of 60,000*l.* be sanctioned in respect of the erection of a new engine-house and the execution of other underground work at the Deptford pumping station; that the work be carried out by the Council without the intervention of a contractor; and that the drawings, specification, and estimate be referred to the Works Committee for that purpose."

Motor Omnibuses.—The Public Control Committee recommended that the Local Government Board be informed that the Council see no objection to the regulations being amended in order that motor omnibuses of a width of 7 ft. 5 in. may be used. This gave rise to some discussion, but the recommendation was agreed to.

District Surveyor for West Wandsworth.—The Building Act Committee reported as follows, the recommendation being agreed to:—

"We reported to the Council on May 26, 1903, that we had considered as to the arrangements to be made for appointing district surveyors to certain districts which were vacant, including the district of West Wandsworth. We also stated that the three candidates whom we considered the most suitable for appointment to this district were Mr. L. R. Ford, Mr. R. D. Hanson, and Mr. F. R. Farrow, and we recommended that Mr. Ford should be appointed. The recommendation was not, however, considered by the Council, as a letter, dated May 26, 1903, was received by Mr. Ford stating that circumstances had arisen which would prevent his accepting an appointment as district surveyor. Mr. Ford has since asked to be allowed to withdraw this letter, and has given a satisfactory explanation of the circumstances which led to the withdrawal of his candidature. We therefore recommend—'That Mr. Lawton Robert Ford be appointed District Surveyor for the district of West Wandsworth as from and including August 1, 1903, on the conditions laid down in the Council's standing order relating to the appointment of district surveyors.'"

Holborn to Strand: Sale of Land.—It was agreed that, subject to the terms of an agreement to be prepared by the Solicitor, the freehold of the land at the corner of Kingsway and Holborn, and shown by pink colour on the plan, presented to the Corporate Property Committee on June 22, 1903, be sold to the Great Northern and Strand Railway Co., in accordance with the provisions of that Company's Act of 1899, for the sum of 60,000*l.*

Size of Rooms in Cottages.—The Housing of the Working Classes Committee brought up the following Report:—

"On December 3, 1889, the Council approved and adopted what have since been known as the 'Building Regulations.' These regulations were made in the form of suggestions, and in this way dealt with the size of rooms in dwellings for the working classes. Their provisions on this matter are as follows:—

'*Size of Rooms.*—The number of rooms to be

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provided in each tenement and their sizes have been considered as one question, and the following may be regarded as minima:—1. In a one-roomed tenement the minimum superficial area should be 144 ft. This would conveniently be provided in a room measuring about 12 ft. by 12 ft. 2. A two-roomed tenement should have a similar room, with an additional room containing 96 super ft., or measuring 12 ft. by 8 ft. 3. A three-roomed tenement should have a large room containing 144 ft. in superficial area, and two rooms each containing 96 ft. These sizes, however, should not be rigidly fixed, but rooms of various sizes should be provided. Four-roomed tenements need not be provided, but if they are, the fourth room should be of about 100 ft. superficial area. It would be convenient as regards planning, and also as regards the population to be accommodated, that some little variety should exist in the sizes of the rooms in each tenement as well as in their number, in order to provide for the different conditions of the families.'

These regulations have been regarded by the Council as suggesting an ideal for block dwellings, from which we should not recommend the Council to depart. Indeed, these minimum sizes of rooms are insisted upon by the Secretary of State in all dwellings, the plans of which he is called upon to approve, and in regard to block dwellings we look upon them as minima which are irreducible.

Since these regulations were adopted by the Council a great development in policy has taken place, and whereas at that time only block dwellings were contemplated, at the present day by far the larger portion of the Council's work consists in the erection of cottages on estates lying upon or outside the county boundary. In the planning of these cottages we are obliged to take into account other factors than those which regulate our action in regard to block dwellings. In particular, the persons who occupy these cottages insist upon having one room in their tenement which can be set apart for occasional or ceremonial use only. The lack of such a room forms a reason why many applicants have declined the accommodation otherwise suitable which has been already provided on the Totterdown-fields Estate, while in other cases tenants are actually using a small kitchen-scullery, containing only 74 sq. ft. or thereabouts, as a living-room, devoting the living-room of 144 sq. ft. to the purposes just alluded to.

Having regard to these facts, we are compelled to conclude that some change in the present design of cottage is necessary. And in this connexion we may draw attention to the advantages of air and light which are enjoyed by tenants of cottages, both by reason of the broad roadway in front and the small garden attached to each cottage in the rear. At the same time, however, we are convinced of the undesirableness of reducing in any way the cubic space per person which is represented by the minima to which we have referred. Without, therefore, intending that anything shall be done in this direction, we desire to be at liberty to divide the minimum cubic space to be provided in any cottage in the manner best calculated to suit the comfort, convenience, and health of the tenants, and not to impose upon them conditions which will cause a large amount of space to become useless. The space which is to a great extent wasted in the parlour or ceremonial room which our tenants insist on might partially be thrown into the living-room or scullery, to the great advantage of the family occupying the cottage.

To illustrate this we may revert to the case of the tenants on the Totterdown-fields Estate, who are using their kitchen-scullery as their living-room and their living-room as their parlour. The total cubic space in these two rooms is 1,753 ft., divided into living-room (parlour) 1,224 cubic ft—that is, 144 sq. ft., and kitchen-scullery (living-room) 529 cubic ft.—that is, 74 sq. ft. Were we permitted to give a parlour of, say, 70 sq. ft., a kitchen or living-room of 148 sq. ft. could be provided, thus affording the same amount of cubic space, enabling the tenants to live under more healthy conditions, and at the same time meeting their very natural desire for a separate room in which could be secured that privacy which in the single living room of a family is impossible.

In a word, our object is to provide cottages similar to those which are built on the best-managed estates in the country, such as those of the Duke of Bedford, Lord Portman, and others. We do not desire in any way to compete with the jerry-builder either in the reduction of the quality of the building or of the amount of cubic space, but simply to be able to rearrange the accommodation for the provision of more practical comfort for the Council's tenants.

In the illustration quoted above we have dealt only with the rearrangement of a living-room and kitchen-scullery. Variations in design upon the same principle could be multiplied indefinitely, both as regards living-rooms and bedrooms, and it is upon these lines that we desire the Council to permit us to work. Where an arrangement of rooms is made as outlined above, it will, we think, be well to reckon the small room provided as accommodation for one person only. If this method of calculation be adopted the maintenance of the present minimum amount of cubic space per person can be readily proved. We may mention that at present the average number of persons in occupation on the Totterdown-fields Estate is 1·2 per room instead of the 2 per room, upon which basis the number of persons provided for is always calculated.

We recommend—'That, without in any way diminishing the quality of the constructional work in the Council's cottages or curtailing the area of the living space provided, the Housing of the Working Classes Committee be permitted to rearrange the rooms so as to allow of the provision of the same number of rooms or cubicles of varying sizes in lieu of all rooms being of a compulsory minimum size.'"

Mr. Robert Williams moved a reference back.

The Rev. Fleming Williams declared that the Council's rooms were likely in ten years' time to become foul and pestilential dens.

Mr. Burns said that that statement was exaggerated to the point of grotesqueness and was ridiculous from every point of view. The parlour of the working man and middle-class man was too often nothing but a museum of wax fruit, the family Bible, and dusty antimacassars—a museum that only the doctor, the undertaker, and the insurance man were allowed to enter.

The Committee's recommendation was carried, eleven members voting for the amendment.

The Council adjourned at 6.30 p.m.

METROPOLITAN ASYLUMS BOARD.

AT the ordinary fortnightly meeting of the Managers of the Metropolitan Asylums Board, held at the offices of the Board, Victoria Embankment, on Saturday last week, Sir R. Hensley in the chair, a Report was received from the Finance Committee dealing among other matters with the drainage of Millfield. The Committee recommended, and it was agreed, "That application be made to the Local Government Board for an order authorising the Managers to incur additional expenditure not exceeding the sum of 3,468*l.* in connexion with the drainage, water supply, and enlargement of laundry, &c., at the Millfield Homes." The Hospital Committee submitted a Report dealing with a proposal to erect a covered way between the patients' ironing-room and corridor. The Report stated that the Committee had considered a letter received from the Local Government Board on the subject, in which that Authority desired to be acquainted with the reasons which had led the Managers to consider such a covered way necessary. The Committee pointed out that as the proposed structure would be of corrugated iron roofing, unlined, with wooden rafters and supported by iron pillars, the possibility of a fire being spread by means of it was extremely remote. They recommended, and it was agreed, to forward to the Local Government Board a copy of the Report (June 18, 1903) of the Hospital Committee in regard to the proposed covered way. The same Committee recommended that in view of the accommodation for small-pox now possessed by the Board at Long Reach and Joyce Green, the Gore Farm Hospital be no longer reckoned as a small-pox hospital. This was agreed to. The Report of the Works Committee contained a reference to some proposed workshops at Darenth Asylum. The original estimate for their erection, made by the late Surveyor to the Board, was 2,100*l.* The present Engineer now reported that the cost would be 2,563*l.* It was agreed to communicate with the Local Government Board. The same Committee recommended, and it was agreed, to accept the offer of the County of Surrey Electrical Power Distribution Co. to supply electric current to the Southern Hospital at 3*d.* per unit.

Books.

Spons' Architects' and Builders' Price-Book, with Useful Memoranda and Tables by W. Young, Architect. Thirtieth Edition. Edited by CLYDE YOUNG, A.R.I.B.A. London: E. & F. N. Spon. 1903.

THE editor of this work boasts of the fact that it has arrived at its "thirtieth edition." We are afraid, however, that much of the matter of this edition will be found to be very little more up to date than that contained in some of those of many years ago. In fact, we doubt whether, if this had not been an annual volume, it would have reached anything like a "thirtieth edition." We have previously pointed out to what an extent the stereotyper has been considered to the exclusion of that far more important personage, the reviser, and we would strongly advise the editor to enter upon the fourth decade with a thorough revision, necessitating in great part rewriting. This course has been adopted with other works of this class with great advantage to their usefulness as works of reference. The items termed "Sundries" at the end of the book, including such "*sundries*" as rolled-steel joists and Robin Hood and Howley Park stone, have been in the undignified position of following sundry tables and general notes for some years now, and might with advantage be incorporated with their respective trades. The weights of the former differ from those in the body of the work. The latter, in fact, bore such a suspicious resemblance to the weights of rolled-*iron* joists of many years ago that we, out of curiosity, turned up the volume of 1886 (the thirteenth edition), and we find that the editor's idea of revision has been to insert the word "steel" in place of "iron" in the heading, leaving the weights as they were. This will give some idea of the sort of thing we complain of. The prices of steel "from 11*l.* to 20*l.* per ton" can hardly be considered a very definite guide as to value. Nothing short of a wholesale revision will enable this work to take its proper position in the list of useful annual volumes.

Estimating: A Method of Pricing Builders' Quantities for Competitive Work. By GEORGE STEPHENSON. Fifth Edition. London: B. T. Batsford. 1903.

THE fact of this work having reached a fifth edition is *some* indication of its continued and well-merited popularity. The writer is obviously a master of his subject, and the analyses, although generally sufficiently detailed, are not so pedantic as is sometimes the case with works of this sort. In a few cases, however, the detail might with advantage be subdivided somewhat. The writer, probably from his experience, has good grounds for the prices he gives, but taking the case of chimney-bars and guard-bars on pp. 122 and 123, for instance, "cost of labour, say 6*s.*" in the case of the former, where the material costs 10*s.*, and 12*s.* in that of the latter, where the material also costs 12*s.*, seems rather a large proportion to "jump" at. The prices generally are well up to date, although the plasterer's work is rather lower than we have been fortunate enough to get even in closely contested competitions. We are somewhat surprised that the author's mind is still in doubt as to the exact meaning of the words "prime cost," *vide* pp. 6 and 123. We have never yet found a builder who could substantiate his contention that "prime cost" and "list price" were synonymous terms. Take gas tubing as an extreme case (which the author does not get in his bill, and thus does not give us an opportunity of learning his views upon such an extreme case). We do not think that any builder would contend that "prime cost" meant the "list price." To save the dispute mentioned by the author on p. 6, it is advisable for the architect to give a definition, *i.e.*, "that it is exclusive of all trade discounts." The fact that the builder is instructed to "add profit," one would think, disposed of any doubt on the matter. Possibly Mr. Stephenson writes from the builder's point of view rather than the architect's. The work is well worthy of the position it holds, and doubtless will hold, as a thoroughly practical help to young estimators.

Rural Water Supplies. By C. J. RUSSELL MCLEAN, M.D., D.P.H., &c. London: Sanitary Publishing Co. [No date.]

DR. MCLEAN is the Medical Officer of Health for the Doncaster Rural District and the Tickhill Urban District, and this pamphlet of thirty-four pages shows that he has a practical knowledge of the difficult problem of rural water-supply. All observant persons who have lived in the country know how difficult and how urgent the problem is in many districts. Water supplies are not only insufficient, but also impure, and in many cases the source of supply is at an inconvenient distance from the houses. Dr. McLean discusses the various sources of supply and places deep-well water first in order of merit, and rainwater (if properly collected, stored, and filtered) second. He deals more particularly with the supplies for cottages and small houses; this is the most difficult part of the problem, as economy must be considered to a degree which is quite unnecessary in the case of large country mansions We have pleasure in recommending the

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pamphlet to the owners and occupiers of rural cottages, and also to Parish Councillors and others whose duty it is to ensure that such houses are supplied with water pure in quality and adequate in quantity.

Lettering for Architects, Engineers, &c. Compiled by JOHN B. THORP. London: The Drawing and Tracing Office. 1903.

THIS is not a book dealing or illustrating lettering in the artistic sense, but giving alphabets of the kind of lettering, plain or what is called "ornamental" (it does not all merit that description), commonly used in architects' and engineers' offices. This is of value in one sense, as it assists to keep the lettering, whatever style may be adopted, consistent in design in all the letters. Old English, Roman of different kinds, and italic writing, are of course always useful. Among the ornamental letterings the first five are very poor; Nos. 6, 7, and 9 have character, also 12; Nos. 11 and 13 are simply ugly, likewise 18 and 20. Nos. 16 and 17 are better, the latter especially. The system of shading part of a letter and leaving the rest white looks tricky, and is not to be commended. The ornamental north points and angles will certainly not commend themselves to any draughtsman with artistic feeling. The two plates illustrating the methods of showing different rock structures, trees, &c., on plans are practically useful.

A Treatise on the Art of Glass Painting. By R. SUFFLING. London: Scott, Greenwood, & Co. 1902.

THIS is a very small book on a very large subject, and it is disappointing to find one of the craft so out of touch with anything like the intellectual side of artistic education. Out of the 138 pages which Mr. Suffling has devoted to the subject, there are really very few of interest to the student. Mr. Suffling has, indeed, taken some pains to explain the ordinary trade processes of making a stained or painted glass window. He is familiar with them himself, and his explanations are straightforward and to the point; but it is, in short, information which is given just as well in larger books on the subject; and, indeed, not a little of it may be presumed to be in the possession of any student before he begins the tiresome process of reading text-books.

The first thirty-two pages are devoted to a historical account of the art and craft of staining and painting glass, which is neither better nor worse than the majority of such condensed narratives. The first dissertation, however, which really engages the attention of the student is that dealing with the design of a stained glass window. Concerning the drawing of the cartoons for this purpose, Mr. Suffling has much to say; but the passage to which we earnestly call the attention of all who have ever drawn from the figure reads as follows: "As a rule, hands put in from the artist's imagination are usually very stiff and faulty. Recourse should, therefore, be had to a model—one's wife, children, or friends are usually handy and will stand as model (*sic*) very willingly. If such models are not to be had at the moment, one must do the best he (*sic*) can with his own hands, seen in a conveniently placed looking glass."

The student must not suppose that his term of probation is now over; he has much before him. His next step will be to find out the "nearest church or museum containing a genuine specimen or specimens of old glass, and ask permission to copy it. Such permission, on giving an assurance not to touch the glass for measurement, will never be refused; and after securing a few studies, you will then be in a fair way to try one on your own behalf The cathedral of your own diocese is sure to contain many windows from which studies may be made, and permission to copy will invariably be given by applying to the Dean, who is custodian of the whole fabric during his time of office." At this point, however, the young student might go terribly astray; indeed, he might end in a species of artistic lunacy did not Providence send Mr. Suffling into the world with more than one word of warning: "Unless you are perfectly sure that modern windows are good and true to style do not copy them, or your idea of date and style will become so confused that you will be unable to differentiate between Norman, Early English, Decorated, and Perpendicular."

We note on p. 30 that Mr. Suffling considers the following artists to have drawn successfully for glass:—Burne-Jones, Stacey Marks, and Cope. These names sound curious together, but as far as Burne-Jones is concerned, it is interesting to speculate in what light his works would be viewed by the student educated on Mr. Suffling's method.

To the bookseller it will probably appear regrettable that the author and publisher did not redeem the promise set forth upon their title-page of illustrating the book with two coloured plates and thirty-six illustrations. Only one coloured plate is noticeable, but we do not complain. We should have been content without that coloured plate. Nor can we see any sufficient reason for the existence of Mr. Suffling's book. A great deal of it, certainly, is perfectly correct, a small portion useful, and a number of passages exhibit the thought of a man who is a keen workman fond of his craft. We have pointed out some of the foolish passages, and we shall not be going too far when we remark that the wise sayings in it are better said elsewhere. As Mr. Suffling naïvely remarks: "the public libraries of large cities sometimes contain books which will help one in studying glass painting."

Intarsia and Marquetry. By F. HAMILTON JACKSON. London: Sands & Co. 1903.

As a rule, a handbook series constitutes an ugly trap to the serious, though, perhaps, unwary, student. Each book of the series is not unfrequently superficial, owing to the undue haste forced upon an author in the preparation of his manuscript, in order to take the required place in the procession of books which the publisher has designed for the public. If, however, Messrs. Sands' series called "Handbooks for the Designer and Craftsman" can be judged by Mr. Jackson's volume on "Intarsia and Marquetry," the whole collection of books will prove a very conspicuous exception to the usual conditions of such publications.

In English there is not a single important book on the subject of what, for the moment, we may call "wood inlays," and it is notorious that the furniture of our own best periods exhibits no anxiety to make use of such work in a very elaborate scheme. Indeed, it is very surprising to note how little English marquetry there has been, and how few of the known examples may be considered as free from Dutch influence.

It may be doubted whether the very elaborate historical survey of the two arts embraced in the title of Mr. Jackson's book be not somewhat out of place in a work produced for the designer and craftsman of to-day, for, although every word should be of immense interest to cultivated people, there is a very generally expressed dislike amongst certain latter-day persons engaged in the minor arts to any information concerning the history of the craft they practise. "Archæology," we are told, "is all very well for clergymen—of leisure." However, Mr. Jackson's book is one of those likely to assist in repairing the lives of certain young craftsmen with loosely-jointed intellects.

By "Intarsia" the author means "those inlays of wood in which a space is first sunk in the solid, to be afterwards filled with a piece of wood (or sometimes some other material) cut to fit it." By "Marquetry" we are to understand "the more modern practice of cutting several sheets of differently coloured thin wood placed together to the same design, so that by one cutting eight or ten copies of different colours may be produced, which will fit into each other and only require subsequent arranging and gluing."

This last definition is not conspicuous for its clearness of expression; nevertheless, the various processes are well explained in one of the closing chapters. We have already referred to the wealth of historical matter of vast interest to those not only fond of the craft itself, but of the memory of the great masters in it, which Mr. Jackson has got together in this small compass. From this part of the matter it is impossible to quote. Of this historical survey in general, it may be said that it deserves a more important volume.

One becomes conscious here and there of a feeling of disappointment that more criticism is not introduced into the body of the text, at the moment that one's eye falls on the reproductions of Italian and other masterpieces. The last chapter but one, however, is critical in spirit. Nevertheless, in it there is but scant reference to many of the works about which one desired more critical information whilst perusing the text. Even from this small chapter, however, it is not hard to see that the author is not only an antiquary but a critic, and the publishers are to be congratulated in having secured Mr. Jackson's services for two more books in the same series which demand very similar knowledge and discernment—"Mosaic and Marble Inlay" and "Mural Painting."

Journal of the Architectural, Archæological, and Historic Society for the County and City of Chester and North Wales. New Series. Vol. IX. Chester: Griffith. 1903.

OUT of a total number of seven papers printed in this volume four are by the Ven. Archdeacon Barber, and deal with various parts of Chester Cathedral. The papers were read at meetings of the Society, and three in the Cathedral itself, and describe the cloisters, the stalls, the south transept, and the discovery of the tomb of Ralph Higden, whose supposed authorship of the Chester "miracle" plays is dealt with in another place in this volume. The papers on the Cathedral are well illustrated by an interesting series of photographs giving details of the bosses in the cloister roof, and the elaborate carving on the well-known choir stalls and their canopies. As a frontispiece is given a photograph of the interior of the south transept, as restored in memory of the late Duke of Westminster, showing, in the foreground, the monument and effigy surrounded by a wrought-iron and bronze grille, which has been recently placed under the central arch of the western arcade.

Particularly beautiful is the bench end of the Dean's stall (facing p. 55) with its tree of Jesse, and quaint seated figure of a Palmer or Pilgrim. A tree of Jesse, on a miserere in the Church of St. Michael at Coventry, which has been formerly illustrated in the *Builder*, is an interesting example of the way in which this favourite subject was adapted to a different purpose and position. Three photographs of misereres in Ludlow Church illustrate a paper on "Ludlow and the Masque of Comus," and give good examples of mediæval headdresses. At the end of the volume is an account of excursions made by the Society, including visits to the Priory of Much Wenlock, and the Cistercian Abbey of Basingwerke near Holywell, of which an account and illustrations are promised in a coming volume. There is a good index to the contents, and the volume generally is of considerable interest and value.

Newquay: The Vale of Lanherne and Perranzabuloe. No. 27 of "Homeland Handbooks." By FANNIE GODDARD. London: The Homeland Association. 1903. 6d.

THIS is one of the useful little books published by the Homeland Association, in which information is given as to the history and the objects of interest in connexion with various neighbourhoods in England. The district dealt with here does not present many objects of architectural interest, so that the account is more concerned with the natural beauties of the coast and with Cornish legend; though the neighbourhood of some interesting archæological relics is pointed out, and the route to get to them. The numerous visitors who choose Newquay as an autumn seaside resort would do well to get the book, so as to have some knowledge as to what is of interest in the neighbourhood.

Subject List of Works on Architecture, Building, and Construction, in the Library of the Patent Office. London: at the Patent Office. 1903. 6d.

FEW people connected with the architectural profession and the building trades are probably aware what a large and valuable collection of books on architecture and construction is to be found in the library of the Patent Office. A glance at this catalogue, which can be had for 6d. from the Patent Office, will enable them to judge for themselves. If we are correctly informed, the library is open to the public for reference, without restriction of any kind.

List of Shipping Marks on Timber. 1903 Edition. London: William Rider & Son.

THIS work, dealing as it does with the almost limitless subject of shipping marks on timber

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will be found of great value to all those connected with the timber trade, either as merchants or (and this applies to the major portion of those to whom this journal appeals) as users in the building trade. It consists, in the first place, of a list of shippers and their agents; secondly, of the different timber-shipping countries, with the ports, the shippers from those ports, the marks of the different qualities, and the average production. This section is also rendered more useful by charts of the various districts. The third portion of the work is taken up by an alphabetical list of the various marks, with the names of ports of shipment, the quality, and a cross reference to the earlier section giving the name of the shippers. The whole work is a marvel of careful compilation.

TRADE CATALOGUES.

Messrs. Drew-Bear, Perks, & Co. send us a pamphlet containing illustrations showing examples of the various classes of work undertaken by them. Several of these relate to modern theatre construction in which an unobstructed view of the stage from all parts of the auditorium is aided by carrying the "circles" on cantilever construction. Two interesting photographs are given of the steelwork for the roof of a large mansion in Kent, erected to the architect's design and specification. Others show portions of manufacturing works, market buildings, railway bridges, and dock bridges. A drawing is given of a bascule bridge for docks in the South of England, the bridge having a clear span of 60 ft. and a width of 24 ft. The design provides for electric motors of sufficient power to open the bridge in one minute, and hand-power gear for use in case of emergency. At the end of the book there is a list of steel sections kept in stock in London.

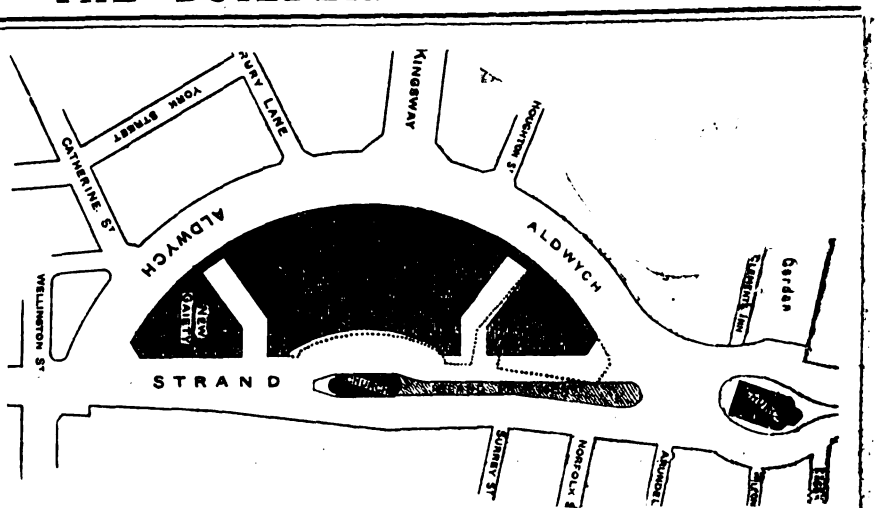
The Pennsylvania Steel Co., of Steelton, Pennsylvania, U.S.A., send us a souvenir containing a short description and pictorial history of the construction of the Gôkteik Viaduct, Mandalay, built in the company's bridge works at Steelton. This structure, erected for the Burma Railways Co., spans the Gôkteik Gorge formed by the Chungzoune River. It consists of fourteen 30-ft. single towers and one 60-ft. double tower, with ten 120-ft. lattice-girder connecting spans and seven 60-ft. plate-girder connecting spans, two of which are supported at their adjacent ends on a short "rocker bent." The total length of the viaduct is 2,260 ft., its greatest height being 320 ft., and it affords accommodation for two railway tracks and a footwalk for pedestrians. The book contains a large number of photographic views illustrating the works of the company at Steelton, and the viaduct in various stages of construction.

The General Electric Co., of London, send us their catalogue of "Freezor" fans. These appliances are shown in various types—as desk fans, arranged with a universal joint, so that they may be adjusted in any desired position; bracket fans for attaching to wall; and ceiling fans of several designs. Any of the standard fans made by this company can be fitted with Coleman's patent deflector, a device which is very useful in places where it is desired to distribute the air over a large area. The ceiling fans described are of different designs suitable for restaurants, halls, rooms, and ships' cabins, where an artificial breeze without draught is required. The same catalogue contains particulars of exhaust and ventilating fans and blowers, also of speed regulators suitable for any of the fans mentioned.

Messrs. Holt & Willetts, of Cradley Heath, send us their catalogue of electric elevators, giving a description of the safety self-sustaining, hoisting machinery and miscellaneous appliances manufactured by them, together with illustrations of electric passenger and goods elevators, belt and hand power hoists, pulleys, blocks, hoisting crabs, cranes, and jacks. The self-sustaining arrangement of this firm is employed in combination with tooth-wheel gearing and belt pulleys, and it is claimed that the device is absolutely reliable, and that the desired result is attained without perceptible friction or shock on any of the working parts.

We have received from Messrs. George Farmiloe & Sons, of 34, St. John-street, E.C., a copy of their catalogue No. 9, containing nearly 200 pages of illustrations, descriptions and prices of sanitary fittings of various kinds, including baths, lavatories, sinks, water-closets, earth-closets, urinals, &c. In addition to these, there are fifty pages devoted to stoneware and iron drain-pipes, traps, channels, drain-testers, manhole-covers, and other drainage fittings. These are followed by soil-pipes. Another section deals with inlet and outlet ventilators, and others with cocks and valves of different kinds, fire-extinguishing appliances, plumbers' brass-work, heating-apparatus boilers, pipes and fittings, pumps, stable-fittings, lead and iron tubes, bells, paints, zinc and galvanised-iron goods, glass, &c. The catalogue runs to 588 pages, and contains a complete index. It is well printed on good paper, and is one of the most comprehensive catalogues we have received. Both architects and builders will find it a very useful work of reference.

We have received from Messrs. Bell Bros., of 41, Corporation-street, Manchester, a catalogue containing illustrations and descriptions of the Bell patent apparatus for purifying and softening water required for manufacturing processes and other purposes. The most important part of the purifying apparatus is the filter, and the special feature of this is the arrangement for cleaning the filtering material. The filter has a drum-shaped shell of steel, which is nearly filled with filtering material. A hollow shaft forms the vertical axis of the drum, and to this shaft horizontal hollow arms are attached, the arms having a number of spikes or teeth like the teeth of rakes. To clean the filter, filtered water is allowed to flow upwards through the material, and a stream of water is also passed into the hollow arms from which it escapes through back-valves. The arms are also made to revolve, thus loosening the material and allowing the dirt to be washed upwards and to escape with the water at the top of the filter. The method of washing appears to be thoroughly efficacious. The pamphlet contains a number of excellent illustrations of plant now in operation, and can be recommended to manufacturers and others.



Proposed Revised Laying-out of the Strand (the Dotted Line shows the Frontages as at present settled).

Correspondence.

FURTHER STRAND IMPROVEMENT.

SIR,—The suggested revision of the line of frontage on the north side of the new Strand, between the two churches, has gradually gained adherents since Mr. Hamo Thorneycroft first called public attention to the matter, and a preliminary meeting of supporters will be held on Friday, at Essex Hall, Essex-street, Strand, at 2.30 p.m., to consider the question and determine what course should be taken to induce the County Council not to extend the building line of Aldwych into what should be the road-way of the Strand.

I send you a revised plan of the suggested modifications.

MARK H. JUDGE.

*** To this plan, as far as architectural considerations are concerned, we see no objection, as it preserves the symmetrical laying out of the street line. Mr. Thornycroft's original proposal, as we pointed out, was objectionable, because it destroyed what was intended as a symmetrical plan.—ED.

HULL TOWN HALL DESIGNS.

SIR,—As I approve your criticism of the insufficient estimate of 9d. per foot cube for my design, I write to point out that my report provided this sum only for the general bulk of the building, and added for architectural features and other works, not properly included in a general cube in my opinion, 23,483*l.* more. This would give an average price of 11¾d. per foot over everything for my design.

Cubic foot estimating in one item of price by competitors is too uncertain to be even a general guide. Where an assessor is employed the pricing of cubic estimates can be left to his judgment, as the responsibility in any case becomes his so soon as he recommends a design as capable of erection for the sum named.

Thanking you for the too generous terms of your criticism.

BERESFORD PITE.

BUILDING BY-LAWS.

SIR,—Noticing the letter in your issue of to-day from the Secretary of the Building By-laws Reform Association, and being in sympathy with the aims of that body, may I draw attention to a point that sometimes gives trouble?

Local Authorities often disapprove plans in an arbitrary manner and refuse to give any reason, and I am informed by a lawyer that they are within their rights.

The Courts can be applied to and a mandamus would often be issued, but this means expense and loss of time. It appears to me highly desirable to obtain the insertion of a clause in building by-laws to the effect that when plans are disapproved, the authority must state their reasons, based on some specific and intelligible grounds.

June 26. G. A. HUMPHREYS, *Architect.*

BUILDING TRADES' EXHIBITION, AGRICULTURAL HALL.

SIR,—Referring to your issue of the 20th ult., I beg to thank you for your kind appreciation of expanded metal and its uses; but there is one matter to which I should like to call your attention. You mentioned that there were no examples of encasing columns and girders in our recent exhibit. This is not correct, as two of the stanchions, forming part of the exhibit, were encased with expanded steel lathing, and plaster, and two were merely encased with expanded steel lathing in order to show the application of the metal. I send you by separate post a photograph of the company's stand, which clearly shows the stanchions encased as I have stated.

ARTHUR S. GRAY,
Secretary.
New Expanded Metal Company.

The Student's Column.

CONCRETE—STEEL.

INTRODUCTION.—In no other art are the traditions of the past treated with greater reverence than in architecture. Hence it follows naturally that in no other department of practical science are the distinguishing features of early examples reproduced with greater fidelity than in modern building construction. Of course, these statements are merely intended in a general sense. Nevertheless, it is true that the classical orders of architecture remain as the standards of the present day, without alteration and without

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addition, and that in general building construction the materials employed and the methods followed are practically identical with those employed and followed for hundreds and even thousands of years. Art and science, both inherent parts of architecture, stand each on a separate footing. Art is an inspiration. It is not progressive, although the ideas evolved by great minds may be taught to lesser minds. Science, on the other hand, is no gift of the gods. All the facts upon which it is based have been gathered with much labour from the great storehouse of Nature. It is distinctively progressive, and the knowledge handed on from one generation to another continues to grow as the ages roll on. Thus we find the natural tendency of art and science in architecture is to pull in opposite directions. One wants to adhere to the spirit and forms of the past, and the other wants improved constructive methods, which may or may not interfere with preconceived standards of artistic design. We have only to look around to see the evidences of this constant struggle. Art is perfectly satisfied with stones or bricks piled one above the other and lightly held in place by mortar or kindred material, so that the stability of structures so designed depends almost entirely upon the weight and compressive strength of the materials employed. Science demands improved methods in which the complex stresses encountered shall be resisted by materials so constituted and so employed that physical properties other than that of compressive strength may be utilised. The first evidence in recent times of this new demand came with the application of cast-iron in buildings, to afford strength and stiffness with a minimum expenditure of material. Then came wrought-iron, a better material; and finally steel, one better still. But it happened, as a consequence of inherited views upon the question of design, that the iron and steel members were not employed in the most scientific manner. Instead of being rigidly connected together and braced so as to form a complete system, of which the members should be capable of affording mutual aid one to another in resisting strain, the iron or steel columns, stanchions, and beams were loosely built into the brickwork. Thus the effect could be no more than local, the valuable properties of the new material could not be fully developed, and the general scheme of construction was not essentially improved. To realise what science could do when unfettered by traditional art, we have only to turn to such works as the Crystal Palace, an early example of scientific construction in cast iron; and to numerous other structures, that need not be mentioned by name, as exemplifying the correct manner of employing wrought iron and steel for the satisfactory resistance of complex stresses. Turning again to ordinary building construction, we find the fact soon became recognised that it was inadvisable to insert steel members in a casual and disjointed sort of way. Consequently there grew up the "steel cage" and "skeleton" systems of construction largely practised and highly developed in the United States, and employed to a considerable extent in this country. It is true that a difference exists in the practice of the two countries. In America, the system is unblushingly adopted, and it is openly admitted that the steel work is merely veneered with stone, terra-cotta, or other material. In Great Britain more diffidence is exhibited, and the steel frame is solidly encased as if to keep up the fiction that we are still adhering to stone or brick for strength and stability. After all, this is merely a fiction, and if their steel frames were suddenly taken away by the hand of a magician, hundreds and thousands of buildings in this country would come to a sudden and untimely end.

Art has never been entirely favourable to steel frame construction, but has been dragged into it, so to speak, by science, and architects have generally entertained some doubts as to its desirability for ordinary buildings. While the preservation of steel properly embedded in concrete is beyond dispute, its endurance when merely cased in building stone, brick, or terra-cotta, is an unknown quantity, and the question is now being asked, even by engineers, whether steel is really the most suitable material for many of the purposes to which it has been applied during recent years. For the construction of railways, bridges, steamships, exhibition palaces, market halls, water conduits, and other works where steel is openly and avowedly used, it is in every way suitable and appropriate. In the erection of houses, office buildings, warehouses, factories, churches, and public buildings generally, it may properly be used for multifarious purposes, but it is quite open to question whether it should form the skeleton in which is vested the strength of the building itself. The writer himself asks this question in the hope that every one of his readers will consider it upon its merits, and without prejudice against or in favour of steel. One thing is quite certain, that in the present state of building construction, steel framework cannot be abandoned unless some efficient substitute be provided. For works of monumental character by all means let us keep to stone, a material which possesses all the inherent qualifications that are necessary for strength and almost unending durability. For less important works, massive brick construction, only second to stone in excellence, has become almost a thing of the past for the ordinary private buildings of most large towns. It has been followed first, by the flimsy structure of brick alone, or of brick with invertebrate metal members, and then by the more stable construction of brick with a substantial framework of steel. Of these latter classes one could be lost without being missed, and the other is that for which an approved substitute has yet to be found.

The opinion has been expressed, and is one which appears to grow in favour, that a solution of the problem is to be found in the combination of the old with the new, in the union of concrete with steel so effected that the desirable qualities of each material may be supplemented by those of the other. Concrete itself is by no means new to the building world. Early in the present era, Vitruvius Pollo wrote of concrete as one of the most valuable building materials known, and as one which had been used for many centuries in constructive works where strength and durability were most essential. The dome of the Pantheon in Rome, more than 140 ft. in diameter, was, practically, built of concrete, and remains to this day after standing for nearly 2,000 years. A concrete floor in the House of the Vestals with a span of 20 ft. and a thickness of 14 in., and the Aqueduct of Vejus are further examples of early concrete construction, while others are to be found in the remains of ancient buildings in Greece and Mexico. The walls of Reading Abbey appear to have been of stone with a concrete core, the concrete still remaining although the stone has long since disappeared. As additional evidence of the durability of concrete it may be mentioned that the fortifications of Badajos still show the print of the boards used in moulding the concrete work. If lime concrete, as employed in early times, shows such remarkable qualities, there is sufficient reason for confidence in the durability of concrete made with Portland cement of the excellent quality now available. So far as steel is concerned there is every assurance as to strength, its only weak point being that of susceptibility to climatic influences. As the physical strength of steel is valuable for supplementing that of concrete in which it may be embedded, so what may be called the "constitutional" strength of concrete is valuable in preserving steel from corrosion. Upon this aspect of the case there is ample evidence of a satisfactory nature. Numerous instances are recorded of iron having been embedded in mortar for ages without appreciable change in condition. Iron clamps laid in mortar joints in the Parthenon have been uncovered and found to remain in good condition after a period of fully 2,000 years. Other examples are cited in which ironwork has been found in a perfect state of preservation after having been imbedded in lime mortar for upwards of 500 years. Among more recent experience may be mentioned that of an American engineer who, while recently repairing the iron hull of a ship, had occasion to remove a portion of the cement floor, which had been laid some forty years ago. The iron beneath the cement lining was found to be absolutely free from rust. At the time of pulling down the old *New York Herald* building, after it had been built for thirty years, the architect had a search made for specimens of badly-corroded iron. None such could be found, and in places where the mortar had been in absolute contact with the paint, this was itself preserved. Again, in February, 1901, a portion of a concrete-steel water main was taken up with the result that the pipes were found in a perfect state of preservation, the steel showing not the slightest trace of oxidation.

We have, then, two materials, of which the most prominent features are respectively durability and strength. The problem is to effect their combination in a manner so that they may be employed to satisfy the requirements of artistic design and of scientific construction. The solution is not to be found in the employment of the materials separately, as occurs when steel columns are erected and cased with concrete, or when steel girders and joists are laid and buried in the concrete which forms a floor between them. It is to be looked for rather in the union of concrete and steel in such a way as to produce what is practically a new material, permitting the retention of recognised architectural forms, and of the solidity that characterises masonry construction, while ensuring ample stability, strength, and stiffness—the three essential conditions of equilibrium. Compliance with these conditions is rendered possible by the use of the composite material described by the generic term "concrete-steel," and also known as steel-concrete, ferro-concrete, armoured concrete, reinforced concrete, and in France as *béton armé*.

At the present stage we do not propose to discuss at any length the theory of this new building material, but a few introductory remarks of general character may be useful. It is well known that the use of concrete alone is limited to classes of work where high compressive strength is one of the chief requirements, as the low tenacity of concrete makes it, like cast iron, an extremely uneconomical material of construction for many purposes. Taking the case of a concrete beam supported at the ends and loaded in the centre, we find the upper or compression side is capable of supporting at least ten times the load that would cause failure of the lower or tension side. This undesirable inequality of resistance can be adjusted by embedding steel so as to take the tension encountered in the lower portion of the beam, thus permitting the strength of the upper part to be fully utilised in supporting much greater loads than would otherwise be possible. By the suitable incorporation of steel in vertical members equally satisfactory results can be obtained, and as the expansion and contraction of the two constituents under temperature changes are practically equal, the new material acts in every way as a composite structure. Further, it should be stated that concrete, when combined with steel in this way, acquires new and unexpected qualities. For example, the well-known French *savant* Considère has proved that in concrete steel beams, the concrete on the tension side will submit without rupture to a proportionate distortion of twenty times that at which it would fail in a tension test of concrete alone. He also shows that concrete can be reinforced in such a manner that the combination acquires high ductility and a crushing resistance considerably higher than the sum of the resistances of the two materials taken separately. Reference will be made later to these unexpected phenomena, which show conclusively that by the employment of concrete-steel far greater economy may be secured than is possible in commonly adopted methods of using concrete and steel. Those who make use of such methods are sometimes aware of the fact that excessive quantities of metal are employed, and that, apart from the consequent waste, the excess is frequently distributed so as to constitute a source of probable weakness, in destroying the continuity of the concrete, or a source of danger owing to its inaccessibility in case of fire. The trouble is, however, that many architects who would like to adopt concrete-steel are deterred from doing so, because at present no definite and reliable information is available in a form convenient for study or reference.

It is the object of the present series of articles to stop this gap in technical literature, so that those who have neither leisure nor facilities for independent theoretical or experimental investigation, and those who have few opportunities for seeing the latest developments of practice in structural work, may have theoretical and practical data for their consideration and guidance. In dealing with the subject chosen, the endeavour of the writer will be to preserve a strict continuity of treatment, commencing with the physical properties of concrete and steel, and the effects of their joint action. The principles underlying

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the theory of the composite material, concrete-steel, will then be discussed, and in connexion with each of the chief types of members employed in construction, the rules necessary for correct design and the precise calculation of strength will be stated and their uses demonstrated by practical examples.

Up to the present time the introduction and development of concrete-steel design has vested in various firms, each favouring some distinctive system of construction, while very few architects or even engineers have inquired closely into the claims of concrete-steel, or have adopted it in their practice. We have now a building material specially appealing to the architect as one entirely in harmony alike with the artistic and the scientific aspects of architecture. Therefore it is clearly desirable that every architect should prepare himself for the general application of the new material. It is a well-known fact that most members of the profession have hitherto relied very largely upon steel merchants and constructional engineers for advice as to the proportions of steel members to be used in brick or stone buildings. In several cases known to the writer, architects have left the design of steel-work entirely in the hands of contracting firms, candidly admitting their own inability to deal with a department of work upon which the very existence of their buildings absolutely depends. There may be some excuse for this in the fact that structural steelwork arrived at maturity before a new generation of architects had grown up, bringing with it the advantages of a modern technical education. It may also be accounted for in a measure by the assumption that the system of skeleton construction is one that does not appeal to the professional instincts of the architect. Be that as it may, it is to be hoped that concrete-steel will not be treated in a similar way. If time should bring the realisation of the hopes entertained by its advocates, concrete-steel will certainly become essentially the building material of the future, and one, therefore, that should be most thoroughly understood by all who are responsible for the design and construction of buildings. In concluding this preliminary survey, it may be remarked that while the theory of concrete-steel is now well developed, so that the material may be applied with perfect safety, its natural advantages have frequently been neutralised by indifferent methods of design and construction. An illustration of this, with which our readers are familiar, occurred at the last Paris Exhibition, and there is still a tendency on the part of some firms to take unwarranted liberties by adopting dimensions that are far less than those consistent with the prolonged duration of the structures erected. This consideration constitutes one more reason why the whole subject should be studied by those who may be concerned with it in a professional capacity.

BOOKS RECEIVED.

A BOOK OF COUNTRY HOUSES. By Ernest Newton, Architect. (B. T. Batsford. 21s.)

THE ANNUAL OF THE BRITISH SCHOOL AT ATHENS. No. VIII.; Session 1901-1902. (Macmillan & Co. 17s.)

REPORT ON STRIKES AND LOCKOUTS IN THE UNITED KINGDOM, 1902. (Eyre & Spottiswoode. 6½d.)

OBITUARY.

MR. W. DRAKE.—We have to record the death at the age of forty-nine, of Mr. William Drake, of the firm of Cowley & Drake, builders, Willesden Green. Mr. Drake's partnership commenced with work in London, and was carried on since 1880 at Willesden Green. In connexion with the firm he has carried out many important public and other works, which included Salusbury-road and Pound-lane Board Schools for the Willesden School Board, the present erection of the Chamberlayne Wood-road Board School, the Willesden Court House for the Middlesex County Council, and many other buildings. The deceased gentleman died at Plymouth, where he had been staying for the benefit of his health.

ALMSHOUSES, NEWPORT, MONMOUTHSHIRE.—The new almshouses, erected on Stow Hill, Newport, as a memorial to the late Queen Victoria, were opened recently. The buildings, which provide accommodation for nine inmates, have been designed by Messrs. Habershon, Fawckner, & Co., architects, and the work has been carried out by Messrs. Jewell & Sons, contractors, for a total cost of about 2,200*l.*

GENERAL BUILDING NEWS.

BRADFIELD COLLEGE CHAPEL.—The western half alone of the chapel at Bradfield College was at first built, and consecrated on June 29, 1892. The eastern half, including the chancel, has now been completed, and was opened on the 20th ult. The chapel now consists of a nave with aisles and a chancel, with a transept on the south side, and an organ chamber on the north. There is an ante-chapel at the west end, and a spacious vestry beneath the eastern half of the chancel. The nave and chancel are continuous without any chancel arch, the roof being similar throughout, except that in the sanctuary bay it is panelled. The arcades of the nave are very light, the columns being of Belgian granite. Above the ante-chapel there is a gallery, with an entrance from the road by means of a bridge, to be used by the boys of the junior school. The chapel stands on a terrace eight or nine feet above the level of the quadrangle at its south-west angle. There is a very simple tower on the north side, the interior of which forms the organ chamber. It is intended that a clock and striking bells shall be placed in the tower as soon as the necessary funds are available. The chapel is seated with oak benches for the boys, while stall seats run along the outer walls facing north and south. There are other stall seats at the west end, which will be used by members of the governing body when they are present. There are seats in the chancel for a large choir, with low screens behind them, which are similar in design to the panelling which lines the aisle walls. It is hoped that before long it may be possible to add a case to the organ in harmony with the rest of the fittings. The pulpit is placed east of the stalls, and is so arranged that it can be drawn out towards the centre of the chapel, so that the preacher may be in the best possible position for addressing the boys; when not in actual use the pulpit will stand against the north wall of the chancel. The altar table, sedilia, and altar rails are of oak, the credence table consisting of a marble slab supported by stone brackets. The east end has received no decoration at present, but it is intended to add a stone reredos when the funds have been supplied. The nave passages are paved with plain red tiles, while marble has been used in the chancel and sanctuary. The style of the chapel is Early Decorated. The materials used externally are brick and flint for the walling and buttresses, with Doulting stone dressings to the windows and doors. The ironwork of the doors has all been made in the village by Mr. Holloway. The contractor for the completion of the chapel is Mr. Orchard, of Banbury, the nave having been built by Messrs. Wheeler, of Reading. The work has been superintended by Mr. Tegg, the clerk of the works, while the chapel and its various fittings have been designed by Mr. J. Oldrid Scott, the diocesan architec . The decoration of the arches is being undertaken by Mr. Feldon, of Oxford.

CHAPEL, OGMORE VALE, GLAMORGANSHIRE.—A new English Congregational chapel has just been opened at Ogmore Vale. The chapel will seat about 450 persons. The architect was Mr. Jacob Rees, Pentre; and the builder, Mr. Jenkin Phillips, Nantymoel. The cost of the building has amounted to nearly 2,500*l.*

FREE CHURCH, MALVERN LINK.—The stone-laying ceremony of the new church at Malvern Link took place on the 18th ult. The church will have seating accommodation for 300. The plan of the buildings includes an entrance portico 10 ft. by 6 ft. 6 in., with a cloakroom 10 ft. by 10 ft. on the right side, and a tower 10 ft. by 10 ft. on the left side, rising to an altitude of 52 ft. The church is 60 ft. long, 33 ft. wide, with wood-block floors to the aisles, and boarding-floors under the seating portions. The roofs will have pitch-pine hammer beam principals, with matchboarded ceilings. The height from the floor line to the wall plate will be 18 ft. 6 in., and to the ceiling 29 ft. The church will be lighted by ten tracery windows with lead lights, and also a tracery window in the gable facing the road. The organ chamber will be recessed from the church in the centre of the gable, with a stone arch opening to the church. Folding doors on each side of the organ arch lead into corridors which have side entrances. The ministers' and deacons' vestries are situated at the rear of the church, the entrances being from the side doors and corridors. The heating will be by hot water on the low-pressure system. The ventilation will be conducted by means of fresh air inlet panels, and ridge extractors. The trustees have also included in the contract the erection of a lecture hall, heating chamber, kitchen, &c., which will be added later. The hall, 50 ft. by 25 ft., will be connected with the church by a corridor entering in the tower. The style of the work is Perpendicular Gothic, and the total cost will be about 4,000*l.* Mr. H. E. Lavender, Walsall, has prepared the designs, and under his superintendence the work is being carried out by Mr. Alfred Holloway, builder, of Malvern Wells. Mr. Thomas Jones is carrying out the masonry and plastering part of the work.

CHURCH, SOUTH RETFORD.—On the 22nd ult. the Bishop of Derby, Dr. Were, dedicated St. Alban's Church, South Retford. Mr. Hodgson Fowler was the architect, and Messrs. Bowman & Son, of Sleaford, the builders, and 2,800*l.* has been spent upon the fabric, which consists of chancel, choir, and side aisles, whilst at the back there is a parish room. The portion of the new church just completed will seat over 200.

CHURCH, SOUTHWICK.—The foundation-stone of a new church at Southwick has just been laid. The new church, which is dedicated to St. Thomas, is being built at the Cross Roads. It consists of a nave, 24 ft. 6 in. by 46 ft., with a deep recess at the west end, 14 ft. 6 in. by 12 ft., to serve as the baptistry; a chancel, 17 ft. by 24 ft. 6 in., with organ recess on the north side; a vestry, at the south-west angle of the nave, and a tower, to serve as entrance porch at the north-west angle. The tower will be of stone, 30 ft. high, with a timber spire covered with oak shingles and surmounted by a vane reaching to the height of over 70 ft. The roof of the nave will be an open-timbered one, and will be covered with tiles on the outside. The chancel roof on the inside will be constructed to form a barrel-vault of wood ribs and plaster panels. The pavements will be of wood-blocks and tiles. The church will be seated with chairs to accommodate about 200, and it will be warmed by means of a Musgrave stove. A feature of the church, is a sunk font at the west end for baptism by immersion; in addition to this there will be an ordinary font in the centre of the baptistry. Mr. C. E. Ponting, F.S.A., Marlborough, is the architect, and Messrs. Long & Sons, of Bath, are the builders.

METHODIST CHURCH, CATCHGATE, DURHAM.—On the 24th ult. the new church and Sunday schools erected by the United Methodist Free Church body at Catchgate, near Annfield Plain, was opened. The church, which is built of stone, will accommodate some 500 worshippers, and provision is made in the Sunday school for about 300 children. The designs were prepared by Mr. Alfred Davis, of Burnopfield, while the contractors were Messrs. Ayton & Sons, of Benfieldside. The total cost is over 2,100*l.*

ST. SAVIOUR'S, ALEXANDRA PARK, LONDON.—The foundation stone of St. Saviour's Church, Alexandra Park-road, was laid on the 25th ult. The church is to cost about 8,000*l.*, but the portion upon which a start has been made is to cost 5,000*l.* When completed, the church will consist of a nave 83 ft. long and 29 ft. wide, with aisles of the same length and 13 ft. wide, with apsidal east end, morning chapel, circular east end, organ aisle with loft and vestries. The nave and chancel arcade arches, and those across the transepts and organ loft, will be of moulded and splayed red bricks, supported by red Corsehill stone columns in the nave, and by red splayed brick piers in the chancel, where the red will be relieved by Bath stone circular shafts carried up to the roof under each of the roof principals. There will be two traceried clearstory windows in the nave, and cusped windows in the chancel. Two similar windows to those in the nave will light the aisles, and there will be a four-light tracery window in each of the transept gables. The principal feature externally will be the aisle transept gables and traced windows, and a bell turret surmounting the nave roof. The portion about to be constructed will provide accommodation for about 500 persons. Mr. J. S. Alder is the architect.—*Islington Gazette.*

WESLEYAN CHURCH, MILBURN, NORTHUMBERLAND.—The foundation stones have just been laid of a new Wesleyan Church at Milburn, near Ponteland. The church has been designed to seat over 200 persons and a vestry is arranged so that on special occasions this may be used for extra seating accommodation by means of a sliding partition. The contractor is Mr. Wm. Boiston, of Higham Dykes, the architects being Messrs. Marshall & Tweedy, Newcastle.

WESLEYAN CHURCH, LONG EATON.—The memorial stones of a new Wesleyan church, to be erected on the Derby-road, Long Eaton, were laid on the 25th ult. The estimated cost of the buildings and site is 9,300*l.* The new church, which is intended to accommodate a congregation of 750 persons, is at the junction of Derby-road and College-street. The building is to consist of nave, chancel, and transept, with the main entrance through a tower 72 ft. in height, at the south-east angle of the site, reached through a vestibule, from which access is given to the three aisles. The chancel is raised 6 ft. above the level of the nave. The choir will be seated on either side of the chancel, to the west of which is a large organ-chamber. A private entrance for the minister will be made at the north-east (College-street) end, with a minister's vestry and lavatory accommodation, whilst on the corresponding side will be a church parlour. Externally, the edifice will be composed of hammer-dressed Cox-bench stone, Hollington stone being used for all the window and other dressings. The total length of the building will measure 107 ft., the width of the nave being 31 ft. 6 in., and the aisles 4 ft. 6 in. A clock will be installed in the tower. Additions are being made to the Sunday-schools, from which communication will be had to the chapel. The classrooms which formerly existed have been removed, and the old school is being transformed into a large assembly hall. Ten new classrooms are in course of construction—five on the ground and five on the upper floor. The plans for the scheme have been prepared by Messrs. Brewill & Bailey, of Nottingham.

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PARISH CHURCH, TAVISTOCK.—Tavistock parish church, dedicated to St. Eustachius, was reopened recently after alterations at a cost of 1,500*l*. Mr. Fellowes Prynne was the architect.

SCHOOL, BEDWAS.—Mr. George G. Lewis, Chairman of the Bedwas School Board, opened a new school at Bedwas recently. The infants' school provides accommodation for 200. The new mixed school forms a detached block and has entrances for boys and girls, with suitable cloakrooms, &c. Accommodation is provided in this department for 250. The amount of the contract was 2,750*l*., the contractor being Mr. Marcus Harding, Caerphilly. The architect was Mr. J. H. Philips, of Cardiff and Caerphilly.

ASYLUM, CARDIFF.—The Cardiff Corporation Asylum Committee paid a visit of inspection to the new Asylum works at Velindra, Whitchurch, recently. The members were received at the works by Mr. Oatley, the architect, and Mr. Orton, clerk of the works. Mr. D. W. Davies is the contractor for the foundations. The cost of the entire work will probably not fall far short of 300,000*l*. There will be accommodation for about 800 patients.

BAPTIST CHURCH, BRADFORD.—The memorial stones have just been laid of the new Baptist Chapel in Horton Grange-road, Bradford. The church will seat about 540 persons, in the nave and north transept. An organ will be placed in the east end of the chapel, with choir stalls for about thirty singers. Over the vestibule and entrance halls will be constructed a gallery to accommodate about eighty persons. The school attached will be for about 600 children, and the building is arranged on the assembly hall and class-room principle. The contractors are as follow:—Masons, Messrs. Charles Booth & Son; joiner, Mr. Uneson Taylor, of Leeds; plumber and glazier, Mr. G. Jackson; plasterers, Messrs. J. & W. Bates; slater, Mr. James Smithies; painter, Mr. Walker Priestley; carver, Mr. S. Charnock; steelwork, Taylor & Parsons, Ltd.; and heating apparatus, Mr. Tom Mears. Mr. A. Sharp, of Bradford, is the architect.

FOREIGN.

INDIA.—Considerable additions are to be made to the railway station at Allahabad, and the sanction of the Government of India is being asked for remodelling the whole structure. The estimated cost is 4 lakhs of rupees.——The Military Works Department has been called upon by the Government of India to expedite their Report with respect to the reconstruction of the breakwater pier in the Royal Indian Marine dockyard at Bombay.——The Madras General Hospital is now lighted throughout by electricity, and it is intended that the punkahs shall be actuated by the same power.——The Lieutenant-Governor has sanctioned the commencement of the new port works in Rangoon. A large sum is to be provided for reclaiming the foreshore and providing a pitched slope.——The new Government buildings at Peshawar are nearly ready for occupation.——A circular has been issued by the railway branch of the Public Works Department of the government of India, with the object of eliciting opinions as to whether it would be advisable to modify any of the existing standard dimensions, which affect the clearance between moving and fixed structures on Indian railways so as to permit, if practicable, the use of vehicles of greater capacity or convenience than at present.——A scheme is on foot for the improvement of the cold water supply to the General Hospital of Madras, and Messrs. J. B. Norton & Sons, of Calcutta, have charge of the work.——The cost of the new cathedral at Cochin is estimated at a lakh of rupees when completed.——It is contemplated to extend the water supply of Cawnpore, and the cantonment is to be more efficiently drained.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Mr. F. Selby, architect, 44, Chancery-lane, has taken into partnership Mr. A. V. Kislingbury, and the practice will be carried on at the same address under the style of Selby & Kislingbury.

LEEDS CITY-SQUARE BUILDING LINE.—A meeting of the Leeds Corporation Improvements Committee was held on the 22nd ult., under the chairmanship of Mr. Appleton, when a visit was paid to City-square for the purpose of considering the question of the building line to be settled on the plot of land at the corner of Wellington-street and Quebec-street, which has recently been acquired and the buildings on which have been demolished. On the original plans the City Engineer provided for a building line set forward in conformity with the Standard Buildings on the opposite side of the square, leaving the post office recessed between the two. The Leeds and Yorkshire Architectural Society, however, urged that the building line should be set back into line with the front of the post office. After viewing the site the committee adopted this suggestion, and, subject to the approval of the City Council, have decided that the building line at the corner of Wellington-street and Quebec-street shall be in line with that of the post office.

NEW PUBLIC BUILDINGS IN LONDON.—In the House of Commons, Mr. Victor Cavendish, as representing the First Commissioner of Works, informed Mr. John Ellis that the dates for the completion of the contracts for the fabrics of the new public buildings are as follows:—New War Office, June 30 1906; New Public Offices in Parliament-street, June 1, 1907; Royal College of Science, June 1, 1905; Victoria and Albert Museum, February 23 1907; Admiralty (Block III.) say June 30, 1906 (Contract about to be made for superstructure.) Such progress is being made with the above works as to justify an assumption that they will be completed by the specified dates. In some cases it is possible that the fittings will not all be finished, but every effort will be made to avoid delay.

KNIGHTHOOD OF AN ARCHITECT.—Sir W. A. Gelder, one of the new Knights, is an architect, the senior member in the firm of Gelder & Kitchen, architects, Hull; but we presume the honour of knighthood was conferred on him rather in respect of his municipal than of his professional position. Sir W. Gelder has been for five successive years Mayor of Hull, and has had much to do in promoting city improvements. The new street adjoining the site for the new municipal buildings at Hull has been named after him.

COURT OF COMMON COUNCIL.—The usual fortnightly Court of Common Council was held in the Guildhall on Thursday last week. A Report by the Streets Committee stating that they had further considered the proposed regulations in relation to the demolition of buildings in the City, and submitting a set of by-laws prepared in accordance with Section 5 of the City of London (Public Health) Act, 1902, and recommending that the same be approved and be submitted to the Local Government Board for confirmation, was referred back for further consideration.—The Improvements and Finance Committee submitted a Report on a letter received from the London County Council relative to the preservation of the garden and the old buildings of Clifford's Inn. The Report stated that in view of the fact that the Committee were unable to charge the Consolidated Rate with any expense in the matter, they had not gone into the question. Mr. Deputy White said that he hoped the matter would not be dismissed summarily. Something should be done to secure the gardens as an open space. He moved that the matter be referred back to the Committee for further consideration. Mr. Cloudesley seconded the motion, and it was adopted.—On the recommendation of the Bridge House Estates Committee it was decided to undertake the repainting of Blackfriars Bridge at an estimated cost of 3,500*l*.

TECHNICAL EDUCATION BUILDINGS.—At Tuesday's meeting of the London County Council, the Technical Education Board reported as follows:—"Progress is being made with the London County Council Poplar Technical Institute. The work has necessarily been slow in consequence of the nature of the foundations, but there is no reason to doubt that the building will be ready for occupation next summer, and that it will be possible to commence the classes in October, 1904. The institution will be specially devoted to marine engineering, shipbuilding, navigation, and allied subjects. At the London County Council Brixton Technical Institute the workshops are roofed in, and the roof of the large hall is being boarded. The Council's Architect is preparing the drawings and specification necessary for the adaptation of the premises in Saltram-crescent, Paddington, recently purchased by the Council for the purposes of the London County Council Paddington Technical Institute, and these alterations will be carried out during the summer recess. Among the institutions aided, but not conducted, by the Council, considerable additions to the buildings are being made at the Northern Polytechnic, the South-Western Polytechnic, and the Borough Polytechnic. The new domestic economy department in the Battersea Polytechnic has been completed, and it is expected that the new buildings in the Woolwich Polytechnic will be commenced this summer. The Council is contributing towards these buildings and providing most of the equipment, but the greater part of the cost has been found by the trustees of the London Parochial Charities."

ARTISAN EXHIBITIONS.—The Technical Education Board of the London County Council reported as follows on Tuesday:—"The result of the recent annual examination for exhibitions for evening students in science and technology is more satisfactory than that of any previous session. These exhibitions have been established for the purpose of encouraging skilled artisans to attain a higher standard of work and enable them to continue their instruction for a period of two years, or in exceptional cases three years, at selected institutions. The number of entries for these exhibitions has steadily increased from year to year. At this competition over 600 candidates entered, of whom about 500 sent in exhibits of work in engineering, bootmaking, bricklaying, cabinet-making, carpentry, carriage-building, electrical fitting, French-polishing, joinery, instrument-making, metal plate work, painting and decorating, photo-process work, plumbing, tailoring, upholstery, wheelwrights' work, &c. The reports on the exhibits in the various departments have been most satisfactory, and 172 exhibitions have been awarded. Of the candidates gaining exhibitions twenty-seven had attended evening continuation schools and obtained a certain degree of proficiency in elementary experimental science, manual training, workshop drawing and arithmetic, and other subjects necessary to qualify them for successful work in polytechnic institutions. The others, 145 candidates, were adult workmen or workwomen, most of whom were already in polytechnics and technical institutes. The following list gives some indication of the trades followed by the successful candidates:—Engineers' apprentices, fitters, and metal-plate workers, 28; cabinet-makers, carpenters and joiners, 25; bricklayers, stonemasons, and plumbers, 21; upholsterers, painters and decorators, and French-polishers, 11; wheelwrights and coach-body makers, 7; electrical fitters, 5. In accordance with the Board's regulations, candidates for these exhibitions who are independent of their parents all signed a declaration that they were not in receipt of an income exceeding *x*. a week, while the parents of those candidates who are dependent have signed a declaration that they are not in receipt of incomes exceeding 4*l*. a week."

JOINT COMMITTEE ON MUNICIPAL TRADING.—At the sitting of this Committee on Thursday last week evidence was given by Mr. A. Kay, J.P., of the firm of McArthur & Co., Ltd., the second largest ratepayers in Glasgow. Witness expressed himself as being opposed to municipal trading, and criticised the financial methods of the City Council. He said it was the system in Glasgow to invest all sinking funds provided in respect of terminable loans in further works and undertakings. The result was that they were continually borrowing and never paying back, although what might be called the communal capital was largely increasing. When the time came for the payment of the loans the City Council would have no liquid assets, as a great deal of the sinking fund was invested in sewers and paving and so on, and so a fresh loan would have to be obtained to meet the obligation. He objected to this piling up of communal capital. He instanced the case of the Improvement Trust, which was started in 1866 for clearing insanitary areas, and it was authorised to buy these areas, clear them, and sell them. Very frequently too much was paid for these areas, and they could not be sold, or, at least, they said they could not sell them. So they built on them, and at the present moment they had enormous property which was the property of the Corporation, and which was carried on for trading purposes. They had warehouses, dwelling houses, and all kinds of property which should be sold and left to private enterprise to look after. By their 1897 Act the Council was authorised to build houses for the poorest classes, but experience showed that these houses were let to the Council's own officials, and the attempt to erect more had been defeated. He contended that if loss resulted in the clearing of insanitary areas that loss should be worked off by a sinking fund. As a matter of fact, the thing had developed into a building speculation. At the present time the value of the property was stated to be 1,500,000*l*., but they refused to have an outside valuer. Some of the ratepayers urged that the proper thing was to realise these properties, and the answer was that it would mean a loss of several hundred thousands of pounds. Yet in the balance-sheet it was stated to be a solvent and remunerative undertaking. The thing had become a municipal trading trust in houses.

ROYAL COMMISSION ON LONDON LOCOMOTION.—At a further sitting of the Commission, on Friday last week, evidence was given by Mr. E. Harper, the Statistical Officer of the London County Council, who described the growth of the population of London, and the great need for inducements being given to workmen to live away from the centre. He advocated the extension of cheap means of transit, and thought that railway companies might be called upon to provide them, seeing that they were granted privileges by the community. He expressed the opinion that, owing to the high price of land, it was no longer possible to build workmens' dwellings in the central area and make them pay. It was true that some of the building companies had in years gone by done so, but the land was cheaper then, and there were cases, such as that of the Guinness and Peabody Trusts, where trust money was left for the purpose, or where landowners had sold the land at much under its commercial value. The London County Council had found it necessary to write down the value of land acquired in the central area for housing purposes. The London County Council had not done much in the way of combining shops with houses. He knew that a company had built a large block of shops and houses in the Goswell-road, and they had been successful as an ordinary commercial undertaking. These buildings were, however, erected years ago, and he felt convinced that it could not be done now on commercial lines with success. Witness also thought that something could be done to solve the problem if factories and workshops were removed to the country where possible, but felt that this was a thing which must be left to the owners themselves.

THE HELLENIC SOCIETY.—The annual meeting of the Hellenic Society was held on Tuesday in the rooms of the Society of Antiquaries. Sir Richard

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Jebb, M.P., President of the Society, was in the chair. The report of the Council was read by Mr. G. A. Macmillan, and stated that the Society had been active in publication, and in assisting explor:- tion. A further grant of 100*l* had been made to the Cretan Exploration Fund. The annual grant of 100*l*. to the British School at Athens had been renewed for a further period of three years, and the Society made a small grant to the British School at Rome. A grant of 25*l*. had been made to Mr. D. G. Hogarth to assist him in exploring Greek sites in the northern portion of the Egyptian delta. Of losses sustained by death during the past year, special mention was due to Mr. F. C. Penrose, the eminent architect, who has served on the Council since the foundation of the society, and had for many years held the office of vice-president, and to Mr. Stephen Spring Rice, C.B., one of the auditors of the society. The balance-sheet showed the present financial position of the society. Ordinary receipts during the year were 1,085*l*., against 1,022*l* during the financial year, 1901-2. Eighty new members had been elected during the year, while twenty-seven had been lost by death or resignation. The present total of subscribing members was 816, and of honorary members twenty-five. Seven new libraries had joined the list of subscribers, making the number at the present time 150, or, with the five public libraries, 155. Sir Richard Jebb, in moving the adoption of the Report, made some comments, chiefly referring to researches of the society in the field of ancient Greek literature. In regard to archæology, the centre of interest during the last year, he said, had undoubtedly been Crete, and it was hoped that a special meeting of the Society would be held in October at which Mr. Arthur Evans would himself speak. Then Professor Furtwängler had unearthed a prehistoric palace at Orchomenus, and Dr. Dörpfeld had found a prehistoric settlement in Leucas. At Simos, Cos, Pergamum, Tralles, and other sites, striking discoveries had also been made. Dr. Charles Waldstein and his colleagues of the American school were to be congratulated on the recent publication of the first of the two stately volumes embodying the results of their labours on the Argive Heræum. Another valuable work of the last year was Professor Ernest Gardner's on Ancient Athens. After a brief reference to the British Academy, Professor Jebb paid a tribute to the great services and the noble character of the late Mr. F. C. Penrose. [The above is compiled from the report given in the *Times*.]

CAPITAL AND LABOUR.

SUNDERLAND JOINERS' DISPUTE.—A meeting of the Northern Counties Federation of Building Trades Employers was held on the 30th ult. at the offices of the Secretary, Mr. W. H. Hope, Sunderland. The meeting had before it the matter of the Sunderland joiners' dispute. The proceedings were private, but the following official statement was subsequently made: The Sunderland employers reported that they had refused the demand of the operatives for an advance of a ½d. per hour in accordance with the advice of the Federation. Further, that the men had been offered arbitration by the employers, which the men had refused, and therefore, in view of the present condition of trade the masters had served the counter notice for a reduction of wages of a halfpenny per hour. The Sunderland employers were determined to resist the men's demands. A ballot of the Federation members has been completed, and the members of that body have decided to lock-out their joiners in support of the policy they advised the Sunderland employers to pursue, provided no settlement has been arrived at before arrangements for locking-out are completed.

LEGAL.

ILFORD BUILDING DISPUTE.

MR. JUSTICE SWINFEN-EADY, in the Chancery Division, on the 25th ult., concluded the hearing of a motion on behalf of the plaintiffs in the case of The Ilford Park Estates, Ltd., *v.* Jacobs, for an injunction to restrain the defendant, her servants, agents, &c., from erecting on certain plots of land in the Brisbane-road, Ilford, more than one house in accordance with the terms of a covenant in a conveyance dated November 14, 1898, made between the plaintiff company and the defendant, or any house of less value than 300*l*., or any building of which the elevation had not been approved of in writing by the company's surveyor. The plots conveyed to the defendant by the conveyance formed part of the Ilford Park Estate on the east side of, and having a frontage to, Brisbane-road of about 54 ft., and the conveyance contained a covenant by the defendant that she would observe and abide by the stipulations contained in the schedule to the deed, so far as they related to the premises conveyed. Clause 2 of the schedule provided that no trade, business, or manufacture should be carried on upon any lot, except those lots fronting Ley-street. Clause 5 provided that no house should be erected fronting any road of less value than that stated thereafter, the value to be calculated at net prime cost, exclusive of the land, and that not more than one house should be erected on any lot. With regard to Brisbane road, the minimum value was to be 300*l*. each house. Clause 10 provided that no building elevations should be erected on any part of the land except where the elevations had been submitted to, and approved in writing by, the plaintiffs' surveyor and a copy of the design deposited with the surveyor. What happened was this. The defendant, intending to erect certain buildings, at first submitted an elevation, and then an amended elevation, of her proposed buildings to the plaintiffs' surveyor, which the latter refused to approve. The buildings were to consist of two floors, one complete tenement with its own front door on the ground floor, and another complete tenement on the upper floor, access to this floor being had through a separate front door opening on a staircase, which was divided by a brick wall from the ground-floor tenement. The two front doors were side by side, set back in an archway. The plaintiffs' case was that these buildings which the defendant was now proposing to erect were a breach of the stipulation contained in Clause 5 of the schedule.

His Lordship, after hearing the arguments of counsel, in giving judgment said that the plaintiffs' contention was that the defendant was putting up on one lot two houses, which were separated horizontally and not vertically. It was agreed that if the defendant were erecting two semi-detached houses vertically separated, they would constitute two separate houses, but it was contended that the building was in reality only one house. There was no internal communication between the ground and the first floor and no common staircase, as the ground floor did not require one. There were also separate front doors to each of the tenements In order to pass from one house to the other it was necessary to pass out of the front door of one tenement to a space which opened upon the street, and to enter the front door of the other. The question for decision was whether each of these buildings constituted one or two houses. There was no question in the present case of one house being built and being intended to be used as two. In substance there were here two houses structurally separated in every respect with separate doorways into the street, and with no internal communication. It was not the same case as where a building was erected and intended to be used for flats, because in that case there was internal communication. He was of opinion that in the present case there was merely one house superposed upon another house, and divided horizontally. He thought that each building constituted two separate houses, and was a breach of the covenant in the deed of November 14, 1898. In those circumstances there would be an injunction as prayed.

Order accordingly.

Mr. Theobald, K.C., and Mr. Fischer Williams appeared for the plaintiffs, and Mr. Eve, K.C., and Mr. Talbot for the defendant.

ACTION TO ENFORCE A COVENANT.

THE case of The Attorney-General *v.* The Playhouse, Ltd., came before Mr. Justice Buckley in the Chancery Division on the 29th ult.—an action by the Attorney-General (on behalf of his Majesty) for an injunction to enforce a covenant in a Crown lease granted to the Carlton Hotel, Ltd., in 1898 of the Carlton Hotel and what was then Her Majesty's Theatre. The Carlton Hotel, Ltd., had granted an underlease of the theatre to the defendants.

The covenant in question provided in terms that the lessees should not make any alterations in the plan or elevation of any of the buildings either internally or externally, nor place or fix to the front of the buildings any pipe, nor alter or change any of the architectural decorations, nor paint or write any inscription, figure, or letter, nor attach or exhibit any signboard or other notice of trade or business to the exterior walls without the lessor's consent in writing being first obtained.

It appeared that at the time the theatre was built the plans included a panel on which were the words "Her Majesty's Theatre." At the demise of the late Queen the words were altered by consent to "His Majesty's Theatre." What the defendants had done of which the plaintiff complained was to put up without the assent of the Crown in front of the theatre the words "His Majesty's Theatre" in letters 21 in. high fixed in a metal frame and held by iron brackets. At night this was lighted electrically, the whole thing being about 30 ft. long. The defendants denied that this was a breach of the covenant but said that they were willing to apply for a licence to use the sign. The Attorney-General accordingly applied for an injunction to restrain the sign being exhibited in alleged breach of the covenant and an order that the defendants should remove the device and the pipes, &c.

In the result his Lordship held that there had been a breach of the covenant, and granted the injunction and order of removal as asked with costs.

The Solicitor-General and Mr. Vaughan Hawkins appeared for the Crown: and Mr. Buckmaster, K.C., and Mr. Boome for the defendants.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED*

15,761 of 1902.—M. P. JANISCH: *Alarm for Doors Windows, and the like.*

An automatic alarm controller, and a carrier with which it has retractive engagement adjustable to be in or out of the opening path of a door, and a latch automatically engageable with said controller on retraction of the same by the pressure of the door thereon.

16,066 of 1902.—B. H. THWAITE: *Method of Manufacturing Portland Cement.*

A method of manufacturing Portland cement from slag issuing from an ironmaking blast furnace whereby the molten slag is introduced into a mixing vessel containing a determined quantity of pulverised lime which has been previously heated to a high temperature, the mixing vessel or its contents being rapidly rotated to produce a Portland cement.

4,905 of 1903.—W. E. MIKSCH: *Wall tile.*

This consists of a wall-tile having one edge cut away with an inwardly projecting edge and grooved at the other side, the tiles being adapted to be attached to the walls by means of pins or pegs and to lock each other in position.

5,426 of 1903.—M. BESHENKOVSKY and I. BESHENKOVSKY: *Fastening Device especially Applicable to Double Doors.*

A locking device consisting essentially in the provision at the opposite sides of the door frame of recesses, in each of which is housed a spring controlled spindle having two outstanding tongues at right angles or thereabout to one another, one of the said tongues projecting normally into the path of that one of the doors which is provided with the lock in such manner that when the said door is closed the pressure on this tongue will partly revolve the spindle and cause the other tongue to enter a recess provided for it in the edge of the door.

6,343 of 1903.—R. STERNE: *Detachable Hinge.*

An easily detachable hinge, characterised by hooks or staples fastened to the parts, to be connected, and a hinge provided with slots or openings, also swivelling bolts or sliding bolts, which hinge is made fast to the hooks or staples projecting through the slots by turning or pushing the bolts into same.

7,869 of 1903.—G. GODA: *Hydraulic Plant and Vessels or Reservoirs for Containing Water.*

This invention relates to means for preventing freezing of the water supply in cold climates, and the reduction of the chances of contamination. The plant consists of a hermetically closed reservoir which may have a surrounding jacket through which warmed air may be passed. Means are also provided for using the elastic force of compressed air for furnishing powerful jets of water without resorting to high-level reservoirs.

3,019 of 1903.—M. J. ADAMS and S. H. ADAMS: *Closets and other Sanitary Appliances.*

This invention relates to improvements in closets, sinks, or lavatory basins, and consists of an arrangement for supporting such appliances clear of the floor. The outlet pipe, made of enamelled cast iron, is built into the wall and forms the support for the appliance. Further security may be obtained by such means as lugs and screws.

7,836 of 1902.—W. SCHULTNESS: *Process for Colouring Building Materials, such as Lime, Mortar, Bricks, and Artificial Stone.*

Process for colouring lime, mortar, and stone, according to which solutions of organic colouring substances are employed in the slaking of calcined lime, or added to the lime-paste or cement.

12,762 of 1902.—W. H. MARTIN: *A Process for Making White Portland Cement for Interior or Exterior Decoration.*

To carry out this process the following ingredients are used, namely:—To 1 part by weight of kaolin or China clay, as free as possible from iron, 5 or 5 parts of pure white chalk are added, according to the purity of the kaolin, and intimately mixed with these from 2 to 5 per cent. (of the combined weight of the mixture) either of gypsum or chloride of magnesia. The whole of the substances may be mixed dry and burnt in the usual kilns, or they may be mixed together with water either as a sludge or slurry, or semi-wet, and partly dried and then burnt in a kiln such as is used in Portland cement making.

15,437 of 1902.—J. KOENNER: *Manufacture of Bricks or Artificial Stone Articles or Blocks and Apparatus therefor.*

A process for the manufacture of bricks, blocks, and the like from low-grade sandy or dusty ores, ore

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

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residues, blast-furnace dust, iron and copper pyrites residues, and similar materials, which consists in first dry-mixing the said materials in a comminuted condition intimately with lime, magnesia, or magnesite and borax, then mixing the dry mass with a solution of sulphuric acid, and then moulding the whole into bricks or blocks, which are afterwards dried.

16,207 of 1902.—J. KULHANEK: *Construction of Ceilings, Roofs, and the like.*

This consists of a roof or ceiling construction essentially characterised by the fact that it is constituted by two intersecting systems of ribs united by a covering layer, in which the cells or recesses between the ribs are, either left quite free or are filled with light filling bodies which are solid and consist of some light material or hollow bodies with thin walls.

16,360 of 1902.—W. CHALLONER: *Construction of Walls, Partitions, Wall Plates or Slabs, and Lining of Walls, Tanks, or Reservoirs.*

This consists in the construction of walls, partitions, tanks, reservoirs, and linings by means of slabs or plates having grooves and fillets on the horizontal and vertical edges of each slab or plate, which allow for the running in of suitable connecting or binding material to render the whole one compact solid mass.

17,080 of 1902.—J. KINCAID: *Gates.*

The object of this invention is to provide simple and efficient means whereby gates can be opened by the driver of a vehicle, from horseback, with facility, and be as conveniently closed. According to this invention the hinge, or heel, post of the gate is mounted so that it can be inclined for causing the gate to open in either direction, or be brought into a mid-position for causing the gate to close. The said hinge, or heel, post is acted upon by means of cords, chains, or equivalent devices, which can be operated from the path or road at a convenient distance from either side of the gate, so that by operating the device at one side the said post is inclined so as to cause the gate to open in one direction or the other, and, afterwards, by operating the device at the other side the post is brought to the mid-position again, so that the gate closes.

18,820 of 1902.—A. G. SALAMAN and P. WILLIAMS: *Manufacture of Artificial Stone or other Refractory Material.*

The manufacture of refractory material from asbestos, with or without a filling, by treatment with sodium silicate and sodium bicarbonate or other reagent producing mono-carbonate, soaking the material so treated in a solution of calcium chloride, and then gradually drying the same and repeating these operations of soaking and drying as often as may be required, according to the amount of mono-carbonate to be decomposed.

20,534 of 1902.—J. S. RIGLEY: *Manufacture of Bricks or Artificial Stone.*

The manufacture of bricks or artificial stone from lime and sand, which consists in the mode of supplying and combining said materials by holding the said material in bulk in separate containers, each having connected with it a weighing machine disposed below same and discharging into same, and conveyors for taking the respective materials from the weighing machines at the required proportional rates, and delivering the same at said proportional rates into a mixer, whereby the required proportions of materials and homogeneous mixture are obtained.

28,849 of 1902.—H. DYER: *Stable Flooring.*

Stable flooring, made of planks of wood two or more inches thick, braced together by iron rods or other means, each plank being half an inch apart and perforated to allow moisture to pass through, and fluted on both sides to prevent slipping.

3,177 of 1903.—E. BURZLAFF: *Bricks and the Manner of Laying Them.*

This consists in forming one or more dovetailed undercut recesses in the sides or ends, or in the sides and ends of bricks, or in any other convenient position therein; and when laying such bricks placing such recesses in juxtaposition with each other, and filling the same with mortar cement or other suitable equivalent, thus forming a series of keys that firmly bond the brickwork together.

6,788 of 1903.—A. TIMMERMANN: *Cramp for Supporting Centering for Use in the Construction of Floors and the like.*

A cramp for supporting centering for use in the construction of floors and the like, comprising links, hook-shaped ends, and a screw spindle having a freely rotatable abutment plate at its upper end.

16,651 of 1902.—J. BRODIE: *Facing Block or Bricks for Building Purposes.*

A new facing block or brick having a mid-projection on the rear or back side.

MEETINGS.

SATURDAY, JULY 4.

Northern Architectural Association.—Annual Excursion. Members to assemble at Ripon Station at 12.10 p.m. Ripon Cathedral will be visited after lunch at the Unicorn Hotel. The party will then proceed in conveyances to Fountains Abbey, the Hall, and the modern Church of St. Mary, in Studley Park. The party will then drive to Skelton Church, after viewing which they will return to Ripon to dine at the Unicorn Hotel.

TUESDAY, JULY 7.

Institute of Builders.—Finance Committee. 3 p.m. Council meeting. 4 p.m.

WEDNESDAY, JULY 8.

Southern Counties Master Builders' Federation.—Council meeting. 3.30 p.m.
Institute of Sanitary Engineers, Ltd.—General Purposes and Finance Committee. 4.15 p.m. Election Committee. 5.15 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

June 16.—By MADDISON, MILES, & MADDISON (at Stalham).

Sutton, Norfolk.—A freehold residence and 3 a. 3 r. 5 p. £425
A freehold holding, 1 a. 2 r. 0 p. 250

June 18.—By MADDISON, MILES, & MADDISON (at Stradbroke)

Stradbroke, Suffolk.—A freehold and copyhold farm, 30 a. 0 r. 39 p. 720
Enclosure of arable, 5 a. 0 r. 29 p., f. 160
Two copyhold houses and shops, y.r. 17*l.* 143

By T. ARMITSTEAD & SON (at Lancaster)

Overton, Lancs.—Pedder's Farm, 130 a. 1 r. 34 p., f. (in lots) 6,746

By BARBER & SON (at Wellington).

Hadley, Salop.—The Hadley Pk. estate, 300 acres, f. 9,500
Corser's Piece, ¾ of an acre, f. 100

By STEPHENSON & ALEXANDER (at Kidwelly).

Kidwelly St. Mary, &c., Carmarthen.—Gareg Farm, 245 a. 1 r. 29 p., f., y.r. 200*l.* 5,020

June 19.—By DRIVER, JONAS, & CO. (at Leighton Buzzard).

Wing, Bucks.—Linslade-st, house, builder's yard, &c., area 1 a. 1 r. 27 p., f., y.r. 32*l.* 610
Wilstone, Herts.—Freehold shop and post-office with an enclosure, area 2 a. 0 r. 27 p., y.r. 20*l.* 440
Linslade, Bucks.—Canal-rd., freehold wharf land, 0 a. 3 r. 15 p., f. 450
Canal-rd., the Wharf House, wharf, and 0 a. 3 r. 31 p. 1,550
Canal-rd., two building sites, 5 a. 1 r. 27 p., f. 1,460
Great and Little Pond Ground, 18 a. 3 r. 35 p., f. 2,500
Old-rd., freehold hunting stables, e.r. 32*l.* 10s. 380
Southcott-rd., enclosure of building land, 7 a. 2 r. 30 p.; also 21 plots of land, f. 2,162

June 20.—By PAXTON & HOLIDAY (at Oxford).

Horspath, &c., Oxon.—Hill and Manor Farms, also five cottages and Malthouse-gdns., 574 a. 0 r. 27 p., f. (in one lot) £3,500
The Park Allotments, 14 a. 0 r. 5 p., f. 570

By ELSWORTHY & SON (at Wisbech).

Elm, &c., Cambs.—Begdale Farm, 19 a. 3 r. 0 p., f. 1,525
The Four Scores Farm, 92 a. 2 r. 30 p., f. 3,125
Enclosure of arable, 7 a. 3 r. 14 p., f. 450
Two freehold cottages 155

By C. FOSTER & SON (at Ongar).

Ongar, Essex.—Pear Tree House, f., y.r. 30*l.* 590
New cottages (two) with granary and stable, f., y.r. 36*l.* 12s. 590
Moreton, Essex.—Embley's Farm, 10 a. 0 r. 33 p., f., y.r. 20*l.* 420

June 22.—By BEALE & CAPPS.

Notting Hill.—103, Oxford-gdns., u.t. 76 yrs., g.r. 15*l.*, e.r. 110*l.* 1,140
52 to 60, Blenheim-cres., and 2, St. Mark's-rd., f., y.r. 294*l.* 4,000
Bayswater.—113, Westbourne Pk.-rd., u.t. 53 yrs., g.r. 10*l.*, y.r. 40*l.* 350
75, Richmond-rd., s., u.t. 53 yrs., g.r. nil, y.r. 35*l.* 400

By H. & R. L. COBB.

Gray's Inn-rd.—No. 272 s., u.t. 11¼ yrs., g.r. 7*l.*, y.r. 65*l.* 300
Bapchild, &c., Kent.—Radfield Farm, 201 a. 0 r. 27 p., f., y.r. 96*l.* 10,250
A piece of orchard land, 1 a. 1 r. 19 p., f. 300
Tonge, Kent.—Bax Farm, 164 a. 3 r. 18 p., f., y.r. 404*l.* 8,250

By LONG & SON.

Terling, &c., Essex.—Termitt's Farm, 269 a. 1 r. 10 p., f., r. 250*l.* 5,400

By ORGILL, MARKS & LAWRENCE.

Portsmouth.—Oyster-st., The White Hart p.-h., freehold rental of 125*l.*, reversion in 5½ yrs. .. 2,400
Commercial-rd. East.—Buross-st., The Refiners' Arms p.-h., freehold rentals of 50*l.*, reversion in 20 yrs. 1,760

By WALTER VINCENT.

Marylebone.—20, 21, and 22, Linhope-st., u.t. 17½ yrs., g.r. 15*l.* 15s., y.r. 142*l.* 12s. 6d. 470
45 and 47, Huntsworth Mews, u.t. 17½ yrs., g.r. 11*l.* 11s., w.r. 52*l.* 150

By WOODS & SNELLING.

Sidcup.—Chislehurst-rd., a freehold plot of building land 275
High-st., Welton Garth and Rydal, f., y.r. 110*l.* £1,820
High-rd., Winchilsea, u.t. 76 yrs., g.r. 10*l.*, p. 460

By T. WOODS.

Hounslow.—5, Laburnham-villas, f., e.r. 40*l.* 675

June 23.—By CHINNOCK, GALSWORTHY, & CHINNOCK.

Hackney-rd.—Nos. 142, 144, and 146, s., area 3,895 ft., f., y.r. 180*l.* 2,500

By COCKETT & HENDERSON.

Wanstead.—The Avenue, a plot of building land, f. 340
Walthamstow.—2, Vallentin-rd., u.t. 72½ yrs., g.r. 6*l.* 2s., e.r. 34*l.* 275

By DEBENHAM, TEWSON, & CO.

South Mimms, Middx.—Bridgefoot House estate, 121 a. 2 r. 28 p., f. 11 000
Eight enclosures of pasture land, 41 a. 3 r. 12 p., f. 2,785
Frensham, Surrey.—Shortfield Common, Lovelands, and 3 a. 3 r. 5 p., f., p. 250

By DRIVER, JONAS, & CO.

Holmbury St. Mary, Surrey.—Enclosure of building land, 4 a. 1 r. 32 p., f. 700
Four cottages and livery stables, area 1 a. 1 r. 33 p., f. 890
Corner plot of building land with two cottages thereon, 0 a. 1 r. 11 p., f. 345

By HAMPTON & SONS.

Kensington.—4, Victoria-rd., f., p. 3,100
Limpsfield Common, Surrey.—Ballard's Shaw and 2½ acres, f., p. 4,950
Northaw, Herts.—West Hall and 3 acres, f., p. ... 2,400

By ROGERS, CHAPMAN, & THOMAS.

Chelsea.—1 to 5, 5A, 6, 6A 7, 7A, 7B, 8, 9, 10, 10A, and 10B, Stanley-studios, u.t. 78½ yrs., g.r. 10*l.*, y.r. 515*l.* 10s. 4,000

By JOSEPH STOWER.

Hammersmith.—350, 352, 352A, 354, and 356, King-st., area 10,000 ft., c., p. 3,100
Hampstead.—6, Arkwright-rd., f., p. 1,660
Paddington.—44, 46, and 48, Fernhead-rd., u.t. 63 yrs., g.r. 19*l.* 10s., w.r. 178*l.* 2s. 1,020
88, Woodchester-st., u.t. 49 yrs., g.r. 5*l.*, w.r. 66*l.* 6s. 280
Kensington.—66, Talgarth-rd., u.t. 73½ yrs., g.r. 12*l.*, y.r. 55*l.* 400
Kilburn.—117, Kilburn Park-rd., u.t. 75 yrs., g.r. 7*l.*, y.r. 44*l.* 475

By WHITE & SONS.

Mickleham, Surrey.—The Long Cottage, f., y.r. 36*l.* 560

By ALFRED RICHARDS (at Enfield).

Enfield.—5 and 6, Cecil-villas, f. 985

By F. PITTIS & SON (at Newport).

Newport, Isle of Wight.—97 and 98, High-st., 27 and 28, Lugley-st., with range of stabling, area ¼ a., f., y.r. 117*l.* 2,050
Lugley-st., Lugley-cot., f., y.r. 35*l.* 550

By T. WOODS (at Hanwell).

Hanwell.—183, Boston-rd., u.t. 77 yrs., g.r. 4*l.* 10s., y.r. 26*l.* 282
Uxbridge-rd., five freehold shop sites 2,500

June 24.—By ARTHUR BARTON.

Lee.—Micheldever-rd., i.g.r.'s 15*l.*, u.t. 78 yrs., g.r. nil 320

By R. BURR & SONS.

Pinner, Middx.—Main-rd., East House and 3 a. 1 r. 27 p., f., y.r. 150*l.* 3,500

By DYER, SON, & HILTON.

Lee.—37, Leyland-rd., u.t. 60½ yrs., g.r. 12*l.*, y.r. 50*l.* 250
Lewisham.—1, 3, 5, and 7, Elthruda-rd., u.t. 77½ yrs., g.r. 16*l.* 10s., w.r. 104*l.* 475
Ponders End.—Scotland Green-rd., the Cottage, u.t. 46 yrs., g.r. 6*l.*, p. 100

By JENKINS & SONS.

Brockley.—88, Wickham-rd., u.t. 74 yrs., g.r. 12*l.*, p. 1,020
Greenwich.—50, 56, and 58, Pelton-rd., u.t. 15½ yrs., g.r. 6*l.* 1s., w.r. 72*l.* 16s. 310

By ERNEST OWERS.

Hampstead.—26, Acol-rd., f., y.r. 120*l.* 2,220

By R. TIDEY & SON.

Stoke Newington.—Albion-rd., f.g.r.'s 35*l.*, reversion in 65 yrs. 1,065
Church-st., f.g.r.'s 14*l.*, reversion in 65 yrs. 410

By FRED VARLEY & SON.

Stroud Green.—39, Oxford-rd., u.t. 64 yrs., g.r. 7*l.*, e.r. 45*l.* 425

By WAGSTAFF & SONS.

Hoxton.—11, Curzon-st., u.t. 27½ yrs., g.r. 4*l.*, y.r. 30*l.* 260

By DOUGLAS YOUNG & CO.

Forest Hill.—82, Forest Hill-rd., u.t. 75 yrs., g.r. 6*l.*, e.r. 36*l.* 375
Clapham.—13, Osborne-ter., u.t. 25 yrs., g.r. 7*l.* 10s., y.r. 44*l.* 350

By SPELMANS (at Norwich).

Ormesby St. Margaret, Norfolk.—Enclosures of land, 24 a. 1 r. 33 p., f. 745
Market-garden land, 6 a. 3 r. 12 p., f. 200
Caister, Norfolk.—Freehold grazing marshes, 35 a. 1 r. 25 p. 830

By G. B. HILLYARD & SON (at Great Yeldham).

Great Yeldham, Essex.—Freehold house and 3 a. 0 r. 18 p., y.r. 12*l.* 300
Freehold land with buildings thereon, 1 a. 0 r. 15 p. 150
Cook's Perry Farm, 12 a. 1 r. 18 p., f. 630
Acacia House, f., y.r. 10*l.* 250
Freehold house and cottage, y.r. 21*l.* 10s. 390
Plot of building land, 2 r. 18 p., f. 120

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By STEPHENSON & ALEXANDER (at Newport).
Nash, Monmouth.—Pool Field, 5 a. 1 r. 12 p., f... £350
Grassing land and orchard, 28 a. 2 r. 37 p., f. .. 3,125
South Land enclosure, 10 a. 2 r. 10 p., f. 875

By T. WOODS (at Hounslow).
Hounslow, Middlesex.—4, Argyll-av., f., y.r. 38*l.* 500
1 and 2, Myrtle Villas, u.t. 5 yrs., g.r. 10*l.*, y.r. 40*l.* 400
1 and 2, Cambridge Villas, u.t. 5 yrs., g.r. 10*l.*, y.r. 44*l.* 10s. 320
1 and 2, Claude Villas, u.t. 5 yrs., g.r. 10*l.*, y.r. 43*l.* 250
Staines-rd., Zoar Cottage, q.r. 20*l.*; also i.g.r. 3*l.*, u.t. 5 yrs., g.r. 14s. 205
17 and 19, Heath-road, u.t. 54½ yrs., g.r. 16*l.*, y.r. 40*l.* 195
1 to 10, Pine-pl., f., w.r. 128*l.* 15s. 1,255
1 to 6, Williams-pl., c., w.r. 64*l.* 7s. 500
Cromwell-rd., &c., four plots of building land, f. 920
Isleworth, Middx.—48 and 50, Church-st., c., w.r. 3*l.* 8s. 410
Lampton, Middx.—1 to 4, The Parade, also Dalton's Cottage, f., w.r. 67*l.* 12s. 940

June 25.—By H. J. BLISS & SON.
Bethnal Green.—50 to 56 (even), Somerford-st., and 89, 91, and 93, Collingwood-st., f., w.r. 18*l.* 1,530
21 to 43 (odd), Somerford-st.; 19 to 31 (odd), Tapp-st.; 2 to 26 (even), Barnsley-st.; 95 to 107 (odd), Collingwood-st., area 16,850 ft., f., w.r. 88*l.* 12s. (in one lot) 7,200
Somerford-st., f.g.r. 40*l.*, reversion in 22½ yrs... 1,200
Neath-pl., f.g.r. 20*l.*, reversion in 36 yrs. 530
Clapham.—Portland-pl. North, &c., i.g.r.'s 162*l.* 5s. 1d., u.t. 17 yrs., g.r. 32*l.* 10s. 1d. 1,180
New Barnet.—Leicester-rd., Moss Villa, and three plots of land, f., p. 415
Thornton Heath.—16, 18, 26, and 28, Livingstone-rd., u.t. 77½ yrs., g.r. 18*l.*, w.r. 79*l.* 6s. 360

By CRONKS'.
Sevenoaks, Kent.—Granville-rd., freehold stable and coach-house, y.r. 21*l.* 230

By DEBENHAM, TEWSON, & CO.
Clapham.—28, 28A, 30 and 30A, Clapham-rd. s., f., y.r. 296*l.* 5,145
1 to 9 (odd), Claylands-rd., f., y.r. 187*l.* 4s. 2,820
Regent's Park.—17 to 25 (odd), 26 and 28, Egbert-pl., f., w.r. 229*l.* 10s. 2,200

By DOWSETT, KNIGHT, & CO.
Caledonian-rd. — 90, Bemerton-st., s., and 22A, Clayton-st., s., u.t. 41 yrs., g.r. 8*l.*, y.r. 68*l.* 450

By FRITH, GARLAND, & CO.
Wood Green.—3 to 6, 9 to 32, Waverley-ter. (maisonettes), u.t. 98 yrs., g.r. 126*l.*, w.r. 974*l.* 8s. 4,620
43 to 48, Cranbourn-ter., u.t. 98 yrs., g.r. 16*l.* 16s., w.r. 120*l.* 12s. 660
3 to 12, Stanley-villas, u.t. 117 yrs., g.r. 31*l.* 10s., y.r. 150*l.* 1,400
Harringay.—74, Rutland-gdns., u.t. 86 yrs., g.r. 6*l.* 10s., y.r. 35*l.* 350
75, Duckett-rd., u.t. 90 yrs., g.r. 7*l.*, e.r. 38*l.* .. 385
60, Burgoyne-rd., u.t. 84 yrs., g.r. 7*l.*, e.r. 45*l.* .. 410
Hornsey.—30, Sydney-rd., f., y.r. 30*l.* 420

By HERRING, SON, & DAW.
Brixton.—179, Brixton Hill, f. and c., y.r. 45*l.* .. 520

By MIDDLETON & CRACKNELL.
Hampstead.—10, Hampstead Hill-gdns., u.t. 61½ yrs., g.r. 12*l.* 10s., y.r. 90*l.* 950
14, Lawn-rd., u.t. 47½ yrs., g.r. 26*l.* 13s., e.r. 100*l.* 550

By C. C. & T. MOORE.
Stepney.—20, 22, and 24, High-st., s., with stabling in rear, f., y.r. 258*l.* 6s. 3,400
167, 169, and 171, Stepney-green, s., u.t. 61 yrs., g.r. 15*l.*, y.r. 144*l.* 1,260
173, 175, and 177, Stepney-green, u.t. 61 yrs., g.r. 15*l.*, y.r. 141*l.* 12s. 1,310
White Horse-la., stabling and premises, u.t. 61 yrs., g.r. 6*l.*, w.r. 25*l.* 4s. 400
43, Rectory-sq., u.t. 61 yrs., g.r. 5*l.*, e.r. 36*l.* .. 410
Limehouse.—8 to 11, Holker-pl., f., w.r. 62*l.* 8s... 360
Clapton.—98, Mayola-rd., u.t. 72½ yrs., g.r. 5*l.*, w.r. 35*l.* 2s. 195
92, Pedro-st., u.t. 76 yrs., g.r. 5*l.* w.r. 24*l.* 14s.. 100

By NEWSON, EDWARDS, & SHEPHARD.
Islington.—1 to 9, Dibdin-st., u.t. 41 yrs., g.r. 54*l.*, w.r. 347*l.* 2s. 1,130
Kentish Town.—24, Willes-rd., u.t. 18 yrs., g.r. 5*l.*, y.r. 38*l.* 260
Camden Town.—216, Great College-st., u.t. 37½ yrs., g.r. 6*l.*, y.r. 45*l.* 335
Canonbury.—22, Canonbury Pk. South, u.t. 33 yrs., g.r. 5*l.* 12s. 6d., e.r. 50*l.* 460

By WM. STEVENS.
Finsbury Park.—37, Bedford-ter., u.t. 63 yrs., g.r. 4*l.* 15s., w.r. 33*l.* 16s. 230

By STIMSON & SONS.
Southwark.—67 and 68, Elliott's-row, u.t. 39 yrs., g.r. 50*l.*, w.r. 120*l.* 18s. 220
Lambeth.—32, Lanfranc-st., f., p. 290
Bethnal Green.—243 and 245, Cambridge-rd. (S), f., y.r. 58*l.* 940
Finsbury Park.—Regina-rd., f.g.r. 16*l.* 10s., reversion in 63 yrs. 425
New Cross.—30, 32, and 34, Lewisham High-rd., y.r. 132*l.*; also i.g.r. 6*l.*, u.t. 49½ yrs., g.r. 24*l.* 5s. 990
Cold Blow-la.—An improved rental of 75*l.*, u.t. 12 and 32 yrs. 210
Fulham.—4, Chesilton-rd., u.t. 77 yrs., g.r. 8*l.*, y.r. 42*l.* 320

By FRANCIS, HELSBY, & CO. (at Brixton).
Brixton.—3 and 5, Church-rd., f., y.r. 100*l.* 1,350
East Ham.—Folkestone-rd., f.g.r.'s 63*l.*, reversion in 87 yrs. 1,260

June 26.—By JOSHUA BAKER, COOKE, & CO.
Pimlico.—35, Moreton-st. (S), u.t. 28 yrs., g.r. 9*l.*, w.r. 104*l.* 400

By BALLARD & MARSH.
Hampton Hill, Middx.—Windmill-rd., a plot of building land, 1 r. 23 p., f. £300

By BEADEL, WOOD, & CO.
Great Clacton, Essex.—The Hale Meadows, 4 a. 1 r. 36 p., f. 300
Smythie's Farm, 30 a. 2 r. 37 p., c. 1,250
A corner block of building land, 5 a. 1 r. 39 p., c. 400

By GRAVES & SON.
Bayswater.—70, Westbourne-gr., beneficial lease for 17¾ yrs., y.r. 280*l.*, with goodwill, &c..... 900

By A. & G. GUIVER.
Ponders End, Middx.—1, 2, and 3, Jubilee-villas, f., y.r. 104*l.* 1,260
Derby-rd., Chatsworth House, f., e.r. 65*l.* 450

By MULLETT, BOOKER, & CO.
Hyde Pk.—117, Westbourne-ter., u.t. 34½ yrs., g.r. 50*l.*, p. 700

By REYNOLDS & EASON.
Spitalfields.—15 and 16, Bell-la., s., f., w.r. 154*l.* 14s. 2,235
Aldgate.—19, Hutchison's-av., s., f., w.r. 46*l.* 16s. 600
Bloomsbury.—70, Torrington-sq., u.t. 16 yrs., g.r. 12*l.*, y.r. 70*l.* 505

By ROBINS, GORE, & MERCER.
Soho.—2, 3 and 4, Noel-st., s., f., y.r. 301*l.* 12s... 4,000
3, Portland Mews, u.t. 62½ yrs., g.r. 50*l.*, w.r. 99*l.* 10s. 500
Portland Mews, f.g.r. 50*l.*, reversion in 62½ yrs. 1,000
Strand.—13, Milford-la., and 3, Tweezer's-alley, profit rental of 20*l.* for 28 yrs. 300
Hackney.—46 and 48, Terrace rd., u.t. 29 yrs., g.r. 4*l.* 10s., w.r. 67*l.* 12s. 350
Regent's Park.—12, St. James'-ter. and 12A, St. James' Mews, u.t. 15½ yrs., g.r. 25*l.*, y.r. 111*l.* 380
Pimlico.—169, Lupus-st., u.t. 35 yrs., g.r. 12*l.*, y.r. 52*l.* 10s. 530

By ROGERS BROS.
Peckham.—Kirkwood-rd., f.g.r.'s 42*l.*, reversion in 89 yrs. 955
Esther Cottages, f.g.r. 50*l.*, reversion in 78 yrs. 1,000
Garnies-st., i.g.r. 25*l.*, u.t. 60 yrs., g.r. 10*l.*.... 245
9 to 12, Fensham-st., u.t. 26 yrs., g.r. 30*l.*, w.r. 121*l.* 16s. 425
31, Waveney-av., u.t. 83 yrs., g.r. 6*l.*, e.r. 32*l.* 275

By SIM & RANDALL.
East Ham.—213, Katherine-rd., f., w.r. 26*l.* 310
Elizabeth-rd., freehold stable and yard, e.r. 10*l.* 100

By G. A. WILKINSON & SON.
Great Glenn, Leicr.—Glenn House and 34 a. 3 r. 3 p., f. 5,950

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 15 0	per 1,000 alongside, in river.	
Rough Stocks and Grizzles.....	1 12 0	,,	,, ,,
Facing Stocks....	2 12 0	,,	,, ,,
Shippers	2 5 0	,,	,, ,,
Flettons	1 7 6	,,	at railway depôt
Red Wire Cuts ..	1 12 0	,,	,, ,,
Best Fareham Red	3 12 0	,,	,, ,,
Best Red Pressed Ruabon Facing	5 0 0	,,	,, ,,
Best Blue Pressed Staffordshire ..	4 5 0	,,	,, ,,
Do. Bullnose	4 11 0	,,	,, ,,
Best Stourbridge Fire Bricks	4 8 0	,,	,, ,,
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers.....	13 0 0	,,	,, ,,
Headers	12 0 0	,,	,, ,,
Quoins, Bullnose, and Flats.....	17 0 0	,,	,, ,,
Double Stretchers	19 0 0	,,	,, ,,
Double Headers..	16 0 0	,,	,, ,,
One Side and two Ends.....	19 0 0	,,	,, ,,
Two Sides and one End	20 0 0	,,	,, ,,
Splays, Chamfered, Squints.....	20 0 0	,,	,, ,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,,	,, ,,
Quoins, Bullnose, and Flats.....	14 0 0	,,	,, ,,
Double Stretchers	15 0 0	,,	,, ,,
Double Headers..	14 0 0	,,	,, ,,
One Side and two Ends.....	15 0 0	,,	,, ,,
Two Sides and one End	15 0 0	,,	,, ,,
Splays Chamfered, Squints.....	14 0 0	,,	,, ,,
Second Quality White and Dipped Salt Glazed	2 0 0	,,	less than best.

PRICES CURRENT (*Continued*).

BRICKS, &c.

	s. d.		
Thames and Pit Sand	6 9	per yard, delivered.	
Thames Ballast	6 0	,,	,,
Best Portland Cement	30 0	per ton, delivered.	
Best Ground Blue Lias Lime..	20 6	,,	,,
NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.			
Grey Stone Lime	10s 6d.	per yard, delivered.	
Stourbridge Fire-clay in sacks	27s. 6d.	per ton at rly. dpt.	

STONE.

	s. d.		
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.	
Bath ,, ...	1 7	,,	,,
Farleigh Down Bath ..	1 8	,,	,,
Beer in blocks	1 6	,,	,,
Grinshill ,, ...	1 10	,,	,,
Brown Portland in blocks	2 2	,,	,,
Darley Dale in blocks..	2 4	,,	,,
Red Corsehill ,,	2 5	,,	,,
Closeburn Red Freestone	2 0	,,	,,
Red Mansfield ,,	2 4	,,	,,
YORK STONE—*Robin Hood Quality.*			
	s. d.		
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.	
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super.	,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,,	,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,,	,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,,	,,
1¼ in. to 2 in. ditto, ditto	0 6	,,	,,
BEST HARD YORK—			
Scappled random blocks	3 0	per ft. cube	,,
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super.	,,
6 in. Rubbed two sides Ditto	—	,,	,,
3 in. sawn two sides slabs (random sizes)	1 2	,,	,,
2 in. self-faced random flags.....	0 5	,,	,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.	
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt	
,, ,, ,, 3 in. do.	1 2½	,,	,,

SLATES.

in. in.	£ s. d.		
20 × 10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry. dep.	
20 × 12 ,, ,, ,, ..	13 17 6	,,	,,
20 × 10 best seconds ,,	12 15 0	,,	,,
20 × 12 ,, ,, ,,	13 10 0	,,	,,
16 × 8 best ,,	7 0 0	,,	,,
20 × 10 best blue Portmadoc ..	12 5 0	,,	,,
16 × 8 best blue Portmadoc	6 5 0	,,	,,
20 × 10 best Eureka unfading green....	15 2 6	,,	,,
20 × 12 ,, ,,	17 0 6	,,	,,
18 × 10 ,, ,,	12 10 0	,,	,,
16 × 8 ,, ,,	10 5 0	,,	,,
20 × 10 permanent green	11 0 0	,,	,,
18 × 10 ,, ,,	9 5 0	,,	,,
16 × 8 ,, ,,	6 10 0	,,	,,

TILES.

	s. d.		
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.	
Hip and valley tiles....	3 7	per doz.	,, ,,
Best Broseley tiles	50 0	per 1,000	,, ,,
Do. Ornamental Tiles 52	6	,,	,, ,,
Hip and valley tiles....	4 0	per doz.	,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000	,, ,,
Do. ornamental Do. 60	0	,,	,, ,,
Hip tiles	4 0	per doz.	,, ,,
Valley tiles.....	3 0	,,	,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000	,, ,,
Do. Ornamental Do. 54	6	,,	,, ,,
Hip tiles	4 1	per doz.	,, ,,
Valley tiles.....	3 8	,,	,, ,,
Best "Rosemary" brand plain tiles 48	0	per 1,000	,, ,,
Do. Ornamental Do. 50	0	,,	,, ,,
Hip tiles	4 0	per doz.	,, ,,
Valley tiles	3 8	,,	,, ,,

WOOD.

	At per standard. £ s. d.	£ s. d.	
Deals: best 7 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0	
Deals: best 3 by 9.....	14 10 0	15 10 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0	
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.	
Deals: seconds	1 0 0	less than best	
Battens: seconds	0 10 0	,, ,,	,,
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0	
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0	
Foreign Sawn Boards—			
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.	
¾ in.	1 0 0	,,	
Fir timber: Best middling Dantzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0	
Seconds	4 5 0	4 10 0	
Small timber (8 in. to 10 in.)	3 12 6	3 15 0	
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0	
Swedish balks	2 15 0	3 0 0	
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0	

[*See also page 27.*]

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Machinery for Lifting Boats	Austrian Government	100,000 Kronen, 75,000 Kronen, and 50,000 Kronen	Mar. 3, 1904

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Sewers, &c.	Portslade-by-Sea U.D.C.	T. Austen, Council Office, Portslade-by-Sea, Sussex	July 7
Road Metal, &c. (3,100 tons)	Rochester Corporation	W. Banks, Civil Engineer, Rochester	do.
Culvert, &c.	Warrington Town Council	J. Deas, Civil Engineer, Warrington	do.
Seven Cottages, Ringley, Lancs	Co-operative Society, Limited	Grundy & Sons, Architects, 12, Brazennose-street, Manchester	do.
Road Works	Leyton (Essex) U.D.C.	W. Dawson, Civil Engineer, Town Hall, Leyton	do.
Paving Works, Cadiz-street	Leith (N.B.) Council	T. B. Laing, Leith	do.
Granite Road Metal	Ashford R.D.C.	A. Sims, Surveyor, Charing, Kent	do.
Foundations to Public Offices, Fire Station, &c.	Waltham Abbey U.D.C.	W. Turner-Streather, C.E., Highbridge-street, Waltham Abbey	do.
Sewers, &c., Knutsford	Bucklow R.D.C.	J. M'Kenzie, Engineer, 7, Market-square, Altrincham	July 8
Additions to Schools	Sprowston School Board	C. J. Brown, Architect, Cathedral Offices, Norwich	do.
House, Leasgill, near Kendal	Mr. J. Germain	J. Banks, 14, Kirkle-street, Kendal	do.
Electricity Station	Bradford Corporation	G. G. Hoskins, Architect, Darlington	do.
Sewer, Old-road	Ashton-in-Makerfield U.D.C.	T. Burgess, Surveyor, Ashton-in-Makerfield	do.
Granite Road Metal (2,500 tons)	Kingston-on-Thames Corporation	Borough Surveyor, Clattern House, Kingston	do.
Four Cottages, Ilton Heath, near Oswestry	.....	W. H. Snaill, Architect, the Gables, Oswestry	do.
House, King Cross, near Halifax	.....	A. T. Whiteley, Architect, 41, Stanley-road, King Cross, nr. Halifax	do.
Two Cottages, Allerwash, near Fourstones	.....	C. H. Sample, Matfen, Corbridge-on-Tyne	do
Six Houses, Woodlands-road, Girlington, Yorks	.....	Walker & Collinson, Architects, Bradford	July 6
Boiler House, &c., Hipperholme Mills, Halifax	.....	A. G. Dalzell, Architect, Halifax	do.
House, Baildon, Yorks	.....	S. Bradley, Architect, Shipley, Yorks	do.
Institute, Hall, &c., Abercynon	The Committee	F. Gibson, Architect, Mountain Ash	do.
Sewers and Reservoirs	Swinton (Lancs) U.D.C.	H. Entwistle, Surveyor, Council Offices, Swinton	do.
Road Works, Genesta-road	Southend Corporation	E. J. Elford, Civil Engineer, Southend	do.
Paving Works	Cheltenham Corporation	J. S. Pickering, Borough Surveyor, Cheltenham	do.
Granite Kerbs, &c.	do.	do.	do.
Street Works, Athens-street	Stockport Corporation	J. Atkinson, Civil Engineer, St. Peter's Gate, Stockport	do.
Laying Water Mains (10 miles)	Bath Corporation	Fox & Tatton, Civil Engineer, 5, Victoria-street, S.W.	July 10
Broken Granite Road Metal (250 tons)	Halesworth U.D.C.	C. H. White, Council Offices, Halesworth	do.
Sewers, &c., Dringhouses, Yorks	Bishopthorpe R.D.C.	Fairbank & Son, Civil Engineers, Lendal, York	do.
Car Depot, &c.	Leicester Corporation	E. G. Mawbey, Civil Engineer, Town Hall, Leicester	do.
*Asphalt Paving	Portsmouth Town Council	Town Clerk, Town Hall, Portsmouth	do.
*50,000 ft. of Zinced Wrought Iron Gas Piping, &c.	The Admiralty	Director of Navy Contracts, Admiralty, Whitehall, S.W.	do.
Alterations to Victoria Wesleyan Chapel, Garndiffaith	.....	Fisher & Sons, Architects, Club Chambers, Pontypool	July 11
Six Houses, Stainland, Yorks	.....	Horsfall & Son, Architects, Halifax	do.
Five Cottages, Runham, Vauxhall, Great Yarmouth	.....	C. G. Baker, Architect, Great Yarmouth	do.
Widening Langley Bridge, near Eastbourne	East Sussex County Council	F. J. Wood, Architect, County Hall, Lewes	do.
Additions to Schools, St. Austell, Corn wall	The Wesleyans	J. Mutton, St. Austell, Cornwall	July 13
Creamery, near Lismore, Ireland	.....	W. Harnett, Chapel-street, Lismore	July 13
Additions to Schools, Abertillery, Mon.	Aberystruth School Board	R. A. Roberts, Architect, Abercarn, Mon.	do.
Street Works, Bradford-street, &c.	Dewsbury Corporation	H. Ellis, Town Hall, Dewsbury	do.
Road Stone (4,500 tons)	Leamington Corporation	L. Rawlinson, Town Hall, Leamington	do.
Sewerage Works, &c.	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	do.
Laboratory, Bush-street East, Pembroke Dock	County Schools Governors	D. E. Thomas, Architect, Haverfordwest	do.
Making-up Beech-road	Hale (Cheshire) U.D.C.	T. Blagburn, Surveyor, Ashley-road, Hale	do.
Alterations to Schools, Ynyshir	Ystradyfodwg School Board	J. Rees, Hillside Cottage, Pentre	do.
Water Supply at Hospital, Morton Banks, nr. Bingley	Keighley Corporation	H. M. Butterfield, Engineer, 3, Laythorpe-terrace, East Morton	July 14
Additions to Workhouse	Biggleswade Guardians	J. O. Jones, Shortmead-street, Biggleswade	do.
Thirty-four Houses, Bedlinog	Building Club	P. V. Jones, Architect, Hengoed	do.
Police Station, Brierfield	Lancs County Council	H. Littler, Architect, County Offices, Preston	do.
Road Works, Victoria and Loxford-roads	Barking Town U.D.C.	C. F. Dawson, Surveyor, Public Offices, Barking	do.
Banking Premises, Blackburn-road, Accrington	.....	Henry Rose, Architect, 15, Cannon-street, Accrington	do.
*Four Blocks of Five Storey Dwellings, at Deptford	London County Council	Architect's Department (Housing Section), 19, Charing Cross-rd, W.C.	do.
*Sewers, Kensal Green	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	do.
*Boundary Wall, Neasden	do.	do.	July 15
Surveyor's Materials	Northfleet (Kent) U.D.C.	C. E. Hatton, Court House, Gravesend	July 16
*Sewerage and Sewage Disposal Works	Godstone R.D.C.	A. Williams & Son, Civil Engineers, 14, Victoria-street, S.W.	do.
*Petty Sessional Hall, Reconstion Heating Apratus, &c	Kent County Council	County Surveyor, 86, Week-street, Maidstone	do.
Hospital	Cheadle R.D.C.	F. T. Inskip, Surveyor, Cheadle	do.
*Enlargement of Head Post Office, Maidstone	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	do.
*New Church	Church Building Committee	The Vicarage, Walton-le-Dale	July 17
*Alterations and Additions to Laundry, &c.	Smallburgh Union	R. L. Curtis, 120, London Wall, E.C.	July 20
*Erection of School Buildings	East Ham School Board	J. T. Lee, Architect, 26, Great James-street, Bedford-row, W.C.	do.
*New Sorting Office, Tooting	Commissioners of H.M. Works, &c.	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	July 21
*New Coach House and Dormitory, Royal Mews	do.	J. B. Westcott, H.M. Office of Works, Storey's Gate, S.W.	do.
*Superstructure of Block Three of New Admilty Bldngs	do.	Sir John Taylor, H.M. Office of Works, Storey's Gate, S.W.	July 22
Sewage Disposal Works	Trowbridge U.D.C.	W. H. Stanley, Civil Engineer, Trowbridge	July 23
*Two Houses at Westcliffe, Southend-on-Sea	County of Essex	F. Whitmore, Duke-street, Chelmsford	do.
*Alterations to Police Station at Grays	do.	do.	do.
*New Wards at West Hill Workhouse	Dartford Union	G. H. Tait, Longfield-street, Dartford	July 29
*Station Buildings, &c., at Shrewsbury Station	L. & N. W. and G. W. Jnt. Railways	Joint Engineer, Woodside Station, Birkenhead	Aug. 4
Houses, Grove-road, Ilkley	.....	F. Musto, Architect, Greek-street Chambers, Leeds	No date.
Engine House, Airedale Mills, Cononley, Yorks	.....	J. Haggas & Sons, Architects, Keighley	do.
Chapel, Crosswell	.....	W. J. Morley, Architect, 269, Swan-arcade, Bradford	do.
Villa, Victoria-road, Llanelly	.....	W. Griffiths, Surveyor, Falcon Chambers, Llanelly	do.
House, Swansea-road, Llanelly	.....	do.	do.
Chapel, Bolton Percy, near York	.....	Danby & Simpson, Architects, 10, Park-row, Leeds	do.
Schools, Barrow-in-Furness	.....	E. M. Young, Architect, 90, Duke-street, Barrow	do.
Alterations to St. Johns' Church, Golcar	.....	A. Shaw, Architects, Golcar, Yorks	do.
Works at Workhouse	King's Lynn Guardians	R. C. Coulton, King-street, Lynn	do.
Cottage, Felixstowe	.....	W. Leighton, Architect, Orwell-road, Felixstowe	do.
Two-story Building, Bromley-road, Catford	Messrs. J. Robertson & Sons	T. George & Son, Architects, Ashton-under-Lyne	do.
Graving Dock, near the Albert Edward Dock	Preston Corporation	J. Barron, Engineer, Dock Offices, Preston	do.
Meter House at Gasworks	Waterford Gas Co.	R. B. Anderson, Civil Engineer, 35A, Great George-street, S.W.	do.
*Plastering and Painting at Tooley-st. Workhouse, S.E.	St. Olave's Union	Clerk to the Union, Union Offices, Tooley-street, S.E.	do.
Fittings to Chemical Laboratory	.....	C. F. Tay-Cox, 10, Clegg-street, Oldham	do.
Additions to Workhouse (Cornwall)	Helston Guardians	F. V. Hill, Union Offices, Helston, Cornwall	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Borough Engineer and Surveyor	Chelmsford Corporation	305*l.*	July 20
*Assistant Surveyor	do.	130*l.*	do.
*Surveyor and Inspector of Nuisances	Chepstow U.D.C.	100*l.*	July 25

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, — *Contracts*, lv. vl. viii. x. & xxii *Public Appointments*, xviii.

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PRICES CURRENT (*Continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
JOINERS' WOOD.		
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10 0
" " " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Dantzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¼ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—Per ft. cube	0 4 0	- -
Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¼ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¼ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
" " galvanised	16 0 0	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	- - -
" " to 24 g.	10 15 0	- - -
" " to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
" " 22 g. and 24 g.	16 10 0	- - -
" " 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	- - -
" " 22 g. and 24 g.	12 15 0	- - -
" " 26 g.	14 0 0	- - -
Nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

PRICES CURRENT (*Continued*).

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 10 0	- - -
Pipe in coils	15 0 0	- - -
Soil pipe	17 10 0	- - -
Compo Pipe	17 10 0	- - -
ZINC—Sheet—		
Vieille Montagne ton	27 5 0	- - -
Silesian	27 0 0	- - -
COPPER—		
Strong Sheet per lb.	0 0 10½	- - -
Thin "	0 0 11½	- - -
Copper nails "	0 0 11	- - -
BRASS—		
Strong Sheet "	0 0 10	- - -
Thin "	0 0 11	- - -
TIN—English Ingots "	0 1 5	- - -
SOLDER—Plumbers' "	0 0 6	- - -
Tinmen's "	0 0 8	- - -
Blowpipe "	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1¾d. " "
21 oz. thirds	3¼d. " "
" fourths	2½d. " "
26 oz. thirds	4d. " "
" fourths	3¼d. " "
32 oz. thirds	5d. " "
" fourths	4¼d. " "
Fluted sheet, 15 oz.	3d. " "
" 21 oz.	4d. " "
½ Hartley's Rolled Plate	1¾d. " "
½ " " "	2d. " "
¾ " " "	2½d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 2 1
" " in drums	"	0 2 5
Boiled " " in pipes or barrels	"	0 2 4
" " in drums	"	0 2 8
Turpentine, in barrels	"	0 3 6
" in drums	"	0 3 8
Genuine Ground English White Lead	per ton	20 10 0
Red Lead, Dry	"	20 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

H. B. (Next week).—J. B. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other Journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BLAENAU-GWENT (Abertillery).—For the erection of school buildings, for the Aberystruth School Board. Mr. R. L. Roberts, architect, Abercarn. Quantities by the architect:—

D. Davies	£4,792 0 0	D. Lewis	£3,507 0 0
E. C. Jordan	3,700 0 0	J. Newcombe	3,516 0 0
N. Bagley	3,680 7 3	Gaen Bros, Abertillery*	3,434 0 0
D. W. Richards, Ltd.	3,635 0 0	Smith Bros.	3,388 0 0
A. P. Williams	3,615 0 0		

BRIXHAM (Devon).—For rebuilding the Buller's Arms Inn, for Mr. J. W. Chapman. Mr. F. W. Vanstone, architect, Palace-chambers, Paignton. Quantities by the architect:—

R. E. Narracott	£1,256	T. Vanstone	£1,125
C. & R. E. Drew	1,215	Hazlewood Bros., Brixham*	957
Webber & Sons	1,198		
E. Westlake	1,145		

DEPTFORD.—For works in reinstating lairage, &c., on the site of the old basin at the Foreign Cattle Market, Deptford, for the Corporation of London:—

Spencer Santo & Co.* £2,626

DEVONPORT.—For the erection of a boundary wall to land adjoining the workhouse, for the Board of Guardians. Mr. Edgar M. Leest, architect, 14, St. Aubyn-street, Devonport. Quantities by Messrs. Leest & Adams, Devonport:—

R. H. B. Neal	£699 0	Pearce Bros.	£566 0
Jenkin & Son	674 0	W. G. Perkins	545 0
J. Crockerell	650 0	J. H. Palmer	543 0
H. J. Allen	640 0	F. C. Ambrose	525 0
T. May	618 0	Matcham & Co., Ltd.	512 0
W. C. Shaddock	597 9	Smith & Son, Devonport*	499 15
W. E. Blake	569 0		

DURHAM.—For the construction of 641 lineal yards of 12-in., 9-in., and 6-in. pipe sewers, with manholes and ventilation shafts in connexion therewith, at Coxhoe, for the Rural District Council. Mr. Geo. Gregson, Engineer and Surveyor to the Council:—

J. Spark	£501 14 8	R. Oliver	£339 9 9
G. T. Manners	480 0 0	T. H. Skelton, Durham*	327 7 3
J. Carrick	432 4 9		
W. Stelling	427 14 0		

[Engineer's estimate, £350.]

DURHAM.—For the construction of 2,206 lineal yards of 12-in., 9-in., 8-in., and 6-in. pipe sewers, with manholes, lampholes, flushing chambers, and ventilation shafts; the construction of tanks, bacteria beds, and a storm-water filter; and the levelling, laying-out, and fencing of four and a half acres of land for sewage disposal purposes at Carrville, for the Rural District Council. Mr. Geo. Gregson, Engineer and Surveyor to the Council:—

Hardy & Atkinson	£4,419 2 9	G. Bell	£4,013 0 0
R. Oliver	4,200 0 0	J. G. Bradley	3,335 17 6
G. T. Manners	4,198 0 0	J. Carrick, Durham*	3,032 1 4

[Engineer's estimate, £3,197].

EALING.—For additions to Ealing Park Laundry, for Messrs. Buck. Mr. J. Hume, architect and surveyor, Chiswick:—

W. Field	£472 10	R. A. Scutt	£450 0
J. Johnson	470 0		

[All of Ealing.

GUNNERSBURY.—Alterations and additions to villa-residence, "Sans Souci," for Mr. F. Schofield. Mr. J. Hume, architect and surveyor, Chiswick:—

Speechly & Smith	£497 0	D. D. Neath	£449 0
Prince Bros.	451 10		

HEREFORD.—For the erection of an isolation hospital, administrative block, and other works at Stretton Sugwas, for the Hereford Rural District Council. Mr. Ernest G. Davies, Bridge-street, Hereford, Architect to the Council:—

Davies & Co.	£2,220	Lewis & Co.	£2,050
H. R. Beavis	2,200	E. W. Wilkes	1,875
W. Powell	2,067	C. Cooke, Hereford*	1,875
J. Davies	2,062		

KINGS LANGLEY.—For houses and cottages at Kings Langley Hill, for Mr. A. Aronson. Mr. W. H. Syme, architect, Watford:—

Albert Timberlake, Kings Langley, R.S.O.* £4,300

LONDON.—For painting work to the Public Library, Bancroft-road, Mile End, E., for the Metropolitan Borough of Stepney. Mr. M. W. Jameson, Borough Engineer:—

A. Andrews	£161 10	J. Calcutt, 2, Grafton-street, Mile End, E.*	£148 10
A. Heard (informal)	160 0		
A. Kendall	156 10		

Electric-light installation at the Public Library, Commercial-road East, Limehouse, E., for the Metropolitan Borough of Stepney. Mr. M. W. Jameson, Borough Engineer:—

Strode & Co.	£98 0	Emerson & Sons	£52 0
Tamplin & Mackovski	75 0	Ward Bros.	51 17
J. C. Christie	68 15	Barlow Bros., 237, Shaftesbury-avenue, W.C.*	42 10

[*See also next page.*

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LONDON.—For a suspended electric goods lift in the large store at the Wentworth-street depot, for the Metropolitan Borough of Stepney. Mr. M. W. Jameson, Borough Engineer :—

Waygood & Otis ..	£315 0	J. Richmond & Co., 30, Kirby-st., Hatton-garden, E.C.*	£220 0
Clark, Bunnett & Co. Ltd.	307 0		
Ward Bros.	290 10	Barlow Bros.	200 0

MAIDENHEAD.—For electric lighting : central station buildings :—

Peerless, Denis, & Co.	£1,242 0 0	Cox & Sons ..	£1,110 0 0
Thompsett & Co.	1,221 0 0	A. J. Colborne	1,099 19 6
W. J. Bloxham	1,174 0 0	F. W. Edwards	1,080 0 0
H. Flint	1,127 12 6	F. Bissley	1,020 0 0
		W. E. Theaker, Maidenhead	874 0 0

PIXLEY (Herefordshire).—For the erection of a parsonage at Pixley for the Rev. Preb. Chas. E. Maddison Green. Mr. Ernest G. Davies, architect, Bridge-street, Hereford :—

D. Smith	£935 15 0	G. Hill, Ledbury*	£853 18 6

PRESTON (Lancs).—For the erection of refuse destructor buildings, St. Paul's-road, for the Corporation :—

Croft & Sons, Victoria-street, Preston .. £12,234

WATFORD.—For household management centre at the Alexandra School, for the Watford School Board. Mr. W. H. Syme, architect :—

Wm. Sampson ..	£2,213 0	Townsend & Coles	£2,004 0
Goodchild & Jeffery	2,150 0	W. King	2,000 0
Clark Bros.	2,124 10	Tyler & White ..	1,976 0
Dupont & Co. ..	2,095 0	G. & J. Waterman	1,956 0
G. Wiggs	2,076 0	C. Brightman	1,920 0
R. L. Tonge	2,065 0	Henry Brown, Watford*	1,897 0

WESTERN HOSPITAL.—For tar-paving works at Western Hospital, for the Metropolitan Asylums Board :—

Williams & Sons ..	£495 0	J. Sheehan	£186 10
G. Neal	272 0	J. Smart	156 0
Fry Bros.	271 10	Goddan & Co.	147 5
Constable & Co. ..	229 0	Grounds & Newton*	129 13

[Engineer's estimate £150

WITHYPOOL (Dulverton, Somerset).—For the erection of a house and stables, for Miss Darbyshire. Mr. Allen T. Hussell, architect, Ilfracombe :—

Sanders	£1,760	Steer, Winsford, Dulverton*	£1,648
Fewings	1,657		

WITTON GILBERT (Durham).—For additions to the Wesleyan Methodist Church. Mr. H. T. Gradon, architect, 22, Market-place, Durham :—

J. G. Bradley ..	£438 13 0	Rutter & Sons, Esh*	£381 13 8
G. T. Manners	399 0 0		

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) will be given as a supplement with our next issue.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each : also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence, will be ready on the 22nd inst.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

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COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under ..... 6s. 0d.
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Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

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And every other description of Slates, except American, Ready for immediate delivery to any Railway Station.
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BATH STONE.
FLUATE, for Hardening, Waterproofing, and Preserving Building Materials.

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DOULTING STONE.
The Ham Hill and Doulting Stone Co.
(incorporating the Ham Hill Stone Co. and C. Trask & Son, The Doulting Stone Co.).
Chief Office :—Norton, Stoke-under-Ham, Somerset.
London Agent :—Mr. E. A. Williams, 16, Craven-street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

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"INK-PHOTO" PROCESS,
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Fetter Lane, E.C.

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For Flat Roofs, Basements, & other Floors.
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LIVERPOOL : and 8, HATTON GARDEN.
GLASGOW : 47 and 49, ST. ENOCH-SQUARE.
BRISTOL : ASHTON GATE WORKS, CORONATION-RD.

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SCULPTURE: "MUSE EXILÉE."—By M. J. B. Antoine Champeil.

(Exhibited at the Paris Salon.)

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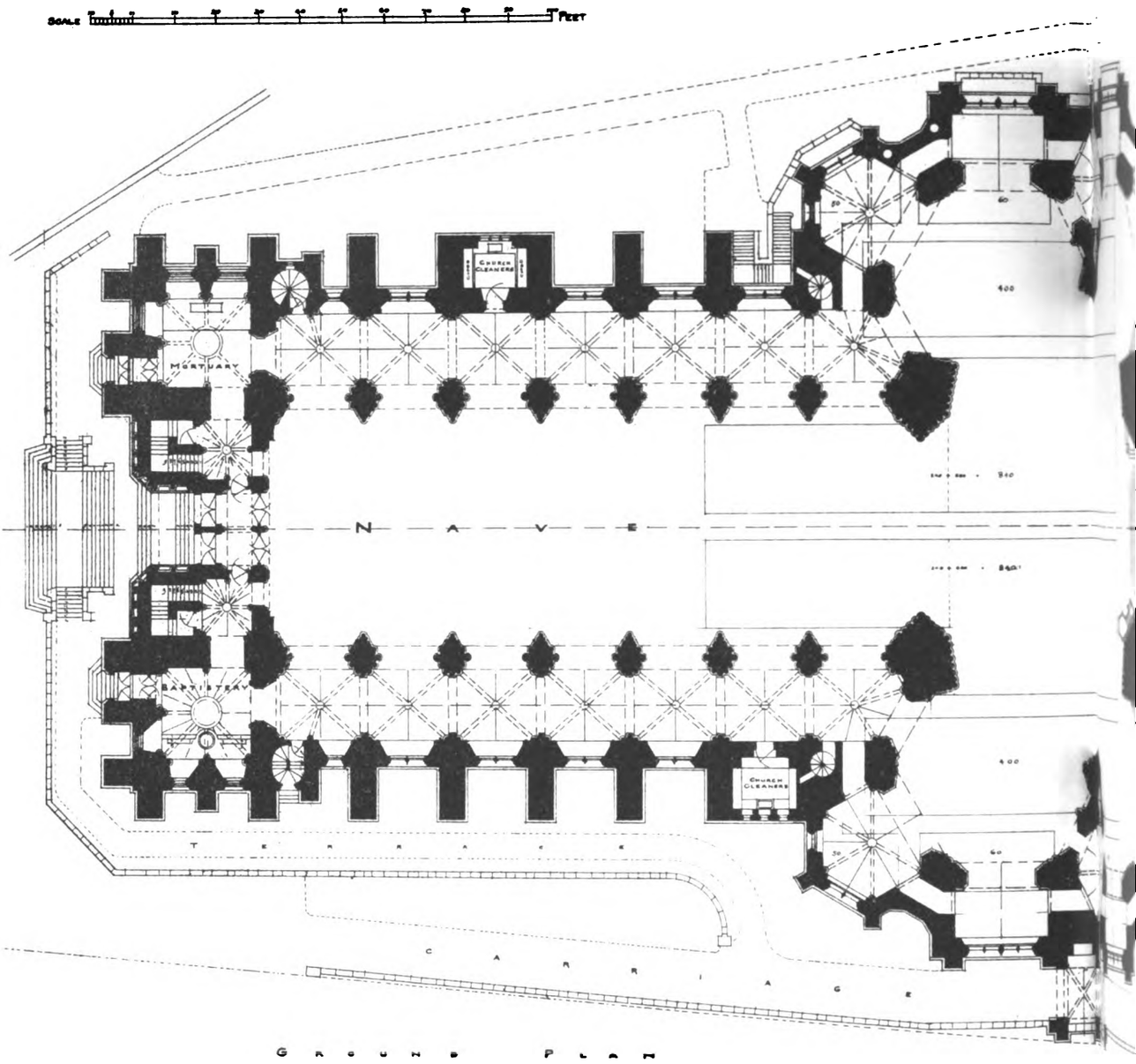
LIVERPOOL CATHEDRAL



GROUND PLAN

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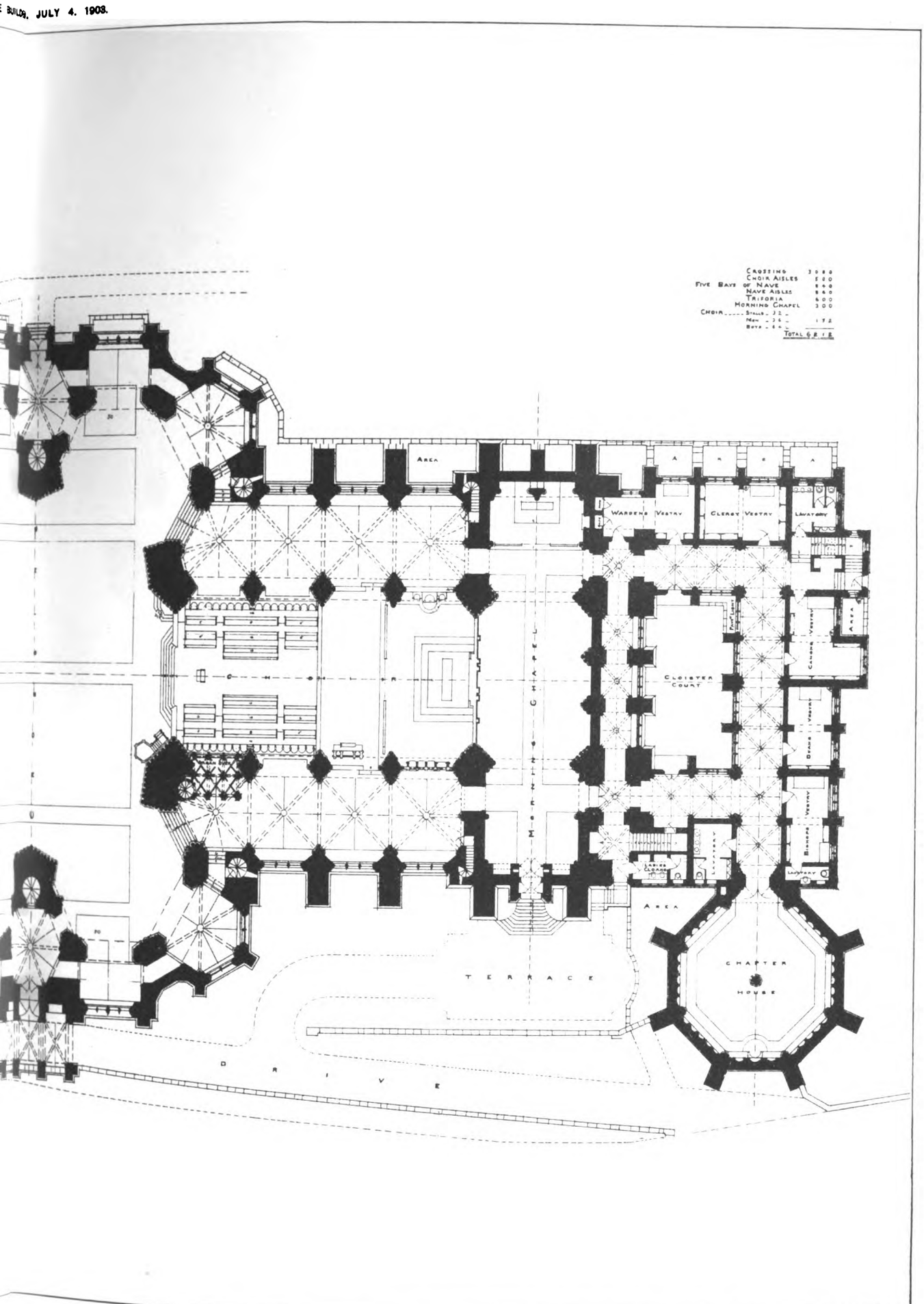

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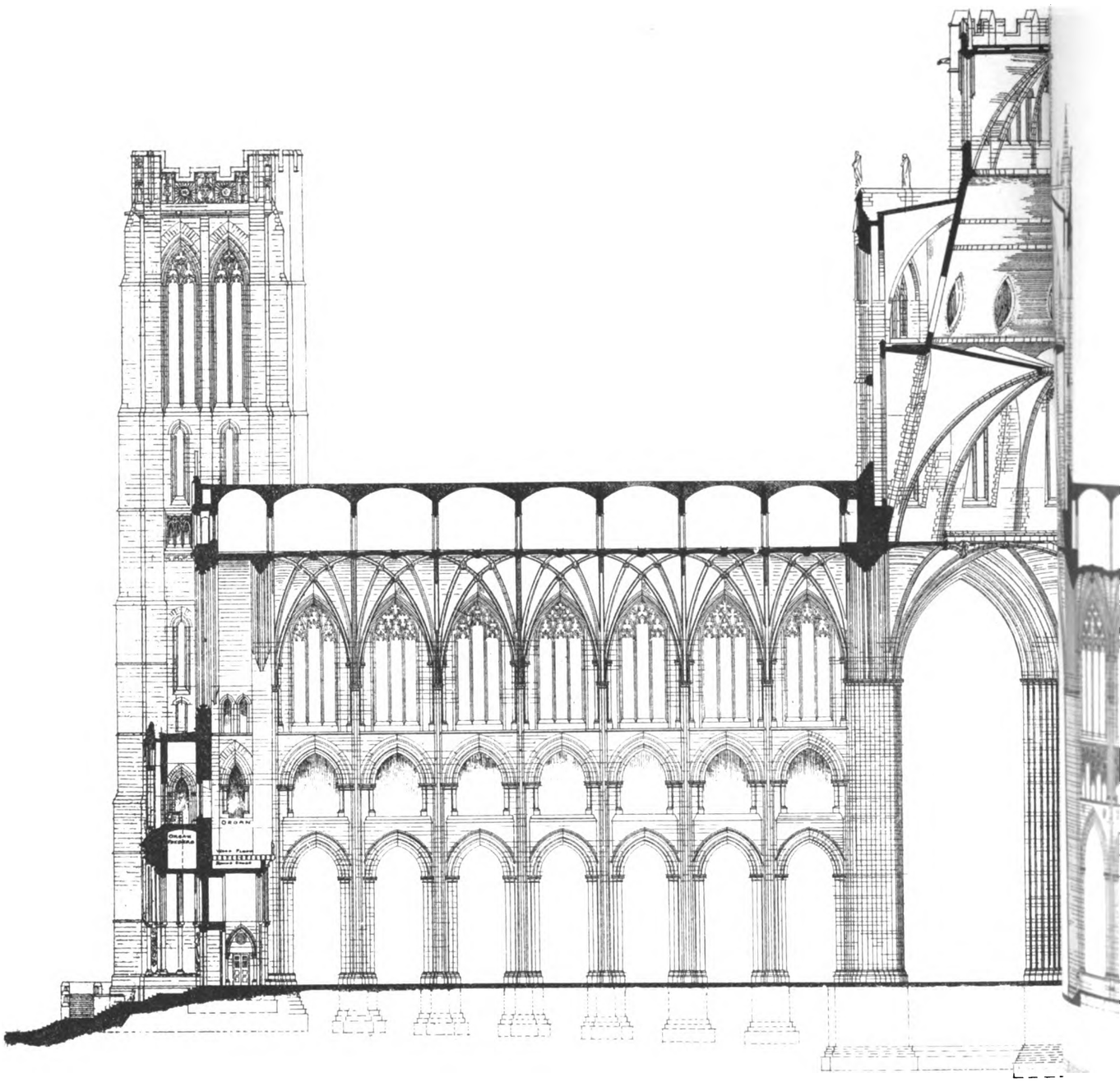

LONGITUDINAL SECTION

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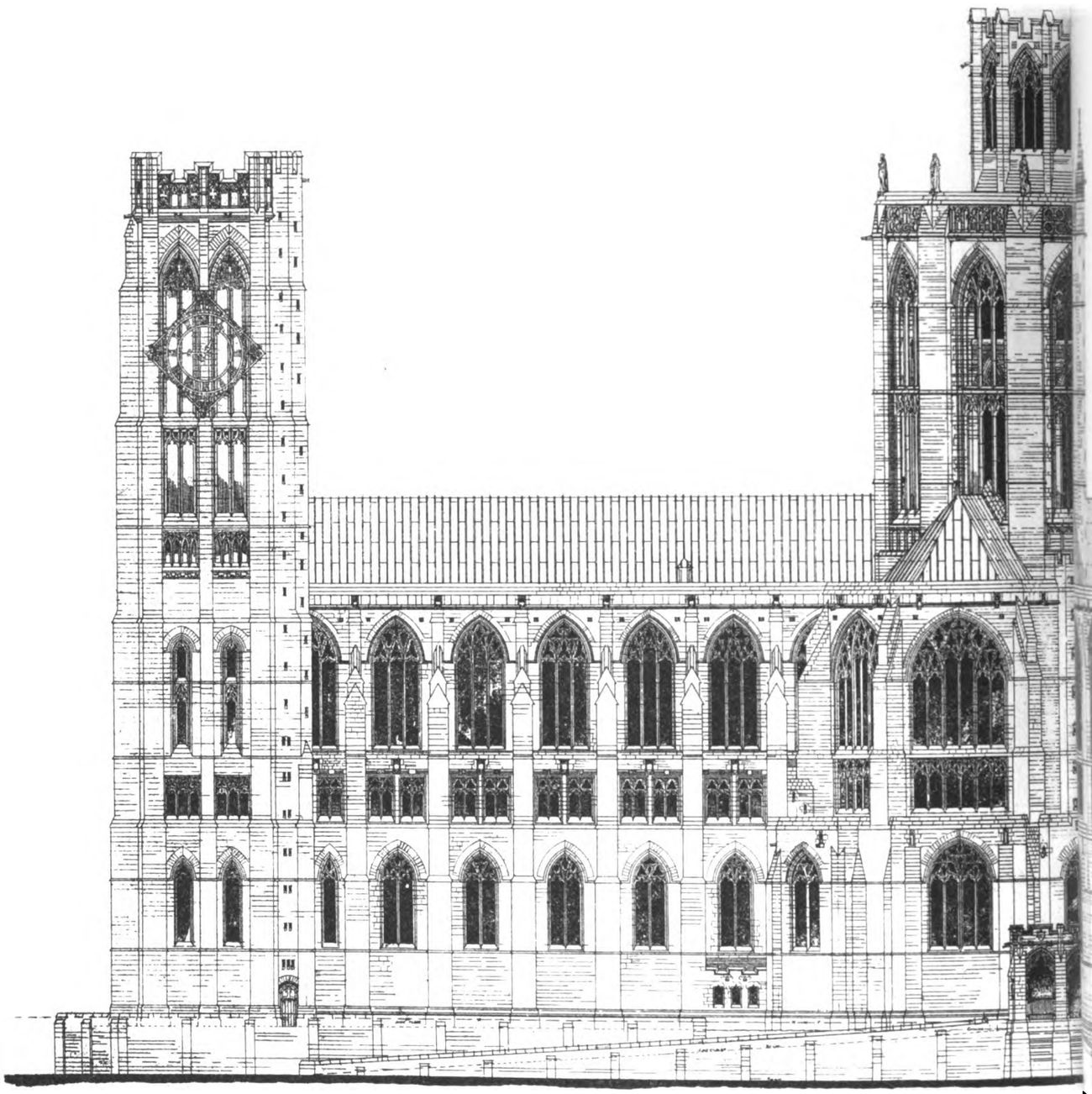

ELEVATION TOWARDS

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SCALE 0 5 10 20 30 40 50 60 70 80 90 100 FEET

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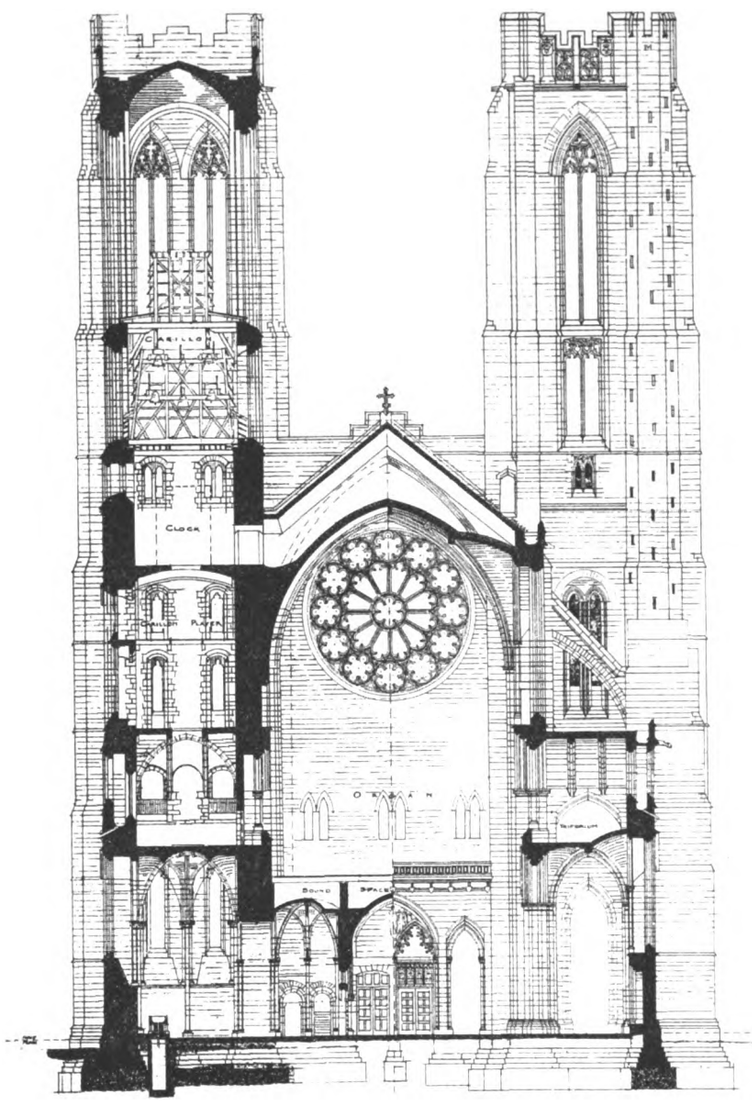

SECTION ACROSS BAPTISTERY AND NAVE

SECTION ACROSS LANTERN TOWER AND LOOKING TOWARDS CHOIR

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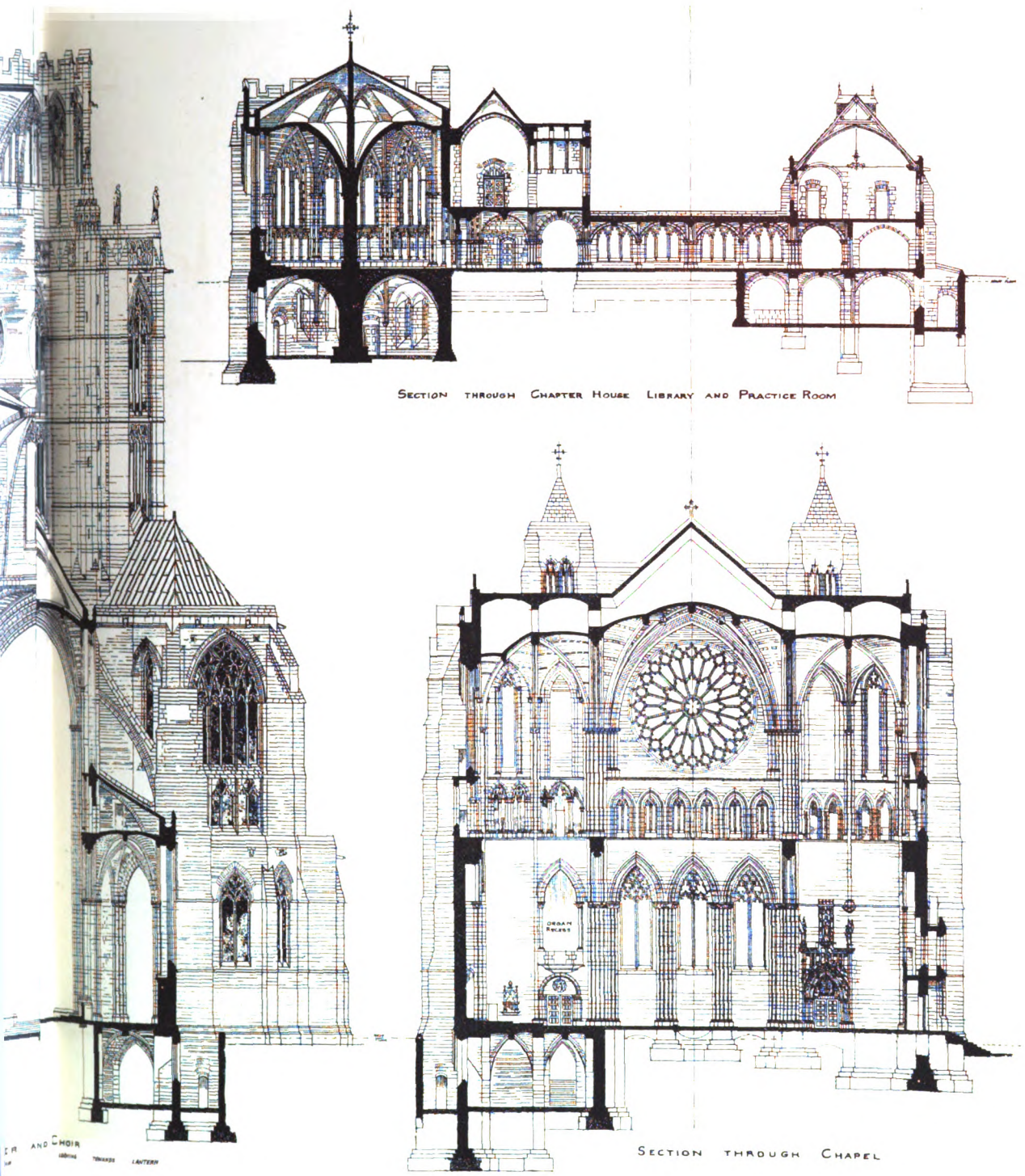

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The Builder.

VOL. LXXXV.—No. 3253. JULY 11, 1903.

ILLUSTRATIONS.

Hull Town Hall Competition: First Premiated Design ..... Messrs. Russell, Cooper, & Davis and C. E. Mallows, Architects.
Perspective ..... " " " "
Elevations and Sections ..... " " " "
Plans ..... " " " "
Some Sculpture at the Royal Academy ..... From Photographs.

Blocks in Text.

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The Ancient Lights Bill.

THOUGH the Ancient Lights Bill was read a first time last month in the House of Commons, we may at once say that, having regard to the period of the Session now reached, and to the state of Parliamentary business, there is not the remotest probability that this measure will become law. A consideration, therefore, of its terms must be regarded as useful in view of the future rather than of the present. The Bill is the result of the deliberations of the Royal Institute of Architects through a Committee, and of those of the Surveyors' Institution. These investigations and deliberations have been going on for a number of years, and we must confess that the result is rather infinitesimal when we consider the time and labour that have been given to the subject.

It was not unreasonable to expect that a clear and concise code of the law of light would have been formulated which would contain a complete statement in ordered array of the whole existing law on this subject, amended by the light of the investigations of the Committee. All, however, that we have now before us is a Bill by which, in some details, the present law is amended. Thus if, and when, the Bill becomes law, there will be added to the considerable mass of judicial decisions and to the existing statute law, such as the Prescription Act of 1832, yet another piece of law—a new statute which must inevitably increase rather than diminish litigation.

What, then, are the main points of the proposed legislation? The first is the abolition of the right to an extraordinary amount of light. In this part, however, there are two limitations: (*a*) That this section shall not apply to a tenement in which a trade has been carried on continuously for ten years, and which required an extraordinary amount of light; (*b*) where the right becomes absolute after the passing of the Act (as our readers well know, there has been for many years a considerable conflict of judicial decisions in regard to the right to an extraordinary amount of light); and the more recent cases, especially that of Warren *v.* Brown in the Court of Appeal in 1901, have been in favour of the occupier of the dominant tenement who claimed an extraordinary right to light. As those who have read the articles published in this journal on this particular branch of the subject are aware, we have always urged that the right to an extraordinary amount of light should not be allowed by the courts. It is more than the reasonable man demands, and a person who requires an unusual degree of light for some business purpose should not obtain it to the disadvantage of his neighbours; therefore, we should have been glad if this Bill had followed the lines of some judicial decisions, and altogether abrogated the right to an extraordinary amount of light.

The next important point refers to the obstruction of light by a notice in place of a physical obstruction. The only means at present by which the growth of a right to light can be prevented is by the actual obstruction by a screen of the light to the windows of the dominant tenant. This has been regarded as an unreasonable and rather a brutal manner of preventing the accretion of such a right. It must however be borne in mind that the owner of a dominant tenement can always do away with this obstruction by entering into an agreement under which, while he enjoys the light, he admits that he is not gaining any prescriptive right. Therefore there is no necessity why a huge hoarding should remain in front of a window. However, the present Bill proposes that the owner of a servient tenement may serve upon the occupier *of*, and upon any other persons whom he knows to be interested in the dominant tenement, a notice, accompanied by a plan and elevation showing the windows through which the light passes. This notice shall be deemed to be an obstruction to the light as if it were an actual physical obstruction.

On the face of it there is something to be said for this part of the Bill, but when it comes to be examined it appears likely to result in a great deal of litigation. If such a notice as this could be filed in some public office and preserved as a kind of record relating to a property, the arguments in favour of this change would be more powerful; but a moment's consideration will show that the least want of precision in a notice of obstruction will open the door to any amount of litigation. It is equally certain also, having regard to the numerous interests which are nearly always to be found in property in this country, that some person having some kind of right in a building will not consider himself bound by the notice. From the very words of the chief section it is apparent that difficulties must arise, because if the notice is served only on the occupier the landlord may never hear anything of it. The words "upon any other persons" obviously present to the person giving the notice an indefinite duty; for how is he to discover all those who are interested in the property, tenants for life, mortgagees, and so forth? We fear, therefore, that this part of the Bill, though well intentioned, is one which will not produce a true reform of the law.

Part 6 of the Bill is obviously intended to prevent litigation by the preservation of records of houses which have been rebuilt. The provisions of this part of the proposed measure are likely to be of practical utility. Briefly stated, their effect is that the owner of a building which is about to be taken down or rebuilt, may cause plans, sections, and elevations of it to be prepared, and may obtain from the District Surveyor, after inspection, a certificate of their correctness. It is unnecessary to go into the details of this part of the Bill; it is sufficient to say that the Official Surveyor, as he is called, shall keep a register of these drawings, which are to be deposited at the town or county hall. The certificate given by the Surveyor is to be conclusive evidence of the correctness of the plans, and should therefore put a stop to wrong assertions as to the size and character of the windows of the buildings to which they refer.

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Part 7 of the Bill is likely to be a good deal more doubtful in its practical results. Here again the prevention of litigation is clearly aimed at, but we feel considerable doubt whether this part of the measure will have the desired result. Section 7 enacts that where a servient owner is about to erect a new building or alter an existing one he shall, at the request of the dominant owner, give facilities to him or his agent to inspect the plans, elevations, and sections of the intended new buildings or alterations. If there are none, then the servient owner shall give all reasonable information on the subject. If the dominant owner considers that his rights will be infringed he may serve a notice of objection on the servient owner, and if this is accepted, there is an end of the difficulty. If, however, the servient owner is not willing to accept the terms of this notice he must serve a counter notice of refusal, and the result of this will be, putting aside details, an arbitration. It does not, however, appear that this procedure is to do away with the right of either party to go to law—that is to say, if the dominant owner does not ask for plans, and he afterwards finds that his rights to light have been infringed by the new building, he has still his ordinary legal remedies. It would thus appear that the result of this part of the Bill would be to add to the means of litigation. We are inclined also to think that the owner of property who is unreasonably asked for a plan may have a grievance, and we are also of opinion that it is a somewhat dangerous mode of procedure which enables the owner of a building before he is in any way hurt to pry into the affairs of his neighbour. We confess that we should instead have preferred to see the existing law amended in regard to injunctions and damages. As our readers are aware, the late Lord Cairns many years ago passed an act allowing damages to be given in the place of an injunction where a judge thought it was reasonable. We believe that the simplest and most satisfactory reform of the law would be to enact that an injunction shall never be granted where the infringement of the rights of the owner of the dominant tenement can be recompensed by means of damages. The last section of the present Bill states that a judge may, if he considers that the claim can be reasonably satisfied by damages, refer the case to arbitration. But why this reference to arbitration? One fault of the present Bill lies in there being too much arbitration in it. Arbitration is not at all cheaper than hearing by a judge, and is not so satisfactory to the parties, and we think that if the infringement of rights to light could, in all cases where it was at all reasonable, be recompensed by damages, that would be sufficient.

There are other provisions in this Bill to which reference should briefly be made, such as the section which enacts that no title to a right to light shall be obtained by the owner of any building which shall have been erected after December 31, 1890, and which abuts on any street and where such right to light would have been obtained by passing over a tenement on the opposite side of the street. This would, of course, put an end to the growth of prescriptive rights to light in nearly all parts of a town. Having regard to the large definition of the word "street," it would have been better at once to have enacted that no rights to light shall be obtained in a town; because, in nine cases out of ten, nearly every right to light is obtained in respect of a cone of light passing over a street. But this, it must be confessed, would be an exceedingly drastic change, which is hardly likely to pass through Parliament, and under these circumstances we are inclined to think that this part of the Bill would be better omitted, and if the law of light is not to be codified, we should prefer to see this measure modified next session in the directions we have indicated.

THE ARCHITECTURAL ASSOCIATION SKETCH BOOK.

IN welcoming the appearance of Volume VI. of the New Series of the Architectural Association Sketch Book, we may congratulate the Association on the remarkable manner in which this series of sketches has been kept up for so many years, and on the continued excellence and interest of the work shown in it. Some old names which were formerly prominent we miss in the present list of contributors; but on the other hand there are new ones whose drawings assist in keeping up the old standard.

If there is any change in the general tendency and character of the collection, it may perhaps be found, if our memory of older volumes serves us rightly, in a rather increased space and importance given to measured drawings of old work, rather than to drawings of purely artistic character. Thus we have no less than nine plates of measured drawings of Bolsover Castle by Mr. F. W. C. Gregory, and five of Houghton Hall by Mr. Stanley Towse, and a good many others of minor buildings of antiquity. This is perhaps well, as it gives a practical value to the collection; but at the same time the kind of power which enables an artistic sketcher to convey forcibly the actual effect of a building or a detail, in a drawing which shall be in itself also a work of art, as a specimen of execution with brush or pencil, is not to be overlooked, and may in a sense be more valuable than the measured drawing. It does not in the same way give information, but it stimulates the imagination and the sense of the picturesque, and adds to the joy of life.

Nevertheless, Mr. Gregory is to be congratulated on the care and fulness of his set of drawings of Bolsover just referred to, which, with their accurate and careful delineation, and the liberal introduction of figured measurements, form a monument of conscientious work of the kind. A good deal of information is scattered about the plates in the way of written notes, arranged in a more or less decorative manner, and the author is not above writing these legibly, in good clear square letters, a point sometimes overlooked either by those who are content with careless writing, or by those who consider that there is an artistic element in writing which is illegible: a vicious error; the finest print writing of the Renaissance, with the most finely formed letters, is also the clearest to read. We observe, by the way, that what we have always known as "mouldings" it is now the fashion to define in the text as "moulds." The old word was a better definition of facts; and it may be added (though probably few architectural draughtsmen are aware of the fact) that the word "moulds" is now habitually used, in researches into the impurity of air, for a particular class of floating impurity not coming under any other head; so that its associations, with those conversant with scientific work in ventilation, are not architectural at all. In these and most of the other sections of mouldings published in the sketch-book the profiles of mouldings are shown by comparatively thin black lines in which it is not always easy to discern at a glance which margin of the line represents the profile and which is only a backing to it. It is a much better and more workmanlike way to show the profile by an accurate thin line and to shade on the inner side of it, as is done, for instance, with the mouldings in Mr. Brown's drawings of Eltham Palace, and Mr. Nicol's of the church at Norrey. Then the eye sees the true profile at a glance.

The measured drawings of details of lead and iron work, a ceiling, and fireplaces, from Albyns (Essex), by Messrs. E. B. Nevinson and J. F. Newton, are interesting and very cleanly drawn, and we are especially obliged to them for the three fireplaces, which are not very well known, and which show some rather peculiar and characteristic bits of detail; notice, for instance, the imitation of rusticated masonry in the lower portions of the colonnettes. Let us add, however, that this is not by any means a detail for imitation—indeed, it is rather false taste, but it is interesting as an example of the peculiarities of the Jacobean chimney piece designer.

Mr. E. H. Bennett's set of drawings of two of the porches of Chartres, the first reproductions from brush drawings in the book, are artistic in style, and give very well the feeling of the quaint lengthened out figures of the sculpture decoration. Part 2 commences with another set of measured drawings: Aston Hall, by Mr. E. F. Reynolds; a very good set, but the building is not so interesting as Bolsover. Mr. J. A. Swan supplies a large line elevation of a rather coarsely designed fireplace in this somewhat overrated building. As a detail of execution, we may observe that shadows shown by line shading, like that under the projection of the chimneypiece in this drawing, should not be defined by a bounding line, which gives them too decisive and hard an appearance for shadow; it is much better to let the shading lines simply stop, and make their own outline. Mr. Hart's sketch of the candelabrum in the Basilica of San Antonio, Padua (not "candelabra," please, which is plural), is a very good and artistic sketch; and very effective also is the one on the next page, by Mr. Rupert L. Austin, of a tripod cistern for wine-cooling (seventeenth century) in the South Kensington Museum; though the near leg, if it is intended to be the same curve as the others, is a little out of drawing. The decoration on the bowl is indicated with great vigour of touch, and a section to scale is added. The drawing of the book, though, for artistic effect and boldness of style, is Mr. Varndell's capital from St. Eustache Paris in Part 3; a very fine bit of work, up to the best traditions of the Sketch-book. Among the other contents of Part 3 we find measured drawings of the porch and an exterior bay of the nave of Walpole St. Peter's, Norfolk, by Mr. J. Myrtle Smith; measured drawings of the porch of St. Mary-le-Strand, by Mr. J. G. Wiles; the simple lines of the Bookham Almshouses, York, with their interesting Transitional doorway (Mr. W. S. A. Gordon), and a good set of

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measured drawings of Wolvesey House, Winchester, by Mr. L. G. Detmar. In Part 4 Mr. Nicol gives a plan and section of the choir of the church at Norrey, near Caen, with its apse on the lines of a semi-pentagon; and M. C. de Gruchy contributes a very good set of drawings of the church of St. Buryan, Cornwall. The measured drawings are prefaced by a bold and effective but somewhat too hasty perspective drawing of the tower, which produces the impression to the eye that the main walls batter a good deal more than the measured elevations and section show. The tower is nothing but blank wall with a string-course at intervals, except for a single three-light window in each face of the upper story. It is one of the churches with three aisles of equal height, not uncommon in Devonshire and Cornwall; very low in proportion, with nothing showing on the side elevation but a single row of square-headed mullioned window; altogether a curious and characteristic church, and well worth illustration. Equally curious and characteristic is the rood in the church of La Martyr, Brittany, sketched by Mr. Cecil C. Brewer; a most singular bit of Renaissance work. On either side of the entrance to the chancel is a pedestal, carrying four colonnettes, one at each corner, which carry a bit of entablature like the top portion of a classic cornice with the rest cut off. On a blocking on each of these stands a figure, and an arched wooden beam springing from one to the other carries the crucifix in the centre.

Mr. Frank Green has produced a clever and effective title-page—a line drawing showing a columned alcove, between the columns of which is seen, below, a collection of some of the celebrated buildings of the world; at each end of the cornice a nude figure, with back to the spectator, sketches the buildings below. As symbolical of the objects of the Sketch-book it is a clever and effective architectural fancy.

THE ENGINEERING STANDARDS COMMITTEE.

IN our issue of March 14 some reference was made to the list of standard steel sections prepared by the Engineering Standards Committee, and our readers will be pleased to learn that arrangements have now been made for the publication of codified lists of all standards settled and to be settled by the Committee. In order that the usefulness of this publication may be more fully assured, it is intended to include in it complete lists of manufacturers and merchants who roll and supply standard steel sections for use in shipbuilding, in bridge and general building construction, and in railway work. Up to the present time only one series of standards has been settled—that relating to structural steel—but several others are to follow in due course, and the following summary of the scope of the Committee may be convenient for reference.

The existence of the Committee is the outcome of a suggestion made by Sir John Wolfe Barry, in consequence of which an Engineering Standards Committee was appointed by the Institution of Civil Engineers. This Institution then approached the Institution of Mechanical Engineers, the Institution of Naval Architects, and the Iron and Steel Institute with the view of securing their co-operation, and at a later date Sir William Preece proposed that the standardisation of electrical plant should be added to the sphere of the Committee's operations. Consequently, the Institution of Electrical Engineers was asked to co-operate with the other associations. Further, representatives of various Government Departments were invited to join the movement, and the Engineering Standards Committee as at present constituted became an accomplished fact. The five leading technical institutions are actively and financially supporting and controlling the operations of this important organisation, and as we have already announced, a Government grant of 3,000*l.* has been made as a contribution to the funds of the Committee for the year 1903-4. The Admiralty, who are one of the largest, if not the largest, users of rolled sections, have signified their approval in a most practical and valuable manner. Mr. Arnold-Forster, who throughout has taken a very keen and far-sighted interest in the work of the Committee, informed the House of Commons shortly after the publication of the first series of findings that the Admiralty had taken steps to give all orders for rolled material in terms of the findings. The loyal support of so important a Department as the Admiralty cannot but do much to hasten throughout the British Empire the adoption of the standard sections now settled. To the main Committee, which includes fourteen well-known engineers representing the five institutions already mentioned, falls the entire work of directing and organising the movement, and of finally approving the findings of the various Committees. At an early stage of the proceedings the main Committee sat to hear evidence on the advisability of standardising rolled sections before proceeding with the work. The evidence then brought forward was so overwhelmingly in its favour that Committees were formed to deal with the matter. Sir Benjamin Baker took charge of the Committee dealing with sections used in "Bridges and General Building Construction," Sir Douglas Fox of that dealing with "Railway Rolling-Stock Under-Frames," Mr. Denny of that relating to "Sections Used in Shipbuilding," and Sir John Wolfe Barry of that relating to "Rails." At the outset the three first-mentioned Committees proceeded independently of each other, deciding upon those sections which were necessary for the class of work referred to them. After repeated consultations various lists were drawn up, and joint meetings were then arranged in order to agree upon a series of standard sections to cover all requirements. The result of the joint meetings is seen in the list of standard sections now published.

The work of the Bridges Committee has been confined principally to drawing up a series of standard beams and tees, and to the consideration of equal and unequal angles, so as to meet the requirements of general building construction. Sections used in railway rolling-stock under-frames were considered by the second Committee, attention being given more particularly to channels and angles. The Committee on sections for shipbuilding is of a thoroughly comprehensive character, including representatives of the Admiralty, the Board of Trade, Lloyd's, the Steel Ingot Makers' Association, and, practically, of all the corporations and associations interested in shipping and shipbuilding. The sections more particularly considered by this Committee were bulb-angles, bulb-tees, bulb-plates, and Z-bars, the lists of ordinary sections used in shipbuilding having to be framed to meet the requirements of other Committees. Rail sections are divided for the consideration of two Sub-committees, one dealing with railway, and the other with tramway, rails. The first Sub-committee consists mainly of permanent-way engineers and representatives of leading manufacturers. This Committee is now engaged in drawing up a series of standards, and the second Sub-committee has already agreed upon a series of tramway rails which has been finally approved by the Board of Trade.

An important sub-committee is one formed for selecting tests for iron and steel material used in the construction of ships, and machinery used therein. This sub-committee includes the members of the committee on steel sections for shipbuilding, with the addition of members representing the mechanical aspect of the industry. Thus Sir John Durston has accepted a seat on behalf of the Admiralty, and Professor Unwin as the nominee of the International Association for Testing Materials of Construction. Other committees and sub-committees, under the chairmanship of Sir Douglas Fox and other engineers associated with traction, are now occupied with locomotives, their component parts and types, tyres, axles, and springs, steel boiler plates, and copper and its alloys. A Committee on Electrical Plant, with Sir William Preece as chairman, and sub-committees on electric generators, motors and transformers, temperatures of insulating materials, cables and conduits, and telegraphs and telephones, are considering the standardisation of appliances used in electrical engineering. A committee on screw-threads, with a sub-committee on limit-gauges, another committee on pipe-flanges, and one on cement, are engaged upon work the results of which will be greatly appreciated in engineering and architectural circles. The committee on cement is especially one from which much advantage may be expected. This body is under the presidency of Mr. W. Matthews—an engineer with considerable practical experience of Portland cement—and it includes the names of several well-known experts, such as Mr. Bertram Blount (Institute of Chemistry), Mr. Fitzmaurice (L.C.C.), Mr. Lyster (Liverpool Docks), and representatives of Messrs. J. Aird & Co., Messrs. S. Pearson & Son, Sir John Jackson, and of the Associated Portland Cement Manufacturers.

Finally we may mention the Committee for Publication and Calculation, under the chairmanship of Mr. Max am Ende, this committee being charged with the supervision of all matters relating to the publication of the findings, and the calculations required in connexion with the standard lists. The general control of finances is under the direction of a committee consisting of Mr. J. Mansergh, Sir Benjamin Baker, Sir John Wolfe Barry, Sir Douglas Fox, and Sir William Preece. From the above brief references it may be gathered how far-reaching is the scope of the Engineering Standards Committee as a whole, and some idea may be formed of the enormous importance of its work to the trade of the Empire at large.

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NOTES.

Strikes and Lockouts.

WE recently commented on the Board of Trade return on wages, and the recent Report of the Labour Department on Strikes and Lockouts furnishes a pendant to the above, and is issued in a very interesting form. The aggregate duration of all disputes, new and old, during the year 1902, represented about three and a half million working days, which represents about half a working day a head over the whole working population, but three-quarters of the above took place in the mining and quarrying interests. There were 442 fresh disputes, affecting 260,000 workpeople, but the cessation of 16,000 pit hands from work threw 85,000 men out of employment. Thus, although the total number of stoppages was smaller than the average of the past five years, the number of workpeople affected was greater. The aggregate number of working days in each year for the whole industrial population being 2,600,000,000, the aggregate duration of disputes in 1902 was 3,479,255, or one day in 750. In the building trades the number of people directly and indirectly affected by disputes was 5,356, or 0·7 per cent., as compared with 9,797, or 1·2 per cent., in 1901; 19,178, or 2·3 per cent., in 1900; 30,524, or 3·7 per cent., in 1899; 16,684, or 2 per cent., in 1898. Of these disputes 40·09 per cent. were settled in favour of the workpeople, taking only those directly affected, 37·94 in favour of the employers, and 21·97 compromised; but, taking the disputes in all industries, only 31·60 resulted in favour of the workpeople, and this percentage is even less if those disputes are eliminated which arose between different classes of workpeople amongst themselves. The year 1902 compares very favourably with the four previous years, and another encouraging feature is the number of disputes arranged by arbitration and conciliation boards. The above figures do not include agricultural labourers and seamen, in which occupations no disputes have arisen, and if those classes of workpeople were added, the percentages of non-working days would be diminished in reference to the whole population.

London County Council Working Class Dwellings.

THE County Council last week adopted a Report of the Working Classes Committee. Assuming that the figures and statements in this document are correct, it appears to show that the London County Council cannot be adversely criticised in regard to the management of some at least of their blocks of working class dwellings. A comparison is made between the Turner and Ruskin Buildings on the Millbank Estate, and the Toronto and Montreal Buildings in Poplar, with those of the Liverpool Corporation in Victoria-square and Juvenal Buildings, and with seven estates belonging to the Guinness Trust. The result of this comparison gives as regards the cost of buildings per room the following result:—Liverpool, 93*l.* 10s. 4d.; Guinness Trust, 73*l.* 0s. 6d.; and London, 86*l.* 0s. 10d. According, however, to this Report, the London buildings are better than those in Liverpool. As regards cost of management this works out at 1s. 2½d. per room per week, and 1s. 4½d., these being for Liverpool, while the Guinness Trust shows 1s. 1½d., and London Turner and Ruskin Buildings 1s. 7½d., and Toronto and Montreal, 1s. 4§d. Under the head of "management" rates and repairs are included, and in regard to rates there are many differences between the different places which may account for the higher London expenditure on management. While we are not altogether in favour of municipal dwellings, it is necessary to admit that the principle has now been so much sanctioned that it must be regarded as settled, and, so far as this Report goes, it appears to show that London has not much to complain of with regard to the management and primary cost of its artisans' dwellings, though it is necessary to point out that the Report in question deals only with a very limited number of buildings, which can scarcely form sufficient data for a satisfactory comparison.

The Motor Traffic Bill.

THE Bill dealing with the regulation of motor traffic, as introduced in the House of Lords, seems both inadequate and incomplete. The declaration it contains against reckless and dangerous driving is an absurdity, since that is already within the reach of the law, and moreover abundant redress can be obtained by the common law by any one suffering damage. What is required is a clearly defined and easily applied law to this new development of high-speed traffic on the high road. Thus, when one person is put in a position of difficulty and danger by the action of another driving at high speed and leaving little time for action, the ordinary law of contributory negligence is inapplicable. This is recognised in maritime law, and a trifling mistake in judgment in the flurry of collision is not a bar, as at common law, to any claim for damages. The onus of proof or disproof should at least be placed on those using the public highways with high-speed and consequently dangerous vehicles.

L.C.C. Tramways.

THE Report of the Highways Committee of the London County Council on electrical traction for tramways is a carefully-prepared document, and gives a clear statement of the relative advantages of overhead and conduit tramways. They anticipate that the cost of constructing the conduit track for the Greenwich and Peckham lines will be higher than on the Tooting line, which amounted to 13,600*l.* per mile. Great difficulty was experienced in getting trustworthy figures either in America or on the Continent, but the average of the figures obtained was 16,000*l.* per mile. In outlying districts the cost was less than this, and in central districts it sometimes amounted to over 20,000*l.* per mile. In our opinion the great advantage of the conduit is the doing away with all the overhead wires in the streets. In addition, electrolysis of gas and water pipes is avoided. Now that the magnetic department of the National Physical Laboratory is removing to a remote part of Dumfriesshire, we do not think that the disturbance that an overhead system of electric traction would cause to the magnetic department at Greenwich or elsewhere is of any serious import. From a scientific point of view the magnetic records obtained in Scotland will enable Dr. Chree to complete his researches on the connexion between sun spots and magnetic disturbances just as well as if they were still recorded at Kew. Another probable advantage of the conduit system is that it will be more durable than the overhead wires. The great drawback to the conduit is the trouble of keeping it clean. The manager of the Compagnie Générale Parisiennestates that the annual cost of cleaning the Paris conduits is 118*l.* per mile. This high figure is probably due to the fact that the Municipal Authorities only allow the dirt to be removed from the conduit at places at long distances apart. At Washington, where there is little traffic, means are provided at frequent intervals for removing the dirt and the annual cost per mile of track is only 5*l.* 10s. The manager of the London County Council tramways considers that the cost of cleaning the track in London will be about 100*l.* a mile.

Structures in Advance of Building Line.

THE Civil Service Co-operative Society recently erected a canopy or covered way in front of their premises in the Haymarket with an iron framework glazed over and tailed into the front of the building, projecting some 11 ft. The County Council took proceedings against them under the London Building Act (1894) in respect of this erection in advance of the building line, and the police magistrate convicted and made an order for its removal. The Society applied for a rule calling on the magistrate to state a case, but this has been refused by the Divisional Court on the ground that it was a question of fact. Section 22 of the Act provides against any "building or structure" being erected in advance of the building line unless with special leave. In the Building Acts a question has often arisen on what is intended by the word "building," and in some of the cases there are dicta to show that the word must be interpreted in its ordinary sense and includes any block of masonry or brickwork covered in by a roof; whereas, some text-book writers have considered the existence or absence of walls to furnish the test. Where, however, as in Section 22, any "structure" is also included (the word "erection" which occurs in the earlier Acts, having been omitted in the London Building Act, 1894), the matter seems free from doubt, and leave must be obtained for the erection of any projection unless it falls within the exceptions contained in Section 73 of the Act (such as bow windows, balconies, &c.).

Covenants, Licensing, Sub-letting.

AN important point to lessees has been decided by the Court of Appeal in the case of Young *v.* Ashley Gardens Properties, Ltd. (Current Law Reports). The plaintiff was lessee of a flat under a lease which contained a covenant that he should not sub-let or part with the possession of the premises without the license in writing of the lessor, which should not be "unreasonably or arbitrarily withheld." The defendants granted a license, but attached to it a condition making the plaintiff and, or, his assignee liable for any further increase in the rates, taxes, charges or assessments. The court held that the lessor had no right to impose a condition to the license, and that the plaintiff was entitled to assign without any further consent. In this case, it is to be observed, the landlord had not refused to give the leave required, assigning

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no reason for his refusal, but had attempted to make his license subject to a condition, and this being the case, the court had jurisdiction to determine whether or no his consent was reasonably withheld. Had the landlord, however, merely refused, giving no reason for his refusal, the tenant would apparently only have had to assign at his own risk, that is at the risk of committing a breach of covenant and rendering his lease liable to forfeiture should it be proved the consent had been reasonably withheld.

Foreshore Protection.

THE inroads of the sea upon some of the eastern coasts of England have served to arouse a considerable amount of public attention, and the inhabitants of the Norfolk and Suffolk seaboard have already taken steps with the object of obtaining financial assistance from the Government towards the cost of protective works. A brief paper read by Mr. W. T. Douglas before the recent Engineering Conference contains some notes that are worthy of record on the subject of foreshore protection and the travel of beaches. The experience of the author agrees with that of other engineers, that beach travel is mainly governed by the flood stream. Consequently groynes should be arranged so as to arrest beach material on the flood-tide side. Their collecting capacity may be measured in terms of the length seaward, for, as pointed out in the paper, the tendency of a groyne is to encourage the shoreward motion of beach material previously travelling parallel with the shore. The most suitable angle at which to construct a groyne is stated at 95 deg. to the flood tide, or at 85 deg. from the shore. A useful warning is conveyed by the statement that "where the foreshore is short, it is not enough merely to construct a groyne between the cliff or sea-wall and low-water mark." When this practice is followed the almost invariable result is the formation of a channel at the end of the groyne, and the effect of such a channel is to pull the beach down into low water. Although short, this paper is full of valuable suggestions.

The "Bassin Loubet," Boulogne.

THIS important work, of which the foundation-stone was laid on Monday last by the French President on his way to England, will consist of a dock covering an area of some 16 acres, and affording more than 1,000 yards of quay room. The depth at low water will be 15 ft. 2 in. at the north side and 25 ft. at the south. The new dock will occupy a site to the north-west of the existing dock, on the Capeune Sands, and the battery at the shore end of the west pier has already been removed, while a new break-water, 720 yds. long by 80 ft. high, has been constructed in its place. Part of the shore end of the west pier, and the whole of the stockade will ultimately be removed, thus affording ample space for vessels entering or leaving the docks. Further improvements contemplated include the building of a new east pier in the place of the existing structure, so as to give better facilities for large vessels using the harbour; and the extension of the deep-sea harbour breakwater by some 650 yards, for the purpose of affording additional protection to the entrance to the inner harbour. The estimated cost of the foregoing works is 520,000*l.*, but those who are acquainted with the progress made in the shipping trade of the port will be prepared to admit that the money will be well spent.

Column Foundations.

As the foundations of a heavy building are sometimes the cause of anxiety, the following particulars, relative to the Government Printing Office, Washington, may be found both useful and interesting. The building in question is a fireproof structure of steel, brick, and concrete, supported by 178 steel columns, arranged about 12 ft. apart in six rows varying from 31 ft. 6 in. to 35 ft. apart. All the columns are seated on battered solid concrete piers carried down to a depth of 6 ft. or more below the basement floor, according to the conditions ascertained in each case. Preliminary tests of the earth were made by excavating pits inside cylinders, 6 ft. in diameter; timbers measuring 12 in. square were then placed vertically in the pits, and it was proved that loads ranging from 8 tons to 12 tons could be imposed without settlement. Hence, the safe bearing power of the earth was taken at 4 tons per sq. ft., but the foundations were designed with a bearing surface of 1 sq. ft. per 4 tons of dead load, and 1 sq. ft. per 3 tons of live load. The soil consists of sand, with some gravel and clay, and is saturated with water nearly to the level of the basement floor. Therefore, the foundation pits were sheeted, and wherever clay was encountered they were sunk down to clean sand, regardless of cost. Separate piers are provided for the columns, all being proportioned for maximum loads of 20 tons per sq. ft. at the top, and the sides are battered so as to provide at the bottom the bearing surface before mentioned. At least 12 in. of the lower part of each pier was made with parallel sides with the object of avoiding weakness at the toe. The spaces in the pits around the columns were filled with concrete, and the tops of all the main piers were finished flush with the basement floor, being capped with grillages made of steel I-beams, arranged so as to form rivetted pedestals, 6 ft. square, receiving the cast iron bases of the steel columns.

Sir Thomas Lovel and his Priory.

SIR CHARLES ROBINSON has presented a bronze medallion bust, surrounded by the Garter, of Sir Thomas Lovel to the Dean and Chapter of Westminster, who have placed it against the wall near the tomb of the Lady Margaret, Countess of Richmond, in Henry VII.'s Chapel. The bust, which is attributed to Torregiano, was formerly over the arch of the gateway of Old Harling Hall, built by Lovel at East Harling, near Thetford. Lovel's coat-arms within the Garter, and with "1518" on a scroll, carved in stone, are on the gatehouse in Chancery-lane of Lincoln's Inn. Lovel, knighted on the battlefield of Stoke, and installed a Knight of the Garter in 1503, played a conspicuous part in the victory at Bosworth; he was elected Speaker on November 8, 1485, and was Henry VII.'s Chancellor of the Exchequer, President of the Council, and Treasurer of the Household; he was also co-executor of that Sovereign and of the Lady Margaret. He was, moreover, a great builder and patron of the arts, and contributed to the building of Caius College, Cambridge; he served as Constable of the Tower, Steward of the Household, and in other exalted offices *temp.* Henry VIII.; as "double-reader" and treasurer to the Society of Lincoln's Inn he contributed largely to the building of the old gate-house there. Some members of his family were buried in the parish church of St. Leonard, Shoreditch; Sir Thomas Lovel built a chapel to receive his own monument on the south side of the church of the Haliwell Nunnery in that parish. The Priory of St. John the Baptist, to which he was a munificent benefactor, and which Stow says he rebuilt, had been founded for black nuns of the order of St. Benedict in the early years of the twelfth century; two of its charters of 1 and 6 Richard I. are transcribed in the "Monasticon Anglicanum," edit. 1823, vol. iv., 393. The adjacent Holy Well gave a name to the Priory, as also to the liberty and a prebendal manor of St. Paul's. Lovel died on May 25, 1524, at Elsyngs, his seat in Enfield; he bequeathed his town-house in Shoreditch to his nephew and heir, Sir Francis Lovel, of East Harling, and on June 6 was buried in his chapel at the Priory which, at the surrender in 1539, was valued at nearly 300*l.* per annum. What some considered to be his vault, containing two leaden coffins, was destroyed by the sinking of a shaft at the making of the middle-level intercepting sewer through New Inn-yard, by the late Metropolitan Board of Works in 1864. Maitland, 1756, mentions the ruins of the Priory as being extant in his day; they are plotted at New Inn-yard and King John's-court, together with the site, on the land of one Bateman, of the adjacent Holy Well, in Peter Chasserau's survey of the Parish taken in 1745. Within the precincts were established "The Theatre," the first play-house built in London, and "The Curtain," being the two public-houses named by Stow in the first edition of his "Survey," 1598. Having lately compared the several *data* on the spot, we gather that the Well lay close to the New Inn-yard, within the angle at the corner of the present Curtain-road and Bateman's-row — the "Ditch-side" and "Cash's-alley" respectively, of Chasserau's survey-map.

University College.

PROFESSOR SIMPSON has been appointed Professor of Architecture at University College. There could not well have been a better appointment. Professor Simpson has in a few years made Liverpool a centre of architectural education, and we are glad now to welcome him back to London.

The Architectural Association Day School.

MR. A. T. BOLTON, we regret to hear, has had to resign the mastership of the Day School of the Architectural Association, which he took up for a term of two years only. No one could have been better fitted to give a good start to such an undertaking than Mr. Bolton, who combines in an unusual degree artistic enthusiasm with practical knowledge. Mr. H. P. G. Maule, however, who has been appointed to succeed him, also combines practical and artistic knowledge, and from what we know of him personally, and of the thorough manner in which he goes into any subject that he takes up, we feel that the Association may have good hopes of the continued success of the Day School under his direction.

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Leicestershire Society of Architects.

THE Thirtieth Annual Report of the Leicester and Leicestershire Society of Architects shows that the Society now numbers 106 members, viz., 11 honorary members, 45 members, 14 associate members, 26 assistants, and 10 pupil members, an increase of two since the last Report was issued. The Report is a highly creditable piece of typography (a matter to which we observe that provincial architectural societies now pay a good deal of attention), and it appears that some very good papers were read during the Session; but one regrets to see a paragraph to the effect that the attendance of members on these occasions is decreasing, and has been recently so small that "unless the members can be induced to show more appreciation the Committee feel that these lectures another session will have to be discontinued." The Society seems to be gradually forming a fairly good architectural library, though we do not think that such very amateur books as Leader Scott's "Brunelleschi" are worth adding to an architectural library; and we may ask, who corrects the press of the library catalogue? It is rather surprising, in a catalogue issued by an architectural society, to find the well-known name of Viollet-le-Duc figuring as "Violet Le Duc."

Lithographs of Old London.

A VERY interesting collection of lithographs of old houses and portions of old streets in London is on view at Clifford's Inn. The drawings are by Mr. Thomas R. Way, and are proofs of illustrations to various books, "Reliques of Old London," "Later Reliques of Old London," and others, several of which have been noticed in our columns at the time of publication. There are 187 lithographs, besides about a dozen and a half of pastel drawings which are added to make a little variety in the exhibits. Mr. Way observes that though his series of illustrations was only commenced about twelve years ago, yet a considerable proportion of the buildings drawn here have already disappeared, and others are only awaiting their final sentence. Among the best or most interesting of the illustrations may be mentioned "55 and 56, Great Queen-street" (6); "Old Gateway, Chancery-lane" (9); "Clifford's Inn Hall" (11); "Field Court, Grays' Inn" (20); "Christ's Hospital, Entrance Doorway" (22); Back Court, E.C." (25); "6 and 7, Aldgate" (33), with their decorated pilasters; "The Vine Tavern, Mile End-road" (38), showing the characteristic entrance to the Trinity Almshouses, which are also the subject of another drawing (37); "The Great House, Leyton" (44); the old "Highgate Archway" (47), much more picturesque and architecturally effective than the new arch which has taken its place; "The Brockley Jack, Brockley" (58), an example of an old wayside country tavern; "High Bridge, Greenwich" (65), showing some curious old timber houses; "The Harbour Master, Limehouse," (69), a riverside inn, with the boats on the beach beneath it; "413 and 414, Strand" (87); "The Greycoat School, Westminster" (93); "16, Cheyne-walk" (99); and "Old Kew Bridge from Strand-on-the-Green" (113). The collection also includes some illustrations of the Halls of the City Guilds—these, we hope, are not to be regarded as doomed, unless indeed the Companies deliberately rebuild them. Among the best of these are "The Entrance to Mercers' Hall" (147), with its columned loggia; the "Cedar Room" and the staircase, Skinners' Hall (153, 154); the Hall and the Staircase, Merchant Taylors' Hall (155, 156); and "The Garden, Stationers' Hall" (170), with its one large tree in the centre. The collection will be on view for a week or two from now, and those interested in Old London should not omit to visit it. We ought to be much indebted to Mr. Way for the industry and ability with which he has produced this valuable series of records.

MAGAZINES AND REVIEWS.

IN the *Magazine of Art* the review of the Royal Academy pictures is continued, and we are glad to see so full a recognition of Mr. Hemy's picture "Youth," which, the editor says (and we entirely agree with him) "excels in its own qualities everything that has been seen in this country before." Mr. Spielmann continues his general survey of the subject of "Art Forgeries and Counterfeits," dealing in this issue with bronzes, medals and coins, gesso duro, and ceramics, and giving many curious details both as to the methods of the forger and the methods of detection. An important article is that by Colonel Plunkett on "How an Art Museum should be Arranged." The main question which the author takes is that of method of classification, concerning which he observes that two principal methods of classification may be recognised—that by material employed, and that by countries or periods to which the works belong.

"By the former system different divisions or apartments of the museum would be devoted to stone carvings, ivories, furniture, enamels, bronzes, leather work, and so on; while by the latter arrangement we should group together all the works of one period or school, say the Italian cinque cento, the French thirteenth century, or the period of Louis XIV., or of Louis XV., of whatever material the objects may be made."

Colonel Plunkett decides unhesitatingly in favour of the latter system, and we think he is right, though the question is not so simple or decisive as he seems to consider. In studying the development of any one class of article, for instance, it is a distinct advantage to have the specimens, of all dates, grouped together. But on the whole the superior advantages are on the side of the epochal grouping, since the styles of design in different classes of objects of the same country and period have a relation to and to some extent explain each other. But the author suggests a block scheme for a museum in which both these aims might be fulfilled, by classifying countries in parallel lines in one direction, and classes of objects in parallel lines at right angles to these, each class running in a straight line through all the country divisions. It looks beautifully symmetrical on paper, but might be difficult to carry out in reality, since some types of objects are not found in all countries, or they are numerous and important in one country and scarce and unimportant in another. However, the suggestion is a good one in its broad lines, and the article is worth attention.

In the *Art Journal* an article under the title "An Artist in Tunis" serves as framework to a series of admirable sketches and studies by M. Brunet-Debaines. The frontispiece, "The Mosque Bab-Dzira" (an etching), and the full-page plate "Souk-el-Halfouine," (a reproduction from a water-colour), are remarkably fine; and the smaller sketches are also of most artistic quality. Mr. Cundall's continuation of the article on "Charles Kean and Theatrical Scenery" is illustrated by examples of scenic effect in which architecture plays an important part, which are certainly very good examples of stage scenery, though there is about nearly all of them that indefinable *soupçon* of claptrap and unreality from which the painters of stage architecture seem never able quite to escape; there is always something cooked, something which is not quite right, about the architecture. The most real of those illustrated is Telbin's "Rialto and Grand Canal." "The Boar's Head and Eastcheap" (Dayes) is good as a picture, but the houses are too tall and the street too wide to convince us of its reality as a London street scene of the supposed period. "The Hall of Nimrod" (Lloyds), for Byron's "Sardanapalus," is a good example of the effective stage trick which, we believe, Charles Kean first suggested, of showing the vista of the vast hall obliquely, so that it vanishes out of sight, and the spectator is left to supply in his imagination the perspective extent of the scene. The contrivance is admirably carried out in this design, but it is a very stagey Ninevitish architecture. The painters illustrated in two articles are Goya and Jacques-Marie, the latter by reproductions of one or two pictures lately seen at the Goupil Gallery. The talent of Goya comes out to more advantage in black and white than in the original pictures; which is not surprising considering his own dictum, that "in nature exist no colour and no lines; nothing but light and shadows." He is a painter at present very much overrated; one of the recent fashions of dilettantism.

In the *Architektonische Rundschau* the illustrations are better in execution than the designs they illustrate; the photographic reproduction of the "Wohn-und-Geschäft-haus" at Hagen—a street front of shops and flats, by Herr Kessler, is quite remarkable in the brilliancy and force of the reproduction, but the design itself has little to recommend it. A chromo-lithograph of a circular memorial tower in red brick, rising from a stone terrace and arcade, is an excellent specimen of colour-printing, thrown away upon a tawdry and pretentious piece of architecture. None of the other illustrations of new buildings are of any architectural interest; but the article on mediæval timber buildings in the North of France is well illustrated.

The illustrations of the *Berliner Architekturwelt* this month are chiefly selected from exhibits in the Berlin art exhibition of the year, the architectural designs being mainly competition projects. Some of the photographs of *ensembles* of room furniture and decoration are interesting, and among the few architectural illustrations of actual buildings, or buildings presumably to be carried out, Herr Kuhlmann's church for Münster am Stein shows a simple and effective stone building which suits well with its mountain background.

The *World's Work* includes a short article on "Trams without Rails," the system otherwise called the "rail-less tram" or the "trolley motor," in which no rails are employed, but there is a second wire to return the current to earth, as well as the ordinary overhead driving wire. The contact is arranged so as to allow a play of 10 ft. on either side of the wires, within which limits the cars can be steered to pass other vehicles. This is the system the threatened introduction of which in Paris has recently been so violently and successfully opposed. It appears to us to have absolutely nothing to recommend it, and is only calculated to make the introduction of electric-wire traction in crowded streets the cause of confusion worse confounded. In the same number is an illustrated article on the work of Mr. Solon Borglum, an American "Wild West" sculptor (with certainly a thoroughly "Wild West" name) who has made an original success as a sculptor by simply modelling prairie horses and other animals as he saw them. We confess that we had not heard of Mr. Borglum before, or at all events did not remember his name or works, though it appears that some of his works obtained acceptance at the Paris Salon and elicited the approval of M. Frémiet. The illustrations given with the article show unquestionably original genius and power of observation, though he does not seem to have arrived at anything like style in sculpture.

In *Knowledge*, under the heading "Modern Cosmogonies," Miss Agnes Clerke has an article on the present condition and acceptance of Laplace's nebular hypothesis, which more modern astronomic thought and methods seem almost to have improved out of recognition. The article which, like all Miss Clerke's writings, is very close reading, forms a summary of the views on this subject of various scientific minds since Laplace's day. Two interesting points in it we may notice: the one is Kirkwood's conclusion (1884) that planets and comets have not been formed from rings of matter, but rings from planets and comets; a conclusion which certainly seems to have a practical bearing on the phenomenon of the rings of Saturn. The other is the theory of Roche, of Montpellier, known as "Roche's Limit," to the effect that a satellite cannot revolve round its primary and

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maintain a globular form at a less distance than 2·44 of its mean radii, owing to the stress of tidal forces, except under improbable conditions of density. It is observed that all the moons so far discovered in the solar system do revolve outside Roche's limit, and that Saturn's rings, which revolve within it, may owe to that circumstance their pulverulent condition. This seems however, rather arguing in a circle, since the pulverulent condition of the Saturn rings (which is only a matter of reasoning and not of observation) has been assumed on account of the impossibility of imagining their stability under any other condition. And then, if Roche's theory is accepted, what becomes of the modern theory as to the moon having been at one time revolving almost in contact with the earth; and what was the shape and density of the moon at that period? These seem to be questions growing out of the argument. Mr. C. Easton follows with an article, "What is the Milky Way?"

The *Antiquary*, naturally and rightly, at the present juncture, offers us an article on "Battlefield, Salop," by the Rev. W. G. D. Fletcher, the Vicar of St. Michael's Shrewsbury, and a Fellow of the Society of Antiquaries. He includes in his article a description of the interesting church, of which some illustrations are also given. Miss Alice Doré contributes an article on St. Martin's, Canterbury, and the Rev. Dukinfield Astley one on "A Ramble round Thetford." We share his regret that the old Guildhall should have been pulled down, and perhaps still more that it should be in course of being "rebuilt on the old lines," a process the usual result of which is to lose both the convenience of a larger and better-planned modern building and the antiquarian value of the ancient one. He does not say anything, however, of the reasons for its demolition, which may have been practical and unanswerable. One must look on both sides of the question in these cases, which antiquaries are often not very ready to do.

In the *Nineteenth Century* Mr. Ernest Rhys writes an article on "The Masques of Inigo Jones," regarded as indications of what Jones would have liked to do in permanent architecture, had he found the opportunity. The comparison must not be pushed too far, but there is something in it. Inigo Jones was doubtless a typical example of the architect as described by Pugin—a person who is always imagining great things and having to execute little ones. The Whitehall Palace design, Mr. Rhys suggests, was in its complete form the natural counterpart of those fugitive temples and palaces of a night with which he dazzled the courts of James I. and Charles I. In saying, however, that it would have been carried out "on a base larger than that of the present Houses of Parliament, and with a result infinitely finer in the completed design," the author is going too far, and shows the usual insensibility of Englishmen to the real greatness of Barry's building. Mr. J. Milnes Gaskell, the chairman of the West Riding Rivers Board, contributes a noteworthy article on "The Pollution of Our Rivers," with statistics as to the condition of some of them in his district, and as to the attitude and action of the "Yorkshire Mill Owners' Association" in polluting the rivers and in opposing any schemes of reform, which ought to have serious attention. Sir Oliver Lodge contributes a short article on "Radium and Its Lessons;" the lessons referring to the new light which may be shed, by the action of radium, on the obscure questions of the construction and behaviour of atomic matter, on which he suggests that there is now an opportunity for some new investigation.

The *Century* gives, as a frontispiece, a fine wood engraving by Mr. Timothy Cole of Velasquez' imaginary portrait of Menippus, in the Prado Museum, Madrid, in which Velasquez transformed a Greek philosopher (or anti-philosopher) into a Spaniard. As usual, Mr. Cole's work is an admirable example of style and texture in wood engraving.

In *Macmillan* there is an article by Mr. Laurence Gomme, "Aldwych in London," which should be read by all who are interested in the early history of London. The main subject of the article is in reality the history of the site and neighbourhood of St. Clement Danes, and it goes to show the probability that the Danes had actually a settlement here, just without the then walls of London. Miss A. S. Galbraith contributes an article on "The Handicrafts" which is marked by exceptional impartiality and common sense. That Miss Galbraith stands quite apart from the Utopian views of Ruskin and Morris as to the necessarily debasing effect of work done by the aid of machinery is obvious from the following passage:—

"As to the idea still prevalent among the disciples of Ruskin, that hand work is in itself a happier, better, and more moral thing than machine work, if this once be granted, then we must abolish every implement, for how can a line be drawn? If a needle be allowed with which to draw the thread, then why not a rod to push the needle? If we may save labour by using a spade, then why not a plough? And if a plough be used then why not a horse to pull it, and if a horse, why not a steam-horse? And wherein lies the greater nobleness in wearing out human flesh by pushing a hand-plough, than in guiding a steam-plough? I have stood in a huge factory and watched a man manipulate a steam-driven loom in the most wonderful way; and I have stood beside a hand-loom in the far north, and I confess that, although at that time a believer in Ruskin, still I could not see the greater nobleness in painfully kicking at the loom with one's feet, and laboriously throwing with the hand a shuttle which a machine could thrown quite as well. Nor in their private lives could I ever discern that those who worked at the steam-driven looms were in any degree more 'debased into leathern thongs' to yoke machinery with than those who strained at the hand-loom. Wherein lies the higher morality in employing human beings to do the heavy work of the instruments, as in hand-ploughs or hand-looms, and why should this be nobler than doing the lighter work of mere coupling or guiding, as in great factories?

As for the greater happiness, ask the Harris tweed weaver of his happiness, or the makers of lace curtains, working at the hand-looms in their icy cellars in Switzerland. It will not be found to exceed that of the mill-workers."

Nevertheless, the writer is quite alive to the superior beauty and interest of handmade artistic work, and the wisdom of permitting those who have the gift for artistic production to produce individual work in their own way. But even in regard to this there is an amusing caution given as to the attitude frequently assumed by the handicraft artists of to-day, as if they were a superior order of beings to be sought out and courted for their work.

"Many could and would buy much more largely if they had facilities for doing so, and if, one must add, artists would put away their false pride and condescend to behave like business men. They make their wares, they want to sell them, but they are terrified at the mere thought of being mistaken for tradesmen. To sell a picture in the studio is good, to employ an agent is permissible; but to put their work in the desecrating hands of a good furnishing warehouse is philistinism. Yet it is an undoubted fact that, once the work passes out of the maker's hands, it is quite likely to be placed (and that permanently) in surroundings as unsuitable as any window in Tottenham Court-road. But it is to be feared that, until some steps are taken to keep the entire work of the artist community before the public, little support is to be looked for from that practical body. For how can people buy things when ignorant of their existence? Do artists really expect that they are to sit in state for ever, while folks come long journeys and beg humbly for permission to inspect their work, or wait patiently for a year between each exhibition to buy a new article."

That is a frank expression of the truth which will make some people very angry; but it is not the less truth for all that.

Scribner, under "The Field of Art," devotes a short article, by Mr. E. H. Blashfield, to the subject of "The Rehabilitation of Pinturicchio," from which we gather that a Pinturicchio craze is to follow the Botticelli craze. There is nothing crazy in the article, however, which is a very fair and critical summary of what Pinturicchio could and could not do. A short article on "The Cedars of Lebanon," illustrated by photographs, is interesting both from the historical and biblical associations with these ancient trees, and the description of their character and apparent great age and vitality.

In the *Gentleman's Magazine* Mr. George Cadell writes a short but strongly expressed article on "British Forestry," or perhaps rather on the want of it. His argument goes to show not only that we are neglecting a source of wealth in the value of the timber itself, but that the value of agricultural land is increased by the neighbourhood of wooded country; in other words, that agriculture and forestry rise and fall together. The following is one instance given of this:—

"The cultivation of the maritime pine, *Pinus pinaster*, in the Landes is an enterprise not yet fifty years old, for it was not till after the Paris Exhibition of 1855 that it was seriously entered into. To-day the district is celebrated not only for a special breed of cattle, which was originally imported from Brittany, but for the excellence of its vines which rival those of the Gironde.

It may be said that this was a Government undertaking. In reality it was a joint enterprise entered into by the Government, the Communes, and the private proprietors. Here is the example of a private individual whom the writer has personally visited.

Mr. X., a retired Anglo-Indian, obtained land for planting operations in France in 1870-71. His work was temporarily suspended by the Franco-German war, owing to the inroads of the Uhlans. But it was afterwards resumed, and to-day he has large and thriving plantations, with a forest nursery of wide reputation. The land in his neighbourhood has so benefited by his own and similar undertakings that the district, formerly almost a desert, is now one of the most attractive of the country, as well for residence as for sport, and the Order of Merit for Agriculture has been deservedly bestowed upon the pioneer planter.

There is no reason why both Government and private proprietors should not in their respective spheres achieve similar results in this country. But they must work seriously as well as in unison."

Temple Bar contains an article by Mr. W. R. H. Trowbridge "From Paris to London by Water," the interest of which lies partly in the fact that this is a trip that cannot at present be taken by any passenger for hire, the goods boats which go from Paris to London quaysides, by way of the Seine, not carrying any passengers, and the author was only taken as a favour and after a good deal of diplomacy. Below Rouen, indeed, there are passenger boats, but between Paris and Rouen the trip along the winding loops of the Seine was an entire novelty. It is very picturesquely described.

THE INTERNATIONAL FIRE CONGRESS.

ON Monday morning, in the Empress Theatre, Earl's Court, an International Fire Prevention Congress was opened by the Lord Mayor (Sir Marcus Samuel, Bart.) in connexion with the International Fire Exhibition. Several Mayors of provincial towns attended in their robes and chains of office. The Lord Mayor was attended by Sheriff Sir George Truscott and Sheriff Sir Thomas Brooke-Hitching in Civic State. The company included Lord Windsor (First Commissioner of Works), Hon. T. Cochrane, M.P. (Home Office), Prince Alexander Lvoff (representing the Ministry of the Interior, Russia), M. Lépine (Prefect of the Police, Paris), Mr. E. O. Sachs (Chairman of the British Fire Prevention Committee and Vice-President of the National Fire Brigades Union), Privy Councillor Stübben (late City Architect, Cologne), Chief Officer Giersberg, Royal Police, Berlin (representing the Ministry of the Interior, Prussia), Chevalier Goldoni (representing the Ministry of the Interior, Italy), Mr. C. Hexamer (President of the National Fire Protection Association, United States), Alderman Sir William Treloar, Sir William H. Preece, Count Szechenyi (Hungarian Fire Brigade Union), and others.

The Lord Mayor, in extending to the delegates a warm welcome, spoke of the necessity for co-operation among engineers, architects, municipal officials, and fire brigade officers, in order to fight that cruel enemy of mankind—fire. He impressed on those present how careful public authorities should be in the selection of the *personnel* of a fire brigade, and especially of those whom they placed over the men. London had been very fortunate in the heads of its fire brigade.

Lord Windsor associated himself with every word the Lord Mayor had said in expressing the cordiality with which he welcomed every gentleman present that afternoon. It was not to be expected that every nation would regard all questions—political and international—from the same point of view; but nothing, he was certain, could tend more to remove their differences, if there were such differences, than free and friendly intercourse on all matters relating to art and science and industry and commerce. They were grateful to those who had come from a great distance to join in the Congress, which he trusted would be of benefit to the whole world, and that the interchange of experiences might be of permanent value to the communities represented.

The Hon. T. Cochrane, M.P., spoke of the importance of finding out the best means of fighting an enemy which in a few minutes destroyed the labours of a lifetime. What could be obtained was fire-resisting

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terial in greater or less degree. It was sirable that the legal status of the fire-n should be raised, and he was glad to see ong them Mr. Guy Pym, M.P., who was ing steps in that direction. There had not herto been that connexion which there ould be between professional and volunteer emen, and he believed one result of that eting might be a better understanding tween them. They and representatives of nationalities might be led to join in one ntral bureau. Warnings against accidents by through playing with matches and so on ght be popularised, as they were in Sweden, schools and elsewhere.

Mr. E. O. Sachs, Chairman of the British re Prevention Committee, in the course of address to the members of the Congress, nted out that never before in this country d a gathering been held at which architects, gineers, fire surveyors, municipal officials, islators, and insurance officials had met to e counsel with fire brigade chiefs and vage corps officers. It was only of recent e that a few of the leading members of the tish fire service had awakened to the fact t a fire brigade officer's work not only con-ted in extinguishing fire, but must, to a eat extent, include a sound knowledge of ecautionary measures. The Fire Prevention mmittee was founded at the time when the rible loss of life at the Paris Charity Bazaar 1897 still haunted the public mind, and the ormous destruction of property in the pplegate area in London made so deep an pression at home and abroad. He advocated tandardisation of fire resistance for practical rposes, and condemned wrongful trading on term "fireproof." He trusted that the ngress would bring some influence to bear on the exclusion of the word "fireproof" m the vocabulary of the English and nerican nations, as the word was a mis-mer. He suggested that the word "fire-isting" should be substituted.

M. Louis Lépine, speaking in French, ex-essed his pleasure in taking part in the Con-ss, and at seeing present so many dis-guished men from all parts of Europe. eat improvement had been made in Paris in calls, which enabled them to deal more ectively with fires.

On behalf of the President of the French public, M. Lépine then presented a diploma honour and a medal to Mr. E. O. Sachs, eutenant-Colonel Fox (Chief Officer, London lvage Corps), Mr. Horace G. Folker (Secre-y, National Fire Brigades' Union), and to . C. Brasier, Chairman of the London Private re Brigade Association.

Speeches were then made by Prince Lvoff, rr Stübben, Chevalier Goldoni, Mr. Hexamer, S.A., Sir. W. H. Preece, K.C.B., M. Metaxas, eek Minister, and others.

After luncheon the official delegates and itors saw the realistic representation in the npress Theatre of "Fighting the Flames," d visited other places of interest in the Exhi-ion. At night a formal inaugural reception as given to the delegates by the Chairman d Executive of the British Fire Prevention mmittee in Caxton Hall, Westminster.

On Tuesday morning at Caxton Hall, West-nster, the members of the Congress sembled at ten o'clock, Mr. E. O. Sachs esiding.

cvention of Loss by Fire in the United States.

After making several announcements to the legates in French, German, and English, the hairman said that a paper had been prepared Mr. Edward Atkinson, LL.D., Ph.D., resident of the Boston Manufacturers' Mutual re Insurance Co., Boston, Massachusetts, S.A., on "The Prevention of Loss by Fire the United States of America." Mr. Atkin-n, who was one of the greatest authorities in merica on the subject of fire prevention, had tended to be present to read the paper, but account of bad health he would not be able attend. Mr. Gray, of Boston, however, had ndly undertaken to read it on his behalf.

Mr. Gray then read the paper, the greater rt of which we print, as follows :—

The problem presented to the underwriters the United States and to the community as whole, is totally different from any problem at could be found in any European country, pecially in Great Britain. First, the climate climates of the United States vary from ose of Europe in matters that have an im-rtant bearing upon the construction of build-gs. In this essay I will omit the conditions of the extreme South and of the extreme North, dealing with the great section which extends from the Atlantic to the Pacific, between parallels of latitude 35 deg. to 45 deg. N. In this section will be found the larger part of the population, the greater number of factories and workshops, the principal cities and public buildings, and by far the greater number of the public school buildings in which the sessions of the common free schools are held. Within this section there are very great variations between summer and winter, the common range of the thermometer being from 30 below zero Fahrenheit—(34 deg. C.)—sometimes lower—to 90 Fahrenheit + (32 deg. C.), and sometimes higher. There is also a great variation in the constant of humidity. On the whole the entire section may be considered dry as compared to the average of Great Britain until we reach the extreme western coast, where the climate of Oregon and Washington more nearly resemble the humid climate of Great Britain.

The next variation from European conditions is to be found in the huge abundance of timber, both resinous and hard wood, and the relative scarcity of good building stone in the earlier period of the history of the country. As yet no building stone has been discovered corresponding to the stone which is so much used in France and Belgium, which can be cut and carved like cheese, but hardens like iron on exposure to the atmosphere for a short period. It therefore happened that the best material for the construction of dwelling-houses in the early stages of the growth of towns and cities, and throughout the country districts, is wood, disposed in a suitable manner and properly finished within and without, rather than brick or stone. It is also true that when these latter materials are used in the ordinary way, that is, without excess of cost in building thick walls with air spaces in the walls to prevent ill effects of cold, heat, and dampness, they are alternately affected by heat, cold, and dampness in excess, from which properly constructed wooden buildings are free. In the extreme cold of winter brick and stone walls become chilled, presently gathering humidity from the atmosphere within the dwelling or building, making the house very damp and difficult to heat; whereas, in the hot summer, brick walls heat very rapidly and become intolerable unless expensively constructed with air spaces. On the other hand, wood is well known to be among the best of the non-heat-conducting mediums, and when disposed in thick sections of heavy mass the building of wood or timber, with properly constructed roof, is warmer in winter, cooler in summer, more easily heated and ventilated, and in every way a more sanitary building than any other kind yet devised except at very heavy relative cost.

The typical dwelling of the early settlers was therefore the log cabin, the most comfortable and suitable dwelling that could have been devised or constructed at any moderate cost within the means of the early settlers. The next typical dwelling-house, built by the richer citizens when the various colonies began to prosper, was constructed in what is now known as the Colonial style by well-trained mechanics who brought their conceptions from England. In the early period these dwellings were constructed of oak timbers, heavily framed, covered in with very thick boards, nailed on with wrought-iron nails; often filled in between the wood and the inner plastering with brick and then finished in a very solid manner, often, in principal rooms, with panels of the Old English style. These broad, well-proportioned, Colonial houses left nothing to be desired in comfort, convenience, and safety at the standard of that period and under those conditions. Many still exist, some of them over 200 years old. One part of one of them in my own town is about 250 years old. After passing through a great variety of stages of very bad design, the best architects of the country are now bringing their clients back to this old Colonial type. It is restful to witness the increasing number of these dwellings scattered around amid the crazy roofs and bad imitations of European styles with which so many of our towns and cities are infested.

This solid method of construction, both of town and country buildings, however, gave place to a very dangerous type of building from the underwriter's point of view, when the circular saw was applied to cutting up the solid timbers into plank, joist, and scantling of various kinds, which have been put together in what has sometimes been called basket-framing, leading to the construction of buildings of a cellular type; the light frames being put together in such a way as to be very firm and strong by bracing and boarding on the outside, or covered in by brick walls in cities, the plastering within on wooden lath and placed on the face of the inside of the frame; partitions constructed in the same way and floors of the same kind, so that the result is a building pervaded with cells of wood very difficult to cut off from each other, communicating with a hollow ceiled roof of the same type of construction, so that the largest possible loss by fire is assured from the least possible cause.

The change which has been brought about in factory construction, under the influence of the Factory Mutual Underwriters, has not been in giving up the use of wood or in any effort to construct fireproof mill or workshop; but in reverting, one may say, to the heavy timber construction of the colonial period, and the disposal of plank and timber within brick or stone walls in such a way that there may be no concealed spaces through which fire may pass out of reach of water. In that way, and by evolving suitable safeguards and means of protection, the whole system of constructing the textile factories, paper mills and workshops has been rendered safe and suitable. The losses by fire within the risks which are under the supervision of the Factory Mutual Underwriters have been, in the older companies, for fifty years, less than fifteen cents per year on each hundred dollars (·0015 per centum) of insured property; and during a period of more than seven years the losses within these risks have been less than four cents per year on each hundred dollars (·0004 per centum) of insured property, or about one-fifteenth part of the loss on insured property outside their range. Their influence is now pervading sections of the country which it has only lately reached, and a profound change is coming over what may be called industrial architecture, since the prevention of loss by fire in factories and workshops of slow-burning construction has been made an applied science, of which the rules and practices are easily mastered.

Having drawn attention to the different conditions which govern architecture and building in the United States, as compared with European States, we may now take up other conditions. It would have been a misfortune had the people of this country adopted more durable methods by constructing city buildings, factories, and workshops of a more permanent kind than they did construct; such buildings would have been, of course, at a much heavier cost, they would have become an encumbrance upon the land, and yet of such solid construction that they might have been incapable of being converted to the right use of modern mechanism. It is only about thirty years ago that a most skilful and competent mill engineer, under whose supervision some of the largest textile factories had been constructed, made the remark that it was not judicious to plan any factory building for a duration of more than twenty-five years, except as to the foundations. Had he made that remark a few years later he would not have excepted the foundations. The textile factory and many other industrial buildings constructed fifty years ago were not over 50 ft., often less, in width, and some of them were eight or nine stories high. The next type was a factory or workshop 60 ft. in width, five to six stories high. Neither type of building is fit for modern conditions, and no person could run modern machinery with any profit whatever in the old type of narrow and high factory building. The modern textile factory is seldom more than three stories in height for carding and spinning; one story for weaving. Whenever there is room machine shops are built of one story, and many other industrial buildings are now being constructed in a similar way. The diffusion of light by ribbed or prismatic glass assures an even daylight over very wide areas, with freedom from glare near the windows.

These rules and methods of slow-burning or mill construction and for the diffusion of light are now being established throughout the United States beyond the area of the influence of the Factory Mutual Fire Insurance Companies, by the distribution of documents from the Insurance Engineering Experiment Station now beginning its work under the direction of the writer. Examples of these documents are sent herewith.

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We may now take up the growth and construction of towns and cities. In that, again, a rapid construction of wooden buildings for temporary use has been and still is necessary for the housing of the population. Throughout the middle and the far-west, where public lands have been disposed of in quarter sections of 160 acres each, towns have been planned on rather a grand scale with a view to future growth into cities. In very many cases that growth has been attained within a very short number of years. The first buildings, hastily constructed of wood, soon give place to a better class, and if the town grows, a wider area may be covered with wooden buildings detached from but very close to each other, the only conspicuous building of a durable kind being the public common schoolhouse, for the construction of which reservations have been made from the public land. Presently the detached wooden buildings give place to brick blocks of a more permanent character, and yet not suitable for any very long duration. In the older cities of the East, narrow streets may be bordered by alternating very old wooden buildings and modern structures, safe or unsafe as the case may be.

Hence comes the necessity for very completely organised and efficient fire departments, and yet occasional conflagrations occur; witness the great fires in Chicago and Boston. These conflagrations were not unmitigated evils. They were disastrous to individuals and to part of the insurance companies, but they cleared away a great ruck of unsafe and unsuitable buildings, made the way for re-adjusting lines of streets; and both in the end worked improvement in the cities at the cost of the individuals who suffered. The Boston fire, however, did not discriminate wisely. It approached quite a large section of old and dilapidated buildings, occupying land leased nearly 100 years ago upon a ground rent—this lease so near its termination that it is not for the interest of the owners to remove these old buildings, but to get all they can out of them, so that they remain a blot and menace in the centre of the best business district. Had the Boston fire exerted sufficient discrimination to cross a street and to wipe out that section on the leased land, it would have been a yet greater benefit to the City of Boston. These long ground rents are very uncommon. They are now prohibited in many States, and where they exist are obstructive to the public welfare.

It thus happens, that what may be called unsafe methods of construction, have been both necessary and expedient in the progress of the development of the country, and that more permanent buildings, which would have absorbed a much greater part of the small capital available, would have been an encumbrance rather than a benefit. The methods of construction of the country have therefore adapted themselves to the materials, to variations in climate, and to conditions of growth. True types of architecture, like the old colonial dwelling, have occasionally been evolved, while very many bad types have been practised in the effort to import architectural designs and methods from European schools, and to work them into buildings for which they were unfit. Again, American architecture in cities is now being diverted from true lines of development and of art by the construction of self-supporting steel-framed buildings of many stories in height, commonly called sky-scrapers, to which a few words will be given later.

Such being the quality and the conditions of the general average of industrial buildings, shops, warehouses, &c., constituting 95 per cent. of the insurable value of property in the United States, outside the lines of the Factory Mutual Companies, what are the conditions to which the prevention of loss by fire can be applied? They are either the incapacity of architects and builders to apply conditions of safety to the construction of ordinary buildings, or the yet greater incapacity and unwillingness of owners to change from the bad methods, even at the instance of an intelligent architect. Faults are committed and re-committed by owners which might be remedied without increase of cost, and very often at less cost, if it had not become the habit of owners and occupants to consider their duty ended when they had negotiated a policy of insurance covering whatever risk, often avoidable at a lessened cost, they might chance to commit. The next element of danger is the gross and criminal carelessness of the occupants of such insured premises.

The ash heap of the United States averages one hundred and fifty million dollars ($150,000,000 = 30,000,000*l.* sterling) a year, two-thirds of which is due in about even proportions to the inattention, incapacity, or negligence of owners, occupants, builders, and architects alike. Or, to put the case in another way, the ash heap, averaging one hundred and fifty million dollars ($150,000,000) a year, which might easily be reduced by one-half; excess of premiums and heavy cost of insurance, amounting to at least eighty million dollars ($80,000,000 = 16,000,000*l.* sterling) a year; the excess of water supply and cost of fire departments, which may be estimated at twenty to fifty million ($20,000,000 to $50,000,000 = 4,000,000*l.* to 10,000,000*l.* sterling) more, makes the aggregate remediable excess of cost of fires in the United States at least two hundred million dollars ($200,000,000=40,000,000*l.* sterling) a year, all of which may be saved. This may be attributed mainly to the restless energy and severe work given to attaining the main point of large production from resources as yet only beginning to be worked upon, and their distribution, to the neglect of the lesser elements and close economy in the small details, and to the total lack of any conception on the part of the owners and occupants of buildings, that they themselves are the only persons who can prevent loss by fire, by attention to construction and suitable safeguards; fire departments being only capable of dealing with the fires when they occur, and underwriters being only capable of showing the way and giving advice by which the heaviest losses may be saved.

The safeguards which are now being introduced, notably the automatic sprinkling system, might, in the judgment of the writer, abate more than one-half of this annual loss. The larger part of the losses are in the large workshops, factories, warehouses, and shops for the distribution of goods. They occur in a relatively small number of fires, each of large proportion. They occur, in by far the large majority of cases, in buildings which, although not good models, are capable of being well protected by automatic sprinklers, by standpipes and hydrants at vantage points and upon the roofs, so adjusted as to be worked by the public fire department, and by care in occupancy.

The invention of the self-sustaining steel frame building, developed in the construction of what are known as sky-scrapers, has brought an entirely new problem before the underwriters as well as the engineers. In the first instance it was assumed that because a building was made of incombustible material it might be considered indestructible by fire, with very slight protection to the metal from heat. The Factory Mutual Underwriters distrusted this theory and have, with rare exception, kept unprotected steel beams from being used to support plank floors, and have, in recent years, caused cast-iron posts, formerly used in the support of factories, to be disused, the preference being given to squared wooden posts.

With the increasing cost of timber and possible scarcity of large logs it became expedient for the representatives of the Mutual Underwriters to be prepared for so-called fireproof construction. To that end the Insurance Engineering Experiment Station has been established under the charge of Professor Charles L. Norton, and under the general direction of myself, for testing both by fire, by laboratory experiments, and by lapse of time all the different methods of so-called fireproof construction and all the fire-resistant and fire-retardant materials for inside finish. The experience of the underwriters who insure the steel-framed buildings has not justified the great confidence with which the work was undertaken. Very destructive fires have occurred in buildings of this type, which have been filled with combustible contents. In some cases it has been the judgment of the appraisers that the total loss on contents of very large value has been due to the resistance of the building; whereas, in buildings of ordinary construction which fell after a fire of moderate duration, there have been large salvages on damaged goods.

Several of the methods of protecting steel from heat have failed, and while the building has stood well and has, I believe, in all instances been capable of repair, there has been much damage by heat, especially in the upper stories. It has proved that the prevention of loss by automatic sprinklers is as necessary in an incombustible building as it is in any other. A large portion of the biggest department stores are now being equipped. Other fires in incombustible buildings, causing very little damage, have generated so much suffocating smoke as to make them hazardous and to lead toward the danger of a panic.

But beyond this question of fire hazard is the yet more important problem of corrosion, a factor which at the beginning attracted little or no attention. It unfortunately happens that the type of steel used in the construction of buildings is more subject to rapid corrosion than any other type of metal derived from iron ore. Whether or not the skyscrapers will be safe for any considerable period of time, say for a generation, is now an open question. How to protect steel is being made the subject of the most exhaustive investigation, and will be one of the most important subjects dealt with in the Insurance Engineering Experiment Station.

It may happen that we passed through the age of unbaked clay to stone construction covered in with timber roofs, then to timber, brick, and stone in combination; in this country, through the age of the log house to the period of plank boards and scantling, or combustible architecture, so-called; then to the period of iron, used mainly outside, filled in with brick for walls, iron posts and beams within; thence to the age of steel in the present type, from which we may pass on in the upward spiral again to the age of clay in its various forms of brick, concretes, and cements, in that way combining stability, durability, and safety from the danger of fire from within or heat from without.

If the foregoing explanations of the condition of the United States in respect to loss by fire are sustained, the general conclusions may be stated as follows:—

1. Entails upon land and succession by primogeniture are either forbidden by law or by common practice. Estates in land, as well as in personal property, are customarily distributed in equal proportions among children without regard to sex. Settlements in trust are limited in all States, I believe, and might perhaps be more strictly limited with advantage. Spendthrifts and incompetents can only be protected by trustees through about one generation; after that the tools of production, whether in land or capital, fall by distribution to those who may use them best.

2. Public buildings are now being or have been constructed with more or less regard to duration, many of them for long duration. Factories, workshops, railway termini, industrial and commercial buildings are and have been built with a view to short duration, in order to give place from time to time to buildings that may be adjusted to the improved conditions of each generation or shorter period. Dwelling-houses in cities have been constructed with a view to longer duration, but with scarcely an exception the sites of dwelling-house districts have within one or two generations passed over to use for business purposes. In many cities that is now going on at a more rapid rate than ever before. Dwelling-houses of the best class, capable of useful occupation for fifty years, are being pulled down to make way for the expansion of trade and commerce. The adjustment of buildings to the purposes of each generation is almost as necessary and almost as rapid as the changes in the mechanism which is put into operation in industrial buildings. The factory or workshop which does not throw out mechanism, perhaps but half worn, in order to adopt the latest improvements, is sure to be left in the close competition on the very small margin of profit which suffices for the modern method, and of late the buildings must often be displaced as well as the machinery.

The series of documents mainly issued by the Boston Manufacturers' Mutual Fire Insurance Company, of which the undersigned is President, during the last twenty-five years—of late supplemented by documents issued by the associated companies—have been published for the purpose of bringing construction and apparatus to a fixed standard.

1. General plans and specifications for the mill or slow-burning construction of factories, workshops, and storehouses.

2. The lay-out of reservoirs, pumps, pipes, and hydrants in due proportion to the requirements in each case.

3. The lay-out of standard protection with automatic sprinklers, sizes, and proportions of pipe and distribution of heads.

4. Steam fire-pumps constructed at the

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standard established mainly by John R. Freeman, C.E., now one of the executive officers of the Factory Mutual System.

5. Standard valves, meters, and by-passes for water supply; and standard air valves used in connexion with the automatic dry-pipe sprinkler system, for the protection of storehouses and other buildings that cannot be heated in winter.

6. Glazing for the diffusion of light with ribbed or prismatic glass, adapted to the special conditions of each building or section of a building.

7. Standard fire-resistant doors and frames, of wood encased in tin.

8. Standard of wired-glass windows and frames, often approved where light is needed, and often accepted in preference to movable shutters.

9. Standard of the fire, flash, and viscosity tests of mineral lubricating oils.

10. Standard of mineral illuminating oils and of lamps in which such oils may be used for lighting.

11. Standard lanterns for the use of watchmen or mechanics employed in night work, both for the burning of sperm oil and kerosene oil.

12. Standard for the lay-out and safeguards for supplying electric power or light.

13. Standard for housing hose and fire appliances in mill yards, with specifications for the equipment of such houses.

14. Standard general organisation for mill fire departments.

15. Standard forms for the regular self-inspection of the insured mills and works, subject to variation according to the nature of the industry.

A physical laboratory is maintained by the Associated Factory Mutual Companies, to which any kind of oil, hose, or other material may be sent for physical tests, chemical tests being made at the Massachusetts Institute of Technology. As soon as the requisite buildings have been constructed, fire and heat tests will be made by the Insurance Engineering Department in respect to all so-called fireproof or fire-retardant materials that may be used either for the protection of wood or steel or in the construction of buildings. It may be added that the cost of making surveys; lay-outs; inspections, special and regular, including the cost of making and executing plans, of which an example is sent herewith; and for the services rendered by the Bureau of Inspections on joint account and at the joint expense of the Associated Mutual Companies, is covered by a charge of one hundred and fifty dollars ($150) on each million dollars of insurance written.

In 1895 the most destructive fire to which the companies had ever been subjected originated in what is called the spontaneous combustion or slow oxidisation of the wooden lagging of a 10-ft. cylinder of a compound engine in a room for which sprinklers were under contract, but had not been placed. Under conditions that might never occur again, the loss of over a million dollars was distributed among the Mutual Companies. In that year, however, nearly complete protection by sprinklers in all main mills and works was brought to a conclusion; since that date, 1895, the losses by fire have been less than four cents per 100 dols. (·0004 per centum) each year, the larger part of this small loss occurring in unsprinkled storehouses, which will all be under sprinkler protection before the end of the present year.

In the interval, as other new causes of danger have arisen, skilled experts have been called into the service in every branch of physical science, except in electricity, in which department at the beginning there were no skilled experts, and the fire hazard was an unknown quantity. A well-bred engineer was therefore brought into the service to study the fire hazard of electric lighting; rules for the instalment of electric plants were established, brought to the attention of all the makers of electrical apparatus, and made the condition on which they could put their plants into the factories insured in the mutual system. The rules have been expanded to meet new conditions and new inventions, but have never been materially changed.

The whole subject of lubrication with mineral and mixed oils was made the subject of a complete study. A standard was established, and wherever volatile oils were found in use they were condemned. The Standard Oil Company was induced to change its whole method of distillation, adjusting patent contests, and presently, within a year, putting on to the market such excellent lubricants at so low a price as to cause all the dangerous oils to disappear. Each subject has been taken up, put under the charge of thoroughly trained engineers and experts, until at the present time the science may be called complete in its application to the special classes of property insured, and to the buildings constructed on the slow-burning principle.

After a short discussion, the following resolution was moved and agreed to, *i.e.*:—

"That the mutual insurance system, as adopted in the United States, materially tends to the prevention of fire and the reduction of fire waste."

The delegates then dispersed to the various sections into which the Congress had been divided, *i.e.*, (1) Building Construction and Equipment; (2) Electrical Safeguards and Fire Alarms; (3) Storage of Oils and Spontaneous Combustion; (4) Fire Survey and Fire Patrols; (5) Fire Losses and Insurance; (6) Fire Tests and Standardisation.

Section 1 was presided over by Privy Councillor J. Stübben, in the Council Chamber, Caxton Hall, and the first paper read was the following by Firemaster Arthur Pordage, of Edinburgh:—

Building Construction from a Fire Brigade Officer's Point of View.

In taking up as my subject "Building Construction from a Fire Brigade Officer's Point of View," I have clearly before me the fact that most architects and builders are fully alive to the necessity of fire-resisting construction, and that legislative and local enactments make stipulations and recommendations with the view of preventing destruction by fire. Such efforts are worthy of praise; but my experience in combating fire leads me to the conclusion that what is intended as a safeguard too often becomes a danger, and what is theoretically meant for strength is found in the hour of need a source of weakness.

I do not presume to dictate, but I feel it my duty to sound a note of warning regarding certain widely spread and much cherished convictions as to fire-resisting materials employed in public buildings. Speaking, as I do, under the auspices of the Fire Prevention Committee, I address myself more particularly to those who are responsible for the construction of buildings, but I appeal also to those of my colleagues who are responsible for dealing with buildings after the fire has begun its work. The question of the general arrangement or architectural planning of buildings does not enter into my argument; what I propose to deal with is the type of building usually described as being constructed entirely "fireproof," and to offer from my practical every day experience suggestions which may perhaps induce building constructors to reconsider certain accepted theories in connexion with so-called "fireproof" materials.

From the fireman's point of view these "fire-proof" buildings have an element of danger added because of their construction, both in the way of increased risk to the fire brigade and the destruction of property. If such buildings were to remain unoccupied and to be subject to no risk beyond the combustibility of their own non-inflammable construction, then certainly they could with propriety be described as "fire-proof." But when (as is universally the case) such buildings are stored with goods readily inflammable, the buildings cease to be "fire-proof," for the action of the fire plays havoc with that portion of the material which is theoretically "fire-proof."

Sufficient attention has not been paid to the bearing these so-called "fireproof" materials have in relation to the calorific effects of the burning materials stored in the buildings, for, after all, it is the contents rather than the structure which in a large majority of cases commence to burn, and which will continue to burn, no matter in what kind of building they are stored. Sufficient attention has also not been paid to the effect of water applied to building materials after they have been subjected to extreme heat.

How do these "fireproof" materials assist the salvage of either the buildings or their contents? Do they assist entrance with safety to those combating the fire?

On each of these points I shall endeavour to prove a negative from my own personal experience, which, I feel confident, is not singular, but is common to the fire profession.

Materials principally considered to be "fire-proof," and which are so styled by the legislative Acts, are iron, concrete, and stone. The latter is particularly mentioned in most Acts as "stone or other fire-proof material." We have to ask ourselves whether these materials are "fire-proof?" When employed in the internal fittings of a building we may unquestionably give a decided negative to that question. My decided opinion is that the materials which meet the requirements are those which are not subject to the laws of expansion and contraction when suddenly exposed to the effects of heat. What are such materials? If we may take for our guidance the results of the tests of time, we find them principally in timber, bricks, mortar, and good plaster.

Floors and Ceilings.—It is the common experience of every fireman that an ordinary wood floor with a thin plaster ceiling underneath has stood the effects of a fire for probably an hour, and though burned through in places still remained in position and with sufficient stability left in the joisting to admit of the fireman passing over it in the course of his operations in extinguishing the fire. If such a floor survives the effects of fire with its slender remains still in position, how much better would a well-constructed wood floor resist the effects of fire under similar conditions. No extraordinary precautions are necessary to construct such a floor, but I suggest that the ends of the joists should be well bedded in the walls, flooring boards of not less than 1 in. thick be well tongued together, the spaces between the joisting be filled with pugging or other deafening, the underside or ceiling coated with 1 in. of good plaster on wire laths. Such a floor will resist a fire either from the top or underside sufficiently long to enable any ordinary fire brigade plenty of time to complete their toilet before turning out, and arrive in time to do some good work and prevent the floors from collapsing. Where supports are required, owing to the large superficial area of floor space, built timber supports or columns have been known to remain in position and to serve the purpose a second time after having resisted the effects of a severe fire. If these wood posts or columns are wire lathed and coated with good plaster, and treated in a manner similar to that often adopted with iron columns, they would come out practically unscathed. It will, perhaps, be argued that this method by no means gets rid of the difficulty with large spans, where iron must of necessity be introduced, but in such cases wrought-iron columns and girders (well protected) should be used to carry wood flooring and joisting, which latter, being impervious to the effects of heat and cold, remain in position, whereas the concrete floor falls in sections, and often wrecks the lower floors, which would otherwise not have been affected by the fire. I have known it to be argued that the burning of a wood floor gives off so much smoke that the inmates of a building would be suffocated before being reached. To properly understand this point it is necessary to compare the results of fire on both classes of flooring. We must remember that a partly-burnt but intact wood floor always affords a means of reaching the inmates, and that before the floor surface commences to burn the fire must have been very severe, and the contents of the apartment would almost certainly have been involved. It frequently happens that the flooring in "fireproof" buildings begins to break away at the early stages of a fire, preventing the fireman entering to attack it, with the result that the operations must necessarily be conducted from the outside, thus giving the fire a chance to make some headway. On the other hand, when the water can be got on to the wood floor and supports there is the possibility of keeping the floor intact.

I will specify a few instances in support of my contentions. The first instance is that of a fire on carriage builder's premises of five floors, which were built upon fireproof principles, the floors consisting of transverse 24-in. plated girders and floors of 9 inches of concrete, without protection on either side. The fire commenced in the paint-shop on the ground floor (a chamber built expressly for the purpose and having no communication with the upper floors). Upon the arrival of the brigade it was possible to see that one end each of the first and second floors was gone, and that the vehicles on the third floor were alight. The upper windows were

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blown out, and immediately the cold air and water got on to the third floor, the whole of this floor went down by the run, carrying everything through the building to the basement. As a result, only a portion of the top floor remained; the iron girders were somewhat twisted, though not displaced, but the concrete collapsed and fell, leaving nothing but the bare walls. The firemen could not be sent into this building. Had the upper floors been of wood they would undoubtedly have been saved.

The second instance is that of a fire on the second floor of a five-story warehouse built on a similar principle, wherein the third floor sections of concrete fell whilst the firemen were directing the hose upon the second floor, with the result that its weight carried the second and first floors through into the basement. This fire would have been stopped on the second floor but for the collapse of the floors above.

The third instance is an illustration in favour of timber floors. At a riverside warehouse in the City of London I attended three fires on the same premises in three successive years—the first two were serious outbreaks—but I noticed on the last two occasions that the same wooden uprights still supported the floors, and many of the exposed wood joints bore evidence of their reliability on their charred surfaces.

Partitions.—I now come to the question of partitions. The reliability of partitions between the different sections and rooms of a building, whether dwelling-house or warehouse, to resist fire, is of the utmost importance, and often determines the fate of the building. The progress of a fire is often regulated by the area of the compartment in which it originates and the internal partitions; therefore much depends upon the time during which the latter remains intact. The wooden lath-and-plaster partition may be immediately thrown out of court, the light laths with rough edges and the space between being a ready conductor of fire from one part of the building to the other. Internal partitions should be solid, preferably of brick, and continued up right through the building, the joisting at the different floors running through them, so that they practically form an internal wall from the basement to the roof. The advantages of such a partition would be many, apart from being a factor in fire prevention.

Stairs.—Great stress is laid upon the idea of employing stone for staircases as a safe and reliable exit for a large number of persons from a building on fire. This is a very good principle under certain conditions, and these are that a stone stair should be built in a well, apart from the general building, and in such a manner that fire or heat cannot possibly get at the underside of the stair. Where a staircase must necessarily run through a building, stone or concrete should be avoided in its construction, but good solid wood (hard wood by preference) is the most reliable under all circumstances. If the underside of the treads be filled in with "deafening" and coated with good plaster, such a stair will remain in position during the progress of a fire long after it has been impossible for any human being to traverse it. If the stair should actually get alight, and the fire, fed by an open door, should even cause it to burn fiercely, so soon as the hose is applied by the fire brigade the fire will be almost immediately extinguished because the actual burning is only superficial, and there will remain sufficient substance to admit of persons passing over the stair. It may be argued that a stone stair would not take fire at all, and therefore would always remain passable, but every fireman knows that when there is sufficient heat and flame to ignite the wooden structure of a hard wood staircase it is quite impossible for any one to pass either up or down a stone stair under similar circumstances.

In my preference for wood in the construction of stairs I specially exclude light and flimsy wooden flights of stairs which are so very frequently found in some dwelling-houses, warehouses, &c., and the wooden step-ladder almost invariably found in factories. I speak of a well-built staircase with hardwood treads and facings, the under side filled in with deafening and coated with plaster. Stone, as employed in stairs in ordinary buildings, cannot in any sense of the word be considered to be "fire-proof," because it succumbs to the effects of heat and fire more readily than any other material employed in the construction of buildings. That portion of the stone tread which is exposed to the fire readily expands under its influence, whilst the ends, which are embedded in the wall, remain normal, the natural consequence being a fracture near the wall, and the collapse of the projecting portion.

I am continually told in Scotland that the reason so many lives are lost at fires in London is on account of wooden stairs, and that there is less loss of life in Scotland owing to the almost universal practice of putting in stone stairs. Having had considerable experience at fires in both countries, I am in a position to say that the idea is entirely erroneous. Most of the lives lost at London fires are at small fires in small dwellings, and in the majority of cases in dwelling-houses situated over shops, where the access to the house is through the shop, thence by a very frail, unprotected, and flimsy wooden staircase. When the shop takes fire, the exit from the house is immediately cut off by the fire and smoke rushing up the staircase. The same conditions apply to the ordinary London dwelling-house, which is let out to a large number of families — the open staircase runs from the street-door through the interior of the house, and every room opens on to it, and escape by this stair is cut off by the first rush of smoke or flame. The system which is almost universal throughout Scotland is very different. Take a block of buildings consisting of shops with flats above. There is no communication between the shops and the houses. The proprietor of the shop does not necessarily live above it; in the majority of cases he lives in another part of the town. What are the circumstances when a fire takes place in one of the shops? It may be burned out, but, given that the ceiling is fairly good and the fire brigade receives a good call, the fire will rarely pass the boards which support the 4 in. or 6 in. of deafening which is universal in Scottish buildings, and forms a splendid barrier to the fire.

The approach to the houses above being by a stair-well, built quite apart from any connexion with the business portion of the block, does not allow the fire to be communicated to the dwellings by the stair-well, for in order to do so it must first pass through the wall dividing the stair from the shop. It rarely happens that a shop fire in tenement blocks spreads to the house immediately above, and when it does, the inmates of the house have had time to escape by the independent staircase. By way of justifying these contentions in relation to stone stairs, I recall a few instances observed at buildings after fires.

At a fire in a large suite of offices with a spacious stone staircase some 6 ft. wide, waste paper stored in the cupboard space under the stair leading from the ground to the first floor, caught fire and was destroyed, a bucket of water was capsized over the stairs, and the whole flight immediately collapsed, scarcely leaving a fragment in the wall to indicate where the stone had been, whilst the thin wooden panelled door enclosing the cupboard remained intact, with the exception of the charring on the inside.

At a fire in a large music warehouse, an unprotected and lightly constructed wooden stair led from the basement to the ground floor, terminating on a stone slab 5 ft. square and 5 in. thick, from which a handsome wooden stair led up to the first floor showrooms. The fire originated in the basement, and flowed up over the stairs to the first floor. When the fire was extinguished, both wooden stairs, which had been exposed to the full effects of the fire, were found much damaged, but sufficiently substantial to admit of the passage of the firemen; but the stone landing had collapsed into a thousand fragments.

Still another instance of the unreliability of stone for a staircase. At a fire in a fine old mansion house which was partially destroyed, the stairs in the end wings were of stone from the basement to the second floor, whilst those from the second to the third floor and from the latter to the roof were of white wood with wooden hand-rails. Practically no actual flame got into the stair-case, but the heat passed up the stair-well, with the result that the whole of the stone stair collapsed, leaving heavy jagged ends projecting from the masonry, while the wooden stairs, where by far the greatest temperature must have been, were merely blistered and scorched.

Iron Stairs.—It has been equally demonstrated that iron, and especially cast-iron, is utterly unreliable under the influences of fire; whilst wrought-iron will buckle and twist itself out of position, cast-iron will collapse entirely. I give an instance which very recently came under my notice at a fire in a manufacturing stationer's warehouse; the offices were situated on the first floor, to which a cast-iron spiral staircase had been erected in a specially-constructed well as a safety exit for the office staff. The fire originated on the ground floor. At the first rush several of the office staff made for the iron stair, but only a few were able to get down this stair; the others were cut off by the very first flow of flame, and were rescued from the windows. The fire was speedily extinguished near this point, but the whole stair collapsed within ten minutes of the outbreak.

Roofs.—The matter of the general arrangement of roofs deserves to receive more serious attention than is usually given to this most important part of the modern building. Unfortunately a fire-preventive roof does not appeal to the artistic eye, especially in large modern country houses, where the Old English style of architecture with its long sloping gables has found so much favour of recent years. These high roofs admit of the fire running all over the building, and their construction prevents a fire being attacked from the outside until a hole has been burned through the roof. In all buildings where fire prevention is aimed at, the division walls should be carried at least 3 ft. to 4 ft. through the roof, with a ledging of at least 2 ft. round the edge, which would admit of men working upon it in case of fire. Such a ledging affords a ready means of both saving life and attacking a fire. The roof is one portion of a building where iron may be used with advantage by reason of the light weight which it has to support and the necessarily exposed condition of its construction. A lightly constructed trussed iron roof reduces the risk of a fire originating and spreading in the roof to a minimum.

Conclusion.—The opinions I have expressed in this paper are facts well known to the fire service and recognised by some architects, and are worthy of the most serious attention by the building profession generally. There are are many points in building construction which are continually presenting themselves to the fireman, but which the architect rarely sees and has, therefore, no opportunity of studying, and these points, when advocated, being so foreign to accepted ideas, are naturally very adversely received and criticised by the building profession.

As a case in point, some time ago whilst in conversation with the authorities responsible for an important historical building, I suggested that certain additional precautions should be taken from a fire-prevention point of view, and as a precautionary measure in dealing with a possible outbreak. I knew there were very bad risks, especially in the roof, which I pointed out, but was told that the building was perfectly safe, the roof was not an old one, it had been renewed not more than forty years ago, and that iron doors had been put in to divide the different sections of the building. Now, every fireman knows that a long, continuous roof which exposes a forest of unprotected and rough-edged and dried timber, is a very dangerous risk; also that iron doors have long proved a failure as a protection against the spread of fire, and that they are inferior to a heavy solid wooden door which remains in position long after the iron door has buckled out of its frame and ceased to fill up the opening.

Whether or not I have made my meaning clear or overstated my views, I think you will at least agree that the subject is one of more than passing importance, and that exchange of views and experience is most desirable. To prevent possible misunderstanding, I desire to say in conclusion that while advocating the more general employment of timber in buildings, I do not include in this category the light pine and deal stairways, thin wooden doors and matchboard lining partitions, but the employment of substantial timber well protected where possible, and of course the avoidance of all exposed edges.

The conclusion I have arrived at, after much observation during a long experience of fires in London and Edinburgh, is that "fireproof" construction, as generally understood, is a source of danger; that, wherever possible, good timber flooring, supports, and stairways should be employed, together with brick partitions; a liberal application of plaster, and an avoidance of air spaces, would result in a lesser destruction of buildings by fire, ensure

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easier manipulation of fire-appliances and a more effective use of the same, and result in a greater salvage of property during the progress of fires. In a word, I advocate the study and use of fire-retarding rather than non-combustible materials as the direction in which safety and fire-protection may more certainly be found; whilst where the more modern forms of planning necessitate provision for big spans and very heavy loads, the systems of construction now erroneously termed "fire-proof" must be so protected as to become fire-resisting.

In the discussion which followed, a delegate referred to the advantage of brick staircases as against wood staircases.

Mr. A. Darbyshire, F.S.A., also referred to the same subject. In large public buildings the staircases should be of reinforced concrete, and he could not follow the arguments in favour of the adoption of wood staircases.

Mr. E. G. Rivers, M.Inst.C.E., official delegate of H.M. Office of Works, said there must be distinct methods of dealing with various classes of buildings, and it would be unreasonable to apply the same system of construction to domestic buildings as to those of a public character. Nor was there any necessity for such a course. Much, however, could be done in domestic buildings in rendering the wood construction less inflammable by treating it with one of the many solutions now on the market. Roofs could also be formed of fire-resisting material, and this without much expense. The issues as to public buildings were greater, and so it was necessary that the legislation for the protection of life from fire should be more stringent. The object of the designer of such buildings should be to prevent the spread of fire from one room to another: to adopt such a system of construction that a fire, should it occur, would be kept to one room or department, and do no more damage than burn the contents of that room. The watertight departments of modern steamships illustrated what he meant.

An American delegate said that fireproof buildings in the United States had few floors with openings in them unless they were protected. Salvage, especially from water damage, in these circumstances, was large, for when the floors were so constructed the water which was poured on to a building did not go from floor to floor.

Mr. J. H. Dyer, Vice-President, N.F.B U., Alton, said that partitions should be of brick, but when they were of matchboarding the air spaces should be filled in with some incombustible material, like slag wool pugging. As to party walls, if they were only carried up to the underside of the slate or tile they were a great protection from fire.

Mr. Pordage, in reply, said that undoubtedly brick staircases were better than wood from a fire protection point of view; when he spoke of wood staircases he meant staircases for internal purposes in domestic dwellings. He thought that the remarks of Mr. Rivers were generally in support of the views expressed in the paper. As to other remarks, the general results from a practical fireman's point of view tended to show that sound wooden construction—solid wood beams, &c.—instead of leading to disaster in a fire, helped to preserve the original form of the building, whereas, with iron construction, the result of a fire was generally total ruin. As to the use of plaster on wire with wooden supports, it was said that the plaster had been tried in America without the wire with unsatisfactory results. He (the speaker) suggested that the plaster should be put on with the wire. His objection to all kinds of steel and iron and concrete erections was that the heavy weight of the material of construction tended to wreck the building. He had advocated the use of an iron trussed roof; that might be inconsistent with his other remarks, but the roof of a building, if built of iron trussing, with slates or tiles, was not only not inflammable, but it was not likely to buckle, as the girders did in other parts of the building when exposed to fire, because it had very little weight to carry.

A vote of thanks having been accorded to Mr. Pordage,

Mr. Darbyshire took the chair, while Privy Councillor J. Stübben, late President of the Amalgamated Societies of German Architects and Engineers, and late City Surveyor of Cologne, read a paper in German, entitled "Urban Fire Protection as Influenced by Street Planning and Building Regulations."

A vote of thanks was heartily accorded to the author on the motion of Dr. Jaffé, and Herr Stübben again took the chair.

Modern Warehouses and Sheds in the Free Hansa City of Hamburg.

Chief Officer Westphalen, Fire Brigade, Hamburg, then read a paper on "Modern Warehouses and Sheds, Hamburg," of which the following is a translation:—

"In the German Empire it is necessary, according to the regulations laid down in paragraph 16, and the following paragraphs, to obtain the permission of the authorities empowered by the laws of the nation: 'For such buildings as by their local position or by the nature of the industries carried on in them might cause important prejudice, danger, or annoyance to the proprietors or inhabitants of the neighbouring sites or to the public in general.' It is, therefore, the duty of the authorities to prescribe in each case the measures necessary to secure safety from fire in the construction of the building and the working of the business.

But mercantile warehouses and stores do not fall under these regulations, although they contain great quantities of combustible goods, and also include some industries, except when the regulations from par. 16 et seq. are applicable to the latter, which, however, does not often happen. In Hamburg, moreover, the Police Building Law now in force must be taken into consideration. This contains a number of regulations for fire protection, and, among other things, enjoins that the outside walls must be solid and the roofs fireproof; but it provides no definition whatever of the space permissible between the party walls, nor any regulations concerning the nature of the interior construction of the stores. Only for that district of Hamburg which has been handed over to the 'Freihafen Lagerhaus Gesellschaft' established under State guarantee has it been laid down in a law *ad hoc*, that special sanction is necessary both for the building and working of stores. To this company belongs a very important part of the store district in Hamburg, containing up to the present 114 stores, covering an area of about 62,000 square mètres. For these buildings, then, the authorities prescribe regulations and conditions both for construction and working as occasion arises. Besides this, on the quays at Hamburg a great number of store-sheds have been erected almost exclusively by the State of Hamburg for its own use. These store-sheds cover a total space of about 385,000 square mètres.

The business carried on in these quay sheds requires that large modern ships (carrying up to 22,000 cubic mètres of goods) may be unloaded and loaded again in the shortest possible time. This is done by iron cranes on the quay, 272 of which are worked by steam, 215 by electricity, seventeen by hydraulic power, and 139 small ones by hand. The goods lying only a short time in these storesheds, and being forwarded as soon as possible, must not therefore be piled up high. They must also be promptly sorted after unloading. Accordingly, each shed must be on ground level, and have space to take comfortably the whole cargo of the largest steamers. The newest sheds are about 200 mètres long and 50 mètres deep. They have no partition walls. They are quite open to the quay in front, and the rear wall is of wood; at the two ends are solid gable walls which are carried above the roof. Between the different sheds there is generally a space of about 30 mètres; in a few cases, where two sheds are built together, being separated by the gable wall, any doors in this wall are fireproof. In this kind of construction each shed, occupying a space of about 10,000 square mètres, presents a single great risk.

The internal supports, as well as the roof construction, are of wood, while the roof itself is made of 'pappe' (paper). Considering the circumstances, these are altogether the best materials, for one cannot use for these sheds materials which would completely resist a really large fire. The roof would, therefore, in any case suffer with the rest of the building through the fire, and also a light wooden construction can more easily be cleared away and renewed than one of iron. Wooden construction has the further advantage that the cost of a renewal is not a great consideration. On the other hand, the interruption of business caused by work of long duration would cripple any part of the quay in which it might happen, and entail great loss of money.

The modern stores in Hamburg are constructed quite differently from these sheds. To the former, of course, different principles and different conditions are applicable. The ground on which these stores stand is very valuable, and the goods generally remain in them a long time; they are therefore built with a number of stories. Such a store is about 16 mètres wide and 22 mètres deep inside, and has therefore, after deducting for staircases, an available floor-space of about 325 sq. mètres in each story. The outer walls are naturally of solid masonry, and the roof is fireproof, the gable walls being carried 1½ mètres above it. The inside construction consists of iron supports protected by fireproof material and iron girders protected in the same manner. The ceilings between are made of "Beton," with layers of iron (System 'Koenen'). Above this lies a floor of wood.

Complete encasement with thoroughly fireproof material—for instance, hard burnt hollow bricks, as is often practised elsewhere, would naturally offer the greatest security against danger from fire, but it costs considerably more than that used at Hamburg, and with the good alarm system and organisation of the Hamburg Fire Brigade, it may be taken for granted that the internal construction of these stores will resist a fire until the fire brigade has had time to extinguish it.

The floor in each of the stories has a slight fall towards the front and back in order to carry off the water that may have been used for extinguishing fire inside the stores, and by means of the outflow pipes fixed on the front to prevent it from doing damage. In these modern Hamburg stores each story has, therefore, its own separated risk, which is not at all a great one.

The staircases of these stores deserve special notice. For each store there are two stairs, the one at the front for general use and that at the back for use only in case of fire. In order that the back staircase should take up as little of the valuable floor space as possible, each staircase is so arranged that it serves at the same time for two stores. Access to these staircases is obtained by an iron balcony on each story. The back staircase has a fireproof entrance in the cellar and leads up to the roof, where small iron stairs provide an escape in case of need over the parapet wall. This practical arrangement of the stairs allows of the greatest possible use of the floor space for storage purposes, and at the same time gives the fire brigade the power of attacking the fire from two sides.

Most of the Hamburg stores serve only for storing goods, but some of them also contain working machinery. This cannot be avoided, as many business houses must manufacture their goods direct in the stores, but in such cases the plant is put in special compartments, which are separated by fireprooof partitions from the stores. The unavoidable openings in the floors are also as much as possible protected by fire proof material, so that in such cases everything possible has been done to divide the whole building into as numerous, and therefore small, risks as possible.

If, on the one side, the Hamburg stores of the modern type may be considered 'model buildings' from the standpoint of fire prevention, yet on the other side it must be pointed out that the fire organisation of Hamburg has only been able to gain this success after many struggles. For a long time the building engineers offered insurmountable opposition. Perhaps they were anxious not to hide their intelligently-designed and elegantly-executed iron structures, but to maintain them in full view of all the world. The old myth was continually served up anew that the iron might suffer from rust behind the fireproof covering. Therefore, this covering ought at least to be made removable. Such removable coverings are much too expensive and utterly impracticable for warehouse purposes.

When the fire organisation, supported by the fire insurance companies, energetically refused to maintain any more stores with unprotected iron construction, at first wood was again employed and supports and girders made of oak; but at last the fact that such a quantity of oak could not be obtained, or at least only at an impossible price, furthered the ends of the fire brigade. Since then the stores at Hamburg have been built according to the modern fireproof system.

Now we might suppose that the fire insur-

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ance companies would allow a considerable reduction off the premium for goods which are stored in such model warehouses, but unhappily this is not the case. The fire insurance companies have formed a ring, and are fixing the amount of the premium to suit their own views, and they take care that the high premium shall be maintained as long as possible. This is indeed greatly to be regretted. I think the fire insurance companies, if they properly considered their own interests, ought, by reducing their premiums, no longer to refuse a practical recognition of the able and successful struggle of the fire brigade for fire prevention, otherwise the State may yet carry out the idea of insuring such favourable risks as the Hamburg warehouses present."

A vote of thanks having been passed to the author,

M. A. Schepers, Commandant du Corps des Pompiers, Anvers, read a communication entitled "Rapport sur le Reconstruction de l'Entrepôt Royal d'Anvers, au Point de Vue de sa Résistance au Feu."

A vote of thanks was passed to M. Schepers.

The following paper by Mr. Max Clarke was taken as read, *i.e.*,

How to Make Existing London Buildings More Fire-Resisting.

As you may imagine, the subject of this paper is not one which I should have chosen, and if it turns out that it has no fresh information to offer you, the excuse must be that nearly all that can be said on the subject has already been dealt with. Still, renewed consideration on the subject *may* bring out some fresh points, and if I cannot give any useful hints I always console myself with the hope that the discussion may bring out forgotten or overlooked information. One might admit at once that to make all existing buildings in London fire-resisting is a practical impossibility, so that you must take my remarks only as suggestions as to what might be done towards making buildings less inflammable than they are at present; even this might involve such an enormous expense that the owners of all classes of property would, I fear, look on my ideas as not in their particular interest; however that may be, we all have a duty to do towards our neighbours, and that consists partly in making buildings as safe as can reasonably be expected against danger to life and property therein contained. To carry out the idea of this paper in a logical manner, I should begin by dividing up the districts of London into risks, and then the buildings in these districts into sub-divisions of risks; but this sort of work I think I may safely leave to those whose particular business this is from an insurance point of view; my chief concern will be to deal with constructional details only, combined, of course, with the inherent danger there always is in the proximity of one building to another—always a source of real danger in large cities such as London. For instance, particular portions of the city of London have unfortunately got the reputation of being what are called dangerous areas. This may be due not only to the buildings themselves but also to the nature of the goods stored therein, and for this class of building I am afraid little can be done. The only thing we can hope for in this division of the subject is to render them less liable to communicate fire to those adjoining. On the other hand, large numbers of buildings not having within them goods or materials of a particularly inflammable nature are built or fitted up, and particularly the latter, in such a manner as to render them very dangerous when by some unfortunate accident they do get on fire.

Many of these buildings in their construction contain all the elements of danger, both to themselves and to their surroundings, and it is more particularly with regard to these that I consider a paper of this nature should call your attention. The idea of pulling down London wholesale, or converting all its buildings at one time into what are erroneously called "fireproof" structures, is eminently absurd. Still, much might be done at a moderate expense, which would render buildings and whole areas much less dangerous than they are at present.

Matchboard.—For instance, take the one item "Matchboarding." It is used in all sorts of places, in most of which it could very well be done without as regards the construction, and it is a material which, so far as safety in case of fire goes, should not be allowed under any consideration whatever. And yet one hears very little against it, probably because no one thinks of the extra danger involved in its use, or does not want to think, simply because it has been used heretofore and it is convenient, easily put up and just as easily removed, requires no time to dry, and is easily painted or decorated. Its use on walls and ceilings, particularly the latter, is much to be deprecated. I am now speaking more particularly of boarding made from soft woods, which when dry and painted or varnished is highly inflammable, the fire passing along it at a high speed, often rendering escape from a building impossible, even in the early stages of a fire.

The limited use of hard woods as wall covering for decorative puposes is not objectionable, particularly if fixed without any air space at the back. In all discussions of the present nature we should be most careful not to advocate views which would prove to be what may be called so excessive as to frustrate the very object intended. I would only make one further remark with regard to this class of material, and that is how fateful the results are when it is used as a ceiling covering with plenty of air space behind, seemingly specially arranged to create rapid and intense combustion.

In making these remarks I am quite aware that in the opinion of many this class of wall and ceiling covering possesses certain advantages, being suitable for buildings in which certain trades are to be carried on. My object is to impress upon you that these ideas are already antiquated, and that for every class of building and every trade some form of covering can be found equally suitable from all points of view, without any of its special element of danger.

Naked Ceilings.—We may now pass on to a form of construction which, alas is even more common in London than the one above-mentioned, viz., leaving large areas of the floor joists of buildings without any covering whatever on the underside. This is done, of course, with the clearly defined object of saving money in first cost, and it *does* save a certain amount; but whether that saving is commensurate with the greatly increased risk such a system of construction involves is for you to decide. I hope it will not be one of the arguments during the discussion that numbers of buildings constructed in this manner have never had a fire in them. This does not seem to me to be discussion at all, at any rate it is *not* "fire preventive" discussion.

There is one aspect of the case which must not be overlooked, viz., "What is fire protection worth?" In these days of commercial speculation most buildings have a remunerative value, beyond which the speculator will not go; his idea is that given a building which can be insured at a reasonable rate, it would pay better to build it in the cheapest manner than to expend a larger sum on a more fire-resisting building. The risk of its being burnt down is taken as a quantity worth so very little consideration that in many cases it is accepted in preference to the safer building. This, of course, is the difficulty met with in any attempt to make fire prevention general. But for this London would be fire-resisting, and I should not be before you at this moment. However, I have to try and bring to your notice items in everyday construction which could be brought into line with modern ideas without wholesale reconstruction.

The cure for the evils which I have already pointed out is, that in future matchboarding should not be used in new buildings, and after a certain date it should be removed from all old buildings. The naked joists in ceilings could easily be corrected and the ceilings made fire-resisting by covering them with wire netting or some form of expanded metal and plaster.

Studded Partitions.—I need hardly remind you that the ordinary wood partition, with its wood lath and plaster covering, leaving hollow spaces from top to bottom, *should* be a thing of the past. Unfortunately, such is not the case, in spite of the numerous forms of light partitions made which are non-inflammable and have no open spaces. Why the latter are not used it is hard to say, but if after a certain date stud partitions were to be abandoned it would render London as a whole much more fire-resisting than it is at present, and at a moderate cost.

Lift Enclosures and Doors.—I must now turn to a matter which seems to me to be most important in buildings of the warehouse class, namely, the means adopted at present for the prevention of the spread of fire in lift wells and generally in vertical shafts of this class. There is no doubt that this particular risk is not sufficiently considered, and great improvement could be made as regards retarding the spread of fire if all lift shafts were properly enclosed with some form of non-combustible material. The particular nature of the material I need not attempt to specify, as it would largely depend upon whether the building was an old one or in course of construction. If the latter, there is no doubt brickwork would be the most suitable, but some other enclosing material would be efficacious, at any rate for short periods, and it is these short periods which, in the initial stages of a fire, are of the utmost importance.

The doorways or openings to the lift shafts should not be mere openings, as is so often the case at present, or if the openings are fitted with doors they are too often of an open type, not in any degree preventing the passage of smoke and flame up the shaft. Iron doors are often fitted to openings in cases where there *is* a solid enclosure; but the doors are not close fitting and the fastenings are not designed with a proper regard to ease in opening and closing, and quite regardless as to their adequacy for preventing the doors bending or twisting when heated to a high temperature. Where the latter is possible of course flame and smoke pass through the small openings and ignite inflammable material on the other side, thus *contributing* to the spread of fire to an alarming extent.

Fire-resisting Doors.—Another small matter I have observed in connexion with iron doors, which should be avoided if proper fire-resisting qualities are to be obtained, is the total neglect displayed in keeping inflammable material at a sufficient distance from iron or other forms of fire-resisting doors. Only by exercising proper attention to this point can the full value of such doors be obtained. A door may in itself be a good stop against fire, though it become red-hot, but it is useless if in contact, or in close proximity to, combustible material on one or both sides. Attention to this matter is sadly wanting at the present time. Wood floors should not be carried up to the iron door frames, but a fairly wide threshold of concrete, stone, or the like should be formed on each side, and the same remark applies to the whole of the opening on both sides, as it is impossible to foretell on which side of the opening or shaft the fire may occur.

Fittings. — The same remark applies to fittings in shops and warehouses, not to say public buildings. Often after the building has been left fairly secure in the direction above mentioned, shop or other fitters come on the scene and fix woodwork everywhere as trade fittings, totally regardless of the risk of fire, and it is only by bearing this in mind always when designing, constructing, altering, or fitting up a building that the fire-resisting qualities of a structure, district, or city can be improved.

Fireplaces.—I shall now call your attention to some of the defects in fireplaces and flues which are being repeated every day in modern building work, and I hope you will understand that throughout my paper my attempt is to show the defects in London building, as it is only by deciding what the defects are that remedial measures can be taken.

Few know the number of fires caused by defects in and about the fireplace. Personally, I am disposed to think that most of the causes are brought about by careless workmanship, and a few perhaps by the use of methods which were quite adequate in former times, before the invention of what are now called slow combustion stoves, close ranges, boilers, and the like. I place first in point of danger the practice of building half-brick trimmer arches to carry hearths in wooden floors, the arches having the centering left in and forming an open space under the brickwork. The underside of this space is lathed with wood laths and plastered in the same plane, as a rule, as the rest of the ceiling. This form of hearth should give place, in my opinion, to a concrete or other self-supporting hearth, the full depth of the floor joists, having a flat soffit on which the plaster could be applied direct. Next I should like to advocate the use of fireclay linings to all flues, a common practice in many districts, but not in use as a rule in London. Improperly bonded and badly built flues, the brickwork of which is only 4½ in. thick, and in which bad mortar forms a considerable component part, and which after a time drops out leaving the joints open (this is often assisted or caused by the nails, spikes, or plugs, driven

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in for the purpose of fixing inflammable finishings), all these defects lead to a considerable number of fires annually, the details of which I am sure my insurance friends know a great deal more about than I do. Wood finishings should not be fixed with iron spikes in front of flues unless the brickwork is of a greater thickness than 4½ in.; in fact, it is probable that a great safeguard against fire would be effected if woodwork in such proximity to flues was abandoned altogether. It seems to me a cause of danger that flues built with only half-brick surroundings are at times used for high-pressure boilers, kitcheners, and the like, the brickwork being quite hot when work is in progress, and in many cases much too hot for safety.

New types of stoves of either the "slow combustion" or "well fire" classes should not be fixed in old houses, unless a thorough examination of the hearth and its surroundings is made, numerous fires having been caused from timbers being in close proximity to chimney breasts, quite unknown to the people who fixed new and powerful stoves in old openings.

Areas, Light Wells, and Narrow Streets.—In cities like London, where land is of such great value, the size of areas and light wells will always be reduced to the smallest possible dimensions, thereby greatly increasing the risk of fire spreading from one building to another. The same remarks hold good with regard to narrow streets and courts. In cases such as these the only precautions which can be adopted are of a protective nature.

Windows in light wells should not be directly opposite each other; should be fitted with metal, or, at any rate, with hard wood frames; the glass should be wired or armoured, so that when cracked it would not drop out of the frames at once, thus allowing the passage of flame from one building to another with fatal rapidity. In more dangerous cases blinds of non-inflammable material might be used with advantage, or, better still, shutters which would fit the openings closely, constructed in such a manner as to prevent much twisting or buckling, and provided with fastenings, which, while admitting of rapid adjustment, would be secure against opening by accident or from falling bodies on the outside.

Shutters or blinds for use in courts or areas might be made of woven wire mounted on frames. This form would admit of a certain amount of expansion or contraction without damage to the frame; would admit a certain amount of light, which is always an advantage, and could be seen through from the inside, also a benefit in many cases. In connexion with any form of shutters, such as above advocated, the objection to having wood finishings near them cannot be too strongly brought before your notice. Any real advantage the shutters might be in case of fire in an adjoining building would be largely discounted if inflammable material was close to the openings *supposed* to be protected by the shutters.

My opinion on these matters is that we do not take advantage of the information we possess. Knowledge is of no use whatever unless properly applied, and my contention is that there is a vast store of information on this particular subject which is not made the least use of. What has been done before is repeated without properly examining the new methods with the object of applying any which might suit particular cases.

I have not dealt with any of the modern forms of fire-resisting construction, many types are so well known that they need no words of mine either of praise or condemnation. All I would say is that, as a rule, the details are not sufficiently attended to. In the case of sanitation we have for many years had good pipes, but even now we sometimes have not got good drains, and only by the very closest attention to the minor details shall we ever get them. It is exactly the same with every form of fire-resisting construction and any attempt to make buildings or districts safer than they are at present. If I may digress from the subject for a moment I would like to address a word to "the man-in-the-street," if any such be here, as to the saving of life from fire. Has he ever thought of the value of 50 yards of moderately stout rope and a block or pulley with a hook in the ceiling in front of a window? Why such a modest equipment should not be in every house, I cannot imagine. A stout belt with its ring and spring catch would be an advantage; but I say, given the rope and block, there is no reason why escape should not be practical for men—and for women also when there are men to assist them—from every building in London. With regard to such places as Eton or other public institutions, each individual should provide himself with his own rope, as he does his cricket bat or fountain pen. It might be years before it was required, but *when* required it should be in perfect order, ready for use at a moment's notice. We are desirous of helping all sorts and conditions of men and women, but it is also expected that they should do something to help themselves.

The conference then adjourned.

Visits to places of interest were made in the afternoon.

[Our report of the proceedings will be continued next week.]

THE MUNICIPAL AND COUNTY ENGINEERS' ASSOCIATION:

ANNUAL MEETING, LONDON.*

IN the discussion on Mr. Smythe's paper on "Tree Planting,"

Mr. Hall, Cheltenham, approved of Mr. Smythe's suggestion that Borough Councils should purchase young trees and grow them on their own land, as they would then know exactly the sort of tree they were having, get trees that were acclimatised, and save one-half the cost.

Mr. Scorgie, Hackney, was of opinion that those Authorities who were subject to public audit might have a difficulty by having the money spent on trees surcharged by the Public Auditor. There was at present a Bill before Parliament to make it legal to plant trees in roads.

The President (Mr. W. Weaver) said that referred to London.

Mr. Greeves, Buxton, said that in Buxton they planted trees wherever they could, and the Council had never been surcharged although they were subject to Local Government audit.

Mr. A. H. Campbell, East Ham, said that some two years ago they were able to get through the Local Government Board a sum of 600*l.* for the guarding and protection of trees. If they were entitled to guard they were certainly entitled to plant trees. They found that while the trees cost 4s. 6d. or 5s. each, the guards ran to no less a sum than 25s., a price which practically prevented them from developing tree-planting. He had designed an efficient tree guard which cost 9s. 6d., which was open to the use of any authorities who desired it.

The President thought it prudent not to plant trees very close together in London, and, he was of opinion that 35 ft. apart for plane trees was sufficiently close.

Cremation.

Mr. W. Nisbet Blair, C.E., Borough Engineer of St. Pancras, read a paper on cremation. He said the number of cremations carried out during the last ten years showed a steady, though slow, increase year by year. It might be thought that fairly good progress in securing the extension of the system had been attained in this country, but we were slow indeed as compared with other countries. In the United States there were twenty-five establishments, at which about 2,700 cremations per annum take place; in Italy there were twenty-seven crematoria; seven in Germany; two in Sweden; and one in Denmark. It was not on account of difficulty in obtaining sufficient land for cemeteries, that the author considered it justifiable to urge the substitution of cremation for earth burial; it was entirely a question of the health of the living.

The President said he believed this to be a matter which demanded the attention of the various authorities who desired to deal with the sanitary matters of their district.

Mr. J. T. Eayrs, Birmingham, and Mr. J. Lemon, Southampton, having spoken, Mr. Blair, in reply, said the more one was brought into actual knowledge of the conditions which followed the earth to earth burial of the past, the more one had evidence that the practice was entirely wrong, and that it was absolutely baneful in regard to the health of the living.

The proceedings of the Annual Meeting were resumed in the Council-chamber of the Town Hall, Kensington, on Friday, June 26 the President (Mr. W. Weaver) in the chair.

* Concluded from last week.

Risk of Fire in Temporary Buildings.

A paper by Mr. T. W. Aldwinckle was read, entitled "Minimising the Risk of Fire in Temporary Buildings." It is printed in full on page 45.

Mr. W. Nisbet Blair, St. Pancras, said the paper was of great practical value in these days when buildings were rushed up—working against time in order to meet emergencies; and from the experience a few months ago at Colney Hatch they realised how serious indeed was the matter of fire protection for temporary buildings. He did not see that Mr. Aldwinckle had referred to that method of protecting wood by some patented material of which many of them had had samples sent. He had tested one of these samples, and undoubtedly it did prevent the wood so treated from breaking into flame. They might put wood so treated into the fire, and it would char away, but would not break into flame. Fibrous plaster slabs or ordinary plaster did to a very great extent protect wood so covered from fire, but he did not think it was altogether satisfactory, because supposing the plaster got broken, as they knew it did, by the bumping of bedsteads into it in such places as hospitals, then it left the laths behind exposed to the risk of fire. The question of the extra cost of heating temporary buildings was an item to be considered, but still a very large item of cost was perfectly justifiable, and he did not think any one would hesitate in incurring considerable extra cost to secure non-inflammable buildings.

Mr. Gamble, London Fire Brigade, said the paper dealt almost entirely with temporary public buildings. Surveyors would know—more especially those in the provinces—that public buildings were only a small proportion of the buildings of this class that were erected. Of course, public authorities could call in assistance and advice upon the protection of any of their buildings; therefore, as far as public buildings were concerned, there was no excuse why they should be left for one day in a dangerous condition. Mr. Aldwinckle had mentioned the necessity of these buildings being run up in a great hurry, and undoubtedly it was so. It had fallen to his lot in days past to run up a small-pox hospital in forty-eight hours, but there was no reason why after the building was erected, the bricklayers should not be employed to put in partitions of 4½-inch or 9-inch brickwork. A partition of 4½-inch brickwork, if properly done, was a great protection in case of fire. As to the author's suggestion as to corridors, he (the speaker) believed that he lost his brother from having to go from the administrative block to the wards through a corridor which was not closed in. He did not think the medical officers who had to go in and out at all hours of the night, would agree that it was a matter of small moment that they had to go out of doors. He saw no reason why the corridor should not be cut up into sections. Although fire was a terrible thing, it was the smoke generated by the fire that was the difficulty and the danger, and if they could, by cutting up the corridors or building into sections by using armoured doors or brick walls, so as to make it possible for inmates to get away or the firemen to get within striking distance, they would have done a great work. They had not heard much of late about that terrible calamity at Paris, the Charity Bazaar fire, where so many ladies lost their lives. It was to buildings of that class, which were erected for charitable entertainments, that they must look for the greatest source of danger. Bazaars with flimsy draperies and stalls erected in Japanese or Chinese fashion, with lanterns, were bad enough in a permanent building, but when used in a temporary building, or a building erected of timber, they were a veritable death-trap. There was another building mentioned in the paper—the temporary building and stands erected in cases of festivities. During the past twelve months forests of timber had been erected in the streets of London. While they came out of that all right he could assure them that the anxiety of those who had to look after the protection of London from fire was considerable. One spent most of the time walking round, special people were put on to watch, and at the same time everything was done to keep from the public that watching was being done. In the case of public stands put up in a hurry by contract, unless someone was constantly watching, the joiner would leave his shavings there, the

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newspaper seller would throw his contents bills there, and they would be surprised in a town how these accumulated. These were some of the dangers to temporary buildings in London. Then there were the wretched sheds at the rear of buildings, made of old egg boxes or anything that could be obtained, filled with all the rubbish that could be collected in the streets or from the houses themselves. There was much to be said from the fireman's point of view in favour of doing away with back-yards. His advice to them was to put their confidence in bricks. They would find the more they used bricks for the protection of their buildings from fire, the more successful they would be.

Mr. Hall, Cheltenham, entered a word of protest against corrugated iron serving for hospitals or for anything but storage purposes.

Mr. Cooper, Wimbledon, said the Superintendent of the fire brigade of a large American city, in issuing his report after a visit to Europe, said there was no doubt that Americans were far in advance of the Europeans in regard to their fire-extinguishing appliances; but as regarded the construction of their buildings, they were far and away behind the Europeans. That clearly bore out what Mr. Gamble had said as to the construction of buildings and brickwork. He thought if architects were more careful in cutting off the portion of the roof between the ceiling and the slates a good deal would be done to prevent the spread of fire. As regarded partitions, he was rather surprised to find that allusion was not made to wire-lathing.

Mr. J. T. Eayrs, Birmingham, said most municipal engineers had to deal with temporary buildings of one class or another in the discharge of their municipal duties. These buildings were not such as were referred to by Mr. Gamble, which were erected in brick; they were usually of wood construction, and corrugated iron was used to a limited extent. If a person put up a temporary building which under the law was exempt from the operation of by-laws, what legal remedy was there, or what power had the surveyor of a local authority to prevent the erection of such buildings, however liable to fire they might be? They were anxious about the protection of buildings in case of danger to life or property contiguous to the buildings themselves, but if they had no power he failed to see where the remedy came in. This was, however, a useful paper for temporary public buildings erected by public authorities, because there they could use such protection as they were advised by their officers.

Mr. Greeves, Buxton, said that twelve months ago he erected a temporary hospital, with two wards for twelve patients, doctor's and nurses' rooms bath, &c. It had to be put up in a hurry at the time of the small-pox scare. They spent about 500*l.* on it. He would ask what should be done with a building of that sort in order to prevent it from catching fire, or, in the event of fire, to prevent it spreading? A building put up in this manner, although called temporary, would stand for twenty years, and be a good and substantial building, and he did not think his Council would be prepared to pull the building down.

The President said he was voicing the views of the members in conveying to Mr. Aldwinckle the thanks of the meeting for the trouble he had taken. He agreed with Mr. Gamble as to the danger from bazaars. He had seen many in that Town Hall, with the large room decked out with matchboarding, festooned with light drapery, and if a fire had broken out the entire building would have been burnt down. As to the stands erected in the streets he could sympathise with the anxiety of Mr. Gamble when one portion of London was converted into stacks of firewood. If a fire had broken out it would have been almost a catastrophe. There was a considerable risk, and it must have been to the officers of the fire brigade a time of the greatest anxiety.

Mr. Aldwinckle, in reply, said he had dealt with the treatment of wood in the paper, but he had purposely refrained from noticing the name of the manufacturers. One thing was that these temporary buildings were apt to become permanent. In London they were erected under the licence of the London County Council, and those licences were renewed. There was the case of a hospital built by himself ten years ago for the London Asylums Board, with 400 beds. They had a licence for five years, that was renewed in 1898 for a further five years, which would expire this year. The lamentable fire at Colney Hatch had set everybody thinking what was to be the future of these buildings. There came in the question which Mr. Greeves asked. It was very important that they should be able to find out some practical means at a moderate cost of rendering those buildings, not fireproof, but of minimising the risk of fire in them to avoid the wholesale destruction of property.

Motor Vans for Municipal Purposes.

Mr. T. W. E. Higgins, Borough Surveyor of Chelsea, in a paper on this subject, said he was strongly of opinion that, should the cost of working motor vehicles even approximate to that of horse-drawn ones, every local authority responsible for cleansing the streets should encourage their use, both on sanitary and economical grounds. If motor vans and carts were substituted for only the horse-drawn vehicles now used for the purposes of the City and Borough Councils within the Metropolitan area, an appreciable saving in the matter of street cleansing would ensue. The first firm to bring into use a motor vehicle for municipal purposes was, as far as he was aware, the Steam Carriage & Waggon Co., of Chiswick, now known as Thornycroft's Steam Carriage & Waggon Co., who designed steam dust-carts, two of which were at once used by the Urban District Council of Chiswick, and worked for some time in that district. There was no doubt that the motor van industry was sorely crippled by the 3-ton limit. If a somewhat heavier van could be built—and it was built, and used—a much more satisfactory vehicle could be produced, and one which need not do any more damage to the road than one within the 3-ton limit. In the summer of 1900 two motor vans were built for his Authority, which had been working since, and were found to be most useful. He also had at work a steam motor van, which had a frame built to take either a tipping body or water-tank (700 gallons). This machine was one which had also proved very useful and economical. It had been in work for some two years for various persons before the author purchased it. The use of such a vehicle was greatly to be recommended, and he found that, by a simple arrangement, he could fasten a horse-broom—or, rather, a revolving broom, made originally to be drawn by a horse—to it, and thus water and sweep at the same time.

Mr. A. E. Collins, Norwich, said he had used a steam motor for some time, and when running it was an economical machine. But the constant vibration made it very difficult to keep the joints tight, and repairs meant loss of work. He found the most economical use of motor vans was for street watering, and the carrying of materials to the sewage farms. For ordinary cartage for short journeys he did not think they paid.

Mr. Cooper, Wimbledon, complained that they had not a single figure in the paper on which to found any estimate as to the economy of using motor vans.

Mr. Winter, Hampstead, said he found with the motors which he had had in work for eighteen months considerable waste of time for repairs. With his two motors it amounted to 20 per cent., which was a serious drawback. The cost had amounted to something like 70*l.* a year. He found the most advantageous use to which he could put them was street watering and the haulage of materials. He had worked out some figures as to the haulage of road metal, and he found, with the disadvantage they had suffered with heavy repairs, the cost of motor haulage was 1s. 5d. per ton, as against horse haulage 1s. 7d. per ton.

The President said he believed that with an ordinary motor they would have difficulty in getting makers to keep it in repair under 75*l.* or 80*l.* per annum, as the breakages and breakdowns were so frequent.

On the proposition of Mr. Silcock, Leeds, a vote of thanks was passed to the authors of papers; and on the proposition of Mr. Eayrs, a vote of thanks was also passed to the Mayor and Corporation of Kensington for the use of the Town Hall.

The members then proceeded in brakes to Cromwell-road, where they had an opportunity of seeing the motor doing excellent work in street watering and cleansing; to the new power-station of the District Railway now in course of erection at Lot's-road, Chelsea; and to the power-station of the London Tramways Co., where refreshments were served.

On Thursday the members were entertained to luncheon by the Mayor of Kensington; and on Friday evening the annual dinner was held in the Venetian Room at the Holborn Restaurant. On Saturday a visit was paid to the works of Messrs. Eastwood & Co., an account of which was given in our last issue.

COMPETITIONS.

TECHNICAL SCHOOL, BLACKPOOL. — The Blackpool Town Council have made the following awards on the competitive designs for a new technical school to be erected on the Raikes Hall estate at a cost of about 17,000*l.*:—First premium (50*l.*), Messrs. Potts, Son, & Pickup, Bolton; second, Messrs. Cheers & Smith, Blackburn; third, Messrs. Simon & Crawford, Manchester.

ENGINEERING SOCIETIES.

THE JUNIOR INSTITUTION OF ENGINEERS.—An extra meeting of this Institution (the Chairman, Mr. Kenneth Gray, presiding) was recently held at Finsbury Technical College, when there was a large attendance of the members to hear a lecture on "High Frequency Electric Discharges," given by Mr. R. P. Howgrave Graham. The members of the Society of Model Engineers were also invited, and many of them were present. The lecturer first explained the principles of "self-induction" and "capacity," and the conditions necessary for their combination to produce oscillatory discharges of exceedingly high frequency. This was elucidated by mechanical analogies, including one based on hydraulic principles and perfected by Professor Northrup. As direct proofs, Mr. Graham spoke of the reduction of the frequency to so low a value as to cause the spark to emit a musical note, and of the measurement of the oscillation period by photographing the discharge with the aid of moving plates or revolving mirrors. The range of frequency of electric oscillations up to 30,000 million per second was briefly sketched, and as a rough guide, the figure given for most of the experiments shown was from 400,000 to 800,000 per second. Some attention was given to practical details, including sources of supply, regulation of spark gap, and the use of strip connexions to allow for the confinement of these currents to the surface layers of their conductors. The enormous effects of self-induction were demonstrated by the lighting of an ordinary 100-volt lamp short-circuited by 2 ft. or 3 ft. of ¼-in. copper rod. Equally striking induction effects were shown, including the lighting of a lamp at 7 ft. distance by the currents induced in a secondary of only three turns of rather large area, the primary being a similar coil on the opposite side of the lecture table. The lecturer emphasised the importance of syntony, and showed an experiment in which a lamp was caused to vary between darkness and extreme brilliancy, the tuning being performed by sliding a wire along an adjustable self-induction until a point was reached where the natural vibration period of the receiving circuit was identical with that of the transmitting coil a few feet away. After a demonstration of other high-frequency phenomena Mr. Graham explained that currents which would kill at ordinary periodicities could be passed with impunity through the human body at very high rates of vibration, and showed a 100-volt glow lamp worked by the current flowing through him from hand to hand. He then dealt at some length with the medical aspect of the subject, and exhibited a neat and well-arranged high-frequency medical apparatus made by Mr. Hillier and Mr. Cossor, of Farringdon-road. An account, illustrated by lantern slides, was then given of the work of Nikola Tesla and others, after which several beautiful experiments with a large Tesla coil were shown, including direct and brush discharges at very high voltages. Mr. Graham took long sparks to his body, charging it to a high alternating potential, faint glows and brushes being visible at his finger tips. These became purple tree-like discharges, ending in pale blue streamers 1 ft. long on approaching the free hand to a plate on the other coil terminal. Sparks 1½ in. long were given to members of the audience from the lecturers hands, and isolated vacuum tubes were made to glow brightly in the space surrounding the apparatus which, with all metal objects attached to it gave out brushes and streamers at all points. The very high-voltage current, after passing along a single transmission wire of No. 40 eureka flowed through the primary of a small coreless transformer

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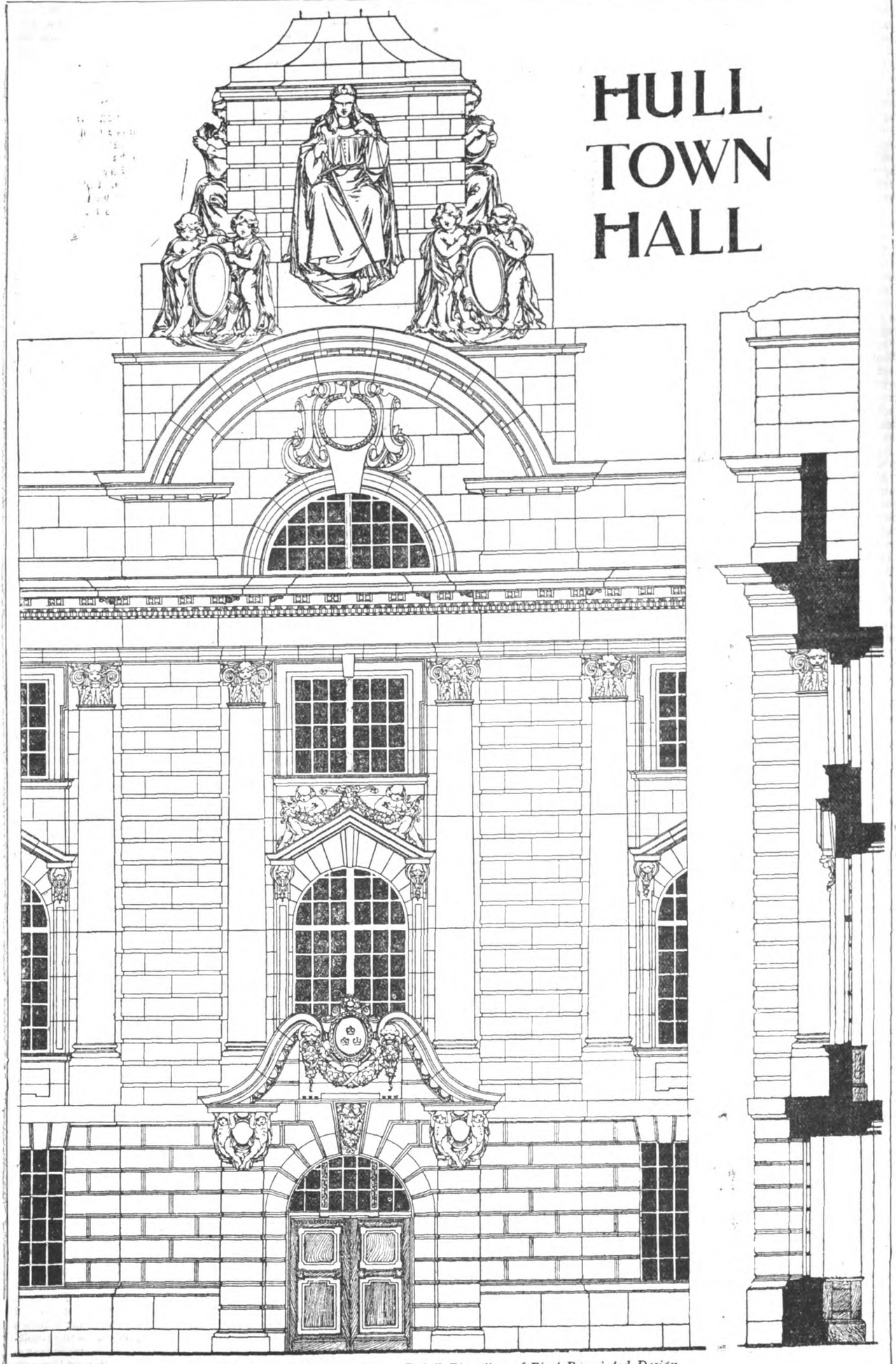
HULL TOWN HALL



Hull Town Hall Competition: Detail Elevation of First Premiated Design.

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and into an insulated metal plate, there being no return wire. The secondary, of only five turns, lit a 25-volt lamp. Eventually the transmission wire was cut and the power for a smaller lamp was transmitted by electrostatic induction between two plates more than a foot apart. Mr. Graham, in speaking of the future possibilities of high-frequency work, entertained hopes that at some future time power might be successfully transmitted to a distance without connecting wires, but concluded by expressing his opinion that at present it could not be said to extend its sphere of usefulness beyond electro therapeutics and wireless telegraphy.

Illustrations.

HULL TOWN HALL COMPETITION:

FIRST PREMIATED DESIGN.

WE give this week illustrations of the design by Messrs. Russell, Cooper, & Davis and Mallows, to which the first place was awarded in the recent competition for remodelling and extending the Town Hall at Hull. The following extracts from the Report sent in by the architects with the drawing will serve to explain their intentions in the design:—

"It is proposed in this scheme to retain for the present the structure of the existing Town Hall for the following reasons:—

1. The sum of 100,000*l.* is not considered sufficient to provide all the requisite new accommodation, together with a new Town Hall, in a manner compatible with the dignity to which the city aspires.

2. A certain sentiment attaches to the present structure, built by a recognised master, and whatever value such sentiment may have it would appear a wanton act to destroy it unnecessarily, leaving aside the objections of the rate-paying public.

Having decided for the foregoing reasons that it is desirable to retain, for the present, the existing Town Hall, its arrangement in connexion with the rest of the scheme is the next consideration.

The present accommodation for the Mayor and the banqueting-room, with their lack of proper service and retiring rooms, is behind the times and would not accord with the requirements of the new building; moreover, the Mayor's room would of necessity be more or less cut off from the Council chamber and committee-rooms.

Therefore, in order to make these important rooms harmonise with the remainder of the building, it has been decided to remove them, together with their suitable accessories, into the new building.

After a careful survey of the site and its environments, it is considered desirable that the law courts should be placed at the western end of the site. Having regard to Clause 13 of the conditions, and summing up the total accommodation that it is requested should be on the ground floor for public business requirements, it is evident that the whole area of the site, paying due regard to efficient lighting and ventilation, is required for this purpose. It, therefore, is evident that the law courts and large hall must be on the first floor.

Various attempts at a suitable disposition of the accommodation required has resulted in the scheme submitted. The principal motives for this disposition are as follows:—

As the large hall is to be let for purposes other than municipal, access is required to it at such times as the offices may be closed, and, when the offices are open, without causing obstruction to the municipal work. A separate entrance from the street is, therefore, necessary to the hall. It is also essential that it should be linked with the Council suite for civic purposes.

To provide the independent access from the street without separating in any way the municipal offices, and to link it to the Council suite in a manner suitable for receptions, banquets, &c., the best position appears to be at the east end of the site, where these objects can be attained in the best and simplest manner.

The large rate office, with its independent public entrances from the street, is another important factor in the scheme, and the position in which this can be satisfactorily placed without causing congestion and noise by the public penetrating the building is also at the east end of the site.

It has, therefore, been determined to adapt the existing Town Hall to the purposes of the large hall and rates offices, by which the foregoing desiderata are achieved and the knotty question of how to deal with the structure in a satisfactory manner in its relation to the new building is solved. The adaptation of the existing Town Hall to this purpose is looked on as a more or less temporary expedient, for it naturally will fall into decay in the near future when compared with the life of the new building.

A proposed future Town Hall and rates offices is, therefore, incorporated in the design, and when erected would, with the remainder of the building, form one harmonious whole, with the large hall well defined.

Future Extension.—The present design has flat roofs to Alfred Gelder and Ann streets. Additional accommodation can be provided by building another story on this with a mansard roof to the streets. This extension is indicated on the elevations and section C C.

Heating and Ventilating. — The heating chamber indicated on the block plan would be in the nature of a tank. The system to be adopted would be low pressure gravity return steam with ventilating radiators in rooms and corridors. Fireplaces could be provided in most rooms in addition if desired. These are not shown in the plans, as they are considered a source of dirt and unnecessary labour. The building generally would be ventilated by electric fans placed in suitable positions. The whole of this work could be carried out by an expert engineer.

Materials and Construction.—The materials and construction generally would be in accordance with the building bye-laws and to the Council's approval. The walls to be carried up in brick. The external elevations to be faced with ashlar and the internal courtyards with approved brick facings and stone dressings. The floors to be of fire-resisting construction. The pitched roofs to be covered with Peake's 'Perfecta' tiles, and the flats with Seyssel asphalt. The offices to have pitch pine flooring in half batten widths. The Council suite to have hard wood floors. The vestibules, halls, corridors, public spaces, lavatories, &c., to have marble mosaic floors. The principal stairs to be in Hopton wood stone and the others in York stone. The joinery generally to be selected yellow deal, that for the Council suite in hard wood. The ceilings of Council suite to be in ornamented fibrous plaster. The walls of rooms generally to be finished according to their requirements. The plumbing to be 'heavy,' the drainage in cast iron pipes, and the sanitary appliances of the best approved types. The work generally to be suited to the demands and character of the building.

Cost.

The design has been carefully measured by a qualified surveyor. From experience of the cost of similar buildings it is considered that 9d. per foot for foundations, and 1s. per foot for the superstructure is ample, and the estimate given below is formed on this basis:—

New buildings ...	£89,668	12
Adaptation of existing Town Hall, say ...	10,000	0
Total ...	£99,668	12

A schedule of the cubic dimensions is annexed.

The cost of the future completion of the front portion of the building is estimated at 23,000*l.*, based upon the same rate as the rest of the building with tower cubed at 2s. 6d. per foot."

SOME SCULPTURE AT THE ROYAL ACADEMY.

WE give this week illustrations, from photographs lent to us by the sculptors, of some of the works in sculpture exhibited in this year's Royal Academy.

All of these were referred to in the article on "Sculpture at the Royal Academy" in our issue of June 20; we need only therefore here give their titles and the names of the artists:—

1. "The Spirit of Contemplation"; by Mr. Albert Toft.
2. "The Truth Seeker"; by Mr. Bertram Mackennal.
3. "Remorse"; by Mr. H. H. Armstead, R.A.
4. "Listen"; a portrait group of children; by Miss Edith C. Maryon.
5. "Panels from Dining Room Doors at Bradfield House Perks"; by Mr. George Simonds.
6. "Panel for Organ Chamber—Low relief"; by Miss Ellen M. Rope.

MINIMISING THE RISK OF FIRE IN TEMPORARY BUILDINGS.*

THERE has been for some time past a growing feeling of uneasiness as to the danger from fire in connexion with buildings of a temporary character, and at the request of this Association the author has written this paper in the hope not only that it may contain a few useful suggestions on the subject, but also that it may form the basis for discussion of a practical nature.

It will be necessary at the outset to define what is meant by the expression "temporary building." It may be fairly described as a building which, being required only for temporary purposes, and having necessarily to be erected as quickly as possible—and in the majority of cases as cheaply as possible—is constructed of materials and in a manner quite different from an ordinary building, and is generally of a flimsy rather than of a substantial character: in other words, it is not built to last. These buildings are put to various uses, such as churches and chapels, lecture-halls and mission-rooms, hospitals and the like, and are all more or less of the nature of public buildings, wherein the public pass some hours in large numbers during the day, or where, as in the case of hospitals, the buildings are occupied by patients both by day and night. In all these cases it is a public duty to see that the risk of fire in such buildings should be as slight as possible. These buildings are all necessarily at variance with the London Building Act, 1894, and with the building by-laws of the provincial local authorities. In London they can be erected under licence from the London County Council, who must previously approve the plans, and the author is under the impression that the same rule holds good in the provinces. There is, however, in the model by-laws issued by the Local Government Board a special clause exempting from the operation of local building by-laws all buildings erected temporarily for the accommodation of persons suffering from dangerous infectious diseases, and this has been adopted by many local authorities in the provinces. (Of course, this does not apply to London.) Thus it happens that a good many of these temporary isolation hospitals must have been erected without any official control or supervision. Where these buildings are erected, as in London, under licence, such licences are frequently renewed from time to time, the result being that many of these buildings, originally intended to stand for a short period, and, indeed, built with that end in view, have been standing for several years. Some of those still standing are, doubtless, of a fairly substantial character, but others are undoubtedly of a flimsy nature.

The temporary building of the ordinary type may be thus briefly described:—

The external walls consist of fir quartering or light iron framing covered externally with boarding, felt, and corrugated iron, the boarding being frequently omitted. These walls rest sometimes upon brick and concrete bases and sometimes upon wooden stakes driven into the ground; occasionally the external covering consists of boarding only, without corrugated iron. The roofs consist of light iron or timber framing covered with boarding, felt, and corrugated iron, the iron being sometimes omitted and tarred felt substituted. The floors, which are of deal, rest upon fir joists on occasional brick piers, leaving an air space between the floor and the ground beneath. The internal linings to the walls and ceilings generally consist of thin match-boarding, which is either painted or stained and varnished, thus leaving an air space of about 4 in. between the inner lining and the outer covering of the walls. Thus it will be seen that the whole of the interior of the building—walls, ceilings, and floors—is lined with thin wood of necessarily a highly inflammable nature, the matter not being improved by either paint or varnish. The method of warming frequently consists of open

* A paper by Mr. T. W. Aldwinckle, F.R.I.B.A., read at the annual meeting of the Incorporated Association of Municipal and County Engineers, held at Kensington, as elsewhere mentioned.

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stove in the centre of the hall or room, with an iron flue-pipe going through the roof.

Where there is more than one building, as in the case of an isolation hospital, the pavilions are generally connected by covered ways of mostly timber construction, and if there is a central system of hot-water supply and heating, the steam and hot-water pipes are laid in a subway, the floor over same being of wood. Thus we see that by the very nature of the construction of these buildings the fire is already laid, and only requires to be lighted. That when a fire *does* break out in these buildings the destruction is swift and complete we know already from the lamentable fire at the Colney Hatch Lunatic Asylum. By the courtesy of the London County Council authorities, the author was enabled to make a careful inspection of the ruins of these buildings, and as he had been responsible as architect for the erection of some nine or ten acres of temporary buildings during the past few years, he felt, as he looked upon the absolute and complete destruction of what had once been well-erected buildings, that some lessons must be learned from such a catastrophe.

As we now know what is the usual construction of these buildings, let us now consider what steps can be taken to minimise the risk of fire in the future, both as regards new buildings to be afterwards erected and as regards those now standing; and we will first of all deal with new buildings. Now it must be borne in mind that two very important considerations are involved, viz., speed and cost. To take the case of an isolation hospital, that may be required to meet an immediate outbreak of infectious disease. The whole value and usefulness of this hospital would be lost unless it could be erected in a few weeks, and a high rate of cost would be prohibitive.

The author would regard as a mistake any attempt to make these buildings fireproof in the sense that we should make an ordinary building fireproof. But a little consideration will show that it is quite possible, without a prohibitive rate of expenditure, to reduce very considerably the risk of fire, and that without delaying the erection to any serious extent. The necessary steps to be taken will undoubtedly add somewhat to the expense of building, but not so seriously as might be surmised; but this must not in the future stand in the way of the provision of reasonable safety for those who occupy these buildings. What should be aimed at are such arrangements and the use of such materials as will not admit of flame spreading from the point of contact with fire to a point out of contact with fire in the same building, and to prevent the spread of fire from one building to another.

It is not proposed materially to alter the general construction of these buildings. Considerations of speed will, as a rule, keep us to timber framing or light iron construction. (If timber framing is used this might be "treated" so as to become non-flammable. As this operation, however, costs about 2s. 6d. per foot cube, it would about double the cost of the timber.) But it will be possible to get rid of one source of danger, viz., the hollow external walls. These hollow spaces form flues and shafts for the passage of flame. There would be no difficulty whatever in filling in this space with brickwork either 3 in. or 4½ in. thick, making a solid or brick-nogged wall, which will also act as a non-conductor of heat, and thus obviate the necessity of using felt as an external covering, this being an inflammable material. In place of brickwork this space could be filled in with concrete slabs; but whatever material (of fireproof character) is used, the great point is to obtain a solid wall.

Another important point is to insist upon there being no open space between the floor and the ground beneath, as this also forms an excellent channel for the spread of fire, in which case the wooden flooring is attacked on both sides. This space should be filled up with hard core finished with a layer of coke-breeze concrete which need not exceed 4 in. in thickness, and the floor-boards should then be nailed down direct upon the concrete. The whole would then form a solid mass upon which a fire could never obtain a firm hold.

As regards roofs, we must not forget that even in ordinary buildings they are a weak spot as regards fire, and that we cannot therefore hope to do very much in a temporary building. If, as we shall presently see, the ceiling can be formed of a non-flammable material, the danger of attack from fire will be principally from the outside, unless a fire breaks out in the interior of the roof. The roof would be covered with corrugated iron, and it would be a step in the direction of safety if the boarding under the corrugated iron were "treated" so as to become non-flammable. As will be seen later on, this could be done at a moderate cost. The most important item, however, will be the internal linings of the building—that is, to the walls and ceilings. As we have already seen, this generally consists of match-boarding. There can be no doubt that these linings are the most inflammable portion of the building, and that their danger in conveying flame cannot well be exaggerated. One of the most instructive pieces of evidence given by several of the nurses at the Colney Hatch inquest was that in which they described, with almost painful realism, the deadly progress of the flames along the match-boarding of the ward in which the outbreak of fire occurred. At one stage this fire was a small one, only to develop into a great catastrophe through the means of rapid transit existing at its disposal. It is, indeed, in this respect that a radical change must be made. Whatever else may be done or left undone, a remedy for this must be found in a practical and efficient manner. There are, fortunately, ample means of dealing with this. It will be found that it will be quite possible to provide internal linings to these buildings which shall retard rather than assist the spread of flames.

In the first place, ordinary plastering is not a conductor of flame—in other words, it is non-flammable—and this would be suitable for the walls and ceilings in those cases where speed in building is not of such great importance; but otherwise ordinary plastering not only takes more time than can be spared, but it seriously interferes with the work of other trades.

There is, however, another material which fairly meets our requirements as to speed, and is certainly a non-flammable material, and that is fibrous plastering. For the purposes of a temporary building these fibrous plaster slabs can be put up by hand, and neatly jointed and then distempered, the slabs being specially prepared for such a purpose at a very slightly increased cost. These slabs can also be made more fire-resisting by the substitution of wire netting for canvas backing at a little extra cost. This material would appear to be fairly suitable for the purposes of a temporary building, as it admits of rapid fixing and is not costly. In the case of infectious hospitals it admits of all internal angles to the wards being rounded, which is very essential for good sanitation. In this connexion it should be mentioned that in issuing their licences for the temporary smallpox buildings erected last year under the direction of the author for the Metropolitan Asylums Board, the London County Council made a requirement that no match-boarding should be used internally, but only fibrous plastering or teak boarding.

Another excellent material for use as internal linings is "Uralite." This is a distinctly non-flammable material, and can be easily and speedily fixed. It requires, however, a good deal of backing in the shape of fir quartering or similar material, which adds to the cost. It does not lend itself to hospital work quite as well as fibrous plastering, but for all other purposes it is a material which has a great future before it, not by any means limited to temporary buildings. Yet another method of lining the walls and ceilings is to revert back to the match-boarding, but to have it previously "treated" so as to become non-flammable. Boarding so treated has been tested by the Fire Prevention Committee with excellent results. The cost of so treating the boarding does not exceed 16s. per square, or about 2d. per ft. super. This would appear to be a very simple and speedy method of wall and ceiling lining, and the only question is whether large quantities could be obtained in times of emergency.

The author does not suggest that these are the only materials suitable for this purpose, but has mentioned them as being representative materials for non-flammable linings. It may appear inconsistent to adopt these measures in relation to the walls and ceilings, and to ignore the doors, windows, and other joiners' work. But there is no need to be inconsistent. The whole of the joiner's work can be "treated" so as to become non-flammable. The wood is dealt with before it is glued up into doors, &c. Some idea of the cost can be formed from two instances. A 1½-in. door costs about 3½d. per ft. super, and a 2-in. door about 4½d. per ft. for "treatment." This is not a large percentage in order to obtain security. As regards the finishings to all woodwork, it is most desirable that all paint used should be of a non-flammable character, and that varnishes should be avoided. There are several good paints of this character, and they do not appear to be more expensive than other paints. It is most essential that passages and all means of inter-communication should be laid with some kind of fire-resisting material, and in no cases with deal flooring. Cement paving laid upon well-rammed hard core, not concrete, is a good and cheap material which can be easily and quickly laid. In the case of isolation hospital, the ward kitchens and linen stores should be similarly paved. There is risk from fire in both these rooms.

Temporary hospitals generally consist of more than one building, and these are frequently connected by covered ways. These should be avoided in all cases. They are of no earthly use as regards administration, and they may become the means of transmitting fire from one block to another; and the larger the number of separate buildings the greater the danger of covered ways, as tending towards a larger conflagration. It should be pointed out that under no circumstances should these covered ways, if adopted, be closed in at the sides. This is not necessary for ordinary hospital work. In the case of the Colney Hatch fire the nature of the institution and the class of inmates (insane patients) necessitated a connecting corridor closed in at both sides. Now the temporary pavilions at this asylum were 75 ft. apart, and were substantially built, and under ordinary circumstances it would have been a difficult matter for the fire to have spread from one building to another, but this closed corridor unfortunately acted as a powerful air-shaft through which the flames, starting from the first pavilion, travelled to all the other pavilions with lightning rapidity and with such complete effect that the remotest buildings were quite as completely consumed as that in which the outbreak occurred. As example is better than precept, it may be noted that at the Gore Farm Town Temporary Hospital, near Dartford, erected by the author last year for 1,000 patients for the Metropolitan Asylums Board, there are eighty-two separate buildings, but no covered ways of any kind.

In all cases where there is a central system for warming and hot water supplies the pipes of the system distributing to the several buildings should be laid in brick ducts, covered with fireproof material. On the same principle all heated chambers in the basement should be protected with a fireproof floor over the same. The use of the wooden joists and flooring over pipe ducts and heater chambers is exceedingly dangerous, as after a time the wood from its proximity to hot pipes has become so dry that it is highly inflammable.

Generally speaking, it is most desirable that temporary buildings should be erected in as substantial manner as the time will admit, and it will be found the truest economy to follow this principle in the majority of instances. That it is quite possible to erect buildings in a very short time and in which fairly non-flammable conditions may exist, the author would refer as illustrations to the Mead ambulance station at Fulham, the smallpox wards and receiving station at South Wharf, Rotherhithe, and the new buildings at the Gore Farm Upper Hospital, Dartford, erected under his direction for the Metropolitan Asylums Board, in connexion with the smallpox outbreak of last year, at a cost of 100,000*l*. These were all built in twelve weeks. There is the ordinary timber framing to the walls and roof, covered with corrugated iron, but the internal linings to all walls and ceilings are of fibrous plastering or teak; all subways, pipe ducts, and basements are of fireproof construction; all corridors have fireproof floors, and all staircases are of teak. If this work had to be done at the present time it is probable that, in the light of recent events, the external walls would be made solid in the manner already described, but no other alterations would be necessary.

So far as regards existing temporary buildings, the matter is somewhat important, as they are so numerous. Some of these are of so flimsy a character that common prudence would suggest their immediate demolition, but there are many of these buildings which could be rendered less inflammable without

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incurring a large expenditure; so that one of two things should be insisted upon: either the buildings should be rendered safe, or they should cease to exist.

The first and most obvious remedy is to remove the whole of the internal wood linings; then, if funds admit, the external walls could be made solid in the manner already described. In any case, all the new internal linings should be of one of the non-flammable materials already mentioned. If this be done, the risk of fire will have been very considerably reduced, as the danger of fire to these buildings is from within rather than externally. The whole of the doors, windows, and other internal joiner's work should also be painted with a non-flammable paint, the existing paint, if any, being previously burnt off.

THE ARCHITECTURAL ASSOCIATION.

THE following is the Prize List of the Architectural Association for session 1902-1903:—

A.A. Travelling Studentship, value 25l., and Silver Medal.—A. G. MacNaughtan.

Second Prize, value 5l.—Vincent Hooper.

A.A. Medal, value 10l. 10s.—A. A. Carder.

Second Prize, value 5l. 5s.—L. G. Detmar.

Banister Fletcher Bursary, value 25 Guineas, and Medal.—J. Gillespie.

Hon. Mention.—A. A. Reeve.

A.A. Scholarship, value 4l. 4s.—T. W. Watkins.

Studio. Division I.—C. R. Pinsent (drawings of old work, book prize, and volume of A.A. Sketch-book). T. A. Jaques (study of ornament, book prize, and volume of A.A. Sketch-book). G. F. Royds (general work, book prize, and volume of A.A. Sketch-book).

Studio. Division II.—T. J. Tatham (drawings of old work, book prize and volume of A.A. Sketch-book). J. F. Schneider (study of ornament, book prize, and volume of A.A. Sketch-book). J. V. Gibberd (general work, book prize, and volume of A.A. Sketch-book).

Order of Merit. Lectures. Division I.

Greek and Roman Orders.—1. J. H. Markham (book prize). 2. A. T. Groves. 3. T. W. Watkins.

Classic Ornament.—1. B. Chaikin (book prize). 2. A. Binning. 3. J. H. Markham.

Elementary Construction.—1. B. Chaikin (book prize). 2. A. T. Groves. 3. T. W. Watkins.

English Architecture.—1. C. R. Pinsent (book prize). 2. J. H. Markham. 3. T. W. Watkins.

Mediæval and Renaissance.—1. R. C. Foster (book prize). 2. S. W. Hill. 3. T. S. Atlee.

Elementary Physics.—1. T. W. Watkins (book prize). 2. R. C. Foster. 3. H. H. Whittington.

Plane and Solid Geometry.—1. T. W. Watkins (book prize). 2. B. Chaikin. 3. G. P. Bowie.

Lectures. Division II.—Materials.—1. E. Gunn (book prize). 2. A. Potter. 3. D. Anderson.

Construction.—1. E. Gunn (book prize). 2. D. Anderson. 3. J. V. Gibberd.

Drainage and Water Supply.—1. E. Gunn (book prize. 2. H. W. Currey. 3. D. Anderson.

Ventilation, Lighting, and Heating.—1. H. W. Currey (book prize). 2. E. Gunn. 3. W. S. Dakers.

Professional Practice.—1. E. Gunn (book prize. 2. H. W. Currey. 3. R. E. Stewardson.

Land Surveying.—1. E. Gunn (book prize). 2. J. K. Hobson. 3. H. W. Currey.

SANITARY INSTITUTE CONGRESS.

THE proceedings of the twenty-first Congress of the Sanitary Institute, held at Bradford this year, began on Tuesday, with a reception of members at the Town Hall by the Mayor, Mr. Alderman Wade. Among the leading delegates and members presented were the President of the Congress (the Earl of Stamford), Sir F. Sharp Powell, M.P., the delegate of the French Minister of Instruction, Dr. Ménard of the Académie de Médecine, the Chairman of the Council of the Sanitary Institute (Mr. W. Whitaker), the Secretary (Mr. E. White Wallis); Messrs. Searles-Wood, T. W. Aldwincle, Edwin T. Hall, W. Kaye Parry, T. H. Yabbicom; Drs. Collingridge and Hill, and many of the leading delegates of municipalities, who in all number nearly 700.

Following the reception, a public luncheon was given at the Municipal Technical Institute, over which the Mayor presided; the Earl of Stamford, Sir F. S. Powell, Mr. Wm. Whitaker, and other leading members proposing toasts or replying for them.

At three o'clock the Mayor of Bradford and his principal guests adjourned to the Belle Vue Volunteer Barracks for the opening of the Health Exhibition of inventions, sanitary apparatus and appliances, formed in the Drill Hall. The exhibition having been formally opened by the Mayor, a preliminary list of awards to exhibitors was read by Mr. Searles-Wood, Chairman of the Committee of Judges. In the course of the proceedings, the Earl of Stamford urged the Corporation of Bradford to imitate the splendid example set by Pittsburgh and Boston in America and start a mighty crusade against the smoke nuisance. The carbon, which was worse than wasted ought to be turned to much better use than the disfigurement of the landscape and the spoiling of the air.

In the evening, Lord Stamford delivered his inaugural address at the Municipal Technical School to a large gathering of members. The President recognised the efforts of the Sanitary Institute to keep pace with the enormous strides made by hygiene since the formation of the Institute in 1876, and the fact that under its auspices last year meetings were held to the number of over 500, with a total attendance of more than 50,000 persons. Immense as had been the advancement of scientific knowledge during the past half century, we were still only standing on the threshold of the great health questions. Daily we were recognising more and more clearly that the foes of health could only be combated by the organised application of scientific and economic principles, by the co-ordination of public and private enterprise, and especially by the more complete education of the working classes themselves as to the importance of living in healthy homes. For a full understanding of the housing question, the perusal of Alderman Thompson's recently published handbook on "Housing" was strongly urged. In great cities like London, Glasgow, Liverpool, and Manchester, serious steps had been taken to cope with this question, and not the least important of the schemes was one that Bradford was working out, which would cost no less a sum than 83,000*l.* to complete. Among the important problems that were forced upon them was the rural housing question, but he would do no more than refer to the suggested remedies of collective ownership by municipalities and co-operative societies, and of State aid by way of cheap loans. There was a tendency for building enterprise to pass from private hands to municipalities or the State in consequence of increasing stringency in building rules and sanitary laws. The Rural Housing Association and kindred bodies were seeking to stimulate public interest in England in the improvement of labourers' dwellings, as to which the law here was far behind that of Ireland, where already under the new Labourers' (Ireland) Acts something had been done by the erection of 15,000 cottages. The importance of teaching hygiene in schools, of securing hygienic conditions in factories and workshops, improved methods of treatment for sewage and trade effluents, and the recommendations of the Sewage Commission in its recently-issued Report were among the other matters touched upon by Lord Stamford, who, in concluding his address said, "My connexion for the last two years with the Metropolitan Asylums Board has proved to me that a desirable combination can be made to work most smoothly and efficiently. Again I would impress upon you, the advocates of sanitary progress, that the first duty which lies before you is to advance the general intelligence of the nation to a just appreciation of the supreme value of its chief asset—public health."

The Conferences.

Among the eight conferences before which the discussions of Wednesday took place, the most important was that of "Engineers and Surveyors to County and other Sanitary Authorities," presided over by Colonel Yabbicom, M.I.C.E., ex-President of the Association of Municipal and County Engineers. After acknowledging the great help that had always been extended by the Sanitary Institute to the borough engineer and surveyor, the President of the Conference said there was an intimate partnership between their Association and the Sanitary Institute, but it was well for the partners to recognise from the outset that each had his own separate sphere without interfering with the other. The surveyor had to carry out works for his Council and to superintend other works constructed by private individuals under the by-laws approved by the Council; he was responsible for the efficiency of their construction and for their maintenance in future years. As it was his duty to examine and report on the plans submitted for new buildings and for alterations of the structure or drainage of old ones, so it was his duty to see these plans properly carried out. The Local Government Board had been memorialised by certain sanitary inspectors to make it the duty of inspectors to superintend the construction of house drains. This seemed to indicate a desire on the part of certain ill-advised persons to usurp the functions of others, and each member of the Association of Municipal and County Engineers, he thought, should take every opportunity of crushing in the bud any attempt to interfere with his obvious duties, as he, and he alone, was responsible.

The only other question referred to in the President's address was the problem of providing suitable dwellings at reasonable rentals for those now lodged in unhealthy tenements with sordid surroundings. It might be assumed that the clearing away of unhealthy slums was a public benefit, and that therefore the cost of providing dwellings for those who had been unhoused was a legitimate charge on the public funds. An improved state of health must result in an improved condition of the mind, a sense of greater satisfaction with things in general, and better ability to perform work. The misfortune was that, for reasons only too well known to all sanitarians, only a small proportion of the unhoused found habitations in the new dwellings, which soon became occupied by a better class of persons than those for whom they were intended.

Papers were laid before the Conference on "Bradford City Tramways and Electric Traction;" the first by Mr. T. H. Cox, M.Inst.C.E., City Surveyor of Bradford, and the second by Mr. C. J. Spencer, A.M.I.E.E. The earliest tramways in Bradford, started in 1882, were mainly worked by steam haulage, horse traction being only found practicable on one comparatively level section. In 1898, after careful comparison of the results attained with various systems of electric traction, Bradford adopted the overhead-trolley system. At the present time the Bradford Tramways extended to over forty-three miles of line, mostly in double track or a length of nearly seventy-five miles of single track. The overhead equipment is of the usual kind, but centre poles are not considered advisable in streets less than 45 ft. wide. In Bradford the tramway tracks are paved with 3-in. by 6-in. granite setts, except in a few streets near the centre of the city, where Australian hardwood blocks have been used. With regard to speed, which was formerly limited to nine miles an hour as a maximum, this has been raised to twelve miles an hour by the Board of Trade, after inspection, on an application by the Bradford Corporation. On narrow roads the speed is still limited to nine miles per hour. In conclusion, the City Surveyor said that electric tramways had now become serious competitors with railways for urban and inter-urban traffic, and railway companies would have to depend more on their long-distance traffic for their revenue in future. The railway companies in the West Riding of Yorkshire, as in other populous districts, had been seriously affected by the great increase in electric tramway traffic during the last few years, and to all appearances it was likely to increase still more rapidly than ever.

Mr. Spencer's paper dealt chiefly with cost of working, maintenance, and the traffic arrangements. The average distance run for 1d. is two miles, but before 8 a.m. a universal 1d. fare for any distance has been adopted.

The third paper before the Conference described the "Gamewell Fire-alarm" system adopted in Bradford, which had given satisfactory results. It has now been at work for twelve months, and is found to be considerably quicker in operation than sending an alarm by public telephone.

A paper on "Cement Joints for Drains, and Drain-testing" was read by Mr. J. G. D.

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Armstrong, and "A Defence of the Disconnecting Trap" by Mr. William Ransom.

In the discussion which followed the reading of Mr. Spencer's paper, Mr. Alderman Adcock (Dover) asked whether anyone present could give him any information as to the wear of tramway rails. A great many corporations who had started tramway schemes appeared not to have had due regard to the short life of rails, and had not set aside sufficient sums to provide for the renewal of them at the end of from ten to fifteen years. His own corporation had laid down tramlines five years ago, and up to the present had not set aside a single penny to renew the rails. They were satisfied with keeping the cars and rails up to date. He had pointed out that in ten years' time they would have to find the money to pay for new rails, and the question had been referred to the town clerk and the surveyor. It was estimated that in ten years' time they would have to spend 4,000*l.* per mile on the tramway. At present they were setting aside 10 per cent. in relief of the rates, and they were thus spending the money that should have been used to provide for the inevitable depreciation.

Mr. James Lemon (Engineer of Southampton) referred to the paragraph in Mr. Cox's paper in which the difficulty was mentioned of the rising of the wood blocks through water getting into the open end spaces, and the tendency to lift observed in the blocks adjacent to the rails. He advocated leaving a greater space upon the end blocks. He would prefer to set the wood blocks close in the middle portions, with greater space left at the open ends. He endorsed the remarks of the previous speaker that in many instances not enough was set aside for depreciation.

After some remarks from Mr. Arthur Smith (Dartmouth) the President of the Conference wound up the discussion. He referred to the paragraph of the paper stating the terms on which the Bradford Corporation had acquired the lease of the Shipley tramway. He had come to the conclusion that Shipley had made a good bargain. The City Corporation had paid 1¾d per unit to Shipley for use over the Shipley line, and the electricity over the other portion only cost 1d. per unit. Thus Shipley appeared to be making a good profit.

Mr. W. H. S. Dawson (hon. secretary), in the absence of the author of the paper, said, in reply to Alderman Adcock, that it was most important that an adequate sum should be set aside for depreciation. The Bradford tramways were in 1882 steam trams, and were leased by the Corporation to a company for twenty-one years at the rate of 290*l.* per mile per annum, which represented 6¾ per cent. upon the capital expenditure, but the line was completely worn out in fourteen years, and they had to put in new rails for the benefit of the Company. Mr. Cox had put the life of the tramway lines for straight road with heavy traffic at eight years. With regard to the Shipley lease, it was the fact that Urban Councils always seemed to get the better of the city. The cost of electricity over the Corporation lines was on the average 1⅛d. per unit, the difference between that and 1⅞d. being the profit obtained by Shipley. The conference shortly afterwards adjourned.

[Our report will be continued next week.]

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Battersea Borough Council 3,010*l.* for electric-light installation, and St. Olave's Union Guardians 39,000*l.* for cottage homes.

Electrification of Tramways.—Two Reports of the Highways Committee, dealing with the London tramways, were discussed at great length. One was the joint Report by the Chief Engineer and the Tramways Manager showing the relative cost of the two systems of electrical traction, conduit and overhead, and the difference in the cost of maintenance, as regarded each system. It was shown that the cost of the conduit system was about 33·13 per cent. more than the overhead system. The second Report dealt with the system of electrical traction to be adopted for various portions of the tramways north of the Thames, and it was recommended that twenty-six miles in the more central parts should be installed on the conduit system, while about twenty-eight miles should be installed on the overhead system.

Mr. Sidney Low said the officers who had reported had pointed out eleven or twelve grave disadvantages which were against the adoption of the conduit system. There was, first, the enormous disturbance of the streets in the construction, and there were certain portions of London where the system could hardly be constructed at all. Then they had constantly exceeded the estimate, and further disadvantages were the liability of flooding in great storms or of congestion in the case of a snowstorm and the difficulty of cleaning. Finally, came the great question of cost. There were about 100 miles of tramway in existence in London, and the difference in cost by adopting the conduit system was no less than 1,300,000*l.* Mr. Benn, however, thought there should be 1,000 miles of tramway in London, and if they were constructed on the conduit system as against the overhead system, it would cost the ratepayers something like 7,000,000*l.* more if they accepted the lowest estimate. Before an elaborate conduit system could be adopted ten or twenty years must elapse, and they had no guarantee that the system would not then be as obsolete as horse-traction. He would not be surprised if in five years they would require neither the conduit nor overhead system, in consequence of the tramway carrying its own accumulator. Therefore, they ought to sink as little capital in rails and wires as possible, for if in a few years they had to scrap the tramway system, it was better to scrap 7,000*l.* a mile than 14,000*l.*

Mr. Strauss pointed out that they must go on with the conduit system, as the Borough Councils would not allow their streets to be disfigured with the wires and posts.

Mr. A. Baker said that in Chicago they were laying down the conduit system to sweep away the overhead system. With regard to the disturbance, when once the construction was done with the disturbance was over, which was not the case with the overhead system. As to flooding, the recent experience had shown that the conduits were not affected. Then with the overhead system danger was ever present, for the breaking of a live wire meant the death of any one coming into contact with it. There was also great danger from electrolysis to the gas, electric-lighting, and other mains from the leakage of the returning current on the overhead system, which might involve London in enormous expense. On the question of cost, it had to be remembered that the first cost was always the greatest, and the system was being adopted for the central streets. When they got further out the cost would not be so great. He contended that the Council had made no mistake in adopting the conduit system.

Mr. Torrance remarked that the people in his constituency looked with dismay on the idea of the overhead system being adopted in North London. He felt that the streets of Glasgow had been utterly disfigured by the overhead tramway system.

The first Report was then agreed to.

After further discussion all the recommendations relating to the electrification of twenty-six miles of tramway on the conduit system in the North of London were agreed to. The recommendations with regard to the reconstruction of twenty-eight miles of tramway on the overhead system were adjourned for a week.

The Works Department.—The half-yearly return of the Works Committee, covering the cost of works completed by the Works Department during the half-year ended March 31 last, was then considered. The Report disclosed several large losses, but these are mainly in connexion with the erection of Horton Asylum, Epsom, and the matter has already been discussed in the Council. The return deals with twenty estimated works, the final estimate for which was 591,790*l.*, while the actual cost has turned out to be 638,534*l.*, or a balance of cost above final estimate of 46,744*l.* On only four of the works is any excess of cost over estimate shown, but in these cases the excess is 56,535*l.* The cost of the building of the superstructure of the Horton Asylum has exceeded the estimate by 37,878*l.*, the final estimate being 291,165*l.* and the actual cost 329,043*l.* The erection of a central electric-lighting station for the same asylum has resulted in an excess of cost over estimate of 1,977*l.* on a job estimated to cost about 14,000*l.* The provision of an "epileptic colony" on the Horton estate, as an adjunct to the asylum, has resulted in a balance of cost above estimate of 5,018*l.* The other loss, which amounts to 11,617*l.*, is on the construction of the Hackney Wick relief-sewer. This work was estimated at 125,329*l.* and has actually cost 136,946*l.* With regard to this work, the Committee do not think that the ultimate cost is excessive, having regard to the difficulty of estimating accurately. A great deal of difficult work was encountered, and much pumping was necessary. The remaining sixteen works embraced in the return all show a balance of cost below estimate, the aggregate saving amounting to 9,791*l.* The jobbing works executed by the Committee during the half-year have resulted in a balance of cost below schedule value of 1,334*l.* In concluding their Report the Committee state that the number of works referred to them for execution and not included in the present return is forty-one, representing an estimated expenditure of, approximately, 739,000*l.*, but they do not anticipate an excess of cost over accepted estimate in respect of any works where the accepted estimate is over 1,000*l.*

Mr. E. White said they all deplored the serious losses which had occurred, and he was not sanguine that there would be much improvement in the future. To account for the losses the Committee put forward various excuses, such as labour troubles, &c., but had the Council given its work to contractors, the contractors would have borne all the loss. The Council had not yet heard from the Committee how many bricks per man per day were laid by the Council's bricklayers, and if it were true that only some 300 or 400 were laid, that would account for a good deal of the loss. He knew works on which 2,000 bricks per man were being laid per day under proper conditions of labour. There had been a loss up to date of 108,000*l.* They would be told that there had been a profit on the jobbing work, but that was because 16¼ per cent. had been added to the schedule. That was how a profit of 10 per cent. was made on the jobbing work.

Mr. Fletcher referred to the number of bricks laid per day, and said he knew contractors whose men easily lay 800 bricks per day per man.

Mr. Torrance, Chairman of the Works Committee, said that the Department, under the present Committee, had made a profit of 10,000*l.*—the losses had nothing to do with the present management: the present Committee had not as much to do with the losses as, say, Mr. White had. Even where the losses had been sustained satisfactory explanations could be given, and if the cost was high in some cases, the work was very good. The Council, in their desire to have a department to check the contractors, desired to pay the best rate of wages to its men and get the best work and the best results, and they were determined to insist on that. As far as he knew, not a single loss had been made by the present Committee. There were good contractors and bad contractors, but in the main the London contractors did their work as well and as fairly as the Department did, but the Council wanted to have a department they could control.

The excess votes were then agreed to.

Housing.—The Housing Committee reported as follows:—

"Redman-buildings are the dwellings to be erected on the Bourne estate, fronting Portpool-lane, the foundations of which have been constructed by the Works Department. For convenience in building we have divided these dwellings into four sections, and we now submit working drawings for the first and second sections, specification for the whole work, and bills of quantities for the second section, together with an estimate of 31,582*l.* in respect of the whole work, including provision for architect's expenses, cost of supervision, quantity surveyor's charges, articles to be bought direct and incidentals. We may add that the architect's estimate for the building only of the second section, based on the bills of quantities, amounts to 10,000*l.* We have been in negotiation with Mr. H. L. Holloway, who built Shene, Skipwith, and Ledam buildings on this estate, with a view to ascertaining whether he would be prepared to build Redman-buildings at the schedule of prices contained in his contract for those buildings. As a result, Mr. Holloway, in consideration of being entrusted with the additional work of building Redman-buildings, has agreed with the architect to accept this schedule of prices, with a reduction of 266*l.* on the estimate on that basis for the whole of the buildings. We are of opinion that the practical continuance of Mr. Holloway's contract for the work now in question will result in a saving to the Council in point of time, and that the terms offered by him are such as the Council may accept with advantage. Owing to the savings effected on the architect's estimate on the contract for Shene, Ledam, and Skipwith buildings,

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and to the savings so far effected by the Works Department, amounting, we understand, to over 5,000*l.*, we have every reason to anticipate that the development of the whole estate will be eventually completed in compliance with the standing orders."

The Committee recommended accordingly, and the recommendation was approved.

They also reported as follows :—

"From the returns of works in hand, particulars of which were submitted to the Council on May 12, 1903, it will be observed that there were in hand at that time building works alone to the value of 352,670*l.* Since that date works to the value of 117,933*l.* have been commenced, and the drawings for works to the value of 118,880*l.* have been completed, making the total value of works in hand and about to be put in hand no less a sum than 589,483*l.* We desire to draw the attention of the Council to the magnitude of this amount, and to the hard work and devotion to duty which it represents on the part of the officials concerned, particularly those of the housing section of the architect's department, since the greater part of the work has been prepared ready to put in hand during the past twelve months."

Improvements: Denmark Hill and Lordship-lane Widening; and Narrow-street Widening.—The following recommendations of the Improvements Committee were agreed to :—

"That the estimate of 119,900*l.*, submitted by the Finance Committee, be approved, and that the Improvements Committee be authorised to incur expenditure on capital account up to 119,900*l.* in respect of the widening of Denmark Hill, Champion Park, Grove-lane, Dog-kennel Hill, Grove-vale, and Lordship-lane, authorised by the London County Council (Tramways and Improvements) Act, 1902, in connexion with the construction of a tramway from Camberwell-green to Lordship-lane."

"That the estimate of 2,000*l.*, submitted by the Finance Committee, be approved; that the Council's statutory consent be given to the widening of Narrow-street, at Nos. 31, 32, 33, and 35, proposed to be undertaken by the Stepney Borough Council in accordance with the plan submitted by the Borough Council with its letter dated December 16, 1902; and that a contribution be made by the Council on the usual conditions of one-third of the net cost of the improvement, provided, however, that if the net cost of the improvement exceeds 6,000*l.*, the Council's contribution shall be limited to 2,000*l.*"

Vauxhall Bridge — Superstructure. — The Bridges Committee reported as follows :—

"The Council on November 25, 1902, approved an estimate of 170,000*l.* for the superstructure of the new Vauxhall Bridge, and on May 19 last also approved a supplemental estimate of 22,690*l.* which was necessitated in consequence of the alteration of the design of the bridge. The plans and specification upon the lines of the new design have now been prepared. In connexion with this we desire to state that we have had under further consideration our recommendation that a clause should be inserted in the specification requiring that the steel and iron used in the construction of the bridge should be of British manufacture only, which matter was referred back to us by the Council on June 23, and having regard to the opinion expressed by the Council, have decided to omit any such clause. We have, however, given instructions for steps to be taken which will, we hope, ensure that fair wages and hours of labour will be granted to employees if the contract or any part thereof is let to a Continental firm. The contract for the piers and abutments of the bridge is approaching completion, and no time should therefore now be lost in entering into a contract for the superstructure. We suggest, therefore, that advertisements should be issued inviting tenders for the work to be sent in by the first meeting of the Council in October. We recommend—'That the specification, plans, &c., for the construction of the superstructure of the new Vauxhall Bridge be approved, and that advertisements be issued inviting tenders for the work.'"

The recommendation was agreed to.

Wooden Structures.—On the reception of the Report by the Building Act Committee, Sir William Collins asked who was responsible for the erection of some temporary wooden structures in St. Giles.

Captain Hemphill replied that the Borough Council was responsible; the London County Council would never have agreed to their erection.

The Council adjourned soon after 7 o'clock.

PRESENTATION TO AN ASSISTANT SURVEYOR.—Mr. Herbert Beeney, architect and surveyor, has been presented with a level, tripod, and staff, on the occasion of his resigning the post of Assistant Surveyor to the Barking Town Urban District Council, in order to commence private practice. Mr. Beeney received his professional education in the office of the Borough Engineer of Guildford.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses :—

Erection of Office Building, Parnell-road, Bow.

Bow and Bromley.—That the seal of the Council be affixed to a duplicate of the deed of covenant entered into by Messrs. Mallinson & Co., with reference to the erection of an office building at Parnell-road, Bow, with the boundary fence at less than the prescribed distance from the centre of the roadway of Parnell-road.—Agreed.

Lines of Frontage and Projections.

Marylebone, West.†—A porch to No. 26, Manchester-square, St. Marylebone, to abut upon Hinde-street (Messrs. Harrod's, Ltd., for Lady Lyster Kaye).—Consent.

Lewisham.†—A two-story house on the north side of Gabriel-street, Honor Oak Park, Lewisham, to abut upon the east side of Ballina-street (Mr. J. P. Choat for Mr. A. J. Geeves).—Consent.

Hampstead.†—Buildings with bay windows on a piece of land on the north-east side of Finchley-road and north-west side of Platt's-lane, Hampstead, so far as relates to the erection of the westernmost house in Platt's-lane (Mr. Eiloart for Mr. G. W. Hart and Dr. H. Peake).—Consent.

Strand.—An oriel window at the ground, first, and second floor levels of the Royal Ear Hospital, Nos. 42 and 43, Dean-street, Soho (Mr. A. O. Collard for the Committee of the Hospital).—Consent.

Chelsea.—A bay window at the basement, ground, first, and second floor levels, and a balcony at the first floor level, of No. 91, Sloane-street, Chelsea (Messrs. Mullett, Booker, & Co. for Mr. J. T. Smith).—Consent.

Clapham.—Three houses with bay windows on the east side of Queen's-road, Battersea, the southernmost house to abut also upon Broughton-street (Mr. J. S. Cooper for Mr. W. H. Atkinson).—Consent.

Kensington, North.—One-story shops in front of Nos. 114 and 116, Westbourne-grove, and three houses with shops on the west side of Richmond-road, Kensington (Mr. G. A. Sexton for Mr. IA. Woollard).—Consent.

Kensington, South.†—The retention of an illuminated sign at the Kensington Arms public-house, Warwick-road, Kensington (Mr. T. H. Smith for Mr. N. Foley).—Consent.

Lewisham.—Buttresses to a church on the south side of Sandhurst-road, Lewisham, eastward of Torridon-road (Mr. P. A. Robson).—Consent.

Lewisham.—A two-story porch addition in front of a block of residential flats on the north side of Sydenham Park, Lewisham, eastward of Sydenham Park-road (Mr. H. G. Leslie).—Consent.

St. George, Hanover-square.—A porch at the entrance to the Oriental Club, No. 18, Hanover-square, St. George, Hanover-square, to abut upon Tenterden-street (Messrs. T. H. & A. M. Watson for the Chairman and Committee of the Oriental Club).—Consent.

Wandsworth.—That the application of Mr. F. Perks on behalf of Mr. R. Simpson for an extension of the period within which the erection of houses with one-story shops on the site of The Hawthorns and grounds on the west side of Balham High-road, Wandsworth, at the corner of Marius-road, was required to be completed, be granted.—Agreed.

Lewisham.—A one-story addition at the flank of No. 51, Wellmeadow-road, Lewisham, to abut upon Torridon-road (Mr. J. Lawrence for Dr. W. J Brown).—Refused.

Poplar.—A two-story building on the western side of Manchester-road, Poplar (Messrs. J. & S. F. Clarkson for Messrs. Yarrow & Co.).—Refused.

Wandsworth.—A wood, brick, and tile porch to "Narford," Lyford-road, Wandsworth, to abut upon Herondale-avenue (Messrs Holloway Bros. for Mr. C. J. Byworth).—Refused.

Whitechapel.—A projecting advertisement sign at No. 46, High-street, Whitechapel (Messrs. Gardiner & Co., the Scotch House, Ltd.).—Refused.

Width of Way.

Camberwell, North.—Three houses on the eastern side of the street at the rear of Havil-street, Camberwell, leading from Ada-road to Elminton-road, Camberwell (Mr. S. W. Wells for Mr. A. Burton).—Consent.

Hampstead.†—A one-story building in the playground of Heath Mount School, Heath-street, Hampstead, with external walls at less than the prescribed distance from the centre of the roadway of the Grove (Mr. J. D. Hunter for Mr. J. S G. Grenfell).—Consent.

Marylebone, West.—Working-class buildings upon the site of No. 9, Paradise-place, St. Marylebone (Messrs. T. H. & A. M. Watson for the Portland Industrial Dwellings Co., Ltd.).—Refused.

Width of Way and Lines of Frontage.

Woolwich.—Re-erection of Nos. 79, 80, and 81, Wellington-street, Woolwich, abutting upon Upper Market-street, with external walls at less than the prescribed distance from the centre of the roadway of Upper Market-street and one-story shops abutting upon Wellington-street (Mr. H. P. Monckton for Lieut. R. L. A. Ogilby).—Consent.

Marylebone, East.†—The retention of an iron and glass shelter at the rear of Nos. 278-288, Oxford-street, St. Marylebone, to abut upon Cavendish-buildings (Mr. T. E. Collcutt for Mr. J. Lewis).—Consent.

St. Pancras, West.—An iron and glass shelter at the entrance to No. 24, Cumberland-terrace, Regent's Park, St. Pancras (Messrs. J. Shoolbred & Co. for Mrs. Etlinger).—Refused.

Space at Rear.

Newington, West.—A modification of the provisions of Section 41 with regard to open spaces about buildings so far as relates to the proposed erection of a building at No. 215, Borough High-street, Newington, with an irregular open space at the rear (Messrs Willis & Leslie for Mr. F. H. Barker).—Consent.

Paddington, South.—A modification of the provisions of Section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of an addition at the rear of Nos. 413 and 415, Harrow-road, Paddington, to abut upon Fermoy-road (Mr. W. Daniell for Messrs. E. Wheatland & Sons).—Consent.

Peckham.—A modification of the provisions of Section 41 of the Act with regard to open spaces about buildings, so far as relates to the proposed erection of two houses on the north side of Peckham Park, westward of the Peckham Park Mission Hall, with an irregular open space at the rear (Mr. E. Crosse for Mr. W. Barbut).—Consent.

St. George, Hanover-square.—A modification of the provisions of Section 41 of the Act with regard to open spaces about buildings, so far as relates to the proposed erection of a bathroom and water-closet addition at the rear of No. 6, Eaton-terrace, St. George, Hanover-square (Mrs. M. S. Lidyard).—Consent.

Lines of Frontage and Space at Rear.

Hackney, North.†—A house on a site abutting upon the south side of Cazenove-road, and west side of Geldestone-road, Hackney, with bay windows and porch, and an open space about such house (Mr. G. R. Woodruff).—Consent.

Fulham.—Two blocks of flats on the west side of Palliser-road, Fulham, southward of Margravine-road, with bay windows and porches, and with open spaces at the rear of such flats (Messrs. Leslie & Co., Ltd.).—Consent. (Consent to the erection of the balconies refused).

Line of Frontage and Construction.

Lewisham.—A wood and iron school building and four water-closets on a site on the east side of Wellmeadow-road, Lewisham, northward of Hazel-bank-road (Mr. T. J. Bailey for the School Board for London).—Consent.

Width of Way and Space at Rear.

St. George, Hanover-square.—A building upon the site of Nos. 20 and 22, Maddox-street, St. George, Hanover-square, with external walls at less than the prescribed distance from the centre of the roadway of Pollen-street, and with an open space at the rear of such building (Messrs. W. Bartleet & Son for Mr. W. E. Davis).—Consent.

Whitechapel.—Dwelling-houses upon the site of Nos. 32 to 48 (even numbers), inclusive, Pelham-street, Whitechapel (Mr. J. R. Moore-Smith for Mr. J. Donn).—Refused.

Deviation from Certified Plans.

St. George, Hanover-square.—Deviations from the plan certified by the District Surveyor, under Section 43 of the Act, so far as relates to the proposed erection of an addition at the rear of No. 68A, Piccadilly (Messrs. G. Trollope & Sons for the Grosvenor Club Syndicate, Ltd.).—Consent.

Formation of Streets, &c.

Hammersmith.—The abandonment of the formation of a street to connect Rylett-crescent with Flanchford-road, Hammersmith (Messrs. Milles & Co.).—Agreed.

Chelsea.—That an order be issued to Mr. G. Edwards, refusing to sanction the formation or laying-out of a new street for carriage traffic to lead from Fulham-road to King's-road, Chelsea (for Mr. H. J. Veitch).—Agreed.

Means of Escape at Top of High Buildings.

City.—A deviation from the plans approved on March 3 and April 6 in respect of the means of escape proposed to be provided in pursuance of Section 63 of the Act, on the fourth story of the Wesleyan Centenary Hall, Bishopsgate-street, City, so far as relates to a continuation of the means of escape across the roof of No. 18, Bishopsgate-street to the roof of the Bank of Scotland (Messrs. Gordon & Gunton for the Trustees of the Wesleyan Missionary Society).—Consent.

City.—Means of escape in case of fire proposed to be provided on the fifth story of an addition (on the site of Nos. 62-63, London-wall) to No. 20, Copthall-avenue, City, and also a modification of the plans approved in respect of the means of escape

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from the fifth stories of Nos. 20 to 26, Copthall-avenue, and No. 65, London-wall, for the persons dwelling or employed therein (Mr. R. B. Marsh for the City of London Real Property Co., Ltd.).—Consent.

Holborn.—Means of escape in case of fire proposed to be provided on the sixth story of a building upon the site of Nos. 83, 85, and 87, Southampton-row, Holborn (Mr. C. F. Doll).—Consent.

Buildings for the Supply of Electricity.

City.—A five-story office building on the site of Nos. 82, 83, and 84, Fenchurch-street, City, and over part of the basement story of the Charing Cross and Strand Electricity Supply Corporation's electricity distributing station (Mr. W. E. Clifton).—Consent.

St. Pancras, East.—A roof to the King's-road power-house (Mr. S. W. Baynes for the Council of the Borough of St. Pancras).—Consent.

*** *Recommendations marked † are contrary to the views of the Local Authorities.*

The Student's Column.

CONCRETE-STEEL.—II.

THE PROPORTIONS OF CONCRETE.

A CORRECT knowledge of the constituents of the new material is absolutely necessary to the designer of concrete-steel. Interesting as the theory of concrete is, we must resist the temptation to discuss it here, except so far as may be absolutely requisite for making clear the essential points connected with the combined material with which we are now concerned. The proportions stated in Table I. are some of those adopted in various forms of concrete-steel construction. Referring to the nature of the aggregate it may be remarked that gravel is very generally favoured, but the sand should always be separated and added afterwards in the correct proportion. When crushed stone is employed, an adequate proportion of cement and sand is added. Crushed brick is not a material to be recommended, chiefly because the strength of the resulting concrete is low. Coke breeze is unsuitable because of its porosity and insufficient strength. Cinder-concrete, as one of the best non-conductors of heat, possesses recommendations from the point of view of fire protection, but from the Report of the Hamburg Commission, issued in 1895, it appears that cinders tend to cause corrosion of embedded iron. Hence, when cinder concrete is used, the metal should be completely coated with neat cement, a plan which is adopted in the Monier system. Whatever may be the character of the aggregate used, it must be fine in order that the concrete may adhere closely to the metal, and protect it from moisture.

Table I.—Proportions of Concrete for Concrete-Steel.

Class of Work.	Cement.	Sand.	Stone.	Gravel with Sand.	Authority.
Columns.....	1	—	—	4	Mr. A. Johnston.
"	1	—	—	4½	M. Considère.
"	1	—	—	3	" "
Walls	1	—	—	6	Mr. A. Johnston.
Partitions ...	1	—	—	3	" "
Beams.....	1	—	—	4	" "
"	1	2	4	—	Mr. Moisseif.
"	1	3	5	—	" "
"	1	—	—	6	M. Considère.
" Melan ...	1	2½	5	—	Prof. I. O. Baker.
" Ransome	1	3	6	—	Mr. Wason.
Floors.....	1	—	—	4	Mr. A. Johnston.
Columbia	1	2½	5	—	Mr. Freitag.
Exp. Met.	1	—	—	3·5	Newcastle Tests (1899).
"	1	2	4·6	—	Mr. Freitag.
Hennebique	1	—	—	4	Dr. W. Ritter.
Melan	1	2	4	—	Mr. Freitag.
Upper ⅓rd	1	2	—	—	Mr. Freitag.
Ransome	1	3	6	—	Mr. Wason.
Roebling	1	2½	6	—	Mr. Freitag.
Arches	1	2½	5	—	Mr. Buck.
"	1	2	4	—	Mr. Moisseif
"	1	3	5	—	" "

In proportioning the concrete great care must be taken to fill all voids as far as possible. The use of sufficient cement to fill the voids in the sand is absolutely necessary in concrete-steel work. A mortar, consisting of 1 part of Portland cement to 3 parts of sand, is strong and durable, and may be quite suitable for many purposes, although the cement cannot be expected to fill all voids in the sand. The most accurate method of determining voids in sand is that proposed by Mr. Allen Hazen,* and consists in determining the specific gravity first of the solid particles, and second of the material as a whole, including the voids. The percentage of space occupied by the solid particles is then obtained by dividing the specific gravity of the mass by the specific gravity of the particles, and the voids are represented by the difference between the whole volume and the space occupied by the particles. If the sand is not absolutely free from water, as is generally the case, a portion must be dried after the experiment to determine the amount of water, and a correction can then be applied. It is not advisable to dry a moist material before taking its specific gravity, as the closeness of packing will probably be different for wet and dry material.

It is a very important matter that all voids in the aggregate should be filled. The proportion of voids in broken stone can be satisfactorily determined by placing the material in a receptacle of known capacity, pouring in as much water as possible, and measuring the volume used. When applied to the measurement of voids in gravel mixed with sand, this method invariably gives results that are too low. The material is rarely dry, and it is quite probable that the voids measured by displacement will be under-estimated by fully 5 per cent. owing to the presence of moisture. With fine gravel and sand a serious error often results from the fact that all the air is not displaced by the water poured into the receptacle. These facts, considered in connexion with the variable proportions of sand and pebbles in mixed ballast, clearly point to the desirability of separating the constituent parts of such material, so that definite and predetermined proportions may be ensured. It is then easy to make a mortar satisfying the essential conditions, and, having determined the voids in the aggregate, to fill them by the use of a sufficient quantity of properly-proportioned mortar.

In making concrete for use with steel, it must always be remembered that impermeability is quite as important as mere strength. For ordinary construction, so long as concrete is composed of an aggregate of sufficient hardness, voids are not objectionable within reasonable limits. But where concrete has to protect steel from corrosion by preventing the percolation of water, the greatest care must be taken to render it as solid as possible. Sir Alexander Binnie, whose experience as a water-works engineer is valuable on this point, says that, "When attempting to make solid impermeable concrete, we must of necessity have water in superabundance, until the mass is made almost gelatinous; and then we get a perfect mixture."† It must not be forgotten, however, that, while some of the water used combines with the cement in the process of setting, the remainder will evaporate in the course of time, leaving a corresponding volume of voids. Hence it appears to be impossible to make an absolutely solid and impervious concrete, although the condition may be nearly approached by the adoption of correct proportions and by careful manipulation.

The opinion has been expressed that sand should not be too sharp, in making impervious concrete. Mr. Orange,‡ in a discussion upon waterworks in China and Japan, said that "if the sand was very sharp, when cement was put with it the water ran through and carried it away. It had to be a little thick, loamy, and close, in order to make a close concrete. That was why, when the sand was sharp, he always used a certain portion of the siftings from the stone-breaker, which was almost dust, to make the mixture close." This is quite contrary to practice in concrete-steel construction both in this country and in the United States. In a recent paper on the subject, Mr. A. de H. Galbraith§ pointed out that "coarse sand, very gritty, and of the greatest cleanness must be used in preference to fine, but whatever the composition of the sand, it is absolutely necessary that it shall be entirely free from all traces of any argillaceous, or earthy matter." Again, to quote from an American source, one of the speakers, referring to a concrete-steel water tank, said that it was the practice in Europe not to use sand that was in the slightest degree dirty, and that he expected to make the tank water-tight by giving what is termed the *glassé* finish.*

The results of some experiments by Mr. C. H. Colson† are recorded in Table II. These tests were made to ascertain the impermeability of concrete to be used under a constant head of about 46 ft., and in a position where this quality was of the utmost importance. The blocks tested were 28 in. by 24 in. by 18 in., and the apparatus, which is illustrated in Fig. 1, consisted essentially of a cast-iron

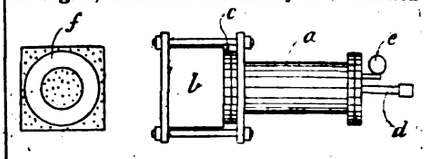

Fig. 1.

cylinder, connected at one end to the block to be tested, and at the other to a hydraulic pump. The blocks were prepared for testing by removing the top skin, and putting on a cement ring of the same diameter as the flanges of the cylinder, the surface inside the ring being kept quite clean. At a pressure of 26 lb. per square inch there was a slight appearance of dampness in some of the blocks, but in no case, even with the highest pressure, was there much percolation.

Table II.—Permeability Tests of Portland Cement Concrete Blocks under a Pressure of 30 lbs. per Square Inch.

Proportions.			Age of Block.	Duration of Test at Maximum Pressure.	Depth of Percolation from Pressure Side at End of Test.
Cement.	Sand.	Stone.			
Parts.	Parts.	Parts	Days.	Hours.	Ft. in.
2	3	7	47	2	—
2	3	7	58	2	—
1½	3	7	44	1½	0 6
1½	3	7	48	2	0 7
1½	3	7	50	2	0 8
1½	3	7	52	2	—
1	3	7	33	2	0 10
1	3	7	53	2	0 10
1½	2	7	19	2	0 4
1½	2	7	21	2	—
1½	3	6	51	2	0 6
1½	3	6	57	2	—
1	3	6	48	2	1 6
1	3	6	42	2	1 6
1	3	6	50	2	1 0
2	4	8	50	2	0 10
2	4	8	56	2	1 0
2	3½	8	29	2	0 10

Some more recent experiments as to the water-tightness of concrete were conducted last year at the Thayer School of Engineering, in the United States.‡ The concrete consisted of 1 : 2 mortar, ranging from 30 to 45 per cent. of the concrete, and the specimens tested were 5 in. thick. The following results were noted :—

Pressure per sq. in.	Number leaky.	Number not leaky.
80 lbs.	11	7
40 lbs.	5	7
20 lbs.	4	0

It was found further that the poorest results were given by one brand of cement, furnished by the makers as being specially adapted for making watertight concrete.

Referring to this aspect of concrete, Mr. J. W. Sandeman,§ of Newcastle-on-Tyne, says, "Judging from experience, the volume of mortar to insure water-tightness should not be less than 50 per cent. of aggregates having 35 per cent. of interstices; adding, therefore, one-third of the volume of the mortar to give the volume of cement and sand, these would equal 66⅔ per cent. of the volume of the aggregates which should allow for all contingencies, and insure the stones or gravel being surrounded with mortar. Finally, to make certain that the mortar shall be water-tight, the ratio of sand must be limited to about 2 parts of sand to 1 of cement."

These quotations serve to emphasise the necessity for filling all voids both in the sand and in the aggregate.

* Proc. Am. Soc. C.E., vol. xxv., p. 488.
† Proc. Inst. C.E., vol. cvii., p. 125.
‡ Proc. Inst. C.E., vol. c., p. 306.
§ Trans. Soc. Eng., 1902, p. 179.

* Proc. Eng. Soc. Western Pa., vol. xix, p. 145.
† Proc. Inst. C.E., vol. cvii., p. 173.
‡ Proc. Eng. Soc. Western Pa., vol. xix., p. 137.
§ Proc. Inst. C.E., vol. cxxi., pp. 219-220.

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In cases where hydraulic pressure exists, as in water-tanks and conduits, the proportions should not be less than 1 part of cement to 4 parts of ballast; or 1 part of cement, 1½ parts of sand, and 2½ parts of crushed stone. In building construction, where percolation is not aided by hydraulic pressure, the concrete may be of poorer quality, but for outside work it would be wise to adopt the proportions of 1 to 4. The infiltration of water may be arrested by a rendering of 1 to 1 cement mortar and a facing of neat cement, while the steel may be further protected by being embedded in similar mortar. With such precautions it may be allowable to adopt weaker concrete than would otherwise be necessary, especially for inside work. However, as absolute confidence in the preservation of the steel is an essential feature in concrete-steel construction, it will always be judicious to spend a little more money in cement than to run the slightest risk of corrosion. The most approved practice in dock and harbour works is to avoid reliance upon a mere facing, and to endeavour to make the entire mass impermeable. This example is certainly worthy of imitation in building construction.

BOOKS RECEIVED.

PRACTICAL SCIENCE FOR PLUMBERS, ENGINEERS, &c. By J. Wright Clarke. (B. T. Batsford. 5s.)

REGULATIONS FOR SECONDARY SCHOOLS. (Eyre & Spottiswoode. 2d.).

GENERAL BUILDING NEWS.

WHITEFIELD TABERNACLE.—The Special Missions Committee of the London Congregational Union have decided to complete this building in the Tottenham Court-road, at an estimated cost of about 10,000*l.*, and in a limited competition the drawings of Messrs. Barnes-Williams, Ford, & Griffin, of London, have been placed first, and the architects have been instructed to prepare the working drawings.

THE PARISH CHURCH, OVERSTONE.—The Parish Church of Overstone, near Northampton, has just been reopened, after having been closed about twelve months for the purpose of additions and restoration. The church, which is dedicated to St. Nicholas, was built in the year 1803 without any regard to architectural treatment either externally or internally, and consisted of a tower, nave (with gallery at the west end), a small chancel, and vestry. The present alterations and additions, carried out in Weldon stone, consist of a south aisle, organ chamber, vestry, and porch. The tower (which was much dilapidated) has been re-roofed and new battlements and windows provided; the bells have been rehung and an additional bell added; the lower portion of the tower now forms a baptistry. A new chancel arch has been substituted for the old plaster arch, the new arch being brought a distance of 3 ft. into the nave in order to enlarge the chancel and to give the required accommodation for the choir. A new ceiling to the chancel, divided into panels with moulded oak ribs and carved bosses, has been substituted for the original plaster ceiling and cornice. The reredos, altar rail, prayer desk, and choir stalls are of wainscot oak; selected pitchpine has been used for the seating of nave and aisle. An oak pulpit on a Portland stone base has been erected by the clergy and personal friends as a memorial to the late Canon Birch, who for a period of forty-three years was rector of Overstone. The lectern was presented by Mr. and Mrs. Gartside in memory of the late rector, the font, of Devonshire marble and polished Hopton Wood stone, was also presented as a memorial to the late rector by the parishioners, past and present, of Overstone. A new organ has been placed in the organ-chamber by the tenants of the Overstone Estates as a memorial to the late Lord Wantage. The glazing throughout, with the exception of a portion of the east window of chancel, is entirely new, and has been carried out by Messrs. J. Powell & Sons, London. The chancel, baptistry, aisle, and porch are paved with terrazzo marble mosaic, wood block paving being used in the organ chamber, vestry, &c. The heating apparatus was supplied by Mr. J. Grundy, of Tyldesley, Manchester. Messrs. J. Fullen & Sons, masons, Northampton, supplied the stonework. The carving was done by Mr. Reynolds, of Northampton. The works generally have been carried out by the estate workmen from the plans and under the superintendence of Mr. J. Maunder, architect, Overstone Park.

CHAPEL, MAESTEG.—A new Wesleyan Chapel has just been opened at Maesteg. The building is built with local stone, faced with blue Pennant stone and Bath stone dressings. Accommodation is provided for 300 persons, with provision in future galleries for a further 150. A schoolroom is attached for 100, with two classrooms, minister's study, &c. The design is by Mr. W. Beddoe Rees, architect, Cardiff, and the builder is Mr. Stephen Lewis, Maesteg. The total cost is 1,500*l.*

UNITED METHODIST FREE CHURCH, JARROW.—The United Methodist Free Church, Grainger-road, Jarrow, has just been reopened after renovation and redecoration. The alterations and additions consist of the removal of a portion of the front wall of the church and the building of a projecting vestibule and cloakroom. The entrances have been remodelled and the interior redecorated. Externally the new work is executed in red brick work, with stone freely introduced. The work has been carried out under the superintendence of Mr. G. R. Smith, architect, of South Shields.

BAPTIST CHAPEL, DERBY.—The new Baptist chapel situated on the Pear Tree-road, opposite St. Thomas's Church, Derby, was opened recently. Mr. Councillor J. Young, of Derby, was the builder, and Mr. A. H. Goodall, of Nottingham, the architect. In all, some 650 worshippers can be accommodated. The total outlay has been nearly 4,500*l.*

ST. STEPHEN'S CHURCH, SOUNDWELL, GLOUCESTERHIRE.—A new church is being erected at Soundwell from plans prepared by Mr. H. M. Bennett, of Bristol. The building will be a Gothic structure, consisting of nave, north aisle, south aisle, baptistry, chancel, organ-chamber, clergy vestry, and choir vestry, with an auxiliary apartment over the choir vestry, and lavatory and heating-chamber at the north end of the church. The entrances will be through porches at the west and north-west, and there will be aisle entrances on the north and south sides. The chancel will be divided from the nave by a dwarf wall, surmounted by iron railings. The chancel, which will be approached by two steps of marble, is to be paved with glazed tiles in patterns. The sanctuary will be two steps higher than the chancel, and on the south side there will be sedilia for the clergy, arcading between. The nave and the aisles will consist of five arches, or bays. The structure will be of Pennant stone, with free-stone quoins and dressings. The inside is to be lined with freestone ashlar work; the roof is to be open, showing the timber principals and rafters. Oak blocks laid to pattern on concrete are to form the floor, with granolithic pavement for the walking ways and in the porches. The church will be lighted by a tracery window and two single windows at the west end, aisle clearstory windows north and south, five single windows at the east end, and two small windows on the north and south side of the chancel. Artificial lighting will be by incandescent gas burners, attached to pendants in the nave, brackets in the aisles, and to standards in the choir. Heating will be by low-pressure hot-water pipes carried through the building, and ventilation will be by exhaust ventilators over the roof and inlets over the heating coils. Seating for 900 persons will be by means of chairs. The roof is to be covered with Broseley tiles. Over the north-west gable will be an open belfry for one bell, and a feature of the elevation will be an ornamental ventilating spire, rising from the roof two-thirds of the distance from the belfry. As funds will probably not be forthcoming to carry the building to a completion, the intention is to erect the nave and north aisle and the porch at the west end. These sections will give accommodation for 450 worshippers.

CHURCH SCHOOLS, FARNWORTH-WITH-KERSLEY, LANCASHIRE.—The foundation-stone of the new Church Schools, Farnworth, was laid recently. The general contractors are Messrs. Cooke Bros., Mr. R. Knill Freeman, Bolton, being the architect.

SCHOOLS, ERDINGTON, BIRMINGHAM.—On the 30th ult. foundation-stones were laid of new schools both at Fentham-road and Slade-road, Erdington. The Slade-road buildings will cost over 9,000*l.*, and will consist of two blocks, one intended as an infants' department, and the other as a girls' department. Accommodation will be provided for about 650 children. There will be provision for cookery classes, but the present building only forms part of a scheme which includes the erection of a block for manual instruction. The architect is Mr. Jenkins, of Bennett's Hill. The Fentham-road school will form part of a larger scheme which will be completed when the demands of the district require it. At present an infants' block only will be constructed, affording accommodation for 400 children in seven classrooms. When completed the building will be used as a higher-grade school for 300 boys and 300 girls, and will include a joiner's shop, laundry, cookery demonstration room, chemical and physical laboratories, lecture-rooms and gymnasium. The school will be erected from the designs of Messrs. Cossins, Peacock, & Bewlay. The contract for the present building amounts to 5,997*l.*

L.C.C. EPILEPTIC COLONY, EWELL.—On the 1st inst. Princess Louise, Duchess of Fife, attended the opening of the Epileptic Colony at Ewell. The colony spreads over about twenty acres of ground, and the villas are surrounded by about a hundred acres of land, which is to be used for farming purposes, the idea being that the inmates shall be employed in cultivating the land. The colony is the property of the London County Council, and the buildings were designed by Mr. W. C. C. Smith. There are eight villas in all, with a centre hospital building.

INFIRMARY EXTENSION, BOLTON.—The corner stones have just been laid of the new "Jubilee and Coronation" wing of Bolton Infirmary. The extension has been designed by Messrs. Cunliffe & Pilling, of Bolton. The dimensions of the new block are about 120 ft. long and 46 ft. wide. The main entrance will lead past a certificate office into the waiting hall, estimated to seat about 120 out-patients. Along the side of this hall are arranged the doctor's consulting and examination-rooms, and the dark and other rooms required by the ophthalmic surgeons. From these rooms the patients enter an inner waiting hall adjoining the dispensary, and are then discharged from a separate exit door. The dispensary, drug stores, and disinfecting-rooms are arranged for on the west side of the building. The new accident-room is situated near the front entrance, whilst a small consulting-room and room for minor operations adjoins the main room. The contractors for the undertaking are Messrs. A. Atherton & Co., Mr. John Dickinson, Messrs. J. Bradbury & Son, and Messrs. J. W. Witter, the latter firm having in hand the plumbing and heating.

NEW WING, DARLINGTON TRAINING COLLEGE.—The new wing of the Darlington Training College is the third enlargement since the college was built thirty years ago. It is practically a separate pavilion, being connected with the main building only by a glazed corridor. It is 84 ft. long and 28 ft. wide (with several protecting bays), and comprises five stories. The basement contains cloakroom, cycle stable, lavatories, and heating chamber. The ground floor has a lecture theatre 35 ft. by 25 ft. (seated in amphitheatre form, and having separate entrance for pupils from the practising school), common-rooms, 30 ft. by 25 ft., and 16 ft. by 14 ft. On the first floor are the governess's sitting-room and bedroom, twelve cubicle bedrooms for students, two bathrooms, lavatory, &c.; and on the second floor governess's sitting-room and two bedrooms, and twelve cubicles, bathrooms and lavatory, &c. On the top floor are four cubicles, servants' dormitory, bathroom, linen-room, boxroom, lavatory, &c. The building is faced with red pressed bricks, having stone dressings. The roof is covered with dark Westmoreland slates. The joiners' work is of pitchpine varnished, except the floors of common-rooms and the stairs, which are of oak. The corridor which connects the new wing with the main building is 8 ft. wide, floored with mosaic tiles, and covered with glass. The work has been designed and carried out under the direction of Messrs. J. P. Pritchett & Son, architects, of Darlington, by the following contractors:—Brickwork, masonry, and plastering, Messrs. Mackenzie; slater's work, Mr. Lancaster; joiner's work, Mr. H. Richardson, of Barton; plumber's and glazier's work, Mr. Coates; painter's work, Messrs. Hoskins; heating, Messrs. Dinning & Cooke, Newcastle-on-Tyne; electric lighting, Messrs. Ernest Scott & Mountain, Newcastle-on-Tyne.

WHITE OAK OPHTHALMIC SCHOOL, SWANLEY.—As a result of the consideration of the subject by the Departmental Committee on Poor Law Schools in 1896, the duty of making provision for children suffering from ophthalmia was placed upon the Metropolitan Asylums Board by order of the Local Government Board in 1897. The site of forty-nine acres at Swanley was purchased in December, 1897, at a cost of 5,050*l.* The buildings had to be planned to serve both as a school and a hospital, while not being too expensive in either capacity. The architects are Messrs. Newman & Newman, of London, and the builder Mr. Charles Wall, of Chelsea, whose tender was accepted in February, 1901, at the sum of 112,324*l.* The school was formally opened on May 23 of the present year. At the entrance is the gate porter's lodge and the receiving block, with ophthalmoscopic room and laboratory. There are thirty cottages for children, arranged in fifteen pairs, and in five groups of three pairs. Each cottage accommodates twelve children and a house-mother. In connexion with each of the five groups is a small staff block, containing a room for the medical treatment of the seventy-two children in the group, and quarters for the charge nurse who carries out this treatment, a cook-general, and a general servant. The heavier part of the cooking for the group is done in this block. The central administration block contains quarters for the matron, assistant matron, domestic and laundry staff, extra nurses, storekeeper's office, general stores, and needle-room. The other buildings include the junior school, the senior school (with special room for ophthalmic surgeon), the laundry, four cottages for male staff, infirmary, and isolation cottage.

ASYLUM, CARDIFF.—The Cardiff Asylums Committee received tenders recently for the superstructure of the new asylum to be erected at Whitchurch. Ten tenders were received as follows:—Jas. Allan, Cardiff, 238,516*l.* 18s. 11d.; D. W. Davies, Cardiff, 237,750*l.*; Turner & Sons, Cardiff, 244,222*l.*; Watkin Williams, Cardiff, 233,090*l.*; Wm. King & Sons, Westminster, 232,390*l.*; M'Cormick & Sons, London, 242,787*l.*; Wm. Thomas & Co., Cardiff, 275,297*l.* 19s. 5d.; H. Willcock & Co., Wolverhampton, 233,028*l.*; Lloyd Bros., Swansea, 263,376*l.*; Stephens, Bastow, & Co., Bristol, 264,997*l.* 0s. 3d. Alderman David Jones moved that the Council be recommended to accept Messrs. King & Sons' tender of 232,390*l.*, subject to the sureties being satisfactory. Mr. S. O. Williams seconded, and it was carried unanimously.

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MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—In consequence of the death of Mr. A. C. Breden, who was partner in the firm of Ernest Runtz & Co., architects, the firm will in future carry on practice under the style of "Ernest Runtz & Ford," Mr. G. M. Ford being now Mr. Runtz's sole partner. The firm have opened a branch office at Lewes.

GLASGOW EAST-END INDUSTRIAL EXHIBITION.—Mr. John Fairweather, Glasgow, has been appointed architect to the Glasgow East-end Industrial Exhibition, which opens next December. Four competitive designs were submitted to the Exhibition Council, and from these the Council selected those of Mr. Fairweather, as being the most practical and suitable for the exhibition. Much originality and resource is said to be shown in the adaptation of the present buildings and grounds, and in the treatment of the entrance façade and concert hall. The latter is designed to accommodate 3,500 persons, and the platform, in addition to the usual accessories, will have a fine organ. The exhibition will be of a general character, divided into three sections, and is being promoted for the benefit of the reconstruction scheme of the Royal Infirmary.

NIDD VALLEY ARBITRATIONS: WINN AND THE BRADFORD CITY CORPORATION. — Lieutenant-Colonel W. H. Wellsted, C.E., the umpire in the above matter, has just issued his award, amounting to 14 585*l*. The claim was in respect of 1,415 acres of leasehold land in the Nidd Valley, taken for the construction of the reservoirs and gathering ground for the Bradford Corporation Waterworks, and amounted to 28,220*l*., whilst the value placed upon it by the Corporation witnesses was 7,073*l*. The arbitrator for the claimant was Mr. Thos. Fenwick, C.E., Leeds, and the witnesses were Messrs. C. R. Fenwick, W. B. Bord, John Maugham, Richard Horsfall, W. F. Tempest, and John Farrah. The arbitrator for the Bradford Corporation was Mr. Chas. Gott, C.E., Bradford, and the witnesses were Messrs. Fredk. Fowler, W. B. Woodhead, R. B. Broster, and Geo. Runton.

THE WIDENING OF PICCADILLY.—At the meeting of the Westminster City Council on the 2nd inst., Captain Jessel, M.P., the Mayor, presiding, the Improvements Committee reported that they had considered a letter from the London County Council stating that they were endeavouring to give effect to their undertaking to take the necessary steps to obtain possession of the premises at present occupied by lessees, but that it was found that it would considerably assist the negotiations with the tenants if the City Council would grant its aid by putting into force, at the cost of the County Council, its statutory powers under Michael Angelo Taylor's Act; also stating that the request was made because the County Council possessed no such compulsory powers for the acquisition of property as those conferred on the City Council by the Act in question. The County Council suggested that, in the event of the City Council's complying with their request, the general practice in such cases should be adopted—viz., that the City Council should appoint the County Council's solicitor and valuer respectively to act in the matter in conjunction with the Town Clerk. The Committee recommended that the request of the Council should be complied with, and the Council agreed.

NEW BUILDING BY-LAWS, ROCHDALE.—On the 2nd inst. at Rochdale Town Council Alderman Topper, the Chairman of the Building Committee, in submitting a draft of the new building regulations, informed the Council that these by-laws, which had been submitted before to them, had been toned down, and if they were now passed he only anticipated an objection to one clause, which enforced the site of a house being concreted. After a short discussion, Alderman Topper said that the Committee had no desire to stagnate the building trade, but to make new houses as healthy as possible, and prevent "jerry buildings" being erected. The Council then approved the new building regulations.

ROYAL COMMISSION ON LONDON LOCOMOTION.—At a sitting of this Commission on Friday last week under the chairmanship of Sir D. Barbour, Mr. H. E. Harper, Statistical Officer of the London County Council, continued his evidence, and was examined by different members of the Commission as to the best means of dealing with the housing problem. Witness expressed the opinion that the only effective means of inducing workmen to live out of London was by the provision of cheap railway fares, but if the remedy was to be effective, it must be brought about by all the railway companies running lines into the country. By this means there would be equal attractions offered all round, and the congestion in the central area would be diminished. As an illustration of the way in which people took advantage of cheap means of transit, he witnessed the opening up of Acton by means of the electric tramways and tube railway in 1900. In three years the rateable value of Acton increased 14 per cent. Where, however, a single district was opened by a tube railway unmixed good did not follow, because people flocked to the district opened up, and very quickly the carrying capacity of the trains was increased, while in the district itself rents quickly rose and overcrowding ensued. So if a single tube railway went to the eastern district, he was afraid it would only tend to aggravate the present excess of population. Hence his desire to see all railways doing their part in carrying the people out. He admitted that it could hardly be expected that a railway company should run unremunerative trains to create a traffic, and there might be a case for consideration as to the localities affected giving some *quid pro quo*.

JOINT COMMITTEE ON MUNICIPAL TRADING—On Thursday last week evidence was given by Mr. H. A Haward, the Controller of the County Council, with reference to the system adopted by the Council for raising money. In reply to Lord Rothschild, witness described the policy of the London County Council with reference to the fixing of value of land used for housing purposes. He pointed out that where the Council cleared insanitary areas or initiated improvement schemes they were under statutory obligation to rehouse the people displaced. It was obviously impracticable to charge to the housing scheme the full cost of the land used for housing purposes, and the course adopted was for the valuer to fix the value of the land for housing purposes, and this was charged against the housing scheme. The excess was charged against the cost of clearing the insanitary area or against the cost of the improvement. He submitted that this was a perfectly legitimate policy to pursue, and pointed to the Holborn and Strand Improvement scheme as an illustration. Here the Council were under statutory obligation to rehouse before they could pull down the buildings in the area, and, consequently, they purchased what was known as the Reid's Brewery site. This site was written down very considerably for housing purposes, and the balance was charged to the Holborn and Strand Improvement scheme.—At a further sitting of the Joint Committee on Municipal Trading on Monday, Mr. Haward, the Controller to the London County Council, continued his evidence, and was asked by Sir G. T. Bartley if the facilities offered by the Council for the obtaining of small loans by Borough Councils for such things as houses, which were to do away with the contractor, did not lead to extravagance. Witness replied that if the contractor were setting up in business he would reckon the purchase of his plant was a fair capital charge. Answering questions as to whether it was not a somewhat dangerous financial operation to purchase the Reid's Brewery site for 200,000*l*., and then write its value down for housing purposes to 44,000*l*., witness said the position was this. By purchasing the brewery site for providing accommodation for persons displaced by the Holborn and Strand Improvement the Council was able to set free for commercial purposes a corresponding portion of land which occupied a frontage to the new street, and this was very valuable land, for which they hoped to get a good price. In other words, it paid the Council better to house the working classes a little bit away from the actual site of the improvement in very many cases, for it gave them more valuable land, which the Secretary of State would otherwise compel them to appropriate for housing displaced persons. To a large extent the purchase of Reid's Brewery site was a commercial undertaking, although, of course, the primary duty of the Council was to rehouse the persons displaced.

FLOODING OF BASEMENTS OF HOUSES.—In reference to the complaints of the flooding of the basements of houses in the borough of Kensington, the Medical Officer of Health, in his last monthly Report, says: "I regret to have to report the receipt of complaints with respect to the flooding of the basements of houses in various localities consequent on the recent heavy rains—especially on the 13th ult. I understand that the building for the pumping machinery at Lot's-road, Chelsea, was completed some time since, but when the engines will be fixed and ready for use I cannot say—ere long I hope. Meantime the only satisfaction that can be offered to sufferers from the inundations is that a period will be put to them when the pumping stations shall have been completed and brought into operation."

BRITISH FIRE PREVENTION COMMITTEE.—Mr. F. R. Farrow has resigned the position of Chairman of the Commercial Section and the membership of the Executive of the British Fire Prevention Committee, and also the title of Hon Publications Secretary of the International Fire Prevention Congress.

SEA WALL, ABERYSTWITH.—Mr. Councillor E. H. James, Mayor of Aberystwith, on Saturday last laid the last stone in the new sea wall and promenade erected by the Corporation. The work, which will cost the town over 16,000*l*., has taken over two years to complete, and has been built from the designs of Mr. Rees Jones, Borough Surveyor. The stone was obtained from the town's own quarry.

EXHIBITION OF BRITISH ENGRAVING AND ETCHING.—As the collection of examples of British engraving and etching brought together in the Galleries of the India Section of the Victoria and Albert Museum continues to attract many visitors, the Board of Education have arranged that it shall remain open until September 30 next.

WAR MEMORIAL AT GUY'S HOSPITAL.—A drinking fountain, erected as a memorial to those members of the hospital who were killed or died in South Africa, was recently unveiled at Guy's Hospital. It has been executed in coloured and polished marbles from the designs of Mr. Frederick Wheeler, of Staple Inn. The bronze inscription, panels, and mountings of the fountain were supplied by the Coalbrookdale Co., Queen Victoria-street; whilst the remainder of the work was executed by Messrs. John Daymond & Son, Vauxhall Bridge-road.

LEGAL.

ACTION BY A BUILDER.

THE case of Green *v.* Radford and others came before Mr. Justice Buckley in the Chancery Division on the 3rd inst.—an action by the plaintiff for a declaration that the second defendants, the Hucknall Torkard Industrial, &c., Society, Limited, were not entitled to permit to be used any part of the Connery Estate, near Nottingham, except subject to the conditions and stipulations contained in an agreement dated November 6, 1900, and that the defendant Radford held the lands purchased by him subject to such conditions and stipulations. The plaintiff also claimed an injunction restraining Radford from using or permitting to be used any buildings on land forming part of the Connery Estate for any trade or business except as an office or private agency, and the Society for permitting any of the land to be so used.

Mr. Astbury, K.C., and Mr. Petersen appeared for the plaintiff; Mr. Buckmaster, K.C., and Mr. W. H. Stephenson for the defendant Radford; and Mr. Laine for the Society.

Mr. Astbury, in opening, said this was a "building plot" case. Both the plaintiff and the defendant Radford were members of the defendant Society which in April, 1900, purchased from the Duke of Portland a piece of land in the parish of Hucknall Torkard, lying to the north of a road called "The Connery." In accordance with a scheme the land was laid out as a building estate, with a street running through the middle, called Co-operative-avenue. The plan of the estate was exhibited in the window of the Society, together with an announcement that the land was for sale and that conditions and terms could be obtained from the secretary. The Society had printed a common form of agreement, which provided that the conveyance should contain proper covenants, restrictions, and provisions for carrying out the conditions referred to in the agreement relating to the width of Co-operative-avenue. One of the terms of the agreement was that no buildings other than those for private residences should, without the consent of the Society, be erected upon the land, and that no building on the estate should be used for any business or trade whatever, those conditions not to prevent the use of a dwelling-house as an office or private agency by licence from the Society, provided that it in no way interfered with the residential character of the street. The plaintiff, who was a builder, on November 6, 1900, entered into an agreement to purchase 2,485 sq. yards fronting on to Co-operative-avenue for 622*l*. 14s., the agreement being on one of the printed forms, and containing all the restrictions and stipulations. The land was conveyed to the plaintiff on May 15, 1901, and the conveyance also contained the restrictive covenants, but there were no covenants whatever by the defendant Society. On August 27, 1901, the defendant Radford, a Shetland shawl manufacturer, agreed to purchase from the Society part of the Connery Estate adjoining the plaintiff's land on the north side, and the agreement was on a similar printed form to the plaintiff's, but the clause as to the nature of the buildings to be erected on the site was altered by giving Radford leave to erect a workshop. On December 7, 1901, Radford purchased another plot, and the conditions of that sale allowed the land to be used for the erection of a "getting-up" room and a store or dry-room. The defendant Radford had erected upon his land a workshop for the manufacture of Shetland shawls, and had threatened and intended to erect the "getting-up" and drying-room. The result was that the value of the plaintiff's land was materially diminished, as the business of a Shetland shawl manufacturer, as carried on by Radford, was a noisy one, which caused much discomfort and annoyance to the neighbours. His contention was that the whole of this estate was subject to a building scheme which the Society could not go behind, and they were bound by the covenants the purchasers were subject to.

Evidence having been called on both sides,

Mr. Buckmaster summed up the defendants' case. He argued that there was nothing in the plans that could suggest a building scheme. They showed, no doubt, how the Society were proposing to deal with the land; but there was nothing to bind them to so deal with it. The plaintiff was told before he signed his contract that in two instances, at least, the restrictions had been relaxed.

His lordship in giving judgment said that, in his opinion, the plaintiff was entitled to judgment. What the Society intended to do there could be no doubt about. The only question was what was communicated to their buyers. Radford had bought with notice of the scheme. The plaintiff bought his land on the condition that the Society could not grant any licence such as was granted to Radford, and Radford having bought with notice of the scheme, was not entitled to the benefit of the licence. He accordingly granted an injunction restraining the

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use of any building on Radford's land for the purpose of any trade or business, or for any purpose other than that of a private dwelling-house. The plaintiff did not ask for damages, and would have the costs of the action.

Upon the application of Radford's counsel the operation of the injunction was suspended for a month.

BY-LAW DISPUTE AT MALVERN.

THE case of Pomeroy and Another *v.* The Malvern Urban District Council came before a Divisional Court of King's Bench, composed of the Lord Chief Justice and Justices Wills and Channell, on the 6th inst., on the appeal of the Hon. E. A G. Pomeroy and the Hon. Hilda E. Pomeroy, his sister, against a decision of the Justices of Great Malvern convicting the appellants of having, as it was alleged, unlawfully allowed a new building, viz., a billiard-room, to continue to exist in such a state as to be a contravention of By-law No. 11 of the by-laws of the district. The charge against the appellants was that the said building was not enclosed with walls of good brick, stone, or other hard and incombustible materials, and with good mortar and cement.

The case came before the Court in the form of a special case, from which it appeared that the Justices, after hearing the evidence of a Mr. Maybury, the Surveyor of the Council, found as facts that the building was not made of incombustible materials as required by the by-laws, but was a wooden-framed billiard-room covered with galvanised iron outside and lined with matchboarding inside. They found that the male appellant gave evidence at the Great Malvern Petty Sessions on November 5, 1902, when he was convicted of the original offence of erecting the building in question in contravention of the by-laws. The Justices further found that the appellants' house, "The Chace," and the billiard-room attached to it were about four miles from the town of Malvern and within the Malvern Urban District, and that there were no other houses in close proximity to it. The respondent Surveyor contended that it was not necessary for him to give evidence with regard to these objections, as the objections were concluded by the previous conviction on November 5, 1902. The appellants' contention was that the previous conviction was by consent and upon the understanding that no subsequent or further proceedings should be taken. The Justices, however, convicted the male appellant and fined him 10*l.*, being 1*l.* a day for ten days, and costs 15*l.* 15*s.* The Justices also convicted the lady appellant, who did not appear, and fined her 10*s.*, being 1*s.* a day for ten days, and no costs. The question of law raised for the opinion of the High Court was, first, whether there was sufficient evidence to convict both or either of the appellants, and, second, whether the by-law in question was or was not *ultra vires* and unreasonable.

At the conclusion of the arguments of counsel,

The Lord Chief Justice, in giving judgment, said it seemed to him there was really not sufficient evidence as to the person who had continued to maintain the building, which had been erected in contravention of the by-law. There was certainly no evidence as to the sister or as to which of the two persons continued the offence. He thought, following the principle laid down by the late Lord Russell of Killowen in the case of Badly *v.* The Cuckfield Rural District Committee, it might in certain cases be very hard to apply a by-law such as this in all its strictness to a building which was a considerable distance from other buildings, and which consequently would not be a source of danger to neighbouring houses in case of fire. The magistrates had, under Section 16 of the Summary Jurisdiction Act, 1879, discretionary powers to deal with an offence if it were found to be of a trifling nature. His Lordship was of opinion that the conviction in each case should be quashed, and the case sent back to the Justices for them to find who was the proper person to be convicted, if at all. He thought also that the magistrates should be informed that they had a discretion under Section 10 of the Summary Jurisdiction Act, 1879. In his Lordship's opinion, the previous conviction of the male appellant on November 5, 1902, was no proof of his committing a continuing offence.

Justices Wills and Channell concurred.

Mr. Asquith, K.C., and Mr. Coventry appeared for the appellants: and Mr. A. Glen, K.C., and Mr. Lushington for the respondents.

NORWOOD NUISANCE CASE SETTLED.

IN the Chancery Division on the 7th inst. Mr. Justice Farwell concluded the hearing of the case of Morris: The Hentschel Colourtype (1901) Co., Ltd., an action by the plaintiff, Mr. Christopher Morris, for an injunction to restrain the defendants from causing a nuisance by the noise of machinery and smells arising at the defendants' factory at Lower Norwood.

Mr. Jenkins, K.C., and Mr. Rolt appeared for the plaintiff; and Mr. Upjohn, K.C., and Mr. F. Whinney for the defendants.

Mr. Jenkins, in opening the case, said that the plaintiff was the trustee of a house and land known as Portobello House, Knight's Hill-road, Norwood, a small estate comprising about seventeen acres of land. The neighbourhood was purely residential, and the property was bought for a Miss Morris in 1876 (the plaintiff being her trustee), the freehold costing 12,000*l.*, and a good deal of money having been spent on it since. The defendants company's factory was built in 1901, and adjoined the plaintiff's property. The nuisance complained of was caused by the working of the defendants' engines in the factory, and defendants also caused to issue from their premises offensive and unwholesome fumes, smells, and vapours, which spread over the plaintiff's house and land. The noise from the defendants' engines sometimes commenced as early as five o'clock in the morning, and often continued till ten o'clock at night. The plaintiff alleged that both the smells and the noise constituted a nuisance, and claimed an injunction to restrain their continuance.

Evidence having been called in support of the plaintiff's case, the case was eventually settled, Mr. Upjohn stating, after he and Mr. Jenkins had seen the learned Judge in his private room, that fair and reasonable terms had been agreed on between the parties, which need not be mentioned in court.

Mr. Jenkins said he considered the terms fair and reasonable, and the case, with his Lordship's sanction, was settled upon the terms agreed to.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

17,101 of 1902.—H. BIDDLE: *Chimney pots.*

A chimney-pot formed with a base of such a size that it will fit into the brickwork of the top of the chimney for which it is intended, and provided with external flange or projections to rest upon the top of the brickwork to prevent it slipping down too far.

24,022 of 1902.—A. SCHLEIDT: *Syphon Flushing Cisterns.*

Flushing cisterns for water-closets, &c., in which the water is discharged on raising two piston valves, and the air required for such discharge is introduced through a tube, in which, moreover, the pressure and the extent to which the cistern is to be filled are regulated by the counterpoise and the regulating valve.

2,934 of 1903.—C. E. LONG and J. C IRVINE: *Fasteners for Windows and the Like.*

In fasteners for windows or the like, having a pivotted arm carried by the first frame or member, and adapted to receive angular motion to interlock or grip a segment or equivalent device carried by the second frame or member; forming or fitting pivotted arm with a key-operated lock so located therein as to be brought into proper relation with a lock bolt-hole formed in the engagement device or its fittings on the second member when the arm is connecting the two members, whereby by operating the key-operated lock the pivotted arm is secured against unwarranted operation from either the exterior or the interior of the windows, or the like.

6,798 of 1903.—E. G. WATROUS: *Water closets.*

In a water-closet the combination of a discharge valve controlling the discharge from the closet bowl, and a slow closing inlet valve controlling the closing movement of the discharge valve.

10,060 of 1903.—E. BOMMER: *Spring Hinge.*

A spring hinge, consisting of a flange attached to the door-frame and provided with a retaining seat at one end, a flange applied to the door and provided with a perforated bracket at the end opposite the seat; said flanges being provided with pintle sockets and a tension spring, the middle coiled portion of which is retained by the seat, while the upper end engages the perforated bracket and the lower end, the pintle sockets forming the pintle for the same.

12,920 of 1902.—J. G. FORBES: *Hollow Interlocking Building Blocks and the Method of Producing Same.*

This invention relates to improvements in hollow interlocking blocks and in the production of same. In the carrying out of this invention a block of concrete or other suitable material is constructed or moulded in the form of a frame, with the two sides square and jointed together with a male and female joint at its ends, and a lap, dovetail or other suitable joint at the top and bottom; the hollow portion or inside of the block being filled with inferior concrete or any other holding body; thus forming a solid cone within the said block. At the joint of the superimposed blocks where the inferior concrete is filled in, the blocks may be angular on their edges for the inferior concrete to run in; the cone as it were having projecting angular strips if the blocks were removed. For the purpose of producing the blocks with the square sides, a die-box is employed, which may be formed to suit the blocks to be moulded and with a sole plate having a metal or other block on its top according to the size of the hollow required in the concrete block itself. When the concrete block is moulded the block on the sole plate is forced upward or downwards, the outer box die taking the opposite motion, leaving the concrete block on the sole plate frame, the die box and block being removed. The die box and sole plate may either be made in wood, iron, or steel, and they may be duplicated so as to mould one or more concrete blocks at one operation. To effect the operation of the die box and sole plate block, an arrangement of levers may be employed to be worked automatically, or may be operated the same by hand.

13,231 of 1902.—W. EADE, J WOOLVEN, and W. J. WOOLVEN: *Water fittings for Flushing and Supply Cisterns, Water taps, and Service Mains.*

Applying and utilising a new method of breaking or checking the force of water in its passage through the pipes, by attaching to the pipes and inserting between the supply main and the supply tank and the various points of delivery a vessel containing the air compartment or compartments or chambers, also a compartment or compartments containing coarse sand, grit, or other suitable material, with a vertical metal partition that divides the aforesaid compartments or chambers, the whole forming a medium to intercept and break up pressure and ensure quiet delivery of water.

10,005 of 1902.—J. A. BRODIE: *Road Paving.*

This relates to road paving, and consists in forming the pavement of composite slabs in which a wearing surface of stone is formed by stones embedded in jointing and base material consolidated under pressure in a mould. It also comprises a method of forming paving slabs which consists in assembling the stones which form the wearing surface, face down, in a mould of suitable configuration to give the desired shape of slab, then adding the jointing and base material and consolidating the slab under pressure. The invention also relates to a paving slab which consists of stones so disposed as to give a plane wearing surface, a layer of jointing material to bind the stones together, and a base of a lower grade material of sound deadening character, the whole being consolidated in a mould under pressure.

10,215 of 1902.—H. A. D. COLLINS: *The Manufacture of a Refractory Material.*

The manufacture of refractory material by mixing pulverised silica or silicious matter with one or more compounds of calcium and sodium, moulding the mixture, and subjecting it to a suitable temperature.

16,519 of 1902.—T. BRINDLE: *Bricks for Building.*

The method of manufacturing a compound brick which consists in cementing or similarly securing a slab or slabs of natural rock to one or more of the ends or the sides or the brick.

17,166 of 1902.—W. H. ALLEN, W. J. ELSWORTH, and W. HARRISON & CO., LTD.: *Drainage Inspection Chamber.*

For inspection chambers a block of earthenware or the like having a channel formed therein, said block being provided with a recessed part at one end of said channel to receive a pipe end.

17,109 of 1902.—J. TAYLOR: *Automatic Fire-Extinguishers or Sprinklers and Apparatus therefor.*

In an automatic fire-extinguisher or sprinkler the use of a frangible glass strut or support, filled, or partially filled with volatile spirit or other expansive fluid which boils at a determined temperature according to the ultimate temperature at which the completed sprinkler is required to operate, the glass strut or support being affected by heat the volatile spirit or expansive fluid would assume a gaseous condition but for the fact that it is held in a hermetically-sealed chamber, and when the prearranged temperature is attained, the globe of the glass strut or support is burst by expansion, and instantly there is a communication to the atmosphere the whole of the contents assume a gaseous form and explode, blowing the glass strut or support into minute particles and freeing the water valve.

17,379 of 1902.—P. COTTANCIN and A. VYE-PARMINTER: *Reinforced Bricks and Brickwork.*

By this invention a brick of any suitable material is made with perforations or grooves through, or in which wires, chains, rods, or tubes are passed or placed, whereupon the perforation or groove is filled up with some suitable material cement or molten metal. When these bricks, or any others, are built to form brickwork, the joints between the bricks are similarly filled with cement having wires embedded in it. Instead of filling the perforations or grooves after the wires have been placed therein, the wires, or the like, may be attached to each other mechanically. In completing walls these reinforced bricks may be used at intervals, and the intervening spaces may be filled with any desired brickwork.

17,580 of 1902.—B. J. B. MILLS (Seigle): *Manufacture of Artificial Building Materials.*

The manufacture of artificial building materials by the following process, viz., calamine is calcined; it is then carefully mixed with lime; sand is then mixed with the mixture of lime and calamine in the proportion of about 90 per cent. of sand to 10 per cent. of limed calamine; the mass is moistened to obtain a sufficiently plastic paste; the paste is then moulded, pressed, and removed from the moulds, and the moulded products are submitted, in closed chambers, to the action of steam at a pressure of 8 to 10 kilogrammes.

16,702 of 1902.—W. T. SUGG: *Lamps for Incandescent Gas Lighting.*

Suspending lamps for incandescent gas lighting by

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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means of tubular, coiled, metal, gas supply-pipes, such coils constituting in tension anti-vibration devices.

21,423 of 1902.—H. N. BAXTER: *Means for Deadening or Reducing Exterior Noises Audible in Buildings.*

Means for excluding or deadening exterior noises, consisting of two or more sheets or panes of glass or other transparent or translucent material, having air space between them and mounted in a suitable frame or support.

9,574 of 1903.—SUTCLIFFE, SPEAKMAN, & CO., LTD., and E. R. SUTCLIFFE: *Construction of Moulds for Brickmaking Machinery and the Like.*

In moulds for the table of a brickmaking machine, the combination with reversible liners formed with fitting projections and recesses, of corresponding recesses formed in the body of the table to engage the projections of the liners, a space at one end for the insertion of the liners and a packing-piece for filling said space.

9,619 of 1903.—D. ISOARD: *Blocks and Slabs for Building Purposes.*

Filleted or grooved blocks or slabs of beton or cement strengthened with metallic linings of all sizes and coloured, or otherwise, with, or without, architectural designs of any character, according to the parts of the constructions or buildings for which they are intended.

9,938 of 1903.—O. STREUBEL: *Flooring.*

This consists of applying cork, reduced to pieces and agglomerated to the building of flooring.

5,753 of 1903.—J. J. PLUCKER: *Fireproof Casings for Elevators, Staircases, and the Like.*

A casing for elevators, staircases, and the like, extending from the top to the bottom of a building by a series of pivotted shutters mounted in the casing and capable of being closed and opened simultaneously for all stories by suitable mechanism located upon any one of said stories.

6,849 of 1903.—H. J. HADDAN (Crozier): *Process of Making Bricks or Blocks or other Cementitious Products or Artificial Stone.*

An improvement in making a cementitious product or artificial stone, consisting in forming a compact porous mass of moist and unset cementitious material: then covering an external surface of the said compacted mass with a cementitious liquid and confining the said liquid externally of the said surface, then exerting further pressure upon aforesaid compacted mass to spread the latter and thereby force or run moisture from the said liquid and facing into the pores of the aforesaid compacted mass, and then permitting the resulting product to set and harden.

MEETINGS.

TUESDAY, JULY 14.

Institute of Sanitary Engineers, Ltd.—Provincial summer meeting at Wolverhampton.

WEDNESDAY, JULY 15.

Institute of Sanitary Engineers, Ltd.—Meeting at Wolverhampton (continued).

Builders' Foremen and Clerks of Works' Institution.—Half-yearly meeting of the members. 8 p.m.

Builders' Benevolent Institution.—Annual General Meeting. 3 p.m. Committee Meeting. 3.30 p.m.

THURSDAY, JULY 16.

Institute of Sanitary Engineers, Ltd.—Meeting at Wolverhampton (concluded).

London Master Builders' Association.—Council at 4 p.m.

JULY 20 TO 25.

The Architectural Association.—Annual excursion, Worcester and district.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

June 16.—By GEO. RICHARDS (at Templecombe).

Templecombe, Somerset.—Yew Tree Farm, 58 a. 1 r. 35 p., f. £4,250
Coombe Throop Farm, 64 a. 0 r. 20 p., f. 3,600
Four cottages and 2 a. 0 r. 35 p., f. 360
Hanging Ground and Sweet's Ground enclosures, 19 a. 2 r. 29 p., f. 1,270

June 18.—By BIDWELL & SONS (at Ely).

Soham, Cambs.—The Henny Farm, 484 a. 2 r. 22 p., f., y.r. 330*l.* 9,200

By R. & C. SNELL (at Axminster).

Membury, Devon.—Land and Mill Dairy farms, 186 a. 2 r. 33 p., f. 3,600
Various enclosures, 18 a. 2 r. 2 p., f. 495

June 19.—By THOMPSON, WHITTON, & LAING (at Exeter).

Topsham, Devon.—Clyst View Farm, 16 a. 0 r. 8 p., f., y.r. 45*l.* 1,000
Blakesley, Northants.—Hootten's Farm, 136 a. 0 r. 11 p., f. 4,490

June 23.—By PEIRCE & THORPE, with THOMPSON, WHITTON, & LAING (at Towcester).

Pattishall, Northants.—Bury Closes, 34 a. 3 r. 34 p., f. 1,750
Bird's Close, 12 a. 1 r. 33 p., f. 430
Hitchcock's Farm, 89 a. 0 r. 5 p., f., y.r. 132*l.* 3,000
Cold Higham, &c., Northants.—The Down's Farm, 130 a. 0 r. 2 p., f., y.r. 110*l.* 1,650

June 24.—By PROTHEROE & MORRIS (on the estate).

Ashford, Middlesex.—Station-rd., &c., 53 plots of freehold building land (in lots) 2,141

June 25.—By GRIMLEY & SON (at Birmingham).

Yardley Wood, Worcester.—Yew Tree Farm, 33 a. 0 r. 2 p., f. £1,650
Trittiford House Estate, 37 a. 0 r. 22 p., f. 3,200
Two enclosures, 14 a. 1 r. 15 p., f. 1,670
Bretforton, Worcester.—The Larkborough Estate, 151 a. 3 r. 24 p., f. (in lots) 2,800

By BIDDELL & BLENCOWE (at Sudbury).

Belchamp St. Paul, Essex.—A small holding, 10 a. 0 r. 11 p., f. 300
Loveland's Estate, 208 a. 1 r. 1 p., f. and c. 2,200
Hadleigh, Suffolk.—Elm Lodge and 20 a. 1 r. 27 p., f., p. 650
The Lodge Farm, 74 a. 3 r. 12 p., f. and c. 620

By WINCH & SON (at Maidstone).

Cranbrook, &c., Kent.—Portions of the Sissinghurst Castle Estate, 151 a. 2 r. 23 p., f. 10,170

By SEWELL, BARNES & BRERETON (at Bungay).

Broome, &c., Norfolk.—A freehold farm, 155 a. 1 r. 27 p. 2,650
A small holding; also several enclosures of land, 53 a. 1 r. 27 p., f. 1,895

By BRODIE, TIMBS, & Co. (at Barnet).

Barnet, Herts.—Fitzjohn's-av., &c., 33 plots of freehold building land (in lots) 9,324

June 26.—By BELLAMY & Co. (at Walham Green).

Haggerston.—84, Whiston-st., f., w.r. 31*l.* 4*s.* 320

By CHAS. FOSTER & SON (at Chelmsford).

High Roothing, Essex.—Hubbard's Farm, 25 a. 2 r. 22 p., f. 250
Attridge's Farm, 46 a. 0 r. 37 p., f. 505
Porter's Manor Farm, 65 a. 2 r. 18 p., f. 700
Two freehold cottages, w.r. 9*l.* 170

June 27.—By DILLEY, SON, & READ (at Huntingdon).

Little Stukeley, Hunts.—Enclosures of land, 53 a. 2 r. 18 p., f. 1,510
Alconbury, Hunts.—Enclosures of land, 12 a. 2 r. 9 p., f. and c. 280
Walpole, Norfolk.—Neep's Farm, 104 a. 0 r. 28 p., f. 3,600
West Walton, Norfolk.—Harp's Hall Farm, 136 a. 3 r. 12 p., f. 3 787

By G. D. COPP (at Torrington).

Beaford, Devon.—Upcott Estate, 371 a. 3 r. 10 p., f. 5,400

By Messrs. CHALK (at Cambridge).

Great Chesterford, Essex.—Burton Wood Farm, 142 a. 3 r. 19 p., f., p. 2,500

By HAMPTON & SONS (at Reading).

Ipsden, Oxon.—Alma-cottage and 2 a. 1 r. 6 p., f., y.r. 18*l.* 385
A freehold enclosure, 1 a. 3 r. 32 p. 125
Victoria Cottage, f., y.r. 13*l.* 16*s.* 335
Two freehold cottages, y.r. 13*l.* 200
Freehold orchard ground, 1 a. 0 r. 3 p. 155
Berinshill Wood, 88 a. 3 r. 25 p., f. 660
Fludger's Wood, 21 a. 0 r. 1 p., f. 320

June 29.—By JOHN BOTT & SON.

Lambeth.—37, Lambeth-walk (site), f., p. 100

By C. RAWLEY, CROSS, & Co.

Islington.—4 and 6, Rocliffe-st., u.t. 35 yrs., g.r. 12*l.*, y.r. 64*l.* 550
Fulham.—25, Gironde-rd. (flats), f., w.r. 91*l.* 725
South Kensington.—132, Finborough-rd., u.t. 60½ yrs., g.r. 10*l.*, y.r. 52*l.* 480
Ealing, 29, The Av., u.t. 75 yrs., g.r. 10*l.*, y.r. 55*l.* 550
Teddington.—3, 4, and 6, Riverside Villas, u.t. 80 yrs., g.r. 13*l.* 1,195

By GOUGH & DOVE.

Stroud Green.—43, Mount View-rd., u.t. 73 yrs., g.r. 14*l.*, p. 910

By ELLIOTT, SON, & BOYTON.

Oxford-st.—67, Berners-st., and 6, Wells-st., s., also premises in Castle-mews, area 3,700 ft., u.t. 19 yrs, g.r. 185*l.*, y.r. 713*l.* 16*s.* 2 500
Kensal Green.—762, Harrow-rd, s., f., y.r. 60*l.* 1,250
Ealing.—7, Grange-rd., u.t. 65¼ yrs., g.r. 16*l.*, y.r. 100*l.* 895

By ELLIS & PALMER.

East Grinstead Sussex.—Windmill-la., a plot of land, 1 a. 0 r. 15 p., f. 300

By FRANKLIN, GALE, & NEWTON.

Sotwell, Berks.—North Farm, 119 a. 2 r. 31 p., f., y.r. 140*l.* 2,700
Wallingford, Berks.—The Severalls Estate, 251 a. 2 r. 22 p., f. 6,200

By G. B. HILLIARD & SON.

Nevendon, &c., Essex.—Little Bromford's Farm, 113 a. 1 r. 33 p., f., p. 1,460
The Little Mead, 3 a. 0 r. 15 p., f. 115
Ramsden Crays, Essex.—Crays Hill, freehold house and shop, y.r. 13*l.* 275

By A. H. TURNER & Co.

Burgess Hill, Sussex.—Franklands and 20 a., f. 5,550

By WEATHERALL & GREEN.

Shepherd's Bush.—Blomfield-rd., i.g. rents 72*l.*, u.t. 62 yrs., g.r. nil. 1,360
Blomfield-rd., two leasehold peppercorn g. rents, u.t. 62 yrs. 180

By VENTOM, BULL, & COOPER.

City of London.—4 and 5, Old Change, area 1,530 ft., building lease for 80 yrs., let at per annum 460

By NORMAN & SON (at Stratford).

West Ham.—41 to 77 (odd), Arthingworth-st., u.t. 80 yrs., g.r. 66*l.* 10*s.*, e.r. 469*l.* 6*s.* 1,575

June 30.—By DAVID BURNETT & Co.

Stoke Newington.—15, Springdale-rd., u.t. 63½ yrs., g.r. 6*l.* 4*s.* 6*d.*, w.r. 76*l.* 14*s.* 430

By DEBENHAM, TEWSON, & Co.

Dulwich.—Goodrich-rd., f.g.r. 18*l.*, reversions in 85 yrs. 450
Hackney.—117, Amhurst-rd., u.t. 67 yrs., g.r. 8*l.*, y.r. 50*l.* 540
218, Amhurst-rd., u.t. 44½ yrs., g.r. 10*l.*, y.r. 70*l.* 700
Highbury.—97, Riversdale-rd., u.t. 67 yrs., g.r. 8*l.* 8*s.*, y.r. 36*l.* 115

By FISHER, STANHOPE, & DRAKE.

Stoke Newington.—141, Evering-rd., u.t. 70 yrs., g.r. 10*l.*, e.r. 65*l.* 600
Dalston.—2, St. Mark's-ter., u.t. 63 yrs., g.r. 6*l.*, e.r. 43*l.* 450

By HAMPTON & SONS.

Anslow, Staffs.—Freehold enclosures, 57 a. 0 r. 7 p. 2,700

By HOBSON, RICHARDS, & Co.

Dalston.—39, Malvern-rd., u.t. 38 yrs., g.r. 4*l.* 7*s.* 6*d.*, q.r. 34*l.* 355
51, Mayfield-rd., u.t. 34½ yrs., g.r. 5*l.*, q.r. 32*l.* 315

By MANSELL & ROWE.

Norwood.—22, 24, 26, and 30, High View-rd., u.t. 74 yrs., g.r. 48*l.* 4*s.*, y.r. 148*l.* £1,300

By RAWLINS & Co.

Wandsworth.—Galveston-rd., f.g. rents 62*l.*, reversion in 83 yrs. 1,580
Oakhill-rd., f.g. rents 26*l.*, reversion in 82½ yrs. 695
Ealing.—Drayton-gdns., f.g. rents 27*l.* 10*s.*, reversion in 94½ yrs. 670
Fulham.—Lillie-rd., f.g. rents 19*l.* 10*s.*, reversion 87 yrs. 480
Brecon-rd., f.g.r's 16*l.* 16*s.*, reversion in 87 yrs. 400
Westbourne Park.—Golborne-gdns., f.g.r.'s 29*l.*, reversion in 63½ yrs. 690
Harlesden.—Fortune Gate-rd., f.g.r.'s 30*l.*, reversion in 86½ yrs. 743
Plumstead, Kent.—Orchard-rd., f.g.r.'s 21*l.*, reversion in 59½ yrs. 520
Orissa-rd., f.g.r.'s 60*l.*, reversion in 51½ yrs. 1,588
Crouch End.—Drylands-rd., f.g.r.'s 39*l.*, reversion in 84½ yrs. 1,014
Tottenham.—Brampton-rd., f.g.r.'s 16*l.* 16*s.*, reversion in 84½ yrs. 396
East Ham.—Lathom-rd., f.g.r.'s 63*l.*, reversion in 97 yrs. 1,620
Ilford, Essex.—Khartoum-rd., f.g.r.'s 50*l.* 8*s.*, reversion in 97 yrs. 1,180
Grange-rd., f.g.r.'s 36*l.* 2*s.* 6*d.*, reversion in 990 yrs. 865
Walthamstow.—South-gr., &c., f.g.r. 20*l.*, reversion in 85 yrs. 460
Maidenhead, Berks.—Ray Park-av., &c., f.g.r.'s 133*l.*, reversion in 61 yrs. 3,965
Market-st., f.g.r. 20*l.*, reversion in 59½ yrs. 755
St. Mark's-rd., f.g.r. 25*l.*, reversion in 60 yrs. 530

By TUCKETT & SON (at Chingford).

Chingford.—Low-st., Dell's Farm, 3 a. 0 r. 6 p., f. 500
Low-st., freehold cottage and 2 a. 2 r. 7 p. 350

By BOYTON, PEGRAM, & Co. (at Walham Green).

Fulham.—108, Bonsart-rd., u.t. 94½ yrs., g.r. 6*l.*, w.r. 41*l.* 12*s.* 895
Chelsea.—30, Upcerne-st., u.t. 79 yrs., g.r. 6*l.* 16*s.*, w.r. 50*l.* 14*s.* 300

By CRAFTER, HARRIS, & Co. (at Mason's Hall Tavern).

Forest Hill.—Breckley Rise, The St. Germain's Tavern, u.t. 69 yrs., y.r. 140*l.*, with goodwill 21,000

By ORGILL, MARKS, & LAWRENCE (at Mason's Hall Tavern).

Pimlico.—Tachbrook-st., The Enterprise, p.-h., y.r. 105*l.*, with goodwill; and 20, Charlwood-st., s., y.r. 60*l.*; also i.g.r. 30*l.*, u.t. 30 yrs., g.r. 4*l.* 31,000

By J. STRAKER & SON (at Abergavenny).

Llanvihangel Crucorney, &c., Mon.—The Berry and Pwll Mair Farms, also Upper Park Cottage, area 125 a. 2 r. 37 p., f. (in one lot) 2,100
Crasswall, &c., Hereford.—The Middle Cwm Farm, 175 a. 2 r. 15 p., f. and c. 1,610
Llanvapley, &c., Mon.—The Middle Ton Farm, 85 a. 0 r. 6 p., f. 2,690

By MELLERSH'S (at Godalming).

Godalming, Surrey.—Bushbridge-la., a freehold building estate, 16 a. 3 r. 12 p. 4,000
Crown Pits, seven freehold cottages 1,250

July 1.—By B. BAILEY & Co.

Ilford, Essex.—Wellesley-rd., &c., the Ilford Sports Ground, 7¼ acres, f., p. 9,600
Wards-la., part of the Aldborough Park Estate, 9 a. 2 r. 24 p., f., p. 5,700

By BROAD, WILTSHIRE, & PENNY.

Kensington.—17 and 19, Beaumont-rd., f., y.r. 87*l.* 1,010
54 and 56, Dieppe-st., f., w.r. 57*l.* 16*s.* 915
63 to 71 (odd), Dieppe-st., f., w.r. 172*l.* 12*s.* 2,100
Sutton, Surrey.—1 and 2, Lind-villas, u.t. 52½ yrs., g.r. 10*l.* 10*s.*, y.r. 66*l.* 485
Wandsworth.—5 to 8, Basnett-rd., u.t. 62 yrs., g.r. 20*l.*, w.r. 131*l.* 6*s.* 380
Brompton.—Richmond-rd., i.g.r.'s 94*l.* 10*s.*, u.t. 63 yrs., g.r. 47*l.* 10*s.* 830
Kramer-mews, i.g.r.'s 130*l.*, u.t. 63 yrs., g.r. 78*l.* 930

By H. DONALDSON & SON.

Fleet-st.—7½ and 8, Gunpowder-alley, u.t. 47½ yrs., g.r. 30*l.*, w.r. 106*l.* 12*s.* 470

By FAREBROTHER, ELLIS, & Co.

Covent Garden.—Maiden-la., f.g.r. 34*l.*, reversion in 14 yrs. 2,000
Fulham.—Fulham-rd., f.g.r. 32*l.*, reversion in 34½ yrs. 1,010

By FOSTER & CRANFIELD.

Leicester-sq.—21, Green-st., s., area 800 ft., f., y.r. 160*l.* 5,460
Soho.—103, Wardour-st., s., f., y.r. 85*l.* 1,750
15, Rupert-st., s., f., y.r. 150*l.* 4,075
Oxford-st.—38, Berwick-st., s., f., y.r. 130*l.* 2,750
3 and 4, Soho-st., s., area 1,650 ft., f., y.r. 350*l.* 7,500
Long-acre.—37, Neal-st., and 15, Neal's-yard (shop and warehouse), f., y.r. 115*l.* 2,400
Chelsea.—King's-rd., f.g. rents 60*l.*, reversion in 39 yrs. 5,960
Anderson-st., f.g. rents 20*l.*, reversion in 39 yrs. 1,050
Coulson-st., &c., peppercorn g.r.'s, reversion in 39 yrs. 2,240

By CECIL HODDAY.

Tooting.—77 to 91 (odd), Selkirk-rd., u.t. 75 yrs., g.r. 42*l.*, w.r. 249*l.* 12*s.* 1,500

By FRANK JOLLY & Co.

Limehouse.—73, Rhodeswell-rd., s., u.t. 52 yrs., g.r. 3*l.*, e.r. 36*l.* 355

By A. M. NEWCOMBE.

Penge.—42, Beckenham-rd., u.t. 59½ yrs., g.r. 10*l.*, p. 300

By NOTLEY & Co.

Basildon, Essex.—Enclosures of land with buildings thereon, 29 a. 1 r. 10 p., f. 560

By G. PEARCE & SONS.

Manor Park.—Sheridan-rd., u.t. 94 yrs., g.r. 4*l.* 10*s.*, e.r. 26*l.* 205

By WESTMORE & YOUNG.

Anerley.—30, Thicket-rd., u.t. 214 yrs., g.r. 13*l.*, e.r. 50*l.* 400

By GEO. HONE (at Tewkesbury).

Deerhurst, &c., Glos.—Walton Hill Farm, 164 a. 1 r. 13 p., f. 3,500
Walton Cardiff, &c., Glos.—Walton Manor Estate, 215 a. 2 r. 36 p., f. 4,306
Elmstone Hardwick, Glos.—Cox's Mead and The Patch, 12 a. 2 r. 7 p., f. 380

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July 2.—By G. ERNEST CLARK.

Walthamstow.—1, Upper Walthamstow-rd., u.t. 76 yrs., g.r. 7*l.*, r. 50*l.* £420
2 and 24, Merton-rd., f., y.r. 84*l.* 895

By LEAGE'S.

Stoke Newington.—11, Dumont-rd., u.t. 71 yrs., g.r. 7*l.* 10*s.*, y.r. 0*l.* 330
Homerton.—241, Glyn-rd., s., u.t. 75 yrs., g.r. 7*l.* 10*s.*, y.r. 40*l.* 335

By C. C. & T. MOORE.

Hackney.—37, Queen Anne-rd., u.t. 42 yrs., g.r. 5*l.*, y.r. 40*l.* 245
Victoria Park.—359, Old Ford-rd., u.t. 50½ yrs., g.r. 4*l.*, y.r. 28*l.* 320
Bethnal Green.—110, Green-st., s., u.t. 16½ yrs., g.r. 5*l.* 3*s.*, y.r. 45*l.* 210
Stratford.—46 to 52 (even), Keogh-rd., f., w.r. 93*l.* 12*s.* 765
37 to 47 (odd), Louise-rd., u.t. 75 yrs., g.r. 18*l.* 10*s.*, w.r. 145*l.* 12*s.* 930
Stepney.—11, Wellesley-st., u.t. 20 yrs., g.r. 3*l.* 10*s.*, y.r. 26*l.* 145

By H. MUSKETT & Co.

Wood Green.—68, Palmerston-rd., u.t. 94 yrs., g.r. 8*l.* 8*s.*, y.r. 42*l.* 400

By NEWSON, EDWARDS, & SHEPHARD.

Farnsbury.—85, Roman-rd., u.t. 58 yrs., g.r. 6*l.* 10*s.*, w.r. 36*l.* 8*s.* 305
Hackney.—17, 39, and 41, Orchard-pl., u.t. 35 yrs., g.r. 15*l.*, w.r. 80*l.* 12*s.* 450
Tottenham.—67, Grove Park-rd., u.t. 79 yrs., g.r. 6*l.*, w.r. 32*l.* 4*s.* 150

By STIMSON & SONS.

Chelsea.—169, King's-rd., s., u.t. 68 yrs., g.r. 30*l.*, y.r. 120*l.* 1,750
Peckham.—38, 40, 42, and 44, Commercial-rd., f., y.r. 128*l.* 1,790
Balham.—Upper Tooting Pk., f.g.r.'s 47*l.* 16*s.*, reversion in 96 yrs. 1,215
Hoxton-rd., f.g.r.'s 50*l.* 10*s.*, reversions in 97 and 94 yrs. 1,875
Southwark.—18, 20, and 22, St. Thomas'-st. (offices), u.t. 44 yrs., g.r. 74*l.* 12*s.* 2*d.*, y.r. 315*l.* 3,955
Peckham.—10, Parkstone-rd., u.t. 61½ yrs., g.r. 5*l.* 5*s.*, w.r. 41*l.* 12*s.* 240
89, Hill-st., with yard, saw mills, &c., in rear, u.t. 28½ yrs., g.r. 8*l.*, e.r. 120*l.* 900
Poplar.—1 to 5, Norfolk-st., u.t. 46½ yrs., g.r. 22*l.*, w.r. 14*l.* 12*s.* 525

June 3.—By F. DOD & Co.

Stoke Newington.—166 and 168, High-st., s., u.t. 47½ yrs., g.r. 40*l.*, y.r. 325*l.* 4,000
36, Green-lanes, u.t. 57 yrs., g.r. 5*l.*, y.r. 38*l.* .. 380
Twickenham.—7, Sandycombe-rd., u.t. 77 yrs., g.r. 9*l.*, y.r. 40*l.* 345

By G. GOULDSMITH, SON, & Co.

Chelsea.—18, Oakley-st., u.t. 39½ yrs., g.r. 8*l.*, y.r. 65*l.* 800
Pimlico.—33, Gloucester-st., u.t. 28 yrs., g.r. 9*l.*, y.r. 60*l.* 570
Maida Vale.—36, 37, 38, 39, and 42, Elgin-ter., u.t. 58½ yrs., g.r. 30*l.*, y.r. 225*l.* 2,025
2 to 16 (even), Elgin-mews South, u.t. 56½ yrs., g.r. 42*l.*, y.r. 105*l.* 2,335

By I. HIBBARD & Sons.

High Barnet, Herts.—Hadley Green, a freehold house, with ground and stabling, p. 1,030

Contractions used in these Lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; h.b. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

'' Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.			
Hard Stocks	1 15 0	per 1,000 alongside, in river.		
Rough Stocks and Grizzles.....	1 18 0	"	"	"
Facing Stocks.....	2 12 0	"	"	"
Shippers	2 5 0	"	"	"
Flettons	1 7 6	"	at railway	depôt
Red Wire Cuts ..	1 12 0	"	"	"
Best Fareham Red	3 12 0	"	"	"
Best Red Pressed				
Rubbon Facing	5 0 0	"	"	"
Best Blue Pressed				
Staffordshire ..	4 5 0	"	"	"
Do. Bullnose	4 12 0	"	"	"
Best Sourbridge Fire Bricks	4 8 0	"	"	"
GLAZED BRICKS.				
Best White and Ivory Glazed Stretchers.....	13 0 0	"	"	"
Headers	12 0 0	"	"	"
Queens, Bullnose, and Plain.....	17 0 0	"	"	"
Double Stretchers	19 0 0	"	"	"
Double Headers..	18 0 0	"	"	"
One Side and two Ends.....	19 0 0	"	"	"
Two Sides and one End	20 0 0	"	"	"
Splays, Chamfered, Squints.....	20 0 0	"	"	"
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	"	"	"
Queens, Bullnose, and Plain.....	14 0 0	"	"	"
Double Stretchers	15 0 0	"	"	"
Double Headers..	14 0 0	"	"	"
One Side and two Ends.....	15 0 0	"	"	"

PRICES CURRENT (*Continued*).

BRICKS, &c.

	£ s. d.			
Two Sides and one End	£ 15 0 0	per 1,000 at railway depot.		
Splays Chamfered, Squints.....	14 0 0	"	"	"
Second Quality White and Dipped Salt Glazed	2 0 0	"	less than best.	
	s. d.			
Thames and Pit Sand	6 0	per yard, delivered.		
Thames Ballast	6 0	"	"	
Best Portland Cement	30 0	per ton, delivered.		
Best Ground Blue Lias Lime..	20 6	"	"	

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	10*s.* 6*d.*	per yard, delivered.
Stourbridge Fire-clay in sacks	27*s.* 6*d.*	per ton at rly. dpt.

STONE.

	s. d.		
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.	
Bath "	1 7	"	"
Farleigh Down Bath ..	1 7	"	"
Beer in blocks	1 6	"	"
Grinshill "	1 10	"	"
Brown Portland in blocks	2 2	"	"
Darley Dale in blocks..	2 4	"	"
Red Corsehill "	2 5	"	"
Closeburn Red Freestone	2 0	"	"
Red Mansfield "	2 4	"	"

YORK STONE—*Robin Hood Quality.*

	s. d.		
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.	
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super.	"
6 in. Rubbed two sides Ditto, Ditto	2 6	"	"
3 in. Sawn two sides slabs (random sizes)..	0 11½	"	"
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	"	"
1½ in. to 2 in. ditto, ditto	0 6	"	"

BEST HARD YORK—

Scappled random blocks	3 0	per ft. cube	"
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super.	"
6 in. Rubbed two sides Ditto	—	"	"
3 in. sawn two sides slabs (random sizes)	1 2	"	"
2 in. self-faced random flags.....	0 5	"	"
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.	
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt	
" " " 3 in. do.	1 2½	"	"

SLATES.

in. in.	£ s. d.			
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at rly. dep.		
20×12 " " "	13 17 6	"	"	
20×10 best seconds "	12 15 0	"	"	
20×12 " " "	13 10 0	"	"	
16×8 best "	7 0 0	"	"	
20×10 best blue Portmadoc	12 5 0	"	"	
16×8 best blue Portmadoc	6 5 0	"	"	
20×10 best Eureka unfading green....	15 8 6	"	"	
20×12 " "	17 8 6	"	"	
18×10 " "	12 10 0	"	"	
16×8 " "	10 5 0	"	"	
20×10 permanent green	11 0 0	"	"	
18×10 " "	9 5 0	"	"	
16×8 " "	6 10 0	"	"	

TILES.

	s. d.			
Best plain red roofing tiles...	42 0	per 1,000, at rly. depôt.		
Hip and valley tiles....	3 7	per doz.	"	"
Best Broseley tiles	50 0	per 1,000	"	"
Do. Ornamental Tiles	52 6	"	"	"
Hip and valley tiles....	4 0	per doz.	"	"
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000	"	"
Do. ornamental Do. 60	0	"	"	"
Hip tiles	4 0	per doz.	"	"
Valley tiles.....	3 0	"	"	"
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000	"	"
Do. Ornamental Do. 54	6	"	"	"
Hip tiles	4 1	per doz.	"	"
Valley tiles.....	3 8	"	"	"
Best "Rosemary" brand plain tiles 48	0	per 1,000	"	"
Do. Ornamental Do. 50	0	"	"	"
Hip tiles	4 0	per doz.	"	"
Valley tiles	3 8	"	"	"

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds'.....	1 0 0	less than best
Battens: seconds	0 10 0	" "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
⅞ in.	1 0 0	"
Fir timber: Best middling Dantzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

PRICES CURRENT (*Continued*).

WOOD.

JOINERS' WOOD.	At per standard. £ s. d.	£ s. d.
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10 0
" " " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
⅞ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, Americas, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	- - -

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
⅞ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
⅞ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 9-in.

JOISTS, GIRDERS, &c.

	In London, or delivered. £ s. d.	Railway Vans, per ton. £ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
" " galvanised.....	16 0 0	- - -

(* And upwards, according to size and gauge.)

Sheet Iron, Black.—			
Ordinary sizes to 20 g.	9 15 0	- - -	
" " to 24 g.	10 15 0	- - -	
" " to 26 g.	12 5 0	- - -	
Sheet Iron, Galvanised, flat, ordinary quality—			
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	- - -	
" " 22 g. and 24 g.	13 5 0	- - -	
" " 26 g.....	14 5 0	- - -	
Sheet Iron, Galvanised, flat, best quality:—			
Ordinary sizes to 20 g.....	16 0 0	- - -	
" " 22 g. and 24 g.	16 10 0	- - -	
" " 26 g.....	18 0 0	- - -	
Galvanised Corrugated Sheets:—			
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -	
" " 22 g. and 24 g.	13 5 0	- - -	
" " 26 g.....	14 0 0	- - -	
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	- - -	
" " 22 g. and 24 g.	12 15 0	- - -	
" " 26 g.	14 0 0	- - -	
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0	

(Under 3 in. usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 5 0	- - -
Pipe in coils	14 15 0	- - -
Soil pipe	17 5 0	- - -
Compo Pipe	17 5 0	- - -
ZINC—Sheet—		
Vieille Montagne ..... ton	27 5 0	- - -
Silesian	27 0 0	- - -

[*See also page 57.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Machinery for Lifting Boats	Austrian Government	100,000 Kronen, 75,000 Kronen, and 50,000 Kronen	Mar. 3, 19

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Sewage Works, Agbrigg, near Wakefield	Sandell Magna U.D.C.	F. Massle, Surveyor, Tetley House, Wakefield	July 13
Road Works, Park-road, &c.	Watford R.D.C.	H. M. Turner, Watford-place, Watford	July 14
Sewerage Works	Aberdeen Town Council	W. Dyack, Civil Engineer, 41½, Union-street, Aberdeen	do.
Sewers, &c., Copland-road, Govan, N.B.	The Committee	J. Deas, Civil Engineer, 53, Bothwell-street, Glasgow	do.
House, Church-street, Egremont	Mr. G. D. Young	Jas. Cowan, Surveyor, Egremont	do.
Additions to Oil Cloth Works, Sowerby Bridge	Messrs. Sykes & Son	Jackson & Fox, Architects, 7, Rawson-street, Halifax	do.
Additions to Public Buildings	Brownhills U.D.C.	W. B. Chancellor, Architect, Public Buildings, Brownhills	do.
Boundary Walls at Cemetery, Dowlais	Merthyr Tydfil U.D.C.	T. F. Harvey, Engineer, Town Hall, Merthyr	do.
Re-erection of the Melbourne Mills, Morley, Yorks	Executors of the late Mr. Stockwell	Buttery & Birds, Architects, Queen-street, Morley	do.
Offices, Levenshulme	Manchester Corporation	J. Gibbons, Architect, 25, Cross-street, Manchester	do.
Rebuilding Church, Newchurch, near Warrington	.....	Travers & Ramsden, Architects, 44, Church-street, Leigh, Lancs	do.
Two Blocks of Houses, Devon-street, Halifax	.....	Lister Coates, Architect, Bank Chambers, Halifax	do.
*Sewers, Kensal Green	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	do.
*Boundary Wall, Neasden	do.	do.	do.
Queen Victoria Memorial, Vicarage-road, Rochdale	.....	Woodhouse & Co., Architects, 100, King-street, Manchester	July 15
Two Cottages, Trelewis, Treharris	.....	W. Dowdeswell, Architect, John-street, Treharris	do.
Footbridges, near Enfield Lock	.....	R. Collins, Surveyor, Council Offices, Enfield	do.
Asphalting Works	Enfield U.D.C.	J. S. Brodie, Civil Engineer, Town Hall, Blackpool	do.
Cast-iron Pipes (9,672 tons)	Blackpool Corporation	Spencer Harty, Engineer, City Hall, Dublin	do.
Additions to Electricity Station	Dublin Corporation	F. T. Clayton, Civil Engineer, Municipal Buildings, Reigate	do.
Asphalting Footways (12 months)	Reigate Town Council	J. S. Brodie, Borough Engineer, Town Hall, Blackpool	do.
Paving Works, Hand-place	Blackpool Corporation	Borough Surveyor, Bridge-street, Walsall	do.
Eighteen Labourers Cottages, Lurgan	Walsall Corporation	W. W. Larmor, Civil Engineer, Banbridge	do.
Hotel, Porthcawl, Wales	Moira (Ireland) R.D.C.	Cook & Edwards, Architects, Masonic Buildings, Bridgend	do.
Foundry, Bridge-street, Batley	Mr. T. Williams	H. B. Buckley, Architect, 85, Commercial-street, Batley	do.
Brewery Offices, Cefn Coed, Wales	Messrs. J. Bagshaw & Sons, Ltd.	C. W. Pearce, Architect, Cefn Coed	do.
Two Houses, Smith House-lane, Lightcliffe, Yorks	Pontycapel Brewery Co.	Sharpe & Waller, Architects, 32, Bradford-road, Brighouse	July 16
Villas, Heaton, Yorks	.....	Adkin & Hill, Architects, Bradford	do.
Lodge, Bickham, near Exeter	.....	E. H. Harbottle & Son, Architects, Exeter	do.
Isolation Hospital, near Stoke-upon-Trent	.....	F. T. Inskip, Surveyor, Brookhouse, Cheadle	do.
Four Houses, Whitcliffe, Cleckheaton	Cheadle R.D.C.	R. Castle & Son, Architects, Cleckheaton	do.
Church, Walton-le-Dale, near Preston, Lancs	.....	The Vicar, the Vicarage, Walton-le-Dale	do.
Additions to Police Station, Seabrook	The Building Committee	F. W. Ruck, County Surveyor, 86, Week-street, Maidstone	do.
Additions to Workhouse, Pleck-road	Kent County Council	H. E. Lavender, Architect, Bridge-street, Walsall	do.
School, Albion-road	Walsall Guardians	—, Carfrae, Esq., Architect, 3, Queen-street, Edinburgh	do.
Street Works, Hardy and other Streets	Edinburgh School Board	T. H. Bell, Surveyor, Council Offices, Ramsbottom	do.
Lodge at Sanatorium, Canton	Ramsbottom (Lancs) U.D.C.	W. Harpur, Civil Engineer, Town Hall, Cardiff	do.
Two Cottages, Sherford Farm, Brixton, Devon	Cardiff Corporation	Pitts & Sons, Architects, Barnstaple	do.
*Sewerage and Sewage Disposal Works	Sir F. G. A. F. E. Drake	A. Williams & Son, Civil Engineers, 14, Victoria-street, S.W.	do.
*Petty Sessional Hall, Reconstruction Heating Apparatus, &c	Godstone R.D.C.	County Surveyor, 86, Week-street, Maidstone	do.
Church, Birchgrove, Whitchurch, near Cardiff	Kent County Council	E. Seward, Architect, Cardiff	July 17
Works at Parish Church, Hunmanby (Yorks)	.....	C. Hodgson Fowler, Architect, Durham	do.
Rebuilding Church, St. Cyrus, N.B.	.....	James Lyall, Roadside, St. Cyrus, N.B.	do.
Builder's Work, Dundee Terrace	.....	R. Morham, City Architect, Edinburgh	do.
Sewers, &c., (4½ miles)	.....	J. T. Eayrs, Civil Engineer, 39, Corporation-street, Birmingham	do.
Abattoir at Market, Brook-street	Edinburgh Corporation	Borough Surveyor, Town Hall, Preston	do.
Chapel, Gilstead, Bingley	Oldbury U.D.C.	W. R. Nunns, Architect, Market-street, Bingley	do.
Sewerage Works	Preston Corporation	R. H. Clucas, Civil Engineer, Town Hall, Kendal	do.
Paving Works, Trelfall-street	The Wesleyans	Borough Surveyor, Town Hall, Preston	do
Schools	Kendal Corporation	A. & W. Black, Architects, Falkirk	do.
Granite Road Metal, (900 tons)	Preston Corporation	T. W. A. Hayward, Civil Engineer, 8, St. Mary's-street, Stamford	July 18
Sewerage Works, Oadby, Yorks	Larbert (N.B.) Parish School Board	Draper & Walters, Surveyors, Friar-lane, Leicester	do.
Additions to Schools, Ashburton	Stamford Town Council	R. E. Tucker, Ashburton	do.
Twenty Houses, Aberbeeg	Blaby R.D.C.	P. V. Jones, Architect, Hengoed	do.
Works at Chapel, Broadhempston	The Governors	—, Johns, Esq., Woodbine Villa, Broadhempston	do.
Destructor Buildings at Sewage Works	Building Club	G. W. Willis, Engineer, Peel-green-road, Patricroft	do.
Slaughter House	The Wesleyans	Borough Surveyor, Town Hall, Lancaster	July 20
Engine House	Eccles (Lancs) Corporation	F. B. Courtney, Architect, 25, Victoria-street, S.W.	do.
Hall at Workmen's Institute, Ton, Pentre	Lancaster Corporation	J. Rees, Architect, Pentre	do.
Bridge Works	Witham (Essex) U.D.C.	P. R. A. Willoughby, Civil Engineer, Architect, Pontypridd	do.
Laying Underground Telephone Pipes	Building Committee	City Surveyor, Town Hall, Manchester	do.
Additions to Lodge at Cemetery	Pontypridd U.D.C.	W. Griffiths, Architect, 5, Hamilton-square, Birkenhead	do.
Water Supply Works	Manchester Corporation	R. Annakin, Engineer, 11, Dragon-Terrace, Horrogate	do.
Sewage Tanks, &c. Sandy Vale	Bebington (Cheshire) U.D.C.	F. Schofield, Town Hall, Stalybridge	do.
Road Works, Clydach Vale	Knaresborough R.D.C.	L. W. Llewellyn, Cambrian Collieries, Clydach Vale	do.
Forty-eight Cottages, Clydach Vale	Stalybridge Town Council	C. O. Baines, Civil Engineer, Council Offices, Goole	do.
Street Works	Cambrian Collieries, Ltd.	J. Williams, Surveyor, Council Offices, Risca	do.
Limestone Road Metal (1,000 tons)	do.	Empsall & Clarkson, Architects, 7, Exchange, Bradford	do.
House, Grassington (Yorks)	Goole (Yorks) U.D.C.	W. Fiddian, Surveyor, Stourbridge	do.
Sewerage Works, Alvechurch	Risca (Mon) U.D.C.	City Surveyor, Town Hall, Manchester	do.
Sewers, Victoria-avenue, Blackley	.....	Council's Surveyor, Spinney Hill, Addlestone, Surrey	July 21
*Rebuilding Plough Bridges, Byfleet	Bromsgrove R.D.C.	W. Bagshaw, Public Offices, Wembley	do.
Kerbing, &c. (Contracts 1 and 2)	Manchester Corporation	Engineers' Office, Public Health Department, Guildhall, E.C.	do.
*Reconstruction of Sewers	Chertsey R.D.C.	do.	do.
*Tudor-street, Paving with Australian Hardwood	Wembley U.D.C.	Architect's Department (Highways) 13, Charing Cross-road, W.C.	do.
*Excavating and Levelling, Fairlawn New Cross-road	Corporation of London	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	do.
*New Sorting Office, Tooting	do.	Guardians' Offices, Brook-street, Kennington-road, S.E.	July 22
*Painting & Repairing Latrine Blocks, Norwood Schools	London County Council	Town Hall, Hounslow	July 23
*Buildings for Electric Lighting Works	Commissioners of H.M. Works, &c.	F. Whitmore, Architect, Chelmsford	do.
Additions to Police Station, Grays	Lambeth Guardians	H.M. Office of Works, Storey's Gate, Westminster, S.W.	July 24
*Enlargement of Post Office at Barrow	Heston and Isleworth U.D.C.	do.	do.
*New Post Office at Merthyr Tydvil	Essex County Council	Director of Works Department, Admiralty, W.C.	do.
*New Coast Guard Station, near Faversham	H.M. Works	E. Bolton, Surveyor, Woodhall Spa, Lincs	July 25
Sewers, &c.	do.	Council's Engineer, 99, Southwood-lane, Highgate, N.	July 27
*Sewering and Making-up Roads	The Admiralty	W. Lockwood, Architect, 36, Gerrard-street, Soho, W.	do.
*Painting and other Works at Asylum, Hendon	Woodhall Spa (Lincs) U.D.C.	G. H. Tait, Longfield-street, Dartford	do.
*New Wards at West Hill Workhouse	Hornsey U.D.C.	School Board Offices, Park-road, West Hartlepool	do.
*SchoolBldngs, &c., Elwick-rd., Eamont & BelmontGdns.	C. L. Sick Asylum District	Chief Surveyor, County Offices, Chelmsford	July 28
*Supply of Two Ten-tons Steam Road Rollers	Dartford Union	W. A. Finch, Architect, 76, Finsbury-pavement, E.C.	July 29
*Children's Homes at Chipping Ongar	West Hartlepool School Board	Borough Surveyor, Town Hall, Fulham, S.W.	do.
*Making-up and Paving Chiddingtone-street	Essex County Council	A. E. Bolter, Paddington Station	Aug. 4
Station Buildings Shrewsbury	Hackney Union	Jas. Clarke, 107, Doncaster-road, Barnsley	No date.
Two Houses, Blackburn-lane, Barnsley	Fulham Borough Council	F. Grover & Son, Ltd., Paxton-road, Tottenham	do.
Road Works, Tottenham, N.	L. & N. W. and G. W. Railway Co.'s	T. S. Ullathorne, Architect, Selby	do.
Works at Manor House, Breighton, nr. Howden, Yorks	.....	J. Fleming, Market-place, Cockermouth	do.
Additions to All Saints' Church, Cockermouth	.....	Swanston & Williamson, Architects, Kirkcaldy	do.
Theatre, High-street, Kirkcaldy	.....	G. Dale Oliver, Architect, Carlisle	do.
Additions to Asylum, Garlands, near Carlisle	.....	G. White, Civil Engineer, Market-street, Mexborough	do.
Hotel, Doncaster-road, Mexborough	.....	J. G. Hawkins, Gas Engineer, Spalding	do.
Cast-iron Pipes	The Committee		
	Messrs. Whitworth & Co.		
	Spalding U.D.C.		

[See also next page.

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Clerk of Works	County of London	5*l.* 5*s.* per week	July 20

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, — *Contracts*, iv. vi. viii. x. & xxii. *Public Appointments*, xvi.

PRICES CURRENT (*Continued*).

LEAD, &c.

		Per ton, in London. £ s. d.	£ s. d.
COPPER—			
Strong Sheet	per lb.	0 0 10½	- - -
Thin	,,	0 0 11½	- - -
Copper nails	,,	0 0 11	- - -
BRASS—			
Strong Sheet	,,	0 0 10	- - -
Thin	,,	0 0 11	- - -
TIN—English Ingots	,,	0 1 5	- - -
SOLDER—Plumbers'	,,	0 0 6	- - -
Tinmen's	,,	0 0 8	- - -
Blowpipe	,,	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

45 oz. thirds	2½d.	per ft. delivered.
,, fourths	1¾d.	,, ,,
21 oz. thirds	3¼d.	,, ,,
,, fourths	2¾d.	,, ,,
26 oz. thirds	4d.	,, ,,
,, fourths	3½d.	,, ,,
32 oz. thirds	5d.	,, ,,
,, fourths	4½d.	,, ,,
Rolled sheet, 15 oz.	3d.	,, ,,
,, 21 oz.	4d.	,, ,,
½ Hartley's Rolled Plate	1¾d.	,, ,,
½ ,, ,, ,,	2d.	,, ,,
¢ ,, ,, ,,	2½d.	,, ,,

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 2 0
,, ,, ,, in drums	,,	0 2 4
Boiled ,, ,, in pipes or barrels	,,	0 2 3
,, ,, ,, in drums	,,	0 2 7
Turpentine, in barrels	,,	0 3 6
,, in drums	,,	0 3 8
Genuine Ground English White Lead	per ton	20 10 0
Red Lead, Dry	,,	20 0 0
Best Linseed Oil Putty	per cwt.	0 2 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 2 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

E. S. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

TERMS OF SUBSCRIPTION.

THE BUILDER (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at £1 16s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., on account. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by personally applying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post.*

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BOURNEMOUTH.—For additions and alterations to the Cricketer's Hotel, Bournemouth, for Marston's Dolphin Brewery, Limited, Poole. Mr. Walter Andrew, architect and surveyor, Parkstone and Poole :—

Jenkins & Sons	£1,913	Williams & Son	£1,766
Millar & Sons	1,839	W. Hoare*	1,727
Jones & Sons	1,829		

[All of Bournemouth.]

DUDLEY.—For the erection of buildings at the Technical Schools, Stafford-street, for the Corporation. Mr. John Gammage, Borough Engineer, Town Hall, Dudley :—

Willetts & Son, Old Hill £733

HEATON MERSEY.—For the construction of a pumping-station, sewage works, &c., for the Heaton Norris Urban District Council. Mr. W. Banks, C.E., Council Offices, Heaton Moor :—

Gosling & Stafford, Stockport* £3,310 8 7

HELE (Devon).—For additions to Hele Paper Works, for the Hele Paper Company. Mr. Chas. J. Bulgin, architect, City Chambers, Exeter. Quantities by Mr. Vincent Cattermole Brown, of Paignton :—

G. Setter	£3,700 0	N. Pratt	£2,325 0
Labdon & Sons	2,363 10	Nicks Bros., Bradninch*	2,030 6

LANCHESTER.—For the erection of a house and smithy, Ford-lane, for Mr. W. Smith. Mr. T. E. Taylor, architect, Prospect House, Lancaster. Quantities by architect :—

Excavating, Masonry, Bricklaying, Plastering, and Joinery.

Ward & Walton, Lanchester and Medomsley £312 10

LONDON.—For repainting Chelsea Bridge, for the London County Council :—

Proctor & Son	£2,325 0 0	A. H. Inns	£1,886 0 0
Vigor & Co.	1,953 0 0	M. McCarthy	1,799 12 0
W. Dudley	1,943 15 3	P. McCarthy*	1,617 14 4

LONDON.—For erecting sheet piling across the mouth of the Drawdock at Old Ford (Hackney-brook sewer), for the London County Council :—

T. W. Pedrette	£370 9 6	D. T. Jackson*	£322 7 6
Fasey & Son	351 7 0	Shelbourne&Co.	295 13 9
Pedrette & Co.	329 14 3	J. Sangwin	293 7 0

LONDON.—For the erection of the second portion of the Clapham car-shed, and laying of rails, &c., there, for the London County Council :—

Roberts & Co.	£36,528 0 0
Peirson & Co.	34,041 0 0
Joseph Jackson	34,541 10 0
F. G. Minter	33,612 0 0
Westwood & Co.	33,071 6 1
W. Norton	32,878 0 0
Shaw & Co.	32,277 0 0
H. L. Holloway	31,909 0 0
Perry & Co.	31,700 0 0
B. E. Nightingale	31,552 0 0
Grays Steel Construction Co.	31,202 0 0
F. & H. F. Higgs	31,000 0 0
Holloway Bros., Ltd.	30,875 0 0
Morton & Co.	30,355 0 0
Jones & Sons	30,240 5 2
Charles Wall	30,047 0 0
Pattinson & Sons	29,852 0 0
H. Lovatt	29,844 0 0
Kirk & Randall, Woolwich*	29,434 0 0

PAIGNTON (Devon).—For alterations and additions to stables at "Primley," for Mr. H. C. Belfield. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton :—

G. Webber	£1,375	E. Westlake	£1,230
C. & R. E. Drew	1,350	H. Drew, Paignton*	1,220
Webber & Sons	1,328		

[* Accepted with modifications.]

PAIGNTON (Devon).—For painting and decorative work at "Primley," for Mr. H. C. Belfield. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton :—

Thomas & Co., Paignton* £325

PAIGNTON (Devon).—For formation of new roadway, &c., for the estate of Mr. H. C. Belfield. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton. Quantities by Mr. Vincent Cattermole Brown :—

R. Harris	£495	Webber & Sons	£461
G. Webber	472	H. Drew, Paignton*	445

PAIGNTON (Devon).—For new Sunday-school premises for the Baptist Church. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton :—

Harris & Son, Paignton* £541

[Lowest of four tenders.]

SHEFFIELD.—For University College, Sheffield. Messrs. Gibbs & Flockton, architects, 15, St. James-row, Sheffield :—

	Contract No. 1.	Contract No. 2.	Total.
W. Hopkins	£36,500	£19,000	£105,500
G. Carr	62,910	7,700	70,610
Willcock & Co.	60,500	7,500	68,000
Hutchinson & Son	57,100	10,690	67,790
Hodson & Son	56 225	9,374	65,599
Roper & Sons	55,644	9,451	65,095
Armitage & Hodgson	57,272	7,109	64,781
Eshelby & Son	57,850	6,503	64,300
Dawson & Jones	56,850	6,520	63,370
Longden & Son, Ltd.	55,403	6,139	61,542
Ash, Son, & Biggin	55,200	5,980	61,180
Watt Brothers	55 000	6,063	61,063
Shillito & Son	58,000	3,000	61,000
Jas. Fidler, Sheffield, and Eckington*	53,800	6,700	60,500

SHILLELAGH (Ireland).—For the erection of labourers' dwellings, for the Rural District Council. Mr. J. J. O. Ramsay, architect, Dunlavin, co. Wicklow. Quantities by architect :—

No. of Dwellings.		
1	M. Connolly, Kilquiggin, Coolkenno*	£150
4	K. Doyle, Ballingate, Carnew,*	[£133,, £134 10s., £138, and £149
2	M. McCrea, Knocknalow, Clohamon,*	[£138 and £148
1	R. Carey, Coolroe, Tinahely*	£150
2	P. Neill, Knocheen, Coolkenno,*	[£150 each.
1	J. Cleary, Curravanish, Tinahely*	£140
2	J. Kennedy, Whiterock, Tinahely,*	[£145 and £150.
1	P. Doyle, Toberpatrick, Tinahely*	£150
14		

[Fences, entrance-gates, and out offices included in all cases, as well as dwellings.]

TEIGNMOUTH (Devon).—For new congregational schools. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton :—

G. H. Marsball	£3,530 0	F. C. Francis	£1,795 0
S. Blatchford	1,850 0	E. Andrews	1,750 10
J. Mumford	1,849 0	J. J. Hayman, Teignmouth*	1,7
H. Mills	1,815 0		

TEIGNMOUTH (Devon).—For dwelling house Crosspark for Mr. S. Lane. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton :—

F. C. Francis, Teignmouth* £490

[Lowest of four tenders.]

TORQUAY (Devon).—For new steam bakery premises for the Torquay Co-operative Society, Ltd., Central Premises, Union-street. Messrs. Bridgman & Bridgman, architects, Torquay and Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton :—

John Mumford, Torquay. At schedule prices.*

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following lists of tenders. Mr. T. J. Bailey is the Board's Architect :—

GLENISTER-ROAD.—School for mentally defective children—Three classrooms for 20 each, with power of extension, by one 20 classroom and enclosing, draining, and tar-paving the additional land :—

Turnbull & Son	£3,447	Greenwood, Ltd.	£3,014
Lawrance & Sons	3,342	Garrett & Son	3,001
Smith & Sons, Ltd.	3,253	J. & C. Bowyer	2,933
Akers & Co.	3,141	T. D. Lelig	2,968
Wallis & Sons	3,139	Rice & Son	2,897
Johnson & Co.	3,102	Martin, Wells, & Co., Ltd., London and Aldershot*	2,832
Treasure & Son	3,101		
Bulled & Co.	3,091		
F. & H. F. Higgs	3,088		

[*See also next page.*

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KNAPP-ROAD.—New school—Accommodation: Boys', 322; girls', 322; infants', 324—total, 968. Graded school on three stories, with playground for girls on roof. Halls: Boys', 50 ft. by 26 ft.; girls', 50 ft. by 26 ft.; infants', 50 ft. by 26 ft. Classrooms: Boys', 50, 48, 48, 48, 48, 40, 40; girls', 50, 48, 48, 48, 48, 40, 40; infants', 50, 50, 48, 48, 48, 40, 40. Drawing classroom, 61 ft. area; Science room, 618 ft. area (separate building in playground). Heating by low-pressure hot-water apparatus and open fires. House on west of site to be adapted for schoolkeeper:—

McCormick & Sons	£22,907	0	0	J. & M. Patrick	£21,663	0	0
John Greenwood, Ltd.	22,626	0	0	A. Porter	21,852	0	0
Johnson & Co.	22,547	9	8	Lawrance & Sons	21,744	0	0
F. & F. J. Wood	22,494	0	0	W. Downs	21,697	0	0
Perry & Co.	22,478	0	0	Smith & Sons, Ltd.	21,652	0	0
Macey & Sons, Ltd.	22,377	0	0	Munday & Sons	21,479	0	0
Longley & Co.	22,289	0	0	Gregar & Son	20,990	0	0
Grover & Son	22,272	0	0	Treasure & Son, London and Shrewsbury*	20,942	0	0
Shurmur & Sons, Ltd.	22,176	0	0				

"SPRINGFIELD."—Altering position of partitions and providing an additional glazed partition in order to redivide classrooms C, D and E into four rooms; reversing stepping, providing stoves, and rearranging doorways, &c. Replacing the old stoves in end classrooms with open-fire portable stoves and providing new Tobin tubes, &c.:—

Hooper & Son	£1,100	0		E. Triggs	£999	0
Bulled & Co.	1,041	0		W. Hammond	995	0
H. Bouneau	1,016	9		Garrett & Son	975	0
F. & H. F. Higgs	1,015	0		W. Downs*	933	0

WORDSWORTH-ROAD.—Providing and fixing a complete low-pressure hot-water apparatus and additional boiler for warming classrooms:—

Rosser & Russell, Ltd.	£866	10		Mather & Platt, Ltd.	£707	0
Wippell Bros. & Row	850	0		Duffield & Sons	700	0
J. & F. May	820	0		G. & E. Bradley	691	0
J. Grundy	760	0		G. Davis	682	0
The Brightside Foundry and Engineering Co., Ltd.	759	0		Turner & Co.*	679	0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) is given as a supplement with this issue

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence, will be ready on the 22nd inst.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under ..... 6s. 0d.
Each additional line ..... 1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

FOUR lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

B. NOWELL & CO.
STONE MERCHANTS & CONTRACTORS.
Chief Office.—*Warwick Road, KENSINGTON.*
Norway, Guernsey, and Leicestershire Granite, Kerb, Pitching, and Yorkshire Stone.
ESTIMATES GIVEN FOR EVERY DESCRIPTION OF ROAD MAKING.

W. H. Lascelles & Co.,
121, BUNHILL ROW, LONDON, E.C.
Telephone No. 1365, London Wall.
HIGH-CLASS JOINERY,
LASCELLES' CONCRETE.
Architects' Designs are carried out with the greatest care.
CONSERVATORIES,
GREENHOUSES,
WOODEN BUILDINGS,
Bank, Office, & Shop Fittings.
CHURCH BENCHES & PULPITS.
ESTIMATES GIVEN ON APPLICATION.

SPECIALITIES
FOR
Architects, Engineers, Surveyors, Builders, and all users of Drawing Materials.
TRACING PAPERS
(Every make, English and Foreign, of any reputation),
TRACING CLOTHS,
DRAWING PAPERS,
SENSITIZED PAPERS, SUN COPIES, &c.
Catalogue and 3 Sample Books on application to
The Architects and Engineers' Supply Association,
74-76, GREAT QUEEN STREET, LONDON, W.C.

THE BATH STONE FIRMS, Ltd.
BATH.
FOR ALL THE PROVED KINDS OF BATH STONE.
FLUATE, for Hardening, Waterproofing, and Preserving Building Materials.

HAM HILL STONE.
DOULTING STONE.
The Ham Hill and Doulting Stone Co.
(incorporating the Ham Hill Stone Co. and C. Trask & Son, The Doulting Stone Co.).
Chief Office:—Norton, Stoke-under-Ham, Somerset.
London Agent:—Mr. E. A. Williams, 16, Craven-street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

SPRAGUE & CO., Ltd.,
PHOTOLITHOGRAPHERS,
4 and 5, East Harding-street, Fetter-lane, E.C.

QUANTITIES, &c., LITHOGRAPHED accurately and with despatch. [Telephone No. 436 Westminster.
METCHIM & SON { 8, PRINCES STREET, S.W. and 32, CLEMENT'S LANE, E.C.
"QUANTITY SURVEYORS' DIARY AND TABLES," For 1903, price 6d. post 7d. In leather 1/- Post 1/1.

BEST BATH STONE.
Original Hartham Park Box Ground & Corsham.
EVERY BLOCK BRANDED WITH OUR REGISTERED TRADE MARK.
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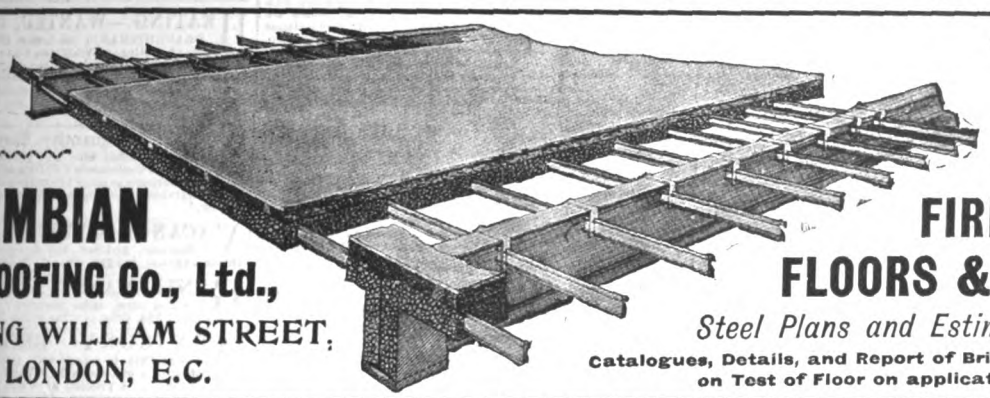

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Dated 4th July, 1903.

W. R. MILLAR & SONS,
No. 53, Borough High-street,
Southwark.
Solicitors for the Administration of the late Walter Hawker.

WILLIAM WHITE deceased. Pursuant to the Statute 22 and 23 Victoria Chapter 35. Notice is hereby given that all CREDITORS and other persons having any debts claims or demands against the Estate of WILLIAM WHITE late of 30A Wimpole-street, and of Gayton-road Hampstead in the County of Middlesex Esquire Architect who died on the 22nd January 1900 and whose Will was proved on the 19th day of December 1900 in the Principal Probate Registry of the High Court of Justice by the Right Honorable William Earl of Stamford of 15 St. James-place and Charles Francis Martelli of 10 Staple Inn both in the County of Middlesex the Executors therein named are hereby required to send particulars in writing of their debts claims or demands to me the undersigned Solicitor for the said Executors on or before the 12th day of August 1903 after which day the said Executors will proceed to distribute the estate of the said deceased having regard only to the claims of which they shall have had notice and that they will not be liable for the assets or any part thereof so distributed to any person or persons of whose debt claim or demand they shall not then have had notice

Dated this 3rd day of July, 1903

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No canvassing permitted.

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Clerk of the Asylums Committee.

Asylums Committee Office,
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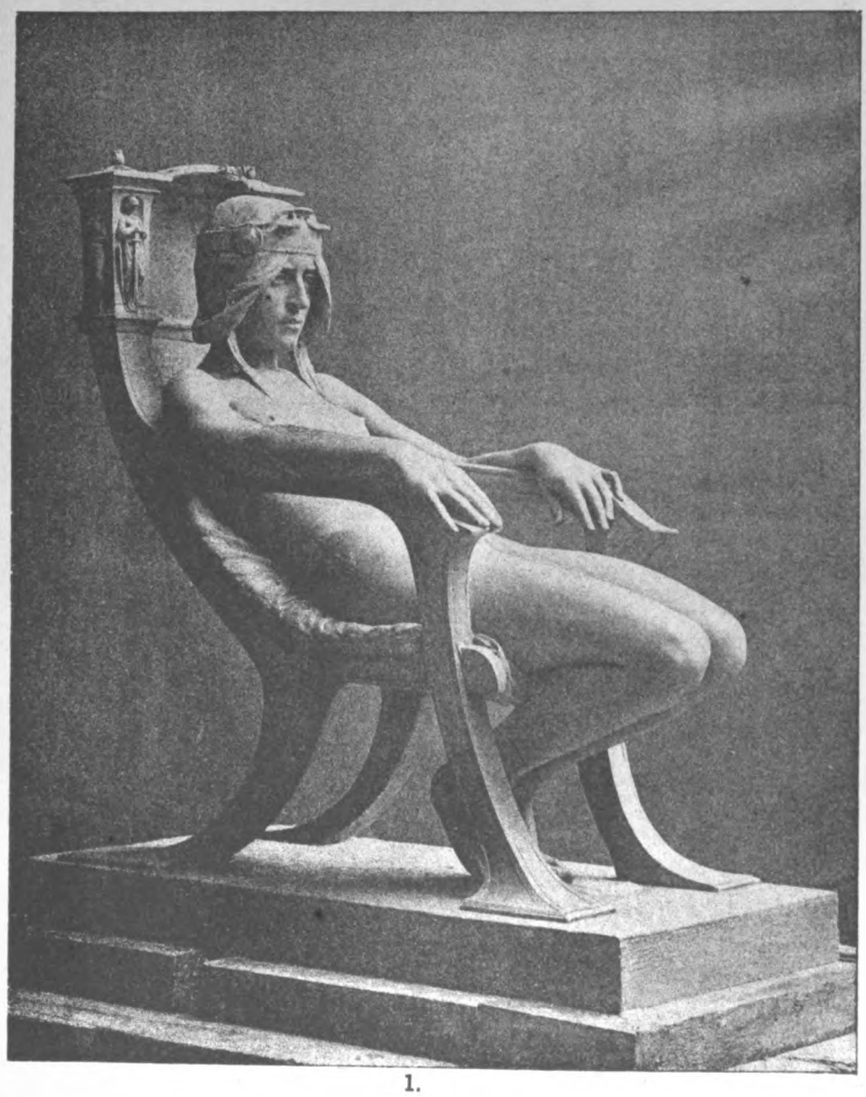

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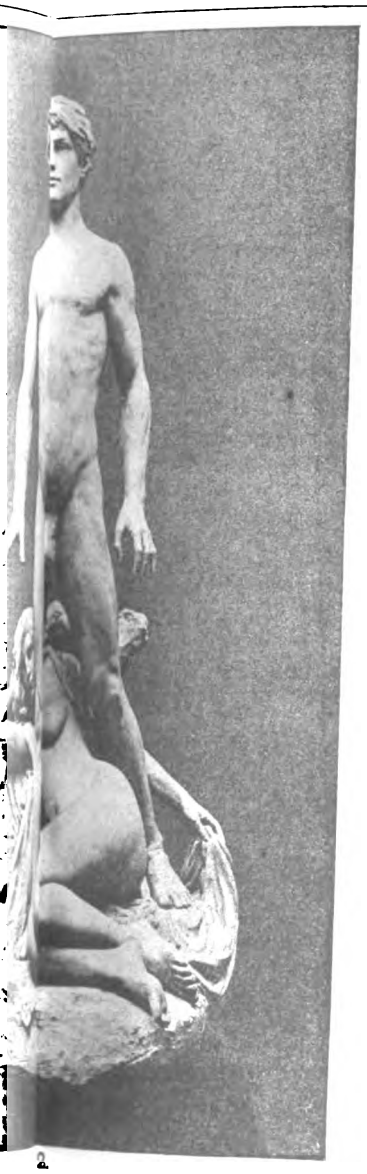

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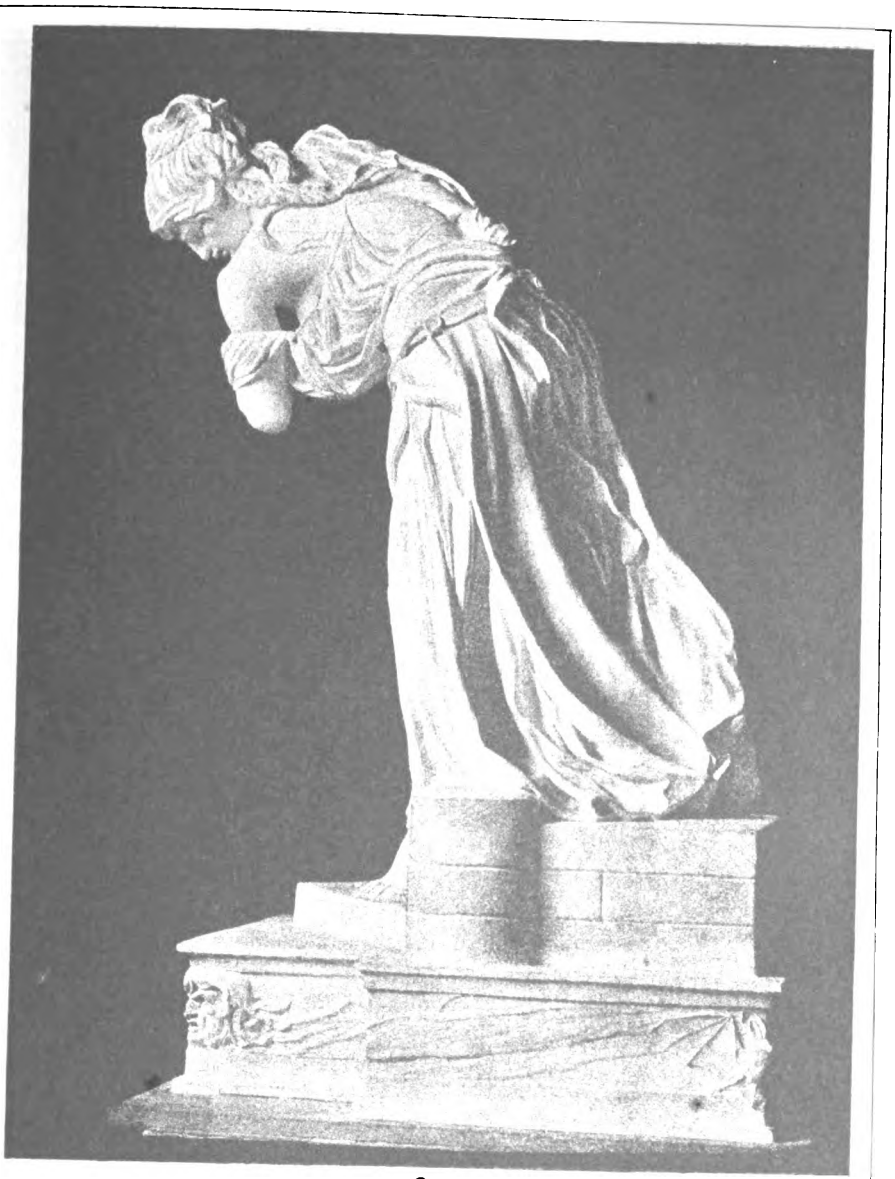

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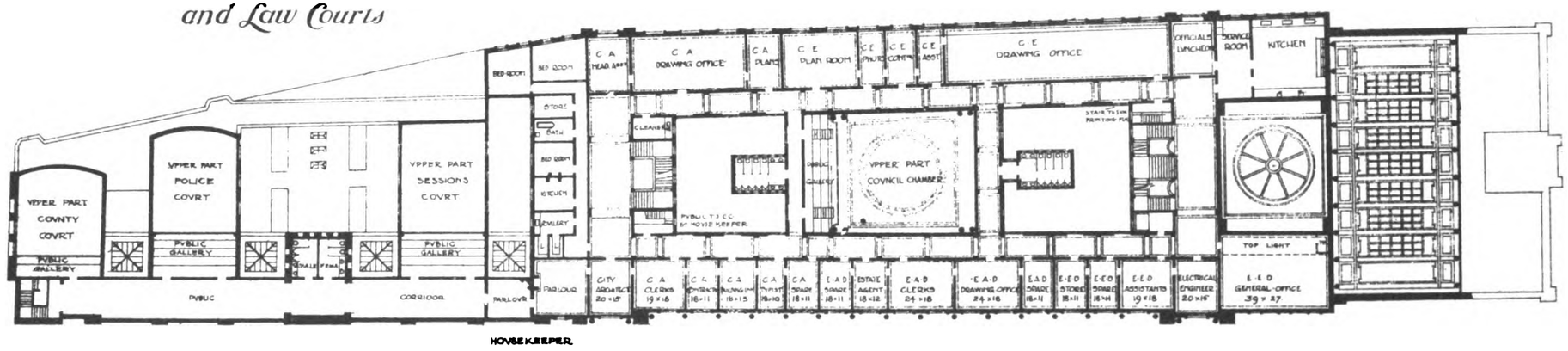

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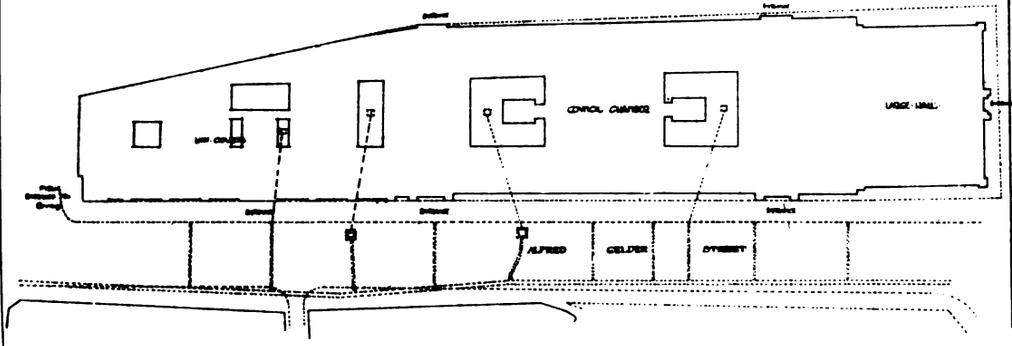

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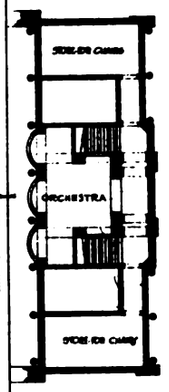

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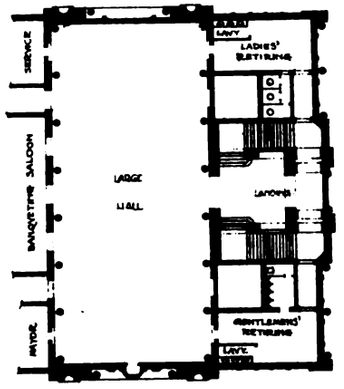

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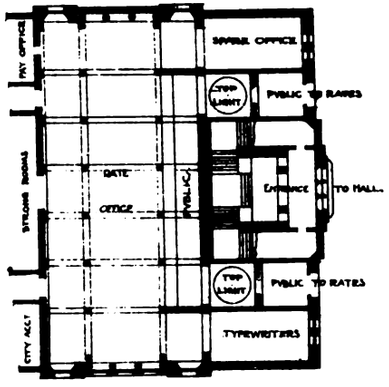

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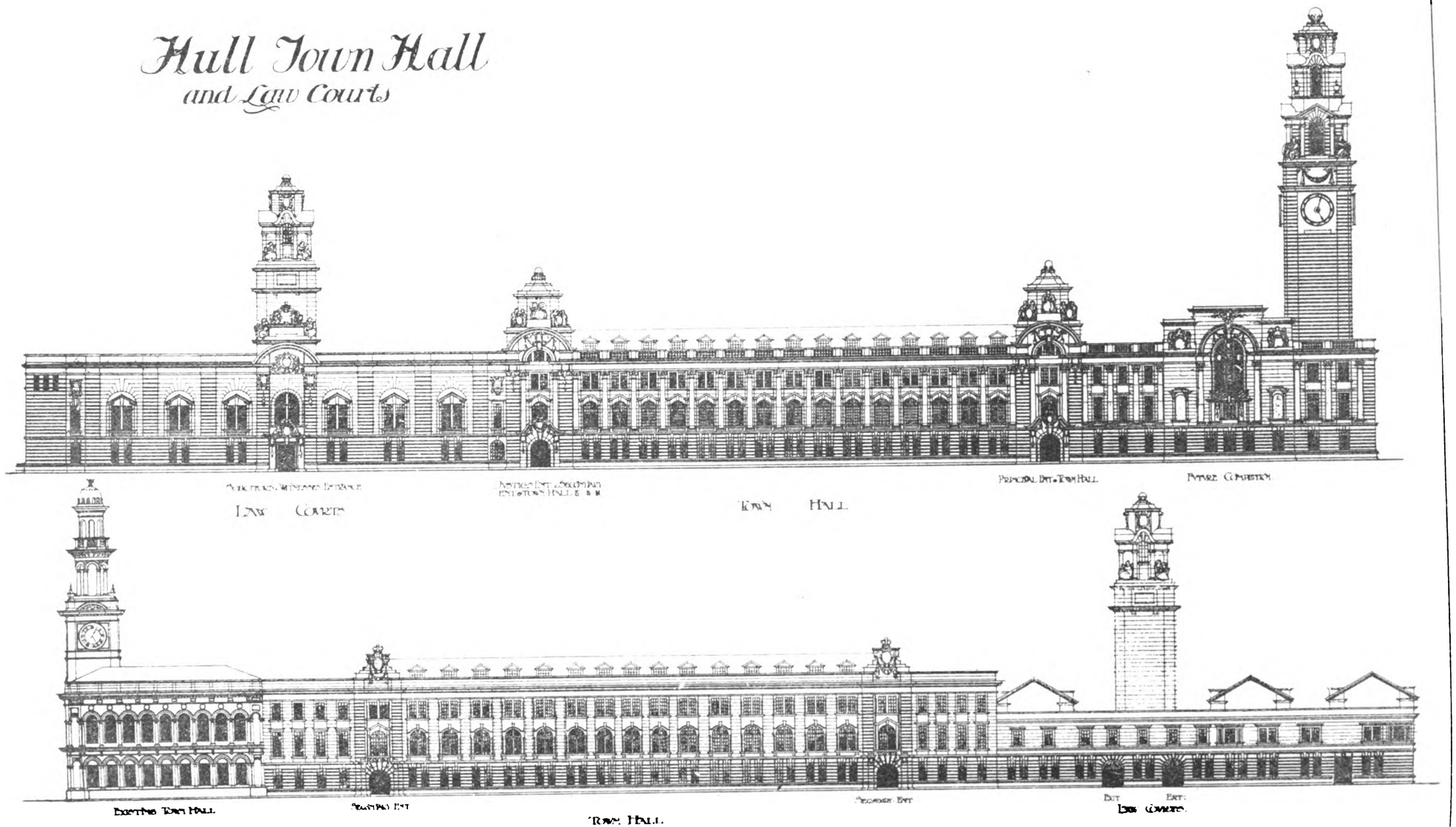

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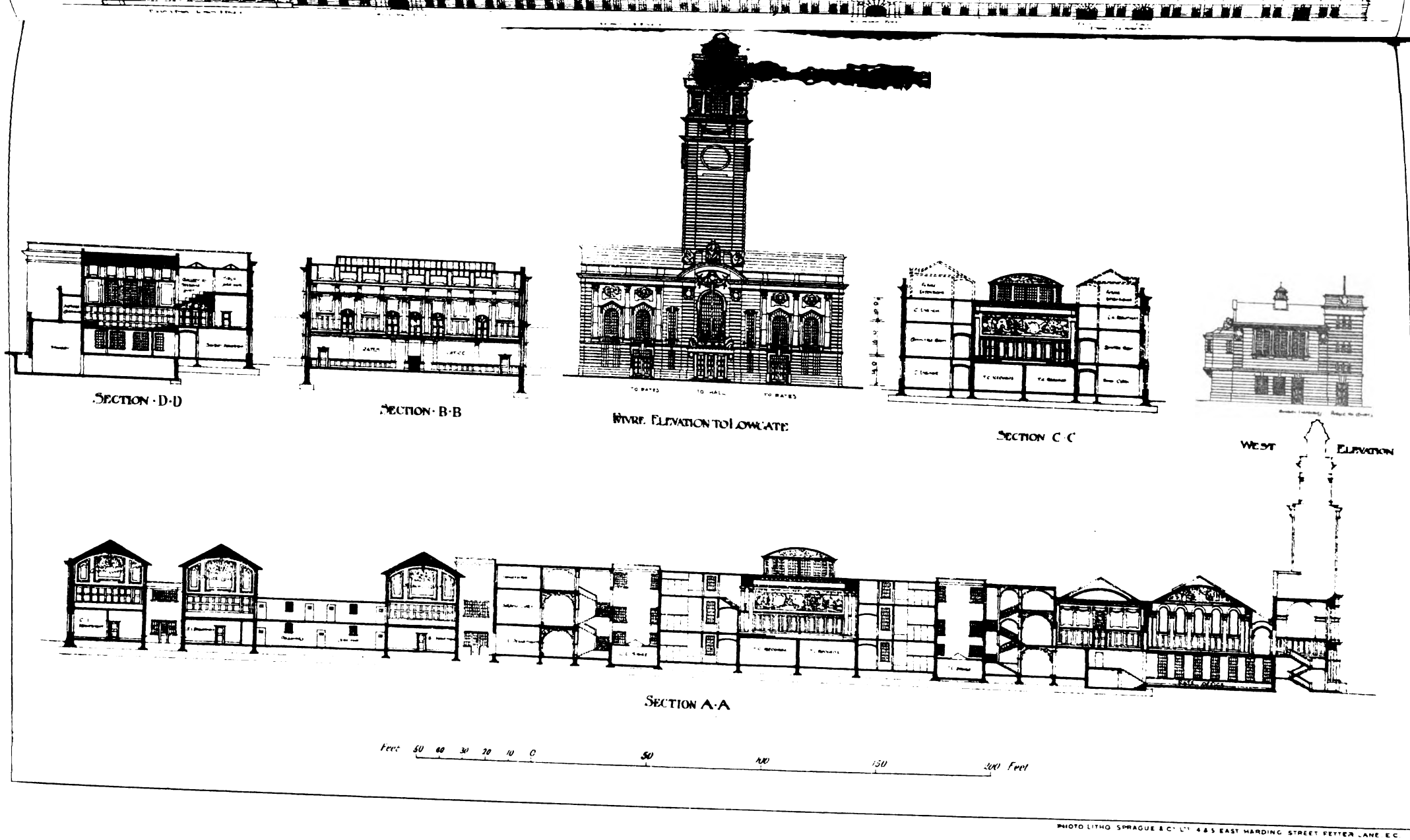

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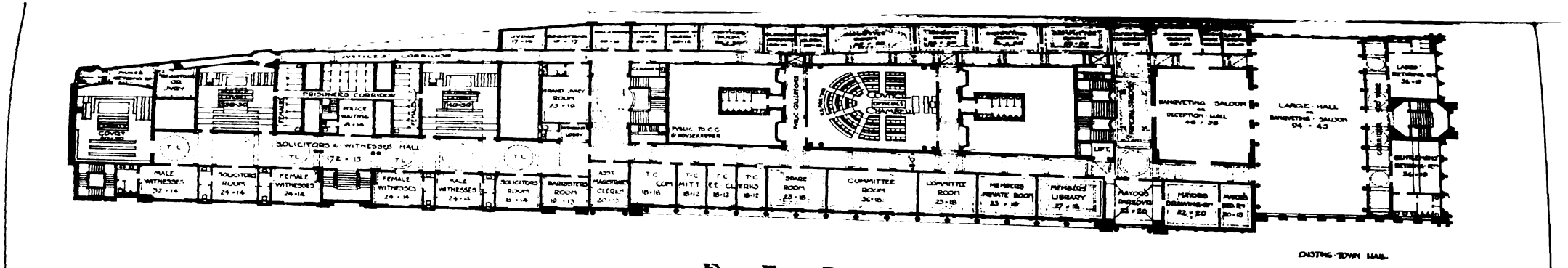

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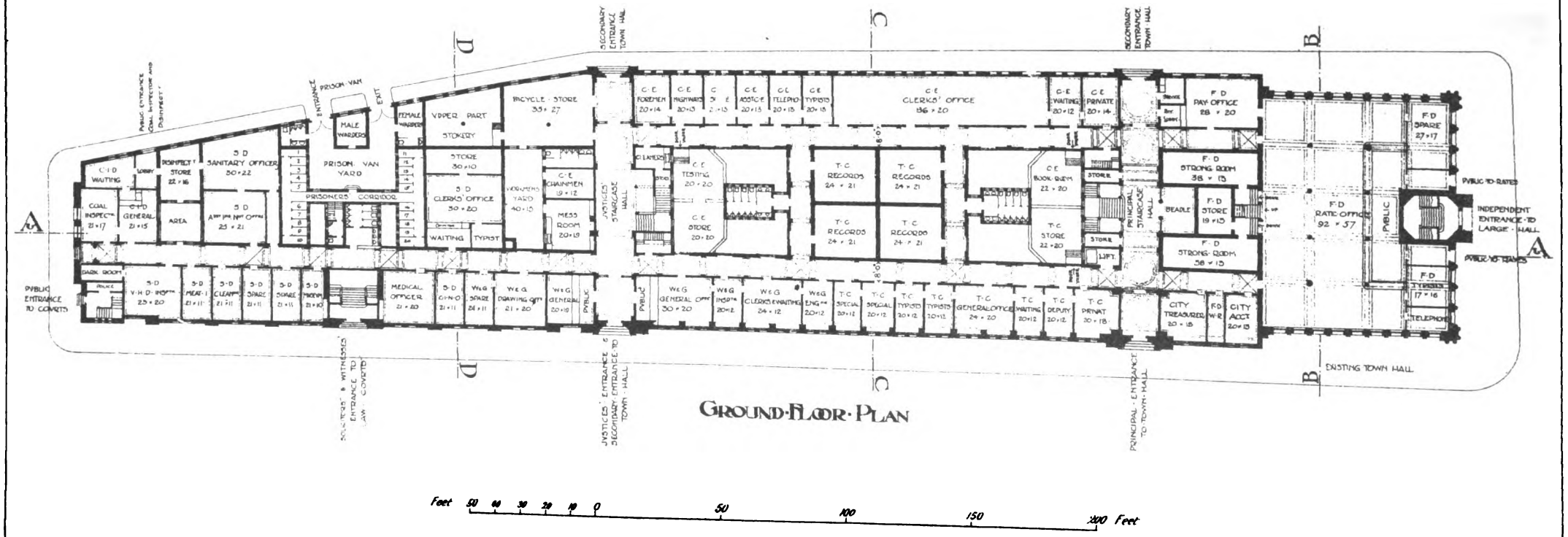

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The Builder.

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The Church of St. Mary, Odiham, Hants.

THE history of the ancient market town of Odiham, Hampshire, yet remains to be written; but from its former importance it might naturally be expected that we should find at Odiham one of the more stately church fabrics of the county. This district, where there is a complete dearth of local building stone, where the surface flints are less in size and more sparsely distributed than in East Anglia, where there was no water of sufficient depth to serve for carriage, and where the old sparse population was purely agricultural amid forest clearings, is distinguished by the smallness of most of its village churches and the poverty of the material of which they are often composed; though this does not prevent the occasional occurrence of architectural gems such as the small Norman chancel arch of Winchfield, or the beauties and curious arrangement of the later woodwork. But Odiham is a striking exception to all this, and gives obvious proof of extensive church building in squared and well-sculptured stone at successive important architectural periods.

The parish of Odiham is still one of great extent, covering over 7,000 acres, and stretching about three miles in each direction from the little town in its centre, except towards Greywell on the west. It comprises, in addition to the town, the five tithings or hamlets, of Hillside, North Warnborough, Murrell, Rye, and Stapely. Odiham must have been an important centre of Christianised Wessex—a fact that lends credit to the tradition that here stood a palace of the Wessex kings—for the original bounds of the great sparsely-populated parish were far larger, and the more distant parts were gradually formed into separate divisions as they dropped off from the parent stem. As late as 1650, the comprehensive Parliamentary survey showed that Rotherwick, more than four miles distant to the north-west—Weston Patrick, more than four miles distant to the south-west, as well as the yet more distant Liss—even then recognised the ecclesiastical supremacy of Odiham, though in a civil sense long independent.

The earlier Norman kings had here a residential stronghold, and Odiham Castle was not infrequently occupied by the ubiquitous John, by whose name the remains of the castle are still usually known. At the time of the Domesday survey, Odiham had two churches; one of them was probably the small church of St. Mary at Greywell, about a mile and a half to the west, and the other, the church of All Saints in the centre of the the town, which must have been a kind of minster church to the surrounding district.

Henry II. gave the church and rectory of Odiham to the Canons of Salisbury as an endowment for their chancellor. The patronage of the vicarage remained with the Chancellor of Salisbury until 1857, when it was transferred to the Bishop of Winchester. The position of Chancellor of Salisbury, after its emoluments had been so materially increased by the royal gift of the rectory of the widespread parish of Odiham, became one of considerable importance, and was held by various persons of distinction. Baldwin, who became Bishop of Worcester in 1180, and Archbishop of Canterbury in 1184, was one of the earliest Chancellors of Salisbury who was also rector of Odiham. It was probably chiefly owing to the successive rectors of Odiham that the fabric of this large church was sustained. The taxation roll of 1291 gives the annual value of this rectory as 66*l.* 13*s.* 4*d.*; there were only four other benefices in the county of higher value. The resident vicar of Odiham only obtained 8*l.* a year. By degrees the rectory emoluments lessened as outlying districts became definite parishes, and the vicar's stipened increased, so that when the "Valor Ecclesiasticus" of 1535 was drawn up, it was found that the Chancellor of Salisbury only obtained 34*l.* from the rectories of Odiham, Rotherwick, and Weston Patrick, whilst the vicarage of Odiham was then worth 23*l.* 19*s.* 4*d.*

Ralph of York, who was Chancellor of Salisbury from 1288 to 1309, was impeded and ejected in the year 1303, by Philip Marmian, bailiff of Odiham, acting under Hugh le Despenser, keeper of the castle and manor of Odiham, from his rights of common pasture there, which formed an important part of the benefice. From that date until 1333 the rectors lost those privileges, but in the latter year Chancellor Richard de Ayremyn, a powerful man at Court, obtained legal redress. The jury, on inquisition, found that the parsons of the church of Odiham, from time out of mind up to 1303, had the right of common for pigs without number in all the fields, in all the arable demesne lands, both stubble and fallow, and in the wood of Whitemondsley and pasture of Holmhurst throughout the whole manor; and also the right of common in that wood and pasture for all manner of horses, mares, oxen, cows, heifers, young oxen, and calves, without measurement of pasture and without number.

The position of Rector of Odiham in conjunction with the Chancellorship of Salisbury was from time to time held by a series of more or less distinguished prelates, including three Archbishops of Canterbury, one Archbishop of York, two Bishops of Chichester, as well as Bishops of Worcester, Carlisle, and Ferns. Simon Sudbury, a favourite envoy of both Pope and King, was rector from 1360 to 1362, when he was consecrated Bishop of London; he was translated to Canterbury in 1375, retaining the primacy until his death through mob violence in 1381. Henry Chicheley and John Stafford, who, were successive Archbishops of Canterbury from 1414 to 1452, also began their respective careers by holding the benifice of Odiham.

The church stands back from the main street of Odiham, that flanks the two sides of the highway, on the rising ground to the south of the town. On its north side is a space called the Berry, or Bury, the undoubted centre of the town, where the stocks and whipping-post still remain. Various old footpaths from the distant parts of the parish converge on the west end of the churchyard. There is no part of the present up-

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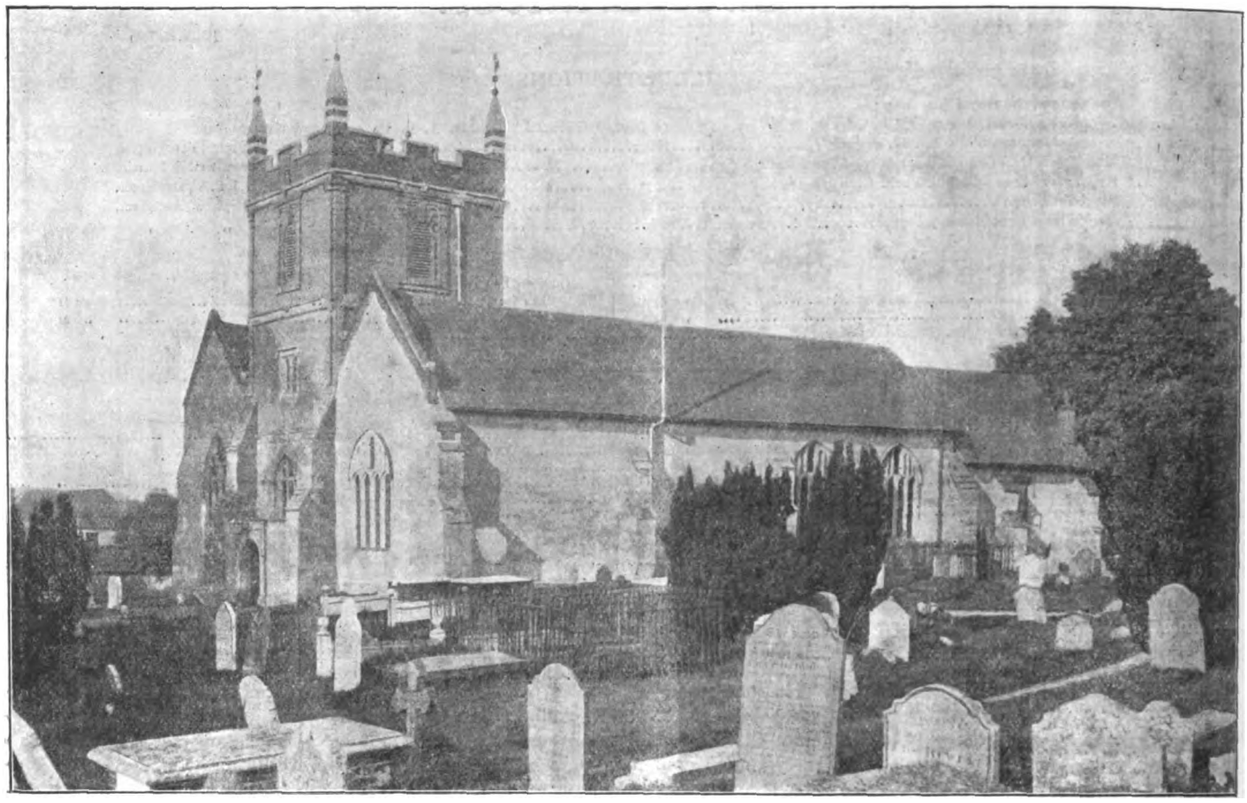
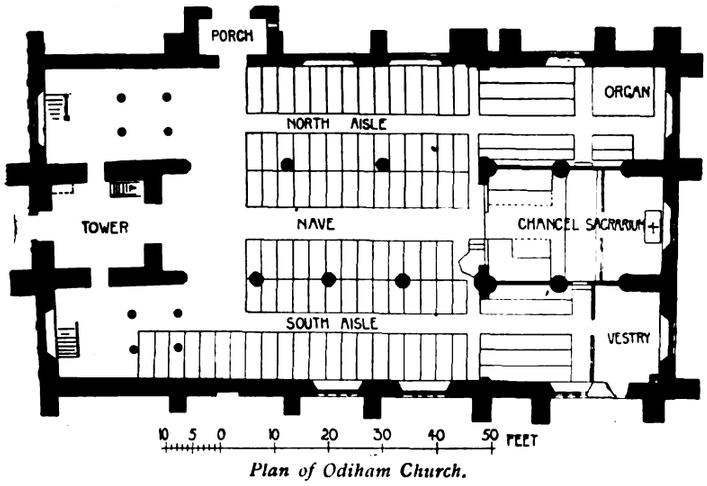


Odiham Church: Exterior.



Plan of Odiham Church.

standing fabric that pertains to the Norman period, but careful examination reveals a variety of moulded stones that tell of a church of that date. Portions of Norman jamb-shafts, &c., may be noticed worked up in the lower part of the buttress to the south side of the west door, and in various places amid the rough walling on the south side of the church. The capital of a small Norman shaft, found during the recent repairs, is now on the floor of the tower within the church. There is also an interesting Norman piscina shaft, with square drain in the capital, on the south side of the chancel; but it must have been moved here, as the walling round it is not Norman.

The present church of St. Mary consists of chancel with side chapels, nave without aisles, north porch, and west tower standing within the west bay of the nave. The ground plan forms a complete parallelogram, measuring 120 ft. by 64 ft., save for the slight projection of the shallow north porch. It is fairly obvious that the comparatively small Norman church was enlarged in the thirteenth century by the rebuilding of the chancel, with aisles or chapels on either side, and by the addition of a western tower. Of the latter, the lofty, narrow arch, with plain jambs and impost mouldings, that opens into the present tower from the nave, is all that remains. The low arcades of the pointed arches, supported on circular pillars and pilasters, on each side of the chancel, are also of Henry III. date.

To this period, too, belongs the remarkable font to which attention has often been directed. Round the circular bowl runs the inscription from the Vulgate, with the usual contractions—"Auxilium meum a Domino qui fecit celum et terram" (Ps. cxxi., 2). The lettering is in raised letters of a bold and slightly ornamental style of "black letter"; this kind of text is very exceptional for thirteenth-century work, and the suggestion that the lettering was done at a later date may possibly be correct. The character and method of this inscription is unique in English fonts, but its special peculiarity remains to be noticed. From the upper part of the bowl there is a bracket-like projection, in the top of which is an oblong hollow measuring 5 in. by 3½ in. This hollow has sloping sides, and is 1½ in. deep. At each end is a circular hole which is carried through the stonework at an acute angle, terminating in similar small holes lower down on the outer surface of the bracket. There have been various surmises as to the original use or intention of this bracket. Of late years it has been generally maintained that it was to serve for baptism by affusion. The usual old rubrics of the baptismal office of the Western Church ordained that when the infant was baptised by affusion the surplus water was not to be allowed to return into the font or compartment of the font wherein was the consecrated water, but that a vessel was to be provided to receive the water running off the head of the recipient. This is the explanation of the bequests of silver basins for the fonts that are occasionally met with in English mediæval wills. The general modern Roman use is to have the font divided into two parts for this purpose, each with its own drain running into the earth. In cases where this is not provided, it is usual for a server to hold a basin beneath the child's head. In several churches of Brittany and Normandy, as well as in the museums of Rouen and other towns in the north of France, are early fonts with side projections for this purpose. But in all these cases such projections have wide circular basins at the top and are continued down to the base of the font or floor level, being provided with a drain communicating with the soil or ground beneath. In the case of Odiham, however, the shallow,

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Odiham Church: Interior.

small, oblong hollow is obviously quite unfitted for any such purpose, and if a little water is poured in, it trickles down the outside of the font in two directions after a fashion that would make its retention in any vessel placed on the ground an impossibility. It is just possible that the Odiham projection may have served to affix a movable bracket upon which a basin could rest; but this is improbable, for in that case the holes in the hollow would have been straight so as to readily permit of the fixing and unfixing of such a convenience. This may have been the use for the slighter projection, with straight holes and no depression, on the rim of the font of Pitsford, Northamptonshire. The curious circular projection or small stone basin protruding from the Norman font of Youlgrave, Derbyshire, has no drain, and doubtless served to hold a movable basin. The Odiham bracket could have had no connexion with the chrysmatory for the holy oils used at baptism, for the mediæval chrysmatory was of very small dimensions, and held in the hand of a server. On the whole by far the most likely use for this bracket was to serve as a support for the hinges of a font-cover of unusual solidity of structure.

The church was rebuilt on a large and extended scale in the second half of the fourteenth century. It is probable that Archbishop Sudbury was the benefactor who found the funds for this object. Simon Sudbury, a man of comparatively humble origin, when he attained to affluence, showed a generous disposition, and was particularly given to building operations. Not only did he leave the stamp of his name written large on the fabric of his cathedral church, and showed himself a considerable benefactor to the walls of Canterbury City, but he rebuilt the church of his native place of Sudbury, Suffolk. The plan that was adopted for the improvement and enlargement of Odiham church towards the end of the reign of Edward III. provided for the entire reconstruction of the nave, with new aisles and arcades, and for the enlargement of the choir chapel, though in the latter case the arcades of the previous century were retained. The plan also involved the extension of the nave by a bay to the west, and doubtless included the idea of a new tower of the more recent style to the west of the nave. But meanwhile the tower of the previous century was left standing, for the continuous service of the bells, &c., whilst the building went on to the north and south of it. Eventually it would seem that funds fell short, or some other obstacle intervened; at all events, the tower project was abandoned, and the church became a great parallelogram, with choir aisles flush with the choir at the east end, and a tower at the west end standing up within the nave, with aisle continuations on its north and south sides. The arcade that separates the north aisle from the nave is of lofty and exceptionally wide, round-headed arches, supported on exceptionally slender octagon pillars with plainly moulded capitals of fourteenth-century date. Similar wide, round-headed arches springing from like pilasters form the entrances from the nave into the choir chapels. The north arcade looks almost daring in its construction to bear the thrust of the wide, high-pitched roof of the nave; although, like all the Hampshire churches of this district (save the early one at Crondall), Odiham is destitute of clearstories.

The windows of the north aisle, and the three windows of the three east gables of the church, are all of fourteenth-century design, though the tracery has been for the most part renewed. Several of the buttresses, though mended at later dates with brick and in other fashions, were clearly originally of that date.

Font, Odiham Church.

Careful observation establishes the fact that the south arcade of the nave originally corresponded with that of the north. It is probable that the slender construction of the arcade, on the side of the church where the pressure would be greatest owing to the considerable slope of the ground, brought about its downfall or rendered it unstable. At all events it was renewed in good workmanship, with four-clustered columns, after the fashion of the latter half of the fifteenth century. The contrast that this arcade offers to the one on the north, though of like height, gives a certain piquancy to the interior of the church which would be lacking if they were both uniform. To the same period belong the windows of this aisle, though now filled with poor imitative tracery of nineteenth-century date. Later in the same style, *circa* 1500, a continuous rood-screen was evidently thrown

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across the chancel arch and the two side arches; a projecting turret staircase for the rood-loft stairs being constructed on the north side. To this date belong the north doorway of the church, with its well-carved spandrels, the now blocked-up and somewhat plainer south doorway, a good deal of rebuilding of the lower stages of the west front of the tower, and well-turned doorway of brickwork into the north choir chapel.

The recent restoration of this church also brought to light the traces of another work of Tudor times. In the east wall of the chancel, immediately to the south of the high altar, a wide built-up doorway was found, and on the exterior, when the rough cast was removed, the exact dimensions of a late priests' vestry were disclosed against the wall; it was 12 ft. in width, and extended a little way under the east window of the south chapel.

It is not often that English church fabrics owe much, if anything, to the Commonwealth period; but in this district of Hampshire there was much wholesome energy during that epoch in good brick-work. A few miles to the west of Odiham is the well-known effective church brickwork of Basing, wrought in that period; whilst a few miles to the east is the substantial brick tower of Crondall church, of a like date. But the tower of Odiham, rising from work of a different date, and from between the two gables of the aisles, not only surpasses both of those just mentioned in happiness of position, but also in the delicacy and refinement of most unusual classic treatment. He would indeed be a Goth who would pull this down (as was once suggested) to give place to an imitative stone tower of sham Gothic. Excellent brickmaking clay is a natural product of the parish and district, and it is of much interest to find in this diversified building to what good purpose builders of those troublous days could use the material that was ready at hand. At the same time the gables on each side of the tower, which was built in 1647, were repaired and edged after a comely fashion in similar red brick.

The interior of the church is of somewhat impressive proportions, but the great semicircular arches into the choir chapels, and the lack of capitals to the spring of the chancel arch, present a rather barren effect, and seem to demand the screenwork which was swept away either at the Reformation or at some later date. There are screens in the arcades between quire and quire chapels; that on the north side being mainly of rather poor fifteenth century work. Some also of the screenwork and beams used to divide off a vestry at the east end of the south chapel seem to be of pre-Reformation workmanship.

But this church possesses interesting and good examples in its woodwork of the Laudian revival of decency and comeliness in church fittings that took no small hold in Hampshire. In the western recessed bays of the nave, on each side of the tower, are remarkably good balustraded gallery fronts, and the work on the stair rail of each of the staircases against the west wall whereby they are gained is exceptionally effective. Both from their workmanship and the nature of the inscription they bear, these galleries are to be reckoned among the treasures of Odiham church. In the first instance, these now separated galleries seem to have formed part of one continuous west gallery which was set back, and a portion removed to give way to a new centre west gallery in 1836. Below the rearranged fronts of the now two west galleries is the following inscription in raised capital letters, the break of the tower occurring (quaintly enough) actually in the middle of the date 16—32:—"Rivers Smith gave forty shillings. John Kerye and Richard Flory, Churchwardens, 1632. Alex. Sandon Serle gave al the balusters not of wealth but of good will that others." . . . The sudden break in the inscription is the result of the 1836 destruction of part of the gallery. The pulpit is a particularly handsome example of rich carving of Charles I. time. It has a striking likeness to the equally good pulpit of the neighbouring church of Winchfield; the two are doubtless the work of the same craftsmen. The one at Winchfield bears the date 1634 on the upper ledge. Such pulpits are now well cared for and valued; but it is strange that the incongruity and clashing effect of that always ugly thing, the bright brass sermon-rest, with the accompaniment of bright brass gas or candle standards, are not realised. This beautiful pulpit would look far better with a small untasselled cushion of crimson material as a book rest. Beneath the tower, well within sight, hang the painted arms of Charles II., with "C.R.," and the Restoration date, 1660; they are arranged within the Garter, and below them is the exceptional and timely motto, "Beati Pacifici." This coat-of-arms has been recently cleaned and moved from an impossibly high position at the west end of the nave. Under the tower is another memento of the restoration of the Monarchy and Church Services. A large parish chest has the date 1662 somewhat roughly marked out in nail-heads driven through the lid, together with the initials of the churchwardens. But the general construction of the chest and the somewhat ornamental wrought-iron hinges (not the side clamps, which are later), show that this chest is much older than the nail-head date—possibly by quite two centuries. It had probably been abstracted from the church during the Commonwealth, and brought back in 1662.

A board in the south gallery states that the accommodation in the church was increased in 1836 by the erection of galleries, whereby 250 additional sittings were gained, 150 of which were free, in addition to 877 seats already provided, of which 250 were free. These galleries were a sad disfigurement, and ran right up the side walls of the aisles, though not reaching across to the arcades; and there was also a large west gallery provided immediately under the tower arch. In 1851 the church underwent considerable repairs, when the high pews in the body of the church were removed, and the whole seated much in accordance with some old plain oak seats, *circa* 1500, with panelled ends. Three of these old oak seats remain in the north aisle, but the new ones are of deal. In 1884 three stained glass windows were placed in the three east gables of the church, with the unfortunate result that the window of the chancel or central gable was considerably reduced in size, apparently to fit the design.

For a church of this size and former importance there is rather a dearth of monuments, and none of any architectural importance. There are a variety of brasses of small dimensions, all of which are now affixed to the walls. Two of them are to the north of the chancel arch facing the nave, and the rest in a dreary row against the north wall of the north chapel. The oldest dated brass has the effigy of William Goode, a priest who died in 1498, holding two very distant benefices, the vicarage of Ponteland, Northumberland, and the rectory of Dogmersfield, which is an adjacent parish to Odiham. The Hampshire Church Notes of the antiquary, William Pavey (now in the British Museum), who visited Odiham in 1702, show that several monuments have disappeared since that date.

In 1897 a restoration of this church was begun under the energetic control of the present Vicar, the Rev. W. J. Windle, Messrs. Colson, Farrow, and Nisbet being the architects. Certain improvements were first of all effected at the west front of the church, and particularly at the west entrance. The restored doorway is after the fashion of the north Tudor entrance, but its date is rightly expressly declared by "V.R." and "1897" in the spandrels. A wholly good part of this restoration was the clearing away of the disfiguring 1836 galleries, whereby the two parts of the 1632 gallery were brought into their rightful prominence.

The entire exterior of the church had been coated with rough-cast, which had got into a deplorable and fragmentary condition. All this has now been removed, and the walls left throughout in a substantial state of repair, without any attempt after uniformity of appearance. The result is the exposing of an extraordinary variety of patchwork material—large patches of undressed and dressed flints roughly embedded in mortar—and considerable repairs in brickwork are intermixed, not only with quoins and buttresses, and window-frames of stone ashlar, but with many blocks of chiselled or moulded stones that have formed part of the previous fabrics. The patchwork effect is particularly noticeable on the south side, where there is a considerable stretch of blank walling owing to the filling up of the south doorway and of the large window of the western bay of that aisle. Here, amongst other previously-used stones of different dates, and coming from at least four different and distant quarries, may be noticed one that must have formed part of the original south arcade of fourteenth-century date, when it harmonised with the arcade on the north. The whole exterior of the church is, indeed, a kind of kaleidescope puzzle of fragments that vary in form, age, and colouring. Such surfaces were not, of course, intended to have their anatomy exposed, and from certain standpoints it would assuredly have been better to have renewed the rough cast. Nevertheless, the treatment that the outer fabric has received will delight the artist, particularly after a little more weathering has passed over it, and will also afford unfailing interest to the ecclesiologist.

The red tiling of the triple-gabled roofs of the church and chancel is delightfully varied in tints and shadings, those of the chancel on the south side being much enriched with golden lichen.

There is no special dignity or touch of grandeur in the church of Odiham, nor can it lay claim to the possession of any striking or graceful architectural feature; but the artist and the lover of

"The time-worn churches of our native land"

cannot fail to take delight in a fabric so

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redolent of the labours of past centuries, which are here blended in harmonious confusion. It would be difficult to find a more picturesque or beautiful view of any English church of no particular magnitude than that which can be gained from a south-west aspect of this church, from the further end of the churchyard, when the afternoon sun is lighting up the grey red-edged gables and flickering through the trees on the warm tints and shadows of the Classic brickwork of the tower.

The exterior photograph, taken before the removal of the rough-casting, hardly represents the present effect of the church.

NOTES.

The National Trust Meeting.

THE annual meeting of the National Trust was held on Friday the 10th in the lecture-room at the United Service Institution; a room architecturally very pleasing but, from its unbroken semi-circular wall opposite the platform, not very well adapted for speaking. The Princess Louise, who is the President of the Trust, occupied the chair. The resolutions to be moved were merely formal, but they afforded the opportunity for some effective speeches on the object and work of the Trust, especially those of Sir Robert Hunter and Lord Lytton. The latter speaker dwelt at some length on what we have often commented on—the absolutely antagonistic spirit with which any subject connected with artistic or æsthetic considerations is invariably received in Parliament. The attitude of modern statesmen, he said, towards questions of art and the encouragement of works of art, was painfully in contrast with that which prevailed in the cities of mediæval and Renaissance Italy. He cited a remarkable instance of this, when a private owner at Siena had commenced an exceedingly beautiful palace, which would have been an ornament to the city, but had not funds to complete it, and the municipality created a well-paid sinecure post and appointed him to it, so that, for the adornment of the city, he could complete what he had so well begun. One is very glad to hear some plain speaking on this subject, though there will have to be much more of it before any impression can be made on the average English Parliamentary mind. The meeting was a very successful one in regard to attendance, and no doubt will have had the effect of drawing public attention to the important work which the Trust is doing in preserving for the nation places of beauty and of historic interest. The contents of the Annual Report are summarised on another page.

Strand Improvement.

A COMMITTEE for bringing about what is defined as the "Further Strand Improvement" has forwarded a memorial to the Chairman of the London County Council recommending the adoption of a new line of frontage on the north side of the Strand, as shown in the small plan published in our issue of the 4th inst., along with a letter from Mr. Mark Judge, the hon. secretary of the Committee. The scheme is supported by the President of the Royal Academy, in a letter which is incorporated in the memorial. As now proposed we approve of the alteration, as it preserves the symmetrical laying out of the new streets, which the first proposal, from Mr. Thornycroft, neglected. We may observe however, that the proposal for an "island," planted or otherwise decoratively treated, between the churches of St. Mary-le-Strand and St. Clement Danes, was made many years ago in our columns, and in a much better form, in a plan and drawing by Mr. H. W. Brewer, at the time when the demolition of Holywell-street was first seriously entertained.

Workmen's Compensation.

A SERIOUS difficulty has arisen under the Workmen's Compensation Act by reason of the terms of Section 6. That section enables a workman who has been injured whilst working on the undertaking of his employer by the negligent act of some third party either "to proceed" against his employer for compensation under the Act, or to pursue his remedy for damages against such third person, but not to sue both. The difficulty is to determine what is meant by a "proceeding" under the Workmen's Compensation Act, so as to bar the workman taking his remedy against the third person. Compensation is very often tendered by employers when they receive the notice of accident, and before even the informal claim required by Section 2 has been made; will compensation so accepted debar a workman from proceeding at law against a stranger? Again, if compensation is paid at any stage short of an award, has he "proceeded" under the Act? The House of Lords in the case of Powell *v.* Main Colliery Co. laid it down that the scheme of the Act was to avoid technicalities, and that regular legal proceedings were not within its contemplation; but even from the judgments in that case, it is apparent that the Lords took a divergent view of whether the claims for compensation prescribed by Section 2, formed part of the "proceedings" for the recovery of compensation. The Court of Appeal last week had this question before it in the case of Oliver *v.* Nautilus Steam Shipping Co., where payments had been made by the insurers on behalf of the employers after the receipt of the notice of accident, but after the first payment the workman had only received the money "without prejudice," and the Court held that all the payments must be taken to have been received on this condition, and that hence the workman had not exercised any option under the section, and was consequently not stopped from proceeding at law against the third person. This decision, therefore, carries the matter no further, and the only points at present decided are that if the workman has obtained compensation under an award of an arbitrator he cannot also proceed against another person, and that giving the notice of accident required by Section 2 is not a "proceeding" under the Act.

Erections Causing Smoky Chimneys.

WE recently (April 4) commented on the case of Davis *v.* Town Properties Investment Corporation, in which the plaintiff endeavoured to restrain the assignee of the reversion of his lease from erecting a building so as to cause his chimneys to smoke, relying on a covenant for "quiet enjoyment" in his lease. The main ground of the decision against the plaintiff was that the lessor, at the time of the demise, had no interest in the adjoining property, and no power to restrain any rights of the owner over that property; but in the course of the case the Court of Appeal expressed considerable doubt as to whether, had the ownership of the properties been in the same hands, any such right to the air for the chimneys could be claimed by virtue of this covenant, and consequently a doubt whether the case of Tebb *v.* Cave had been rightly decided. We said we should revert to this latter point when the case of Davis was fully reported, and such a report appears in the "Law Reports" for June. After the doubts expressed by the Court of Appeal, and also the decision in the case of Booth *v.* Alcock, it is clear that no such right can be claimed by virtue of a general covenant in the absence of a special licence or grant. Nor does it appear that a general right to air can be acquired by prescription, and in this respect a distinction occurs between the right to air and the right to light. The reason for this distinction is clearly shown in the cases, in that the right to light is limited to particular windows or apertures, and its acquisition can thus be guarded against by adjoining owners, as it is capable of interruption; but a general claim to air is too vague, and this natural right is qualified by those of adjoining owners. The right to air seems limited to its freedom from contamination, or its necessary access to a particular place; but this latter right must be taken in a limited sense, since the right to air for turning a windmill was held to be too vague and incapable of interruption.

The Worcester Corporation.

IT makes one despair of sanitary improvement by small local bodies when one reads of the judicial censures of an important municipal body like the Corporation of Worcester. This body, through its several members, was this week brought before the King's Bench by the Local Government Board, and writs of attachment were issued against a number of members of the Corporation. The proceedings against the Corporation had begun in 1897, and in the opinion of the Court the Corporation had not taken genuine steps to have a new sewage system carried out. "The story," said Mr. Justice Wills, "was one of the most discreditable which had come to his ears since he had been on the Bench." It is impossible in a short space to go into all the facts. It is sufficient to say that so long ago as 1885 an Act was obtained by the Corporation to dispose of their sewage, and they were given three years in order to carry it into effect, but up to the present time the system was still not begun. It is certainly difficult to understand how the citizens of Worcester, if only for the credit of their town, can allow their representatives to bring their city into discredit, and expose its inhabitants to dangers of disease in a manner which we do not believe would be sanctioned by any other community. We can only hope that good sense will overcome what we suppose is some kind of feeling of antagonism to the pressure of the central Government.

Influence of the Aswan Dam.

WATER held up during the winter months in the Aswan reservoir has now been discharged, and one of the first consequences of the process has been that some of the

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reconstituted hôds, or basins, in the provinces of Asyût and Miniyeh have this year received summer supplies for the first time. Further, it has been found possible to withdraw the restrictions as to the cultivation of rice which were necessary in former years of indifferent flood, with the result that a large area of rice land has this year received water-supplies. The favourable influence of the reservoir is also to be traced in modification of the system of "rotations" and in the unusually early removal of the prohibition against the irrigation of land used for growing maize. As maize is the most important food crop of Egypt, the last mentioned is not the least of the benefits derived from the construction of the Nile reservoir works.

The Wellington Monument. A BRONZED facsimile of Stevens's model for the horse and rider, made for the Wellington monument, has during the past week been erected on the space left at the top of the monument as a pedestal for the equestrian statue. Some parts of the horse seem to have been left in a rather crude state of modelling, but one can judge of the general effect. As might have been expected, the group is quite different from the ordinary commonplace of the military equestrian statue; the attitude both of horse and rider is very characteristic and original; as with all the rest of the monument, there is a kind of stamp of the Italian Renaissance period about it. But we must own that this experiment seems to show that the position is not very suitable for an equestrian statue when the monument has to be seen within a building. The furthest position one can get from it, at the side of the south aisle, is not far enough to properly take in the group as a part of the whole composition, or to see it from the proper point of view. In the middle of an open square it would have been just the thing; and in the middle of the nave of the cathedral it would be far more effective; as it is, the arch comes too close down upon it. There would have been objections of another kind, however, to the central position in the nave; it would have been unsuitable as a matter of sentiment, as giving too prominent a position, in a sacred building, to a monument of distinctly secular type. We are not arguing that the group ought not to be placed on the monument; it was the finish intended by the artist, and the monument is palpably incomplete without it; but one cannot help feeling that the position, from the artistic point of view, is inadequate for the effect of the equestrian group, or of the work as a whole. We must make the best of it now.

The Sullivan Monument. IT is a gratification that we begin now to find monuments erected in London which are not commonplace, and which display individuality and poetic feeling. Such is Mr. Goscombe John's monument to Arthur Sullivan in the Embankment Gardens, which was unveiled last week. The portrait bust of the composer, in gilt bronze, is carried on a high slightly pyramidal stele, in front of which a partially draped female figure, with her forehead against the stone, symbolises Grief. On the west side of the stele are engraved the lines from one of Sullivan's and Gilbert's joint operas—we forget which—

> "Is life a boon?
> If so, it must befall
> That death, whene'er he call,
> Must call too soon."

At the base of the stele, on the opposite side, is a knot of what the French call "attributes"—a mask of Comedy, a lyre, and an open score on the page of which is engraved the musical setting by Sullivan of the words above quoted: these are also in gilt bronze. All this is expressive, suitable, and in good taste. Perhaps we might have liked the bust and the figure better in bronze patina, without the gilding, which at present looks a little too staring; but it must be remembered, of course, how soon bronze gets dingy in the London atmosphere, and perhaps the gilding will be more proof against this.

The Onslow Ford Monument. IN the monument to Mr. Onslow Ford, unveiled on Monday last at the junction of Grove End-road and Abbey-road, St. John's Wood, we have another monument which can be said to be of artistic merit. It consists of a pedestal, with an obelisk rising from it, designed by Mr. J. W. Simpson, architect. On the projecting portion of the pedestal in front of the obelisk is a replica in bronze of Onslow Ford's own figure of the Muse at the base of the Shelley Memorial at Oxford, and at the back of the obelisk is an excellent alto-relief bronze portrait head of the late sculptor, in a circular medallion decorated with palm leaves, and with a scroll beneath bearing the words from "Hamlet"—"To thine own self be true"; words equally appropriate to Ford's memory whether regarded as man or artist. This portion of the work is by Mr. A. C. Lucchesi. The only point in the design that we feel a little doubtful about is the bronze string-course with angle-caps which surrounds the obelisk near the top. The object was, perhaps, to insert a bit of bronze detail here as a kind of echo to the bronze work beneath; but we do not think it improves the effect. Otherwise, the architectural details are excellent, and the whole effect very satisfactory. The monument was subscribed for by numerous friends of the late artist.

Antiquities from Beni-Hasan. A VERY interesting collection of Egyptian antiquities recently discovered at Beni-Hasan, by Mr. J. Garstang, is on view at the rooms of the Society of Antiquaries until the 25th inst. These are objects discovered in tombs, and relate mainly to the everyday life and habits of the Egyptians. There are a considerable number of rather rough models of boats, with the rowers and other inmates, which however hardly show anything beyond what one is familiar with from many representations of Egyptian boats. Among other objects is a light wooden-framed bedstead (very narrow), and two of those singularly uncomfortable-looking head-rests which served the function of pillows; these are of wood, but in another case is a superior one of alabaster with a fluted stem. Wooden sandals with wooden straps are among other articles to be seen; and a wooden model of a court-yard and granary, the men carrying the packages of grain from the courtyard up a ladder, to discharge the contents through openings in the top of the granary. A large coffin, not shaped at all to the lines of the body, but a long high box, simply but very effectively decorated, is one of the most important exhibits, and is in wonderfully good preservation. Among minor articles may be noticed some beautifully woven baskets, one large one quite perfect and of most finished and delicate workmanship; a round clay bowl with eight smaller bowls, of deeper and narrower section, worked on the edge of it (is this an ancient form of cruet-stand?), and a very elegant toilet-box for kohl, quatrefoil in plan, with a simple repeating ornament down the centre of each face. There is nothing of specially architectural interest except a photograph of the oldest arch known in the world; this however does not belong to the Beni-Hasan group of antiquities. About these latter there is a singularly human interest; they seem to bring us into relation with the every-day life of ancient Egypt.

L.C.C. School of Arts and Crafts. THE exhibition of the work of the students of the London County Council Central School of Arts and Crafts, open this week at 316 Regent-street, shows the best work in the departments of modelling and book-binding. We understand that the book-binding class has been the most numerously attended of all, and certainly the bindings exhibited show both good workmanship and good design, though there is not much in the way of new or original idea in design. Among the examples of sculpture modelling we noticed a good study of a child from the life by A. Wilkins; G. D. Macdougald's architectural pediment with figures, and his frieze of children, are good; and Miss Dorothy Rope's panels of child subjects in very low relief (one of which, if we mistake not, is exhibited at the Royal Academy in silver), are the work of an artist. The architectural designs seem to run rather in the direction of the picturesque fancifulness of the present time—white houses with red-brick plinths, &c., and in one of the "designs for a country house" we observe that dining-room, drawing-room, and kitchen windows all face the same way; we hope this is not the way they are taught to plan. Among the tile designs are some good patterns, and among the numerous carved picture-frames one by H. W. Walker, and one by E. M. Willis, with a thistle pattern, may be noticed as superior to the rest. In one of the rooms a large angle cabinet with leaded glass panels in the doors shows very good design and workmanship. We may also notice the examples of lettering and illumination; there is nothing much in the illuminations, but the examples of lettering show that the style in this class of work has been framed on the best models.

The Fine Art Society. AT the Fine Art Society's Gallery there is a miscellaneous exhibition of water-colours by various artists; some of them not very familiar to us. The exhibition is noteworthy as showing, when considered *en masse*, a great deal of good colour—in some instances perhaps one may say, colour and little else; but nevertheless there is a decided impression of harmonious colour left on the mind. Miss Frances Hodgkins, who exhibits the

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first nine works in the catalogue—Moorish sketches chiefly, is admirable in colour, but the drawings have rather too much the appearance of being painted on blotting paper. Mr. North's "First Day of a Late Spring" (15) is a perfect example of his style—a style complete in itself, but it is not nature, it is his translation of nature. Miss Smythe is imitating her father's style rather too closely in "Winter Gleanings" (40), a picture flat and almost decorative in treatment, but very clever. Mr. Bagshawe's "A Grey Dawn" (12) and Mr. Coop's "Conway" (16) are studies of light effects, rather too woolly in texture. In "The Cypress Avenue" (28) Miss Mary Barton gives us the poetry of trees, while Mr. Hopkins's "In a Pinewood" (35) gives us the prose without the poetry. Miss Butler's "The Gateway" (43) is a lovely bit of colour; crimson flowers massed over the gateway, white lilies in the foreground. Mr. Alfred East's "Golden Autumn" (65) is one of his experiments; a fine bold study, but a little overstepping nature. The central and all-round school of water-colour is represented by two or three admirable landscapes by Mr. Eyre Walker; by Mrs. Allingham's "Bluebells" (59), and Mr. Newton Benett's beautiful and delicate drawing of "Lechlade" (67). Among others of note are a fine interior with a figure, by Mr. Walter West (57), in the style now familiar to us; Mr. Tom Brown's "Corner of Vollendam" (70) in which there is real humour in the study of three figures in the foreground; "The Potato Planter" by Mr. Grierson (24), a study of a single figure seen against sky; and Mr. R. Barratt's "View from St. Mark's, Venice" (26), an architectural subject. There is a great deal of varied interest in the collection.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

WONERSH, SURREY.

In glorious weather, the third summer visit of the current session was made on Saturday last to the neighbourhood of Wonersh, in Surrey, a district rich in ancient and modern domestic work of a high order, attractive alike to the architect and to the lover of rural life. Chilworth Station was the rendezvous of the thirty members, whence a walk of about a mile brought them to the first place of inspection.

Great Tangley Manor represents all that is homely and all that is delightful in the tradition of the English house and garden. The history is the not unusual one of a mediæval moated manor-house falling into disrepair, used latterly as a farmhouse, rescued from destruction within the last two decades and repaired and adapted to the needs of modern living. The old parts of the exterior are half-timbered, dating from 1582, with doors, windows, partitions, &c., of oak, and chimneys in brick, all typical of this period of English work. Evidences exist, however, of the scale and magnificence of the place previous to that date, notably in the heavy open-roof trusses now seen in a first-floor bedroom, but which originally spanned a large banqueting hall; traces of a musician's gallery are there also. The height of this hall was intercepted by the chamber floor referred to, which was put in at the time of building the new fronts in 1582. Interesting timber-framed partitions occur in many places, but most of the ceilings are plastered in large plain surface, hiding the oak floor timbers, and this is a process a work of recent years to assist in deadening sounds, which are so easily conducted all over a house with open-framed floors and walls. Under the direction of Mr. Philip Webb, additions, comprising drawing-room and bedrooms over, were made at the north end in 1897, and at the south end in 1886, when the library was built and at the same time the covered way and bridge leading to the house from the main entrance; this work was carried out in a sympathetic manner, in which one observes the spirit of the ancient builders carefully retained. A somewhat more ambitious addition was made in 1902 on the south by Mr. George Jack, containing amongst smaller and minor apartments a large octagonal chamber now called the tapestry-room; modern in form and treatment, it shows, however, some "clever" features; the ceiling consists of two intersecting barrel vaults in plaster into which the splayed walls of the octagon are run; the lighting is successful, but the extension cannot be said to harmonise with the traditions of the house.

When the property came into the hands of the present owner, one of the first works undertaken was the development of the garden, in 1884, since when time has worked wonders in the growths now to be seen; for instance, yew hedges planted 1 ft. 6 in. high now measure 12 ft. One of the earliest operations was the excavating of the moat, and regulating the water-supply from the neighbouring stream. Here are rock gardens, a bog garden which can be flooded at will, orchards and lawns through which the members were conducted by the owner, Mr. Wickham Flower, and from whom it was understood that no plan was used in the lay-out. Considerable judgment and taste have, however, been bestowed on the work, for although straight paths, hedges, and other regular features are introduced, there is an absence of rigid formality and of the quaint shams often met with in modern garden craft. The natural conditions are seized upon, and form the basis of the scheme, and by sound direction order has grown out of chaos—an order resulting in a really true garden, as befits the surroundings of such an interesting house. The welding of house and garden was never more satisfactory, or achieved with so little effort.

Over the hill to Blackheath Common a delightful roadside church—St. Martin's—was next visited. The lines of the simple rectangular plan are only broken by a carved recess for the officiating clergyman on the north side and by a square recess on the south, originally intended to accommodate local musicians. No organ space was provided, as an effort was to be made to revive the old form of village church music, and the recess was made only deep enough to admit of the playing of a few instruments. The scheme, however, did not succeed, and a small independent organ has been introduced in the choir. Mr. Harrison Townsend, the architect, kindly met the visitors and made some general remarks on the fabric, which has an internal area of about 60 ft. by 25 ft. The walls are built of concrete, about 2 ft. 9 in. thick, rough casted externally, while the doors, windows, and other parts have Ham Hill stone dressings; a pantile roof of a very flat pitch covers the whole, and behind the east wall an old cottage is incorporated for use as a vestry. Internally, the walls are but 6 ft. high, from which springs a large plaster barrel vaulted ceiling relieved only by broad flat ribs and low intersecting arches, three on each side, each of which contains two small side windows. A horizontal rib placed at about the level of one-third of the rise produces with the string course at the springing a deep frieze within the lines of which are contained the intersecting arches referred to. An ambitious scheme of frescoes has been applied to this frieze, the work of Mrs. Lea Merritt, and stands out in greater evidence than other features of the broad interior. One is compelled to make criticism upon this colour decoration, for it is an instance of the unfortunate result of introducing an embellishment, the treatment of which is quite out of sympathy with the architecture and bears no relation whatever to the position either in design or colour; moreover, it is but fair to state that the architect is in no way responsible for it. A prominent feature is a large gilt screen which shows a Spanish influence in its design; there are other interesting fittings, but the spectator's attention is directed to the altar and its lighting. The screen marks the extent of the choir (the usual chancel arch being dispensed with), but at the east end a large semi-circular sanctuary arch is built about 5 ft. from the east wall; there are no side lights, but an indirect toplight is obtained from a small gable window at the apex of the main roof, the source of which is therefore hidden by the arch from view by the congregation, and a pleasing mystery has therefore been introduced with great effect. In many other repects this little fabric possesses much that is the outcome of considerable study.

In the same village was seen a small mission hall, in the design of which Mr. Seth-Smith has spared no pains in producing a little building which is at once a success both in its practical purpose and in complete harmony with its delightful surroundings.

Various cottages which Mr. Townsend has worked upon were inspected on the way home, but before arriving at the station the party halted at the Grey Friars' Monastery, at Chilworth. These buildings are entirely erected in stone with tiled roofs, and comprise a large chapel with nave and side chapels, choir and chantry; a cloister, chapter-house, library, and refectory all on the ground floor, while the first floor is mainly the sleeping apartments of the twenty Franciscan priests who now inhabit the institution. Poverty is one of the rules of the Order, and has been observed by the architect, Mr. F. A. Walters, in all detail, the bareness of which is everywhere seen in depressing contrast with the luxurious site upon which the buildings stand. We published a view with description and plan on August 1, 1891. The plan is of the usual quadrangular arrangement with broad external effects: that seen from the south-east is particularly dignified. The bell-turret, surmounted by a small spire, is a splendid piece of grouping, and forms a conspicuous landmark.

Time alone prevented an extension of the programme to St. John's Seminary, Wonersh, by the same architect, and although late in returning to town the members fully appreciated the variety and interest of the places visited during a brilliant summer afternoon.

THE HEALTH EXHIBITION, BRADFORD.

AMPLE space for the Health Exhibition in connexion with the Annual Congress of the Sanitary Institute is afforded by the permanent and temporary buildings and grounds of the Neville Barracks, Bradford. As usual, the exhibition is one of the most important features of the Congress, and it contains a comprehensive collection of exhibits representing various departments of science in relation to hygiene, the hygiene of special classes, trades, and professions, construction and sanitary apparatus, water supply and sewerage, heating, lighting, and ventilation, and domestic hygiene. Almost all the exhibits are more or less of interest to our readers in one way or another, but in the following notes we are only able to call attention to some of the more important materials and apparatus. As might be expected, manufacturers of fireclay goods are conspicuously to the front. One of the first stands encountered on entering the temporary building is that of Messrs. Shanks & Co., of Glasgow, who have a good selection of baths, lavatories, sinks, and closets, with suitable fittings. Messrs. Twyfords, of Hanley, also show an excellent collection of their well-known specialties; Messrs. Cliff & Sons, of Wortley, exhibit glazed bricks of different colours—Tiltman's patent partition bricks, Hall's hanging tiles, Shepherd's partition, as well as numerous examples of hospital sinks, baths, lavatories, and similar appliances. In addition, their stand includes some very interesting objects, such as the Hessell-Tiltman scum channel, the "Corporation" disinfecting channel, and the "Fios" self-recording test recorder. The latter instrument, invented by Mr. F. J. Osborne Smith, is intended for automatically recording the movement of water surface in manholes, drains, sanitary appliances, cisterns, and wells, and also for indicating the varying pressures of gases, the discharge of flush tanks, and the time occupied in various stages of bacterial sewage purification. We may also direct attention to the well-arranged porcelain mortuary slab, on pedestals of similar material, exhibited by this firm. Among other fireclay goods shown by Messrs. Oates & Green, of Halifax, special mention may be made of a range of white enamelled lavatory basins, with lugs for building into a wall and complete with wall brackets, and a range of white enamelled "Isolt" latrines, with automatic flush and separate trap made in one piece with the pedestal, this set being specially designed for institution work where absolute

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isolation is desired. Fireclay goods are also represented by Messrs. J. Duckett & Son, of Burnley, who exhibit miscellaneous fittings, and some well-arranged sets of isolated siphonic closets; and by Messrs. Doulton & Co., of Lambeth, whose extensive stand includes some thirty exhibits, such as wash-tubs, baths, operating and ordinary lavatories, closets, urinals, and an excellent mortuary table, with ball-bearing pedestal and screw-brake arrangement, enabling the operator to fix the table in any required position.

Turning now to exhibits devoted to plumbing in connexion with fittings of the kind already described, we find in the stand of Messrs. Claughton Bros., of Leeds, some admirable examples of sanitary lead work, and in that of the Valveless Siphon Co., of Leeds, various closet suites, watertight cisterns, closet suitors, ball valves, and kindred apparatus. Sanitary engineering is further represented by a number of firms devoting attention to pipes, traps, gullies, and miscellaneous fittings. The Neville Engineering Co., of Worcester, exhibit Caink's patent jets and sprinklers for street watering-carts, and Caink's sewer ventilators, in which gas is filtered and allowed to escape gently. A sectional model of this apparatus serves to make clear its method of action. The Ames Crosta Sanitary Engineering Co., of Nottingham, show patent self-adjusting pipe joints, permitting true alignment, and ensuring sound gas and watertight joints, and surface water-gullies perfectly trapped under all conditions. Stoneware conduits for electric cables, and drain-boxes for tramway rails, are also a feature on this stand. The Bradley Star Tap Co., of Sheffield, have several patterns of their ingenious ball-taps, the mechanical action of which is briefly as follows:—The tap has a full-way water passage for all pressures; therefore, when one is used to supply a cistern, the inflowing water rapidly raises the float-lever, thereby closing the valve against the upward pressure of water within the tap, and which resists the closing movement owing to the area of the cup-leather end of the valve being greater than the area of the outlet. This action continues until a point of equilibrium is reached, which is maintained until the volume of water passing into the cistern causes the float lever to turn the balance, when the valve instantly completes the act of closing without injurious concussion. A reversal of these operations opens the valve when water has been drawn off from the cistern. A cup leatherless ball-tap for varying pressures, or for hard waters, is another useful invention exhibited by this firm.

We noticed several types of apparatus for testing drains and for removing obstructions from pipes. Mr. Richard Ravenor, of Newbury, has a machine for testing drains and soil-pipes by smoke and air pressure, the special features of this invention being that smoke rockets can be used effectively in drains of considerable length without danger of explosion from unconsumed gases emitted from the previous rocket, and ready adaptability for testing with smoke and air at high or low pressure, as desired. Mr. Edmund Ebdell, of Doncaster, is an exhibitor of drain-plugs for testing, apparatus for tests by smell, drain grenades, and similar appliances. Mr. A. T. Cooper, of London, shows his suction and vacuum pump for the removal of obstructions in pipes. Messrs. Burn Bros. have on their stand, among other sanitary fittings, various appliances for dealing with obstructed drains, and an "Eclipse" smoke machine, with some recent improvements. The gully dredger patented by Mr. G. B. Wilson, of Barnsley, is in reality a scraper, capable of cutting cement off the inside of drain-pipe joints and of cleaning roof spouting. Another scraper for sewers or drains is that of Mr. W. H. Gibbs, New Brompton. This is a spiral tool for the removal of obstructions, consisting of rigid scraping blades fixed on a central shaft. The back end of the scraper is screwed to receive rods, by which the apparatus can be pushed forward to the desired point. Messrs. J. S. Reekie & Sons exhibit a drain-testing apparatus which can be used for testing intercepting chambers in the following manner:—Clay is pressed round the top of the large bore plug fitted in the inlet of interceptor to make it watertight. Attached to this plug is a portion of 1-in. barrel, carried above the manhole top, through which is inserted a metal tube carrying a pressure gauge. The intercepting trap is emptied of water in the first instance, and if any water leaks from the filled chamber through the plugs in the intercepting trap, air in the metal tube becomes compressed and pressure is indicated by the gauge.

Systems of dealing with sewage are represented by the exhibits of the Septic Tank Co., of Westminster, where alternating gear for sewage filters are to be seen; of the Patent Automatic Sewage Distributors Co., of Westminster, where Candy-Whittaker sprinklers of different types are on view; and of Messrs. Mather & Platt, of Saltord, where a model sewage purification works, consisting of sedimentation tanks and bacteria beds are in operation—of course, with clean water. Domestic water filtration is exemplified by the varied exhibit of Messrs. Slack & Brownlow, of Manchester; and by the Pasteur-Chamberland filters shown by Messrs. J. Defries & Sons, of London, who also include on their stand Dr. Scurfield's ventilator indicator for determining the percentage of CO_2, the "Equifex" steam disinfector, the "Equifex" purifier for milk supplies, designed by Dr. Pakes, and several other appliances for the use of hospitals and public bodies. Disinfection in another form is illustrated by Messrs. Meldrum Bros., of Manchester, models of whose refuse destructors are shown at the exhibition, while actual installations are open to the inspection of visitors to the Congress at Cleckheaton and Elland electricity stations. The Horsfall Destructor Co., of Leeds, have a small stand with various interesting models and samples of crushed clinker, suitable for making concrete and artificial stone. Messrs. Heenan & Froude, of Manchester, also represent the refuse destructor industry.

Heating, ventilation, and lighting is the next department of sanitary engineering to which reference will be made. The Richmond Gas Stove and Meter Co., of Warrington, and the Davis Gas Stove Co., of London, both have some useful patterns of gas-cooking stoves on view. Messrs. Wilsons & Mathiesons, of Leeds, exhibit gas fires, boilers, irons, and the Wilson cooking and heating stoves. Mr. G. J. Hutchings, of London has in operation a set of his patent steamers, fitting one above another, and so cooking five, kinds of food at once, without mixing the flavours, on an area no greater than is usually required for a single cooking utensil. Mr. Jackson, of Leeds, shows types of his anti-fur gas boilers for water, specially suitable for hard waters. Messrs. James Stott & Co., of Oldham, exhibit their water heater, a combination of steam and water valves giving an instantaneous supply of hot-water for public institutions; their gas-regulator; also electric fans, water-driven fans, and apparatus for plenum ventilation. Mechanical ventilation is further represented by the Sun Fan Co., of Bradford, who show belt and electrically-driven fans; and by Messrs. Matthews & Yates, of Swinton, whose stand includes fans and air-propellers of various types, driven by belt and electric motor. Among exhibitors of gas-lighting appliances we may mention those of the Anti-Vibration Incandescent Lighting Co., of Leeds, whose specialities are intended to protect incandescent mantles from shocks or vibration, however caused. The same company have also apparatus for high-pressure gas-lighting, and for what they term "atmospheric" gas lighting, suitable for the generation of gas in places where public supplies are not available. Messrs. Moffat's, of London, show the "Lucas" lamp, which is made in sizes up to 1,000 c.-p. This is another form of high-pressure gas lighting, for which it is claimed that 41 c.-p. can be obtained for every cubic foot of gas consumed, and that from 200 c.-p. to 1,000 c.-p. can be secured from a single mantle. Messrs. Wilson & Stockall, of Bury, show a brougham-ambulance for isolation hospital use, an accident ambulance van, and a neat dinner waggon. Messrs. W. Glover & Sons, of Warwick, and the Bradford Motor-Car Co. are other exhibitors of vehicles used by public authorities.

Purely structural work is somewhat scantily represented at the Health Exhibition. The only firm devoting attention to fire-resisting construction is the Fireproof Plate Wall Co., of Bradford, whose exhibit is somewhat similar to that already noticed in connexion with the International Building Trades Exhibition, and need not now be mentioned in detail. A few samples of building stone are to be found, and the Basaltine Stone Co., of Westminster, exhibit armoured kerbing and channelling, which has iron ties running longitudinally for increasing its strength. Some samples of sewer and water conduits made by this company are also included in their stand, these being made of basalt chippings, cement, and trass. It is claimed for these pipes that they are impervious to water, and that they resist the action of acids. Messrs. Humphreys, of Knightsbridge, have erected in the grounds of the exhibition a small shelter for consumptive and convalescent patients. Messrs. Burgess & Sons, of Bracknell, exhibit a neat model of a modern sanitary padded room, the entire surface being covered with sheet lead, and upon the surface thus formed suitably-shaped sections of wood, rubber, canvas, and fibre are laid, each section forming a pad. We noticed also two different types of windows and fanlights, one by the Sanitary Gully Scoop Co., of Hemsworth, being reversible for safety in cleaning, and the fanlight arranged suitably for ventilation; and the other by Mr. J. Procter, of Shipley, a somewhat similar contrivance, but hinged to allow of cleaning, and the fanlight designed so as to admit air through a hollow cornice. The "Cyclo" whitewashing machine, shown by Mr. Thomas Harrison, of Bradford, seems to be a serviceable machine for the treatment of large surfaces on the interior or exterior walls of factories and similar buildings.

From these notes it may be judged that there is plenty to interest members of the Institute in the Health Exhibition, which on the occasion of our visit was well filled with visitors in every department.

THE SANITARY INSTITUTE CONGRESS AT BRADFORD.*

THE President of the Sanitary Inspectors' Conference, Mr. Isaac Young, Chairman of Council of the Sanitary Inspectors' Association, delivered an address, and the first point taken up by him was the training of persons for the office of inspector. He thought the time had arrived when the aspirant for the office of inspector should be required to have undergone a probationary period of practical training and not merely to have had a technical training for the work. He suggested that in future the Local Government Board should recognise the appointment of assistant inspectors and sanction the payment of one half of their salaries, as in the case of inspectors. Such a step would, he was confident, bring into the ranks men better qualified to undertake the duties of the office, when called upon to accept the responsibility, than was at present the case, and he was of opinion that two years' service as an assistant inspector should be regarded as the minimum qualifying period. The paper subsequently referred to the unsatisfactory state of the law with regard to existing combined systems of drainage, certain drains requiring repairs for which the Sanitary Authority, instead of the private owner, was made responsible where documentary evidence was not procurable to prove that the connexions had been sanctioned. A sum of not less than 30,000*l.* was annually expended in the metropolis in the repair of combined systems of drainage serving private property, and this unjust burden on the rates was increasing. The London County Council drafted a Bill in 1896, but for four Sessions in succession it was introduced without success. Another effort was being made by the Councils of the Metropolitan Boroughs to remove this increasing burden upon the rates, and they might reasonably ask, for the benefit of the public health, that the Council of the Institute would use its influence in the proper direction to remove such a stumbling block to efficient sanitary administration.

In concluding his address, Mr. Young referred to the efforts made to secure unity among Sanitary Inspectors. With that object in view, the Sanitary Inspectors' Association had altered its articles of association in such a way as would remove, they hoped, every obstacle that had hitherto prevented their forming themselves into one great body which should be influential in all parts of the country, with a central executive council composed of representatives from the various centres and holding its meetings in various parts of the country. As the mouthpiece of the Sanitary Inspectors' Association, he had felt justified in mentioning this matter, although the draft had not yet been finally approved by the members generally. "I trust," said the President in concluding his address, "that if it is not possible

* Continued from last week.

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to form one Association representing the whole of the United Kingdom, that it shall be one embracing England, Ireland, and Wales, and that then an acceptable scheme of federation will be evolved by which our Scotch brethren will be federated with us. I, therefore, ask that with this great object in view we shall individually and collectively firmly resolve to achieve it, and thus help on our mutual interests and the progress of sanitation."

Mr. Wilkinson (Derby) in proposing a vote of thanks to Mr. Young, said he agreed with most of the proposals made in the address, but would prefer a period of three years instead of two for the qualifying service as assistant inspector. The motion was seconded by Mr. H. H. Spears, Chairman of the National Union of Sanitary Inspectors, who said that the proposed alterations in the articles of association of the Sanitary Inspectors' Association, virtually conceded all that the National Union asked, and he thought they would soon lead to the desired union. The resolution, on being put by Mr. W. Whitaker, Chairman of the Council of the Sanitary Institute, was carried unanimously, and the President briefly replied.

Bakehouses.

Mr. F. J. Rowe (Manchester) was then called upon to read a paper on "Bakehouse Reform." In view of the almost revolutionary change, said the lecturer, that would be effected in bakehouse construction by the Act of 1901, which, after three years of grace, would come into force on January 1 next year, every baker was asking himself—Is my bakehouse satisfactory, or can it be made so? In most cases the answer must be "No," for the majority of bakehouses were not originally constructed for the purpose, and, as a rule, they could not be satisfactorily altered. An underground bakehouse was defined as one which was more than 3ft. below the adjacent ground level. Such bakehouses ought to be forthwith abolished; they were never adequately lighted and were always liable to be infested by creeping things hideous and innumerable. It was a defect in the Act that it allowed the right of appeal to justices or quarter-sessions. Such tribunals were apt to be unduly lenient, and they had no special competence to decide such questions except in the rare case where an architect or sanitary expert happened to be upon the bench. A certificate might often be obtained for a bakehouse that ought to be condemned, and unfortunately a certificate once obtained was irrevocable. Had it been provided that certificates should be granted subject to continued suitability, and renewed at intervals, the underground bakehouses could have been closed a few at a time year by year, and much irritation would have been spared. The bakers had in this emergency taken up an attitude of resistance in a businesslike way. They had formed associations and retained the services of architectural and legal experts to protect their interests, and had taken steps to bring the points in dispute to prompt and definite issue. Delegates to a "Home Office" conference had met in a friendly way to discuss the Medical Officer's official circular point by point, and a disposition had been shown to accept modifications and to relax hard and fast lines. A working compromise might be arrived at. A committee of the Council which would reflect all shades of opinion would be the best guarantee that every case would be thoroughly inquired into, and that humanly speaking no error or premature decisions would be made.

A discussion followed, in which Mr. Peter Fyfe (sanitary inspector), Mr. Lindsay (solicitor, and Mr. Bailie Anderson (Glasgow), Dr. Berry (Wigan), Mr. Bland (Barton-on-Irwell), the Chairman, and other speakers took part. It was pointed out that sanitary inspectors were only indirectly concerned with bakehouses. It was the Medical Officer of Health who had been made responsible. The Chairman pointed out that the duty of inspection would devolve upon the inspector, who would generally be required to report upon cases to the Medical Officer of Health. Dr. Berry said there were seventeen underground bakehouses in Wigan. Should any of them be granted a certificate, he thought it would be possible to take action in the case of any that were not kept in a sanitary state, but it was a great pity that certificates once granted could not be revoked. It was a flaw in this Act, as it was in the Food and Drugs Act, to allow an appeal to the magistrates, who always showed a leaning towards offenders against the laws of public health. Mr. Lindsay pointed out a special difficulty that would be met with next year in Glasgow. On January 1 all underground bakehouses would be condemned, and it would be the duty of the Local Authority to immediately prosecute. But leases would not close until Whitsuntide, and he thought Medical Officers of Health would think it advisable to wink the other eye until May. Mr. Rowe replied very briefly to the points raised in the discussion, and to the vote of thanks which had been accorded.

Smoke Abatement.

After the reading of a paper on "Smoke Abatement" by Mr. W. Nicholson (Sheffield), the Conference adjourned to Thursday, when the discussion was taken and the business of the conference was completed.

Mr. Nicholson, who is the Chief Smoke Inspector of Sheffield, avoiding sentiment, said he would deal only with the practical aspect of the question, the only aspect likely to be profitable. He stated four chief causes of excessive smoke-production, the last of which was senseless stoking. Skilled stokers could not be obtained without technical training. If the educational authorities would not provide for this training, the Sanitary Institute would have to take it up and bring it to a successful issue, as it had done in other branches of practical science. Sheffield afforded proof that prevention of excessive smoke was possible in spite of the denials of manufacturers and metallurgists. Sheffield did not profess to be perfect on this question, but it was at present practically smokeless so far as boiler smoke was concerned. Previous to 1890 it was not unusual for factory chimneys to emit dense smoke from eight to thirty-eight minutes in every hour. Thirteen years ago the authorities of Sheffield attacked the evil in dead earnest. Chimneys, big and little, were observed; the black smoke emitted was recorded; boilers and conditions of working were inspected and reported upon, and suggestions were made for improvements. The City Council at length fixed the limits of emission of dense smoke which, if exceeded, constituted an offence. Chimneys for one boiler were limited to two minutes' emission of black smoke per hour; one with four or more boilers was allowed six minutes per hour. Within two years from the commencement of the crusade the average was reduced from ten to two minutes. This line of practical procedure was recommended to be taken against any furnace, fireplace, brick-kiln, or anything else which caused a preventable nuisance. If the furnaces, apparatuses, and system of working were antiquated, then pressure should be put upon the owners to construct furnaces on the best and most modern principle, to adopt smoke-preventing appliances that had been thoroughly tested and proved effective, and to work the said furnaces on the best known system for preventing smoke.

In the animated discussion which followed, Messrs. Peter Fyfe, Bailie Anderson (Glasgow), West (Walthamstow), Norton (Middleton), Nuttall (Manchester), Lowe (St. Helens), Bland, and others took part. The Glasgow delegates explained that, in the terms of the Scottish law on this subject, the mistake of introducing the contentious term "black smoke" had been avoided, the latter defining the offence simply as "sending forth smoke in such a quantity as to be a nuisance." They also gave the results of experiments made in Glasgow to show the bad economy of emitting dense smoke. They had found in 1,000,000 cubic feet of dense smoke from 200 lbs. to 300 lbs. of solid carbon, and even 350 lbs. with very dense smoke. Air so polluted must be most injurious to health. In Glasgow alone 120 tons of carbon were annually wasted. At certain points the country was almost entirely denuded of vegetation. Nothing would grow there but a few hardy shrubs. In Scotland, where the unpaid magistrates were elected by the ratepayers, and not appointed by the Lord Lieutenants, they were more ready to convict on the evidence offered, regardless of local influences. Experiments had been made with Mond gas to abolish the smoke nuisance, and the results appeared to have been fairly satisfactory.

Mr. Nuttall and Mr. Lowe also referred to experiments with Mond gas applied to annealing and re-heating, but the results were very unsatisfactory. At Stretford (Manchester), after spending 1,000*l.* on plant, it was found that a greater nuisance was created than the smoke nuisance and the experiment was given up. At Middleton and St. Helens, similar experiments with Mond gas had failed. Mr. Bland said he would advise that where new works or extensions of works were proposed, the Local Authorities should require, on the plans being submitted, that they should show the system by which it was proposed to deal with the purification or prevention of smoke.

In the course of his reply, Mr. Nicholson said coal-gas instead of coal had been tried at Sheffield, but had proved a failure in steel manufacture. Steel made by it was found too brittle, and many tons thus made had to be rejected.

The Sanitary Conference, which was the most numerously attended of the series, concluded its sittings by passing a number of resolutions. The first, which was passed *nem. con.*, approved of the efforts now being made by the Sanitary Inspectors' Association to unite the various organisations of inspectors, the principles decided upon being such as should speedily result in the formation of one Association for the United Kingdom. Five other resolutions were passed by large majorities recommending the Council to consider and take measures in favour of the following objects:—1. To add to the technical qualifications now recognised, the condition that the candidate shall have served the office of assistant inspector for a minimum period of three years, the Local Government Board being urged to recognise such appointments and to sanction the payment of one-half their salaries as in the case of inspectors; (2) regretting the continued exclusion from the Examining Board of the Institute and the Examining Board for Metropolitan Inspectors of one or more sanitary inspectors, and urging the Council to remove the anomaly; (3) to admit as members of the Institute, at the reduced subscription of one guinea, sanitary inspectors who have held office as such for ten years and have passed the Institute's examination for sanitary inspector or that of the Metropolitan Examining Board; (4) to obtain an extended definition of the term "Drain," as provided in Section 42 of the West Ham Corporation Act of 1898; and (5) to obtain an amendment of the law relating to the sale of food and drugs, so as to enable a sanitary officer to obtain samples outside his district and to empower the officer to proceed in such cases as if the samples had been obtained within his district.

The Conference closed with votes of thanks to the President, the local secretaries, and the honorary recording secretary of the Sanitary Inspectors' Conference, Mr. Albert Taylor.

The Engineering and Architecture Section.

The sitting of the second section, over which Mr. Maurice Fitzmaurice, C.M.G., &c., presided was well attended, 170 members being present at the opening.

In his inaugural address the President dealt with the sanitary aspects of some of the engineering works in the construction of which he had himself been engaged. Some of his remarks would refer to London works, for he had spent a large portion of his life there, and some to works upon which he had been employed abroad. Among the many sanitary problems that faced the London engineer, none had been more prominent than the disposal of London sewage. In 1889 it was thought that the question had been settled for many years when chemical precipitation and the conveyance of the sludge to sea was decided upon. This system had made a wonderful improvement in the Thames. Before 1890 crude sewage was turned into the river, while now 2,600,000 tons of precipitated sludge was carried annually out to sea fifty miles below the outfalls at Barking and Crossness, and clarified effluent amounting to 230 millions of gallons per day was returned to the river. In the dry summers of the last few years the relative amounts of river water and effluent had greatly altered. The flow in the lower reaches of the Thames had diminished through the increasing demands of the water companies, while the quantity of effluent had been increasing, and there was consequently a change for the worse in the river. The London County Council had forseen the danger, and had for many years been experimenting on a large scale at Barking and Crossness on the bacterial treatment of sewage—a system which had passed the experimental stage, was coming into general use, and would be dealt with by several papers before the section. During the last two years 700,000*l.* had been spent on improvements, and

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the river would be brought back to the condition of purity existing in 1894, or to one of greater purity. Turning to questions of sanitation in connexion with large engineering and architectural works, the President said he had been very much impressed with the necessity for proper medical treatment and sanitary supervision in large works with which he had been connected both in temperate and tropical climates during the past twenty years. A temporary camp of workmen where proper precautions were not taken might easily become the means of spreading disease, and a far-seeing contractor would see that he owed it not only to his men and the public but to his own pocket to arrange that sanitary matters were well looked after. As a general rule contractors did recognise what was to their own profit, and did take the necessary precautions with advantage to themselves and their workmen. In two large engineering works, the Forth Bridge at home, and the Nile Reservoir at Assouan, abroad, the execution of the work was facilitated, and good relations between employers and men were attained by having medical attendance and sanitary supervision of the best kind. He had seen works abroad where no interest had been taken in workmen, where sanitary precautions were neglected, and where medical attendance was only obtained with difficulty. He had seen men who were ill, or had met with an accident on such works, lying in bed in filthy huts for days without medical attendance, without proper food, without any sanitary convenience, and absolutely uncared for. The workmen, of course, recognised these differences and would refuse to work for employers of the latter class, if there was any alternative. Even abroad the callous employers were now in a minority, and would, he hoped, soon disappear. Before concluding his address the President referred to the provision of better dwellings and of improved sanitary surroundings for the poorer classes, a question closely connected with the subject of locomotion in cities and towns, to which he had devoted a good deal of time. The exodus to the outer ring of towns, even now very great, would increase in proportion to the facilities given for rapid travelling at cheap rates. The time would come when a large proportion of the working classes would think nothing of living six or seven miles away from their work where they could obtain larger houses at lower rents than they paid for tenements in central areas. Tube, and elevated or underground, railways would have stations much further afield, providing for express local traffic, and attaining an average speed of twenty miles an hour. The twenty-five miles of new railway now under construction in New York would be one of the most complete systems of urban traffic in the world, and would be an object-lesson to other municipalities in effectually dealing with a very difficult problem. In all large towns the greatest vigilance ought to be displayed in preventing any narrowing of roads by new buildings, and every opportunity for widening roads should be taken advantage of when old buildings were pulled down. The gradual building of small houses for the working classes on the outskirts of towns had been accompanied in many cases by the formation of narrow streets and roads. No one could say what the development of motor traffic would be, and to what distance outside towns electric trams would run. It is all the more necessary, therefore, to keep the entrances to our towns and the country roads approaching them of a good width, so as not to throttle the traffic at these places at a future date. The development of motor traffic ought from a sanitary point of view to be encouraged. It seemed more than probable that a diminution in the number of horses in the streets must be accompanied by an improvement in the general health, or, at all events, by a diminution in many of the throat and eye troubles so prevalent. In concluding his address, the President said that "the provision of streets and roads of ample width, and the satisfactory maintenance of such thoroughfares, are the best means of encouraging the development of electric trams and motor traffic. The provision of quick surface locomotion on wide roads may, I hope, do away with the necessity of spending an hour a day in tunnels underground—a penance which I am sure we were never meant and ought not to be called upon to undergo."

A cordial vote of thanks was voted to the President on the motion of Mr. Whitaker (Chairman of Council of the Institute), seconded by Professor H. Robinson, which the President briefly acknowledged, and then called for three papers on the purification of sewage problem, respectively prepared by Mr. D. Archibald, Mr. W. Kaye Parry, and Professor H. Robinson — the discussion to follow the reading of the third paper.

Purification of Sewage.

Mr. Douglas Archibald compared the merits of chemical and septic tank systems of treatment as preludes to artificial filtration. He contended that recent experiments, and particularly those of Mr. Harding, at Leeds, had condemned the tank-less double contact system, so much upheld at one time by Dibdin, and it was now, he thought rightly, regarded as dead and buried. The alternative methods were, therefore, reduced to three, all involving tank settlement, viz., (*a*) settlement without septic action, (*b*) settlement with septic action, and (*c*) settlement aided by chemicals. Mr. Archibald adduced copious tables to prove that the third system, where the chemicals were properly employed, and the resulting sludge was utilised, gave by far the best results. By a combination of effective chemical precipitaton with filtration, as at Chorley and at Kingston, the author contended that the highest purification could be obtained on the smallest area, a purification of 55 per cent. beyond the average attained in the septic tank system, occupying six times the area.

Mr. W. Kaye Parry's paper on "The Present Position of the Sewage Problem" traced the developments of expert opinion during the last six years, as shown at succeeding congresses and meetings of the Sanitary Institute since 1897 (congress at Leeds). The famous experiments at Exeter with the system of Cameron, in which a preliminary treatment of sewage in tanks by anærobic bacteria seemed to show such excellent results, had led experts like Messrs. Dibdin and Thudicum to speak very confidently about the economies that would result from the new septic system of treatment. The author had repeatedly maintained in opposition to the optimistic believers in the septic tank system that in every system of treatment there must be some residuum which, if it were not removed, would sooner or later clog the bacteria beds, whereas if it were removed it would constitute sludge, which must be handled and disposed of. The costly works at Manchester, described at the Manchester congress last year by Mr. J. P. Wilkinson and Mr. G. H. Fowler, proved the unsoundness of the forecasts of experts as to the economies that would follow the general adoption of the septic tank system. Such works as those at Manchester, for a population of 1,000,000, would cost 700,000*l.*, or 13s. 10d. per head. The *bête noire* of sludge still remained, and although substantial progress had been made in the quality of effluent produced, the question of sludge disposal was by no means a thing of the past.

Professor Robinson's paper on the "Bacterial Treatment of Sewage" recalled to the notice of experts the importance of the conclusions stated in the Report of the State Board of Health of Massachusetts many years ago. These conclusions did not appear to have been kept in view by subsequent experimenters. The London County Council, instead of following the conclusions and adopting the results of the Massachusetts reports, had spent a great deal of money in experiments to arrive at similar results. Why should they spend money to prove what had been already proved by the Massachusetts Board. We ought to have started where the Massachusetts Board had left off. The London Council had continued experiments begun by Mr. Dibdin, but the various reports were inconsistent and did not greatly elucidate matters. Satisfactory results could be obtained by treating sewage in bacteria beds by continuous filtration through interstices in the presence of air on the lines indicated by the Massachusetts Board. Public money could be usefully expended in experiments directed to determining the best materials and depth for both classes of bacteria beds, also the most effective rates of working. A series of contact beds and of continuous trickling beds worked side by side under similar conditions of flow would give results of the greatest service. Other experiments of practical value could be suggested. If such were carried out, valuable information would be afforded at comparatively small cost for the guidance of those who have to advise as to sewage disposal.

A sustained discussion followed, in which Dr. Rideal, Professor Robinson, Mr. G. H. Fowler, Mr. Watson (Birmingham), Mr. Robinson (Durham), Mr. H. A. Martin (Exeter), Mr. W. Kaye Parry (Dublin), Mr. Douglas Archibald and Mr. Parker (Newcastle), took part. The majority were on the side of the septic tank treatment and the modifications of it, as against chemical precipitation, with subsequent filtration, as advocated by Mr. Douglas Archibald.

Details of a Hospital Ward.

"Details of a Hospital Ward," was the title of a paper by Mr. Saxon Snell. In treating of "some details and their principles recalled," the object of the author was rather to recall one or two old and sound principles that seemed in danger of being forgotten, rather than to advance any new theories. There were instances in new wards constructed on the latest principles of failures which were absent from the older and entirely out of date buildings. Many examples were cited in which good old principles had been obviously forgotten. Floors should be non-absorbent and not liable to harbour dirt. Nowadays no one thought of using plain-jointed, soft wood floors, because in addition to being absorbent the material was bound to shrink, leaving any number of crevices for the secretion of dirt and dust. Floor sweepings well wetted and impregnated with soap made a horrible compound. Terrazzo floors which were impervious or floors formed of hard wood blocks were the best. The skirtings should be of the same materials as the floor, and should be rounded so as to form a good hollow. With regard to wall surfaces experts differed in opinion, arising out of differences of opinion about ventilation. For hospital wards impervious walls were mostly in vogue at present. Tiles gave an impervious and even surface, but they afforded too many pockets for dust. The ideal surface would be an unbroken and polished surface such as obtained on tiles, but affording no ledges for dust. Keene's cement or sirapite could be brought to a polished surface. It would be possible to cover permanent wall paintings with glass let in flush with the wall surface. Ceilings should be non-porous and they were best painted. Ordinary sash windows involved many angles, crevices, and hidden voids. Casement windows with solid frames were not open to that objection, but their advantages in other directions were questionable. Little could be said about doors in a hospital ward, except that they should be wide enough to allow of the passage of a bed. With regard to furniture, for which the architect was not generally responsible, general principles should govern the selection of objects, which should all be easy to clean and of non-absorbent material. Cupboards were generally harborers for mysteries and ought to be abolished. The one cupboard necessary for holding medicines, surgical, and medical appliances should stand out in the centre of the ward. It should be framed and glazed all round so that the doctor on his rounds can see all round it, through it, and even under it. With regard to lavatory basins, which obviated the old objection of the nurse following the doctor with a hand-basin, the improvements in design and construction of fixed lavatories have overcome the objection to having them in a ward. The first he saw was in a hospital not even yet finished. It was of quite an ordinary pattern and fixed close to the wall, but he regretted to add that underneath, the supply, waste, overflow, and anti-siphon pipes—all on the surface of the wall—reminded one of Medusa's head.

Publicity, or "openness," in every part of a ward and its adjuncts was strongly insisted upon, except, of course, in bathrooms and ward conveniences. When patients knew they could not escape casual observation their behaviour was likely to be most correct, and the nurses themselves were none the worse for the lack of opportunities of concealment. In conclusion, the author put in a strong plea on behalf of the nurses. Nurses were often very much overworked. He thought it a great pity that hospitals were not able to employ more nurses and for shorter hours. It was better that nurses should always be employed when on duty for shorter hours, than that the weariness of long hours should lead them to lounge or neglect their duties when occasion offered.

The discussion was opened by Mr. T. W

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Aldwinckle, who said that the terazzo floor was cold and liable to crack. It was generally used in Germany, but in a hospital he had visited near Hamburg the terazzo floor was warmed. The teak floor was hard, and made the best possible floor, but it was more expensive. When waxed and polished it had a warm, cosy tone. For wall surfaces they could not get anything better than Keene's cement, which after a year or two could be painted. With regard to windows, Mr. Snell seemed to favour the Middlesex type. He thought the old-fashioned double sash, with hopper above and the lower sash opaque, was more cheerful. It was sometimes difficult and perhaps dangerous to open the casement window. The open fireplace was a very desirable thing. It not only conduced to cheerfulness, but successful treatment, which was one of its best points. Stoves should be used for warming only and not for ventilation.

Mr. Herbert Jones thought Mr. Snell's paper most practical, because it dealt so much with the details and not with the general features of hospital construction. They must make it as easy as possible to keep clean a hospital ward. They should endeavour to make the administration as costless as possible. To diminish the staff by one maid would be to save 50*l.* a year. If wards were placed on both sides of a corridor they should not be of the same size. It would be a better arrangement for twelve beds, to have one ward of eight and the other of four, rather than two of six beds each. They must have an impervious floor like terrazzo. He personally did not approve of terrazzo, not because it was cold, for it was not cold, but because it was unsympathetic. It was very tiring to walk upon, and the nurses complained that it made them much sooner tired. The flooring should be elastic and sympathetic; cracks could be filled up. All angles should be curved. At the Burton-on-Trent Hospital the angles between the ceiling and the wall had a curve with a radius of 9 in. or 10 in., the effect of which was pleasing, giving a dome-like appearance to the ceiling. Aspinall's enamel had proved a failure, the enamel peeling off. At Cardiff all the walls were covered with a vitreous cement. If the ceiling was non-porous it would crack. The ordinary double sash-window was a great disadvantage, the space for the weights forming a perfect dust-bin. With regard to doors he had seen in Birmingham the Dowson-Taylor door, which was practically solid, there being no panel anywhere.

Dr. Freemantle (Guy's Hospital) said the question of how to make the wards look bright had perplexed them a good deal at Guy's. They had artists like Mr. Watts and Holman Hunt who suggested that they should try to get a company of young painters like the pre-Raphaelites to join together for the purpose of painting their walls. The difficulty was that if the walls were painted ever so beautifully the scrubbers would soon scrub the paintings off, and to cover them with plate-glass would cost 2,000*l.* per ward. He would like to know whether some kind of wall surface could be devised suitable for painting.

Mr. Saxon Snell, in replying to the various criticisms, congratulated Mr. Jones on having been able to get an opinion from a nurse. That was more than he had been able to do. "Sympathetic" was the right term to apply to the kind of floor they wanted. For doors they wanted solid joinery. The new Canadian doors would be made for Charing Cross Hospital. He wished somebody would intercede for him with some pre-Raphaelite band of painters. They might be able to get their canvasses covered with plate glass.

Public Baths.

Mr. Saxon Snell was subsequently called upon to present a paper on "Public Baths; the Influence of Planning and Construction upon the Cost, Maintenance, and Administration."

Baths, so desirable in the cause of public health, did not pay, said the author, and he proposed to ask why they did not pay and how they could be made to pay. In the first place, he hoped they would be able to get cheaper materials. The main cause of unremunerativeness was bad sites. Whenever a municipality had a cheap site, they told the architect to build a bath upon it. Short-sighted economy had been responsible for the selection of some of the most extraordinary sites that had taxed the ingenuity of architects to use to advantage. A bad site meant waste of space in passages and long corridors, and straggling and therefore uneconomical plans. A table was given of eleven modern establishments in London and the provinces in which the corridor area varied from 6,600 square feet to 1,013 square feet, every square foot of corridor more than necessary involving the waste of 20s. On a good site the corridor area, as shown by the table, was reduced to 112 ft. per section; on bad sites it rose to 500 ft. to 660 ft. The Corporation of Bradford were building a series of baths for the whole city, designed and carried out by Mr. F. E. P. Edwards, in which the corridor area was reduced to from 70 ft. to 80 ft. per section. In the direction of economy was the change from slipper to spray baths. In an establishment, say, of fifty baths the saving in structure and fittings alone would probably exceed 40*l.* per bath, or, say, 2,000*l.*, and supposing that each bath was used on an average during the year three times daily, water would be saved to the extent of over 1,000,000 gallons, which at 6d. per 1,000 equalled 25*l.*, or the interest on over 800*l.* To this must be added the saving in fuel, &c., in heating the water, and less cost of attendance.

In many establishments the energies of bath attendants were employed in an unsatisfactory manner. If the number of attendants on duty was calculated for the busy season, they would not have sufficient to do to keep them employed at other seasons, and they would get into the worst of all habits—lounging. If they were to be kept employed they must throw over the trade-union fetich of "one man one job," and nowadays, on public Boards, it was necessary to reckon with trades-unionist feeling.

In the discussion which followed, questions were asked as to the best manner of heating and the best position in the longitudinal section of a swimming-bath to form the deepest part.

Mr. Councillor Upson (Maidenhead), said he had been charged to find out how a bath could be the most economically heated. After visiting a great many establishments he had been unable to decide on the best method. The men in charge were, as a rule, happy-go-lucky sort of people. Generally speaking, baths were not run as business establishments. He was glad to hear the spray-bath recommended rather than the slipper. The cost of a bath ought not to exceed 2d., instead of 6d. or 8d., which was charged now at some establishments. One penny should be enough to pay for a spray-bath. The deep part of a swimming-bath should be about 10 ft. from the end with graduated incline to the ends.

Mr. F. E. P. Edwards (City Architect, Bradford) said the sites of the baths in Bradford were all good, and well isolated by good streets. He would like to hear from Mr. Snell whether he preferred the rose douche or the ring douche. How would he ensure that a bather did not scald himself? The question of water was a troublesome one in Bradford. They drew water from the moorland, and the peaty matter gave it a brown tint. It had been suggested to have coloured tiles for the bottom. With regard to the deepest part of swimming-baths, they placed it 10 ft. from the end, and with slowly rising inclines they got a good square base.

Mr. Councillor Totter (Bradford) asked whether Mr. Snell knew of any bath which was making a profit. In Bradford they were a source of great loss. They looked for their profit to the future in the improved health of the community. He was very glad to find that they in Bradford were on so many points in agreement with Mr. Snell.

Mr. Saxon Snell, in responding to a vote of thanks, replied to the various questions raised. The deepest part of a swimming-bath should be from 7 ft. to 10 ft. from one end, and it should slope upwards both ways to the ends. He had heard of a bath in which the deep part was about 20 ft. in the centre. It sloped rapidly up towards the shallower end and then inclined very slowly. That form saved water. With regard to heating, the best results might be obtained by circulating the heated water by means of a calorifier. He was very glad to see that Bradford had so many good sites. With regard to the douche, he said that with cold water it was better to employ the ring douche. With hot water there was no objection to the rose douche. With regard to the peaty colour of Bradford water, as they had no peat in London, that was not a difficulty. Dark blue tiles had a distinctly enlivening effect, and with the brown water of Bradford the effect should be beautiful. Bradford did well to have free baths. Let them encourage the habit of bathing; then after a while the baths would become popular and would pay.

The section, jointly with Section III., met on Friday morning to discuss six papers on the treatment of sewage and trade effluents, but through the absence of five out of the six authors of papers, the meeting—a very good one—was a comparative failure. In other sections papers were read on "The Garden City Scheme" by Dr. Fremantle (Medical Officer of Health, Herts), "Open Spaces" and "The Housing of the Working Classes Act," the latter, which was read by Dr. Eustace Hill, suggesting amendments of the Housing of the Working Classes Act of 1890, Part II. Dr. Hill's suggested amendments were adopted by the Conference of Municipal Representatives and formulated in a resolution forwarded as a recommendation to the Council of the Institute. The suggestions were (1) to attach to the word "owner" the same meaning as in the Public Health Act, 1875; (2) to make the owner of a house closed by order liable to continuing penalties during continued occupation; (3) requiring notice to administrative county before determining a closing order; (4) giving sanitary authorities power to make a demolition order where a structure is dangerous or injurious to health; (5) giving County Councils power to enforce the Act in urban districts other than muncipal boroughs; and (6) giving right of appeal against the dismissal of an application for a closing order.

The Congress Lecture, on "Architecture in its Relation to Hygiene," was given on Thursday evening by Mr. J. Slater, F.R.I.B.A., at the Technical College.* At the closing general meeting of the Congress, held at the Church Institute on Friday, the Secretary of the Institute, Mr. White Wallis, stated that a total of 1,556 members had attended the sittings of the Congress, for which the most excellent arrangements had been made by the Local and Executive Committees. Among those attending were 700 delegates from 335 Local Authorities, and 451 members and associates of the Sanitary Institute. The presidents and secretaries of sections and conferences presented reports, and the proceedings of the Congress closed with a series of resolutions of thanks to the Earl of Stamford, the Mayor of Bradford, Mr. Councillor Godwin, Dr. Arnold Evans, and the numerous bodies who had contributed to the success of the Congress.

THE INTERNATIONAL FIRE CONGRESS.†

THE sitting of the Congress was resumed on Wednesday morning last week, in the Caxton Hall, Westminster, Mr. A. Darbyshire, F.S.A., presiding over the Building Construction and Equipment Section (Section 1).

The first paper taken in this section was by Mr. Bernard Dicksee, District Surveyor, London, and was entitled:—

"Fire Preventive Sections of the London Building Act."

Mr. Dicksee said that the existing law in London dealing with the construction of buildings is comprised in five Acts:—The London Building Act, 1894, and the London Building Act, 1894 (Amendment) Act, 1898, dealing with building generally. The Metropolis Management and Building Acts Amendment Act, 1878, Sections 11-13, and the Metropolitan Board of Works (Various Powers) Act, 1882, Sections 45 and 48, dealing with theatres and like buildings. The Factory and Workshop Act, 1901, dealing with exits from factories and workshops. His paper would deal only with the fire sections of these Acts, their effect upon the construction of buildings, and suggestions for the amendment of the law where such has been found by experience to be necessary or desirable.

After some preliminary remarks, he said:—'The fire sections of the London Building Act may be grouped into four groups.—1. The separation of buildings from each other to prevent the spread of fire from building to building. 2. The sub-division of a building to confine the fire to one portion of the building. 3. Fire-resisting construction to prevent as far as possible the commencement of fire. 4. Provisions for exit in case of fire. In some cases the same section would come within more than one of these groups, but I think the most

* We hope to give this address in our next issue.
† Continued from last week.

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convenient way of dealing with the subject will be in this form.

Separation of Buildings.—Buildings may be separated from each other, either directly by party-walls and party-floors, or indirectly by their external walls and roofs. The first schedule provides that every building shall be enclosed by walls of brick, stone or other hard and incombustible substances, and sets out the method of construction and the thickness; this latter is only of importance for our present subject in so far as that it is necessary that a wall should be stable to prevent the spread of fire; it must not collapse during a fire; on this score there is nothing to fear from the thicknesses in the schedule. These enclosure-walls will include party-walls and external-walls, which the London law requires to be of the same thickness.

The use of the party-wall in preventing the spread of fire has been established on many occasions, but in no case more so than in the Cripplegate fire, where the fire, checked by the party walls, spread by crossing and recrossing the street. The party wall is required to be carried up above the roof of the highest adjoining building, 3 ft. in the case of a warehouse exceeding 30 ft. in height, and 15 in. in the case of other buildings; it must also be carried up 1 ft. higher and wider than any dormer, &c., on an adjoining roof, and as high as any portion of the roof within 4 ft. of the wall. This figure is probably enough, except that in the case of warehouse buildings less than 30 ft. high the party-wall should be carried up 3 ft. above the roof; it should be remembered that it is the class of building more than the height that makes the risk, and the 3 ft. parapet is required as a screen for firemen to work behind. London, however, is well in advance on this point, as the Montreal Building By-law of 1902 only requires 12 in. in any case, and the Glasgow Building Regulations Act, 1900, requires 2 ft. for warehouses and 12 in. for other buildings.

The efficiency of a party wall to prevent the spread of fire depends upon its integrity; it is, therefore, of the utmost importance that openings in it should only be very sparingly allowed and under close supervision. Buildings may only be united when wholly in the same occupation, and when, looked upon as one building, they are entirely in accordance with the Act. If the buildings, taken together, exceed 250,000 cubic feet in contents, the openings must be closed with iron doors ¼ in. thick in the panel, one on each side of the wall, fitting into proper frames, and no woodwork of any kind is allowed; the openings must not exceed 7 ft. in width by 8 ft. in height, unless the doors be at least 24 in. apart, in which case the opening may be 9 ft. 6 in. high. In some cases the small width allowed for this opening presses rather hardly, as it will not allow of the passage of a van, a not infrequent requirement of the tenant. A great defect in this section is the lack of enactment as to fastenings; a pair of iron doors are of little use unless securely fastened at each edge; there should be at least three fastenings top, middle, and bottom) required on the lock style, and a heel bolt in the centre of the hanging style in addition to the pivots. This deficiency is partly removed in the case of sliding doors, which must be "properly constructed"; this gives the District Surveyor more control.

It is open to question whether the iron party wall doors required by the Act are the best doors for the purpose; power should be given to the County Council, on the advice of the District Surveyors' Association, to make by-laws to allow the use of doors constructed of other material.

When buildings that have been united cease to be in one occupation, notice must at once be given to the District Surveyor, and the openings must be at once bricked up. There are, however, doubtless many cases where no such notice is given, and the omission is difficult to detect. It should therefore be enacted that the owner or occupier of any building connected with an adjoining building by an opening in the party wall, should make application to the District Surveyor for a certificate as to each opening; such certificate should state that the opening is in accordance with the Act, and should be renewable every two years. If at any time the District Surveyor discovered that the opening was in any way irregular, or that the buildings were no longer in the same occupation, or that an opening had been surreptitiously made, he should have power to refuse a certificate, and to cause the opening to be bricked up. The District Surveyor would thus have a register of all permitted openings, and could therefore keep better control over them.

But perhaps the greatest difficulty as to party wall openings a District Surveyor has to meet is the case where one opening has been made surreptitiously uniting two buildings; this may be, and probably is, quite irregular; but, no notice having been given, and the work having been done as secretly as possible, the existence of the opening never comes to the knowledge of the District Surveyor, until such time, perhaps years afterwards, that it is desired to make another opening, of which notice is given. The second opening does not unite the buildings, for they were united when the first opening was illegally made; the District Surveyor is therefore powerless to prevent the new opening, or, in many cases, to cause the old opening to be closed. Thus the owner is allowed to profit by his illegal action. This point formed the subject of a decision of the High Court in the case of Woodthorpe *v.* Spence (63 J. P. 246), when the District Surveyor failed for the reason just stated. The remedy for this would be the insertion of a clause making the formation of any subsequent opening a uniting of the buildings in law, though not actually in fact, and declaring that such subsequent opening shall be subject to the same rules as though it were a first opening. The system of certificates above suggested would also greatly assist matters.

Section 74, sub-section 1, requires buildings to be separated by party or external walls or "other proper party structures;" there is a definition in the Act of a party structure but none of a "proper party structure." Clearly it is intended that the separation shall be of fire-resisting materials, equal to a brick wall. If the words "party arch or party floor" were substituted for "proper party structure" the law would be clear, as section 71 deals with the construction of party arches and floors, requiring brick, stone, or other incombustible materials, of the thickness of 8½ in.; the floors to be constructed in such manner as may be approved by the District Surveyor.

The question whether openings, such as windows, are or are not permissible in the upper portion of a party wall overlooking the roof of the lower building when the two buildings are of different heights has caused much discussion and difference of opinion; but there can be no two opinions as to the danger of such openings from the facility they afford for the spread of fire, particularly from the lower to the higher building. This danger was fully proved by the fire that took place in December, 1898, in New York, when almost the whole of the upper stories of the Home Life Insurance building, overlooking the adjoining lower building, were burnt out by a fire that was communicated from the lower building through the windows overlooking the roof.

Should any dormer or other similar erection of combustible material be placed upon any roof within 4 ft. of the party wall, the Act requires the party-wall to be carried up 1 ft. higher and wider on each side than the erection; but when the window is advanced to and fixed in the party-wall, thereby increasing the danger, it is the contention of some persons that such an arrangement is allowed by the Act. This view appears to be based on the decision of the Chancery Court in the case of Weston *v.* Arnold (22 W.R. 284), but it must be remembered that this was a case not under London law, but the Bristol Improvement Acts, 1840 and 1847; the requirements as to party-walls being different under those Acts, which do not require the party-parapet; moreover, it was not an action to enforce observance of the building law, but an action for injunction to restrain the defendant from blocking up a window opening that was being reconstructed in its old position in a re-erected party-wall. The judges naturally supported the owner of the right of light, and held that unless there is something to the contrary in the Act a wall might be in part of its length and part of its height a party-wall and an external wall for the remainder, but they did not decide that such must be the case under all circumstances. Indeed, they cited instances to the contrary.

A case more in point is that of Williams *v.* Bull (only reported in the *Times* February 15, 1890), decided under the repealed Metropolitan Building Act, 1855, where W. had raised the party-wall between his building and B.'s under the powers granted him under that Act; but when B. subsequently sought to again raise it he objected, unless B. paid him for a share in the first raised portion, which he claimed to his own external wall; it was however decided to be a party-wall, and that B. was entitled to use it without payment.

There is yet another decision, that of Drury *v.* Army and Navy Stores (60 J.P. 421), bearing on window-openings in party-walls, but that case deals not with party-walls proper, but only with quasi party-walls, the expression party-wall being used merely as a convenient phrase for sub-dividing walls within the same building, used to divide a warehouse into fire risks. In this case the windows were held to be allowable, and I am afraid that this decision will encourage the view that they would be allowable in party-walls dividing buildings in different occupations, but I do not think that this view is justified by the sections of the Act. The actual point has never been before the High Court.

As openings are prohibited in party-walls except in accordance with the provisions of the Act as contained in Section 77 above cited, the whole question will depend upon the point as to whether the upper portion of the wall is a party-wall or an external wall; the only London case dealing with party-walls proper (Williams *v.* Bull) is in favour of the former alternative. Section 58 limits the party-wall to such portion of its length as it is used by buildings on each side, and therefore, by implication, does not so limit the height. Section 101 allows the reconstruction of an existing ancient light in a party-wall; it would, therefore, appear that the upper portion is a party-wall, as that would be the only part of the wall in which an ancient light could exist. Section 59 requires the party-wall to be carried up 1 ft. 3 in. or 3 ft., as the case may be, above the roof of the highest (not the lowest) building adjoining. Section 88 (5) confers on the building owner the right to raise a party-wall, not to erect an external wall on the party-wall. On the other hand, the only argument in favour of the external wall theory is the Bristol case, which is, in my opinion, not a ruling case for London law, as the London Building Act does in fact make the enactments that were held in the Bristol case to be necessary to make the wall a party-wall.

The question, however, is sufficiently open to doubt to make it desirable to amend the Act by inserting a section declaring the wall to be a party-wall for the full height of the highest building, and prohibiting openings except in accordance with the rules of the act as to openings in party-walls.

The indirect separation of buildings has not received in the Act the consideration it deserves. Beyond the requirement that buildings shall be enclosed by brick or stone walls, that roofs shall be covered with slates, tiles, metal, or other incombustible materials (Section 61), the prohibition of woodwork in the external face of external walls (Section 55), the requirement of a parapet whenever any part of the gutter is of combustible material (Section 57), and the limit of the area of openings in external walls above the ground story to one-half the area of the wall above that story, little or no attention has been given to the subject. On the contrary, one section, though not strictly describable as a fire section, has decidedly an opposite effect.

The proviso of Section 13 (5) enacts that no dwelling inhabited by the working classes shall be erected within the prescribed distance of the centre of the road to a greater height than the distance between the front wall and the opposite side of the street. Now the height of the building is defined as the height of the front wall, or to the base of the gable, if any, and does not include the two stories in the roof permitted by Section 62 (1), the surface of which roof may be inclined at an angle of 75 deg. to the horizon.

Suppose then the case of a street or alley 12 ft. wide (and there are many such), the front wall may only be 12 ft. high, but above that there may be two stories in the roof with an almost vertical front enclosed by a stud partition covered with slates. Surely this is an encouragement to the spread of fire. Should the ground story be a shop there would be no brickwork at all in the front. The inclosure of the front of such houses with brickwork should not be discouraged. The defect might be amended by limiting the height above the road of the ceiling of the topmost story to 20 ft. more than the distance of the front wall from the

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opposite side of the street or by keeping the whole building within an angle of 45 deg. of the horizon, taken from a level of 16 ft. above the street level at the opposite side of the street.

The crowding together of warehouse buildings or narrow streets and contracted light wells in the rear is a great source of danger; the four great fires in the City of London—at Wood-street, St. Mary Axe, Cripplegate and Barbican—are to be attributed to this crowding. The source of weakness is clearly the proximity of window openings and roofs to each other. This question is nowhere dealt with in the London Building Act, though it is somewhat imperfectly in the Montreal Building By-law of 1901.

It is suggested that in warehouses all roofs should be fire-resisting, that all windows overlooking a street of the width of 20 ft. or less, or a light well or area of a width of 20 ft. or less, into which the windows of other premises look, should be fitted with metal frames glazed with wired glass, or be fitted with shutters of hard wood, iron, or other fire-resisting materials capable of being closed from the inside; and that all external walls abutting on such streets, wells or areas should be carried up as parapets 3 ft. above the roof.

The Subdivision of Buildings.—Warehouse buildings must be subdivided by party walls so that no compartment exceeds 250,000 cubic ft. in contents, but the County Council have in certain cases the power to allow an extension of this figure to 450,000 cubic ft. Although the more recent Glasgow Act of 1900 allows a limit of 350,000 cubic ft., the London limit of 250,000 cubic ft. is excessive, unless all the floors of the building be fire-resisting. The fire insurance companies encourage a 100,000 cubic ft. limit by charging an extra premium on larger buildings, and I am inclined to the view that that should be the limit—the extreme limit — where fire-resisting floors are not employed; but I should prefer to see all floors in warehouses over ten squares in area made fire-resisting. The question of the subdivision by fire-resisting floors, instead of walls, came before the High Court under the corresponding section of the 1855 Act in the case of Holland and Hannen *v.* Wallen (70 L.T. 88) when it was decided that a subdivision by floors did not comply with the Act.

Buildings exceeding ten squares in area used in part for trade or manufacture and in part for dwelling are required to be separated by fire-resisting walls and floors, so as to protect the persons in the dwellings in case of an outbreak of fire in the trade portion. This section was inserted in consequence of several serious fires in shop premises, resulting in loss of life. It has, however, been very unfortunately drafted, and has afforded much scope for the ingenuity of judges, enabling them to place most original constructions upon it. No real difficulty was found in the working of this section until the decision of the High Court created one.

The decision of the Court in the case of Canitt *v.* Godson (1899 2 Q.B. 193) removed public-houses from the operation of the section, and although the plaintiff succeeded on the appeal the decision of the Court of Appeal in the case of Dicksee *v.* Hoskins (65 J.P. 612) practically did the same for beerhouses. In consequence of these two decisions the present effect of the section is so uncertain that its immediate reconstruction so as to carry out its original intention is of the utmost importance. Buildings exceeding twenty-five squares in area containing separate tenements used as dwellings or offices, are required to have the floors constructed of fire-resisting materials.

The corresponding section of the Act of 1855 required the rooms or tenements to be separated by walls and floors of fire-resisting materials; this was found to be impracticable in the case of office buildings, on account of the nature of the tenancies; rooms let together to one tenant are frequently subsequently let separately to a number of tenants, but the mistake was made of remodelling the section in such a way that the fire-resisting partitions between different dwellings have been lost. The section should be redrafted, treating office buildings on the lines of the 1855 Act.

The limit of the size of the building should not, however, depend upon the area, but upon the height, or the cube, which would include both height and area; the risk from fire is clearly greater in a building of 20 squares in area and five stories in height, than in a building of 100 squares in area and one story in height, yet the former does not come within the meaning of the section, but the latter does. No limit is at present placed upon the cubical extent of these tenement buildings; this should be amended. It would not be unreasonable to fix the limit at 250,000 cubic feet.

Fire-resisting Construction of Buildings.—As has been before stated, external and party walls must be of incombustible materials.

Projections from the face of the wall are dealt with in Section 73; these are required to be of "fire-proof" material. Evidently the use of this word is an oversight; it is imported from the Act of 1855. The word "fire-resisting" is evidently here intended, as in every other case that word is substituted for the word "fire-proof" of the older Act. Wooden eaves and large boards are permitted in the case of detached and semi-detached dwelling-houses, and in terraces where the party wall is corbelled out 4 in. in advance of the woodwork; but in all cases the wall must be built up solid behind such cornice. It is difficult to see why two semi-detached dwelling-houses should, for the purposes of this Section, be deemed one building; this proviso was new to the 1894 Acts and should be struck out.

Shop fronts are allowed to be of wood and to project from the face of the wall, with some very slight provisions for the interception of the woodwork of one shop from the next. These rules might well be revised; as at present constituted, a one-story corner shop, projecting a considerable distance from the building to which it is attached, may, with the exception of the party wall against the adjoining shop, be constructed entirely of wood, the roof only being covered with metal.

Bond timbers and wood plates are prohibited in party walls, but no such regulation exists for external walls; some restriction is surely desirable. The collapse of a wall in case of fire is, in my opinion, often caused by the improper use of timber built into walls. A floor-plate or lintel is frequently built into a 9-in. or 14-in. wall to within 4 in. of the external face of the wall, and this is carried across a small brick pier between two openings, rendering the destruction of the wall certain in case of fire or the decay of the timber.

In the Montreal regulations wooden lintels are only permitted when at least 12 in. of brick or stone intervene between the ends of the two lintels bearing on a pier. If wooden lintels be used they should be required to be arched over with a relieving arch.

Bressummers, if of wood, must not approach nearer than 4 in. to the centre of the party wall; but there is nothing to prevent them being of wood, however objectionable that may be, nor to prevent them from being entirely supported on wooden story posts. There is not much use in having a fire-resisting wall supported on an easily-consumed support; the district surveyor has special power as to the strength of bressummers and their supports, but not as to the material. In this particular Glasgow is in advance of London; in that city every bressummer, arch, lintel, column, or other support of a wall must be of fire-resisting material, and if of iron must be protected from fire. In Montreal, also, wooden lintels or bressummers are only allowed up to 5 ft. span in the inside of an external wall, and up to 6 ft. in an internal wall.

The remaining fire sections, relating to internal construction, are practically limited to the provisions for the construction of chimney-flues, hearths and stoves, and pipes for conveying hot water, steam, and the products of combustion. These hardly call for special notice, and they have been substantially the same for the last fifty years, and have on the whole worked well, though some minor amendments would be advisable. The amendment new to the 1894 Act, requiring the flue from a trade stove, or a furnace or steam boiler, to be surrounded with 9 in. of brickwork, was a much wanted improvement. I have myself known stationery, placed against a party wall in which there was a flue from a fish stove 7 ft. away, to be singed.

The construction of public buildings is not subject to the ordinary rules of the Act, but they must be constructed in such manner as the district surveyor may approve; the same applies to the conversion into public buildings of buildings originally constructed for a purpose other than public. There is an appeal from the district surveyor's requirements to the Tribunal of Appeal. This regulation may sound very autocratic, but during the nearly fifty years it has been in force it has been found to work well.

Having dealt so far with the requirements of the Act for the construction of buildings, I now propose to refer shortly to some very important omissions from the Act, of subjects that demand legislation. Perhaps the most important of these is the question of the proper protection of iron and steel from the action of fire. The London County Council have, by Section 164, the power to make by-laws on this subject, and it is not to the credit of that body that nine years after the passing of the Act no such by-laws have been made. But I venture to think that this is far too important a subject to be dealt with by by-laws; there should be a section in the Act itself requiring the proper protection of all columns, stanchions, bressummers, and joists. No one who has given any consideration to the subject can have failed to be impressed with the danger of permitting a corner building used for shop purposes to be supported entirely upon cast-iron columns and iron girders without any attempt to protect the iron. The District Surveyor has special powers as to the strengths and support of breast-summers, but none over their protection from fire. Again, when an iron or concrete floor is used, there is nothing in the Act to prevent the lower flanges of the joists being exposed, as they very frequently are, to the action of the fire, and that although it is common knowledge that such neglect will cause the failure of the floor.

A very important and almost entirely neglected subject is the internal construction of warehouse buildings. I had the opportunity of inspecting the ruins of Cripplegate after the fire, and was much impressed with the state of affairs that allows warehouse buildings to be constructed almost entirely with inflammable materials. The party walls in many cases remained standing entirely alone, the whole of the interiors, consisting of wooden floors, partitions and roofs, the walls and ceilings lined with matchlining, had disappeared. This fire destroyed property to the value of 1,250,000*l.*, and yet the district surveyor is powerless to prevent the erection and re-erection of warehouses constructed in this manner.

All warehouse buildings, except perhaps the very smallest, should be constructed with fire-resisting floors and roof, including all flats over the rear of lower stories at the bottom of light wells. The staircases should be fire-resisting, and enclosed by brick or similar walls carried up to the fire-resisting roof, and should be as far as possible shut off from the rest of the building.

Matchlining, particularly in warehouses, should be most severely regulated. It was proposed in the Amendment Bill, now withdrawn for this year, to require that all wooden boarding and panelling should be fixed close to the wall or floor without any intervening space; this would, I think, be impracticable, in addition to being useless; on contact with fire the boarding would warp and curl away from the wall, forming the very cavity it was proposed to prohibit. There can be no doubt that hidden spaces behind boarding or plastering are calculated to induce the spread of fire to an alarming extent; but that danger can, I think, best be met by limiting the risk to the one room; we should then have a real security instead of the false idea that would be created by the prohibition of space behind the boarding.

In a warehouse or shop premises no matchlining should be allowed to walls or ceilings unless the floors above and below the room, and all the walls of the room in which the matchlining is fixed, are fire-resisting, and no space more than is necessary for the necessary battens should be left behind the boarding. There is not the same risk of fire in dwellings as in warehouses, so that the regulation of boarding need not in dwellings be so severe, and care should be taken in framing any regulation not to prohibit a reasonable amount of wooden panelling in dados, window-backs &c.; but matchlined ceilings should be prohibited in dwellings as entirely unnecessary and dangerous.

The "lath and plaster" partition is another form of construction that requires regulation: I have seen many hundreds of houses constructed with the whole of the internal partitions, floors and roofs of timber, lathed and plastered; such a building could offer no resistance to fire, which, when once behind

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the plaster face of a partition, would spread immediately to the whole house through the flues provided between the studs. In some of the provincial by-laws this is partially dealt with, by requiring the space between each ceiling and the floor above to be filled in with brickwork at each partition; in other districts the whole partition has to be filled in with brick.

The lath and plaster partition should be discouraged as much as possible by requiring a brick wall or half-brick partition wherever support for such is available; this will always be the case on the lowest floor, and very frequently in other situations; though, of course, half-brick partitions are not to be encouraged for more than one story in height. Where stud partitions become necessary, the plastering should be required to be carried down to the floor behind the skirting, and the stories should be bricked off from each other as required by the provincial by-laws.

Lift shafts have nowhere been dealt with in the Act; an attempt to supply this omission was made in the now withdrawn Bill, and the suggested requirements were on the whole satisfactory. The shaft, if enclosed, should be enclosed with fire-resisting material capable of sustaining a severe test, as the shaft, in the case of fire, not infrequently becomes a furnace shaft; this enclosure should be carried through the roof or at least covered down with a fire-resisting ceiling. The Montreal regulations of this subject are well worth consideration, and might well be adopted for London.

In any amendment of the London law, steel frame buildings should be dealt with, as they undoubtedly will come into use in the near future; they are not prohibited by the present Act, provided the walls be of the schedule thicknesses, but there are no provisions for stability of construction nor the protection of the steel from the action of fire. These buildings could, in my opinion, be dealt with under section 82, as buildings to which the general provisions of the Act are inappropriate, and be specially licensed by the County Council, but I believe that body does not take the same view.

Wooden Structures.—No notes upon the fire sections of the Act would be complete without reference to the question of wooden structures. These are dealt with in Section 84, which requires a licence to be obtained from the County Council before any wooden structure may be erected; this power of licensing has been transferred by the London Government Act, 1899, to the Borough Councils created in name by that Act. It is difficult to imagine what can have been the object of the authors of that Act in effecting that transfer, which is certainly one of the most ignorant and meddlesome pieces of legislation ever perpetrated, and has caused nothing but trouble and annoyance to all concerned, without any compensating advantage. The County Council retain the power under Section 82 to licence iron buildings and structures and any other building or structure to which the general provisions of Part VI. are inapplicable or inappropriate; this section would therefore appear to cover wooden structures, and so render Section 84 redundant.

It is significant that whereas Section 82 mentions buildings and structures, Section 84 makes no mention of buildings, but refers only to wooden structures: it therefore becomes necessary, now that the licensing under these two sections is in different hands, to draw a hard and fast line between a building and a structure; a building cannot be licensed under Section 84 as a wooden structure. This does not seem to be recognised by many of the Borough Councils, who claim to be able to license any erection they please as a wooden structure, and have on several occasions illegally issued such licences; indeed, the question has become so serious that the County Council have been obliged to take proceedings against a firm for the erection of a wooden building without a licence under Section 82. In this case the defendant had applied to the County Council for a licence for a building covered with corrugated iron, but had been refused, as the building was to contain a furnace and was to be constructed of wooden framing. The defendant thereupon omitted his iron covering, substituting wooden boarding and tarred felt, and applied to the Borough Council for a licence for a wooden structure, which was granted; and the building was erected without notice to the District Surveyor. On the case coming before a magistrate he decided that it was a building for which the licence of the County Council was necessary, and convicted the defendant, and ordered the demolition of the building.

This improper licensing, besides being a great annoyance to the person who is called upon to remove the irregular building, is of great danger from the fire point of view. The question of the regulation of wooden buildings and structures has always been one of great difficulty; there are many old erections that cannot be touched by reason of their age; again, many are undoubtedly constantly being put up in backyards and similar places out of sight, and it is only by chance that they are discovered and proceedings taken. The law on this subject needs strengthening, whereas the transfer of the licensing power has distinctly weakened it. These wooden erections are a real danger to the public; the licensing power must be returned to the County Council, and an enactment should be passed similar to that now existing for sky signs, requiring the entire removal of all objectionable buildings and structures, old and new, within a short time, and the periodical licensing of the remainder for two years at most at each time, the District Surveyor being required to report on each structure at each renewal as in the case of sky signs, now happily obsolete in London.

Provisions for Exit in Case of Fire.—The important question of exit in case of fire has hitherto been most imperfectly dealt with in the past and present Building Acts; in fact, until the passing of the Act of 1894, it had all but been ignored. The only class of building dealt with in that Act in any way adequately is one division of public buildings, viz., places of public resort. Section 80 provides a fairly good set of rules for churches, chapels, public halls, and similar buildings, giving minimum widths according to the number of persons to be accommodated, and requiring separate exits for each floor or gallery with all doors to open outwards. The weak point of this section is that a single exit for each portion of the building is all that is required, a second exit being only necessary where the width of the exits are reduced to two-thirds of the minimum. In my opinion, at least two exits should be required to all parts accommodating more than about 100 persons. Of course, theatres, concert halls, and all premises licensed for music and dancing, are also dealt with under the London County Council regulations made under the Act of 1878, and these require two exits in every case; but this still leaves all other buildings with only one exit compulsory.

The stairs, corridors, passages, and landings of all public buildings are required to be constructed of, and supported on, fire-resisting materials; but beyond that there are no provisions for the number, size, or situation of staircases and exits from such public buildings as hotels, hospitals, schools or asylums.

Buildings exceeding 60 ft. in height (this will probably include public buildings) must be provided "with such means of escape in case of fire from the stories more than 60 ft. above the street as can reasonably be required under the circumstances of the case," and the County Council's certificate that this has been complied with must be obtained before the upper portion of the building can be occupied. This form of legislation is most unsatisfactory; it places the person about to build either under the arbitrary rule of an official of the Council (perhaps a subordinate), or subject to the whims and fads of a committee of men probably not technically versed in the subject. Every architect about to design a building has a right to know what the law requires of him, and the provisions should therefore be set out definitely in the Act, and be enforced by the District Surveyor. This section is an importation into the London law of the objectionable provincial system, and it is to be noted that there is no appeal from a decision of the Council. A section in the Act requiring a fire-resisting staircase on fire-resisting supports, and enclosed with fire-resisting walls, and also a second way of escape by means of the roof to an adjoining house, or by an external iron staircase or bridge to some other building or to the ground would, I think, meet the case.

The provisions as to staircases and exits from tenement buildings or flats are most inadequate; unless these buildings exceed 125,000 cubic feet there is no provision whatever, and for buildings exceeding that cube the only requirement is that the stairs and corridors shall be fire-resisting. A building containing hundreds of tenements may be constructed with only one staircase. I have already suggested that these buildings should be limited in size; each of these subdivisions should have its separate staircase and exit to the outer air on the ground level.

The only provision for exit from ordinary dwellings is that if exceeding 30 ft. in height and having a roof parapet, there shall be a trap door or dormer by means of which access can be obtained to the roof. This may be no exit at all where the adjoining roofs are inaccessible.

It was the intention of the framers of the 1894 Act that all buildings exceeding 10 squares in area, used partly for trade and partly for dwelling should, in addition to the fire-resisting separation, be provided with a means of escape from the dwelling; unfortunately the text of the Act does not properly carry out that intention, as such a provision is only inferentially required by the section. The means of approach to the dwelling portion referred to will naturally form part of the dwelling division, and as such must be separated from the trade portion; this will entail an approach from the outer air, but not necessarily from the street. An attempt was made in the case of Carritt *v.* Godson (63 J. P. 644) to enforce an exit to the street; this of necessity failed, and I cannot help thinking that this case was very unwisely taken into court, unless indeed it was the intention to at once amend the Act in case of an adverse decision. The remark made by Mr. Justice Day that with an exit into a backyard you might get scorched, but not necessarily burnt, and that the object of the section would thus be partly obtained, "which is always something to be thankful for," is certainly quaint.

The section of the Act prohibiting buildings being erected or extended beyond the general line of buildings has been indirectly productive of death traps. Where consent is given the building in advance of the line is in all cases limited to 16 ft. in height, but no attention is paid to the exits from the building. A tall building some 50 ft. back from the road, shut in entirely behind a one-story shop, is quite inaccessible by a fire escape, and the natural exit may be entirely shut off by reason of the shop being in flames. Should the building exceed 10 squares in area the imperfect provisions of Section 74 would apply, but they would be practically useless, as has many times been demonstrated when a fire occurs in a building of this construction. Unless there be an adequate exit into a side or back street, a proper exit 3 ft. wide separated from the shop by a fire-resisting partition should be required to the front street. The roof or flat over all shops projecting more than 3 ft. from the main wall of the building should be required to be entirely of fire-resisting construction, and no skylight should be allowed within 6 ft. of the main building; at present the skylight is usually placed immediately under the windows of the first floor, so that in case of fire these windows become impossible as emergency exits. New legislation is not in all cases required to effect this imperative improvement; the County Council have this matter entirely in their hands in the case of each new application, as they have by Section 26 power to impose any condition they may deem expedient in the public interests.

The exits from factories are dealt with under the Factory and Workshops Act, 1901, Section 14: Every factory must be furnished with the certificate of the County Council, that it is provided with such means of escape in case of fire as can reasonably be required under the circumstances of each case. This form of legislation is bad in principle for the same reasons as in the case of buildings more than 60 ft. high, where a similar enactment is contained in the Building Act; but after many years of worry and friction the Council have now issued (July, 1902) a list of general requirements for the public guidance, which are in many respects admirable.

The Factory Act applies to the whole of the kingdom, and has, therefore, been drawn on the provincial principle that the local authority enforces the building by-laws; it is, therefore, somewhat out of key with the London law, where the District Surveyor has the administration. This has evidently not been entirely overlooked, as in the part dealing with the application of the Act to London power is given to the County Council (Section 153 (7)) to make by-laws under Section 164 of the London Building Act, with respect to the means of escape from fire in factories and

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workshops; when made these by-laws will be by-laws under the Building Act, and as such will be administered by the District Surveyor. The provisions of the Factory Act do not apply to warehouses, nor to any buildings except factories so defined under that Act; nor are there any provisions on that subject in the Building Act, except the trap-door to roof required where the building exceeds 30 ft. in height and the roof has a parapet.

Exemptions—The exemption sections of the Act require careful revision; circumstances have very considerably altered since these exemptions were originally allowed. It is evident that a building situated some distance from adjoining buildings that might reasonably be exempted from provisions aimed at preventing the spread of fire from building to building is not necessarily one that should be exempted from provisions regulating the construction of the building to secure prevention from fire or exit in case of fire. Speaking generally, exemptions of particular buildings or buildings in particular ownership are not justifiable; if provisions are necessary in the public interest, all should be subject to those provisions; exemptions should therefore be reduced to a minimum. It is impossible to justify, except by favouritism, the exemption of such buildings as the Mansion House, Guildhall, Bank of England, the Sessions Houses, Covent Garden Market, Deptford Cattle Market, or the buildings of the Inns of Court.

The exemption of dwelling-houses of less than stated sizes, and exceeding certain distances from adjoining property, are no longer tenable, as many of the provisions of the Act concern the construction of and exit from the building, and not merely its protection from neighbouring buildings. Another class of exemption that needs careful reconsideration is the exemption of the railway, dock, and gas companies; it was intended that the exemption should only extend to buildings used exclusively for the company for its own use, but the operation of the exemption has been considerably extended by the decision of the Divisional Court in the case of Elliott *v.* L.C.C. (63 J.P. 645, which allowed the exemption of a wooden building erected by a firm of coal merchants on the premises of the railway company, and used as an office in connexion with the sale of coal by the firm, the coal being carried by the railway company; this was held to be "used for the purposes of or in connection with the traffic of a railway company." In this case the object of the section was not even partly obtained, so there is nothing to be thankful for. The time has, I think, gone by for allowing a railway or any other company to cover large areas with inflammable buildings; the only argument in favour of the exemption of railway companies is that the control is in the hands of responsible engineers; but this does not prevent the erection of inflammable buildings even contiguous to dwelling-houses. There are some very extensive office buildings erected by railway companies entirely of wood; surely the hundreds of clerks are entitled to the protection of the Building Act.

I now come to the burning question (in more senses than one), whether the provisions of the Act, or any of them, should be made applicable to existing buildings. As the law at present stands, the London Building Act controls the construction of only newly erected buildings, and alterations, additions, and other works done to existing buildings on the initiative of the owner of those buildings; there is no provision for the compulsory alteration of existing buildings to bring them more up to date. This is a very serious subject. The owners naturally look upon any attempt to amend their buildings as an interference with the rights of the individual, and the Act rather supports this view, containing as it does, many provisions for the maintenance of vested interests, even in the erection of new buildings on the site of old. But there is a vast difference between relaxing the rules of the Act when the width of a street is involved and when the lives and health of persons are at stake. Vested interests in property are one thing, but no man has a right to a vested interest in endangering the lives of his fellow men, even though they be his employees. The right of the authorities to interfere and demand structural alteration when the lives of others are endangered has for many years been recognised in various Acts. The Building Act itself, in Part IX., provides excellent machinery for the demolition or amendment of buildings in a dangerous condition. The Metropolis Management and Building Act, 1878, provides not only for the safety of the public in new theatres and other licensed places of assembly, but also gives the County Council power "where special danger from fire may result to the public," to cause structural amendments to be made to remedy the evil. The Factory and Workshop Act, 1901 (following on the repealed Act of 1891), in Section 14, provides for the safe exit of persons employed in a factory erected before as well as after 1891; the Authority (in London, the County Council) having the same power in old buildings as in new. The Public Health Acts provide for the abatement of nuisances in all buildings, old and new.

There is, therefore, plenty of precedents for applying to existing buildings such provisions as are required for new, for the safety of life, limb, and health. The number of new buildings is very small compared to that of existing buildings; by applying, therefore, these provisions to new buildings only we are making very slow progress; and we cannot, I think, logically go on enforcing the law as to new buildings without requiring some amendment of the numerous death-traps that exist. The owner of a factory may be required to provide proper exits for those employed in it, but should he discontinue the manufacture of goods and merely store or sell them, the building is then a warehouse, and as such the exits, no matter how dangerous, cannot be interfered with.

A reasonable amount of control of existing buildings has, I think, been shown by recent fires to be necessary. But while there is a precedent for the compulsory alteration of existing buildings, there is, as far as I know, no precedent for allowing repeated interference with the same building for the same defect: the power must be exercised once for all. That is the principle of law laid down by Mr. Justice Channell in the case of St. James's Hall Co. *v.* L. C. C. (84 L.T. 508). In this case the late Metropolitan Board of Works had in 1885 exercised their right under the Metropolis Management and Building Amendment Act, 1878, in respect of the St. James's Hall, to which they had required certain amendments, which had been carried out. Subsequently the L. C. C. sought to again exercise their authority and made a further requisition, but the Court held that this could not be enforced, as the Metropolitan Board of Works had already exhausted the power to demand amendment. I think, therefore, that it must be accepted that any power conferred on the authority (whoever that may be), to require the amendment under the Building Act of any existing building, must be exercised once for all: this, unfortunately, was not the proposal of the L. C. C. in the Bill of this year, now withdrawn.

The Glasgow Building Regulations Act 1900, while making provisions for the compulsory alterations to existing buildings, so far as regards the exits from warehouses and high buildings, recognises this principle, and requires the work to be done within five years of the passing of the Act (July 30, 1900). The question as to who shall exercise the power of demanding and enforcing these alterations is a very important one; it must clearly be in the hands of an authority that would exercise a uniform control over the whole of London: it will therefore be impossible to parcel it out to different authorities acting over confined areas, and it would, I think, be throwing too much personal responsibility on the District Surveyors to ask them to undertake the task. Similar duties are already exercised by the L.C.C. in the case of dangerous structures and the theatres and the Factory Act; they are also the present authority for special consents under the Building Act; and in addition the area of their administration is coterminous with that of the Building Act. There can, I think, be no two opinions that they are the proper authority to exercise this power, subject to the right of the owner to appeal to the Tribunal of Appeal.

The present dangerous structure procedure would form a good model for these cases. The District Surveyor might be asked to report upon the building. Acting upon his report, the L.C.C. might formulate their requisition, and the owner might have, say, one month in which to appeal to the tribunal, who might, if necessary, revise or cancel the requisition. When the work to be done has finally been decided upon, copies of the drawings and requisition should be sent to the District Surveyor to see the work carried out, and on completion he should issue a certificate to the Council and the owner that the work had been completed, which certificate should be a guarantee that the owner will not be required to further amend the building unless he should himself voluntarily make additions or alterations to it, in which case the rules for new buildings will, of course, apply.

It has been urged in the City that the Court of Common Council should administer the proposed law within the City; but this cannot be accepted, as the very persons on whom the notices would fall would, in many cases, be members of the authority to enforce those notices; no man would make a rod for his own back; again, this would destroy the necessary uniformity of administration throughout London. The time has, I think, passed for making any exception in favour of the City; those made in the past have been the outcome of petty jealousy, and exist to the detriment of good building and sanitation.

Suggested new sections to carry into effect some of the amendments of the law suggested:—

Separation of Buildings (in substitution for Section 74 [1]).

1. Every building shall be separated from each of the adjoining buildings by external or party walls, or by party arches or party floors.

2. If any building exceeding ten squares in area be divided into two or more tenements, each having a separate entrance and staircase, or a separate entrance from the outer air, every such tenement shall be deemed a separate building, and shall be separated accordingly.

Separation of Tenements within a Building (in substitution for Section 74 [3] and 68).

1. In every building exceeding 100,000 ft. in cubical extent separate sets of dwelling-rooms, tenanted or constructed or adapted to be tenanted in different occupations, shall be separated from each other by walls, partitions, and floors constructed of fire-resisting materials; and from the common staircase or other approach by walls constructed of brick, stone, or other hard and incombustible substances of the thickness prescribed for cross walls; and the floors of the common corridor and passages, and also the landings and stairs of the common staircase approaching thereto, shall be constructed of, and be carried on supports of, fire-resisting materials.

No such building shall extend to more than 250,000 cubit ft., unless divided by party walls in such manner that no division thereof shall extend to more than 250,000 cubic ft., and each such division shall be provided with a separate staircase and entrance affording a direct means of approach from each set of dwelling-rooms in that division to a street or public open space.

2. In every building exceeding 100,000 cubic ft. in cubical extent containing separate sets of offices or rooms (other than dwellings) tenanted or constructed or adapted to be tenanted by different persons, the floors and the principal staircases and corridors shall be constructed of and carried on supports of fire-resisting materials, and the walls of such staircases shall be of the thickness required for cross walls.

No such building shall extend to more than 250,000 cubic ft., unless divided by party walls in such manner that no division thereof shall extend to more than 250,000 cubic ft., and each division shall be provided with a separate staircase and entrance affording a direct means of approach to a street or public open space.

Separation of Trade Premises from Dwelling-rooms (in substitution for Section 74 [2]).

"1. Every building exceeding 10 squares in area and used or constructed or intended to be used jointly for the purposes of manufacture or trade (whether wholesale or retail) and for dwelling, shall be structurally divided into a part or parts to be used for the purpose of manufacture or trade, and a part or parts to be used for dwelling.

2. The part or parts to be used for the purposes of manufacture or trade shall be separated from the part or parts to be used for dwelling, by walls and floors constructed of fire-resisting materials, and all such walls shall be at least 4 in. in thickness; or if more than 10 ft. in height and not built in cement, at least 8½ in. in thickness.

3. All openings made in the walls and floors of fire-resisting materials shall be closed by doors and frames of fire-resisting materials bedded solid to the wall or floor.

4. There shall be provided to the part or parts to be used for dwelling, a separate means of approach from a street or from an open space, from which reasonable access can be obtained to a street, and all staircases and passages forming such means of approach shall be included within the part or parts to be used for dwelling and shall be constructed throughout of fire-resisting materials.

5. Where the building extends to more than fifty squares in area, two such means of approach shall be provided separate and distinct from each other.

(*Continued on page 74.*)

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Illustrations.

SCULPTURE AT THE ROYAL ACADEMY.

WE give this week three further illustrations of this year's sculpture at the Royal Academy; Mr. H. Pegram's "Monument" in marble bas-relief; "Prayer," a marble relief by Mr. A. Bertram Pegram; and "Girlhood," a bronze bust by the same sculptor.

HULL TOWN HALL COMPETITION.

WE give this week illustrations of the design by Messrs. Treadwell & Martin, which received the second premium in the Hull Town Hall competition. The architects send us the following notes in regard to their intentions in the design:—

"The existing buildings have been retained, as we are of opinion that it would be impossible to include the whole accommodation in an entirely new building for the sum mentioned; for the same reason the necessary alterations in the existing building have been as slight as possible, the Mayor's apartments and banqueting-room remaining unaltered. The general arrangement of the plans is as follows:—

On the first floor the large hall is placed centrally with the Alfred Gelder-street frontage communicating with the courts and council corridors. It is approached by a spacious hall on the ground floor, with ladies' and gentlemen's cloak-rooms and lavatories in retired positions near the foot of the staircase, which leads to a large top-lighted crush hall giving direct access to large hall. Retiring rooms with lifts communicating direct with the kitchens are provided. The luncheon rooms are also so placed as to form convenient supper rooms in the event of a ball. Ample emergency stairs are provided at each end of the hall giving direct access to the street.

The Council Chamber is situated at the head of the existing staircase in the old building, extended to meet the new conditions, and is approached from it by a spacious council lobby. To the left and right of this lobby are the council corridors, with the council chamber placed centrally. The committee rooms are in front, *en suite*, and the members' rooms are at the back. The Council corridor gives direct communication, on the same level, between the Mayor's apartments and banqueting-room and council chamber and large hall.

The Law Courts are placed in the middle of the building on the first floor, in order to keep them as free from noise as possible, and are approached from Alfred Gelder-street by a grand double staircase leading direct to the law-courts corridor, giving access to the floor of the courts and the various witnesses' rooms.

From Anne-street a staircase leads direct to a private corridor on the level of the bench, from which are entered the various private rooms of magistrate, recorder, and judge, which again open immediately upon the bench. The grand jury room and justices' rooms are so arranged that they may conveniently be used as committee-rooms in connexion with council chamber.

The prison van entrance is from Anne-street, and leads direct to a police area, around which are arranged in two tiers the twenty cells required for police and sessions courts respectively. The dock in each case is reached by a staircase direct from the cells beneath, which are so arranged that the police cells may be used in conjunction with those for the sessions court, and means are provided for completely shutting these off.

On the ground floor are arranged the public offices, the City Engineer with a suite of offices with north light to Anne-street, and the City Architect in a similar position on a mezzanine over.

The Rates office is placed beneath the council chamber, with the treasurer's offices immediately adjoining, with entrances direct from Alfred Gelder-street, and from corridors leading to the other parts of the building. The pay office has also doors direct to Gelder-street and main corridor.

The elevations are treated in a free Renaissance manner, carrying on the main lines of the existing buildings.

Bearing in mind the small amount of money to be expended on the building, the elevations have been treated in a simple manner with no unnecessary domes or towers, as we felt that it would be quite impossible to introduce these for the amount laid down in the conditions."

NORFOLK AND SUFFOLK YACHT-CLUB HOUSE, LOWESTOFT.

IN the case of the Royal Norfolk and Suffolk Yacht-club house at Lowestoft, which has just been opened, the architects had what was practically a triangular site to deal with, hence the only plan that quite adapts itself to the site has to be triangular too. The base of this triangle faces the Yacht Basin, whilst the apex of it, carried up in the form of a dwarf tower look-out, or belvedere, is seen conspicuously from the two main lines of approach, viz., the Bridge and the Esplanade. The tower forms a square on plan, and the square is set diagonally towards the sea front. This arrangement allows two wings to be thrown out, one of which is the dining-room with the billiard-room over it, and the other the reading-room with the cardroom over it. The tower itself forms internally the central hall and takes the staircase, the steward's office, and the other offices generally.

The walling, externally, is finished with rough stucco, coloured cream white. The roofs are covered with bright red tiles. The woodwork generally is painted white, except the doors and the balcony, which are painted a bright green. There are windows, balustradings, copings, and carved panels in red terra-cotta brickwork introduced in various parts of the building. The belvedere is of woodwork painted white, surmounted by a copper dome, above which a copper "ship" gilded acts as weather-vane. In order to complete the design, grass will eventually be laid all around the building, and straight gravel paths will be formed.

The plans of ground and first floor, which are appended, show the general arrangement of the building. Over the second floor is the tankroom, and over that the belvedere, which forms the conspicuous feature on the land side of the tower. From this belvedere there are steps out on to the tower terrace. Telephones have been laid into different parts of the building, so as to avoid needless running about of waiters, &c.

The general contractors for the work have been Messrs. J. Youngs & Son, of Norwich. Messrs. Johnson, Burton, & Theobald, of Norwich, have done the hot-water and heating works; they have also installed the telephones and supplied the stoves. Messrs. G. N. C. Mann & Co. have installed the electric light and supplied the fittings. Mr. Minns, of Norwich, has done the carved brickwork. The linoleum, curtains, blinds, &c, have been supplied by Messrs. Chamberlins, Ltd., and most of the furniture has been the workmanship of Messrs. Trevor, Page, & Co. The lead glazing is from designs prepared by the architects, and executed by Messrs. Watson & Kirby, of Norwich. The whole of the works have been carried out from the designs and under the superintendence of the architects, Messrs. George J. Skipper & F. W. Skipper, of Norwich, whose designs were originally selected in competition.

DESIGNS FOR LODGE AND BOAT-HOUSE.

THE lodge was proposed to be built at the entrance of Neasden House. The walls were to be built of uncoursed random rubble, and the roof covered with stone tiles. The window frames and sashes were to be of oak.

The boathouse was designed for the lake at Neasden House, and has floating accommodation for a skiff, punt, and sailing dinghy, also several canoes; and two skiffs can be hung from tackle attached to the floor joists. A special sail and tackle room is arranged in a long and narrow room on the right hand side of the boat entrance. The land entrance is at the back, and ladies' and gentlemen's dressing-rooms and dining-room open out of a small hall.

The kitchen has its own entrance, and leads through a servery to the dining-room. Entrance is obtained to the boat-house below by a staircase in the hall, and from the balcony another staircase leads on to the landing-stage. Direct access is also obtained for the watermen from the road to the landing-stage.

The lower portion of the building is composed of red brick and stone; the upper portion is formed of oak framing with lath and plaster between. The roofs are covered with sandy red tiles. The balcony is of oak supported on strong oak brackets.

R. MORPHEW.

THE INTERNATIONAL FIRE PREVENTION CONGRESS.

(*Continued from page 73*)

6. All buildings used or to be used wholly or in part for the purposes of manufacture or trade, whether wholesale or retail, shall so far as regards the part used for the purposes of manufacture or trade, be subject to the provisions of the Act of 1894, and any amendment relating to the cubical extent of buildings of the warehouse class.

Width of Way (in substitution for section 13 [5] first proviso and amendment 1898.

Provided always that no dwelling to be inhabited or adapted to be inhabited by persons of the working class, shall, without the consent of the Council, be erected or re-erected within a distance of 20 ft. from the centre of the roadway, so that the height of the ceiling of the topmost story above the footway shall exceed 20 ft. more than the distance of the front or nearest external wall of such building from the opposite side of such street; and that no building or structure shall be converted into such dwelling-house so as to exceed such height.

Uniting Buildings (in substitution for Section 77 [1] b).

Such opening shall have the floor, jambs, and head formed of brick, stone, or iron, or other fire-resisting and non-combustible material, and shall be closed by a pair of party wall doors at a distance from each other of the full thickness of the wall. Such party wall doors shall be of iron at least ¼ in. thick in the panel, and be either hung on pivots and fitted close to rebated iron frames, and secured by bolts or other fastenings at the top, middle, and bottom of each style, or sliding doors or shutters fitted close at all edges into grooved or rebated iron frames; and such party wall doors shall be constructed and fitted in all respects to the satisfaction of the District Surveyor.

Provided that the Council may by by-laws or otherwise, after consulting with the District Surveyors' Association, approve the use as party wall doors of doors of fire-resisting material otherwise constructed.

(Additional to Section 77 [1] c.—Provided that the Council shall have power where they think fit to allow such opening to be constructed of a width not exceeding 9 ft.

(Additional to Section 77).—Where any opening or openings have at any time been made in any party wall or in two external walls dividing buildings, the making of any subsequent opening in such party-wall or two external walls, shall, notwithstanding, be deemed to be a uniting of buildings, and no such subsequent opening shall be made except in accordance with the provisions of the principal Act or any amending Act to the uniting of buildings.

Additional.—"Where, before the passing of this Act, any openings have been made in any party-wall or in two external walls dividing buildings, the owner or occupier of such buildings shall within six months of the commencement of this Act make application to the District Surveyor for a certificate as to such openings. Every such application shall state the situation, area, height, number of stories, use of each building, and the name and address of each occupier and tenant, with particulars as to their occupation and such other information as the District Surveyor may reasonably require. On receipt of such application the District Surveyor shall make a survey of the buildings, and if the openings be found to be in accordance with the Act he shall issue a certificate to that effect; but if the openings be found to be in any way irregular, he shall cause the same to be amended or built up, as the circumstances may require.

In the case of openings constructed after the passing of this Act the District Surveyor shall issue his certificate on completion of the opening.

The certificate shall run for two years from the date thereof, and at the expiration of that time application shall be made by the owner or occupier for the renewal, when the same provisions shall apply.

Any person who neglects to make application to the District Surveyor for his certificate as aforesaid shall be liable to a penalty not exceeding 5*l.*, and the District Surveyor may take all proceedings as though application had been made.

Any person who makes an opening in a party-wall, or in two external walls dividing buildings, without giving notice to the District Surveyor, shall, in addition to the penalty for neglecting to give building notice, be liable to a penalty of not exceeding 20*l.*

Additional.—Where a party-wall separates buildings of different heights and in different occupations, such wall shall be deemed a party-wall for

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the full height of the higher building, and no opening shall be made in any portion of the wall except in accordance with the provisions of the Act of 1894 and any amending Act as to the uniting of buildings, or as provided in Section 101 of the Act of 1894.

Limit of Cubical Extent of Trade Premises (in substitution for Section 75, first two paragraphs).

No building of the warehouse class or other building used or to be used either wholly or in part for the purposes of manufacture or trade, the floors of which are not constructed of fire-resisting materials, shall extend to more than 100,000 cubic feet, unless divided by party walls in such manner that no division thereof extends to more than 100,000 cubic feet. Provided that where the floors of such building are constructed of fire-resisting material the building or division may extend to not more than 250,000 cubic feet.

No addition shall be made to any existing building exceeding the aforesaid limits of cubical extent, unless the building be altered to comply with this section; nor shall any addition be made to any building nor to any division thereof, so that the cubical extent of such building or division shall exceed the aforesaid limits.

Construction of Warehouse Buildings (Additional).

The following provisions shall (except with the consent of the Council) apply to buildings of the warehouse class and all other buildings used or to be used for the purposes of manufacture or trade.

1. The roofs, flats, and gutters of every such building and every turret, dormer, or other erection thereon shall be constructed solid of fire-resisting materials, except the necessary woodwork of doors and frames, windows and frames, skylights and lantern lights.

2. The external walls abutting upon any street or upon any court or light well connected with or adjoining to such building shall, where within a distance of 20 ft. from any other buildings opposite thereto, be carried up as a parapet at least 8½ in. thick for a height of 3 ft. above the roof, flat, or gutter. And all windows in such walls and any skylights or lantern lights lit from such street, court, or light well, shall be either fitted entirely with metal frames and glazed with wired glass, or be fitted with fire-resisting shutters capable of being closed and fastened from the inside.

3. In all such buildings exceeding ten squares in area, the principal staircases shall be constructed of and carried on supports of fire-resisting materials, and shall be enclosed with walls or partitions of fire resisting materials carried up to the roof, or where such staircase does not extend to the top of the building, be covered in with a floor of fire-resisting materials. And the corridors and passages from such staircases communicating with the street shall be similarly constructed and enclosed.

Protection of Metal from Fire (Additional).

Every metal girder, stanchion, column, or story-post supporting a wall or a floor or partition, required by this Act to be of fire-resisting material, shall be protected from the action of fire by being encased to the satisfaction of the district surveyor, in concrete, brickwork, terracotta, or metal lathing, and plaster or cement, without woodwork of any description. Should any person be dissatisfied with the decision or requirements of the district surveyor he may appeal to the tribunal of appeal.

Wooden Boarding and Panelling (Additional).

1. No wooden boarding or panelling shall be fixed as a lining to walls, partitions, ceilings, or soffits, in any building of the warehouse class, nor in any other building used or to be used for the purpose of manufacture or trade, nor in any shop or room used in connection therewith, unless all the floors, ceilings, flats, soffits, walls, and partitions enclosing the room or other space in which such boarding is fixed to be constructed entirely of fire-resisting materials or the spaces between the joists or studs be filled in solid with brick, concrete, or other fire-resisting materials, and there shall be no space between such wooden boarding or panelling and the wall partition, floor, ceiling, or soffit, to which it is affixed, other than the thickness not exceeding 1 in. of the battens necessary for fixing such boarding or panelling.

2. No wooden boarding or panelling shall be fixed as a lining to walls, partitions, ceilings, or soffits in any dwelling-house unless the floor, wall, or partition or the ceiling or soffit (other than to a roof over which there is no room) to which such boarding or panelling is affixed be constructed of fire-resisting materials, or the space between the joists or studs be filled in solid with brick, concrete, or other fire-resisting materials.

Internal Partitions and Walls (Additional).

1. All interior walls and partitions (other than partitions constructed of wooden boarding or panelling) shall, so far as regards the lowest story at least of such wall or partition, where adequate support is available upon the solid ground or upon a thick wall, or upon a metal girder, be constructed of brick, stone, concrete, or other incombustible material.

2. The spaces inside any partition constructed of timber framing shall be filled in solid with brick, stone, concrete, or other incombustible material from the level of every ceiling up to the level of the top of the skirting of the story immediately above.

One-story Projecting Shops, &c. (Additional).

1. The roof or flat over any shop or other premises used for the purpose of manufacture or trade, projecting beyond the main front flank or rear wall of the building of which it forms part, and abutting upon a street or open space adjacent to a street, shall be constructed throughout of fire-resisting materials. And no skylight or lantern-light shall be placed on such roof or flat within 6 ft. of any such wall in which there are windows, but all such skylights and lantern-lights shall be so situated as to afford a clear gangway at least 4 ft. wide from such windows to the frontage abutting on the street or open space aforesaid.

2. There shall be provided to the stories above the ground story of such buildings a means of approach at least 3 ft. in width from a street or from an open space from which reasonable access can be obtained to a street, and where such means of approach passes through, along, or across the aforesaid projecting shop or premises used for manufacture or trade it shall be separated therefrom by walls, floors, and partitions of fire-resisting material, and shall be constructed of fire-resisting materials.

Exit from certain Buildings (in substitution for Sections 63 and 68).

In every public building, and in every building the upper surface of the top floor of which is more than 60 ft. above the level of the street, and in every building of the warehouse class and every other building used for the purpose of manufacture or trade, there shall be provided exits from the building by means of one or more staircases communicating with the various parts of such building, constructed throughout of fire-resisting material and carried upon supports of and enclosed by walls of fire-resisting material, and the floors of all lobbies, corridors, and passages communicating therewith shall be constructed of fire-resisting materials. There shall also be provided to such building an additional means of escape in case of fire either by a second staircase as aforesaid, or by an external iron staircase or bridge communicating with the ground or with some other building from which access can be obtained to the street, or by some other means that may be approved by the Council, or on appeal by the tribune of appeal; and the Council may make by-laws under Section 164 of the principal Act with respect to such additional exit.

Regulation of Exits of Existing Buildings (Additional).

1. In the case of any building erected before the passing of this Act that is either
   (*a*) A public building; or
   (*b*) A building, the upper surface of the top floor of which is more than 60 ft. above the level of the street; or
   (*c*) A building of the warehouse class or other building used for the purpose of manufacture or trade.

Where it is made known to the Council that the said building is so defective in its structure that special danger from fire by reason of the insufficiency or inadequacy of the means of exit may result to the persons dwelling or employed therein, or frequenting or resorting thereto, the Council shall require a survey of such building to be made by the District Surveyor.

2. The District Surveyor shall make known to the Council any information that he may receive with respect to any structure being in such state as aforesaid.

3. For the purposes of carrying this section into effect the Council may cause such inquiries to be made respecting each building as they may think fit.

4. It shall be lawful for the District Surveyor to enter into any building or upon any land upon which any building is situate, for the purpose of making a survey of such building.

5. Upon completion of his survey the District Surveyor shall report to the Council his opinion as to the condition of the building and the reasonable means to be adopted to remedy such deficiency or inadequacy of exits as aforesaid, if any.

6. If the certificate be to the effect that such deficiency or inadequacy exists the Council may cause a requisition to be served on the owner or occupier of the building requiring him to cause such works to be done as can reasonably be demanded under the circumstances of the case. Any person dissatisfied with the requisition of the Council may within twenty-one days of receipt of same appeal to the tribunal of appeal, who shall hear and determine such appeal and may affirm, alter, amend, or disallow such requisition.

7. At the expiration of the twenty-one days aforesaid should no appeal have been lodged or where such appeal has been lodged, then upon the decision of the Tribunal of Appeal a copy of all plans and particulars of any works approved or required by the Council under this Act shall be furnished by the Council to the district surveyor within whose district the building to which such plans and particulars relate is situate, and it shall be his duty to ascertain that the same is built in accordance with the said plans and particulars.

8. Upon the completion of the required works by the owner or occupier, the District Surveyor shall issue a certificate to the owner or occupier and to the Council that the works have been done in accordance with the requisition of the Council or of the Tribunal of Appeal as the case may be. After the issue of such certificate no further requisition shall be served by the Council in respect of the same building.

9. If the owner or occupier fail to comply as speedily as the nature of the case permits, the Council may cause a complaint to be made at a Petty Sessional Court, and the proceedings shall be in all respects, where the same are applicable, the same as in the case of dangerous structures.

[We are compelled, owing to the pressure on our space, to hold over the rest of our report of the Congress proceedings until next week.]

THE NATIONAL TRUST.

THE eighth Annual Report of the National Trust states that the Council is able to announce the acquisition of one new property, while the acquisition of others is hoped to be imminent.

An appeal was made in the closing months of 1902 for funds to purchase the summit of *The Kymin* at Monmouth. The purchase price was 300*l*., and the Council appealed for 400*l*. in order that it might have a balance to meet the necessary initial expenditure as well as the cost of repairs and maintenance for the future. Before the end of the year the property had passed into the hands of the Trust, and about half of the balance asked for was received. The new acquisition contains about nine acres on the highest part of the hill, and commands a very extensive and beautiful view of the Wye and Monnow Valleys. The Kymin Round House was built there in 1794 by public subscription, great care being taken in its erection in order that each window should present a peculiarly wide and beautiful "natural picture." Six years later a temple was built in honour of the British Navy, which was visited in 1802 by Lord Nelson. From that time forward the place has been a well-known resort alike of visitors and natives. But latterly the temple has fallen out of repair. When the property was announced for sale last year, the Council was of opinion that it was a case in which the Trust should intervene and ensure its preservation for the use and enjoyment of coming generations.

The Council has voted from its general funds the balance needed to complete the purchase of the *Old Post Office* at Tintagel. In 1893 this most interesting fourteenth century house was put up to auction and bought by Miss Catherine Johns, who was anxious to ensure its preservation; it was at that time put into a state of thorough repair, and subsequently Miss Johns made an offer of the house to the National Trust on favourable terms. The Council is of opinion that its acquisition will be highly satisfactory, for it is by far the most interesting building in the neighbourhood.

Negotiations between the Council and Mr. W. H. C. Nation for the transfer of some 20 acres or so on the top of *Rockbeare Hill* (to be called, by the wish of the donor, "Prickly Pear Blossoms Park") are in an advanced state. Rockbeare Hill is a few miles east of Exeter, and the top of it commands a very fine view westward across the valley of the Exe to the heights of Dartmoor; while to the north, the view stretches up to Exmoor. The land is in part covered by a wood, and in part by open heath, such as is familiar to those who know the New Forest country, and which makes so beautiful a foreground to English landscape. This will be the first acquisition by the National Trust of land in the county of Devon.

In addition to its acquisition of properties, the Council has considered many cases in which danger has been thought to threaten some place or building of historic interest or natural beauty; and action has been taken where it seemed desirable.

Stonehenge still remains inclosed. Action with reference to the rights-of-way alleged to have been obstructed by Sir Edmund Antrobus has hitherto been postponed, both by the Wilts County Council and by the Open Space Socie-

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ties, in the hope that the negotiations known to be pending for the transfer of the Monument to the Government would be successful. It has, however, lately been ascertained that these negotiations have come to an end, owing to the high sum asked by Sir Edmund. Under these circumstances, the Commons and Footpaths Preservation Society has determined not to delay longer in organising an effort to try the question of the validity of the inclosure. While the public are threatened with exclusion from Stonehenge, the most interesting historic remains in Ireland, those of the *Hill of Tara*, have been exposed to danger. During 1902 considerable damage was done to the hill, and it was much feared that a large portion of the historic remains was in grave jeopardy. The Hill contains the most interesting semi-historic monument in Ireland—perhaps in the United Kingdom.

The ownership of the hill is divided, and the leasehold of that portion on which the excavations were being carried out has just been sold, and the purchaser has expressed in a letter to the National Trust her intention of doing all in her power to protect from further disturbance this historic landmark.

In conjunction with the Society of Antiquaries and the Dartmoor Preservation Society, the National Trust has addressed a communication to the chief landowners and public authorities of the district with reference to the damage which is constantly being done to the pre-historic remains on Dartmoor. Dartmoor is peculiarly rich in the remains of the Neolithic Age, as well as of those of more historic times, and perhaps for that reason less care is taken to ensure their protection than might be. Most of the damage is done in complete ignorance of their true value. Throughout the district it has long been the custom for individuals to remove such stones as might be required for domestic or agricultural purposes; while some, at least, of the damage is done under the powers given to the Highway Authorities by the Highway Act of 1835. It is hoped that the action of the societies may result in awakening the interest in Dartmoor's pre-historic and historic antiquities among those by whose influence and power they may be protected.

The Council has been appealed to by the Dorset Field Club with reference to the destruction of a very fine barrow at *Game*, near Dorchester. The damage was done for the sake of the flints, of which the barrow was composed, and which were used for road-making purposes, and it was feared that other barrows in the neighbourhood might meet with the same fate. The club felt strongly on the subject, but considered it to be a matter strictly outside its function, and so called the attention of the Trust to the danger. The trustee of the property was approached, and has very willingly given an assurance that no further damage shall be permitted.

While unable to take any very active part in the movement, the Council has expressed its approval of the scheme for the extension of the public open space at Hampstead Heath, and has supported the Hampstead Heath Society in urging the London County Council to secure for preservation the fields at North-end immediately adjacent to the projected station on the new Tube Railway from Charing Cross.

Members of the Trust will remember that the County Council of Oxfordshire recently decided to substitute new iron-girder bridges for the old bridges over the Thames at Sonning. The Thames had been robbed of many of its picturesque old bridges during the last few years, and the disappearance of the far-famed Sonning Bridges will cause a serious loss to the river scenery. The Council, however, was advised that the old bridges were not safe, and that the case was not one in which the Local Authorities ought to be opposed *in toto*. Representations were accordingly made by the National Trust as well as by other public bodies and private individuals, urging the County Council to erect a less obtrusively ugly bridge than that at first suggested. Unfortunately the Council has decided to persist in its original scheme.

In the course of last autumn a large portion of Snowdon came into the market, and the National Trust was publicly urged to take action to secure it as a national possession. The Council did not see its way to carry out such a scheme, but when the property, which formerly belonged to the late Sir Edward Watkin, Bart., failed to find a purchaser in the auction market the owner's representatives were approached with a view to the transfer of the summit of the mountain to the National Trust. The owner, however, was unwilling to negotiate on that basis.

The Council has been asked by the City Churches Preservation Society for an expression of opinion upon the proposed demolition of All Hallows, Lombard-street. Without discussing the economic conditions of the problem presented by the City churches, the Council regrets, from an æsthetic point of view, the proposal to remove another of Wren's City churches.

The Council has viewed with great distrust another railway Bill now before Parliament, by which power is sought to tunnel through the East Cliff at Hastings, in order to bring a line of railway to the harbour. If this line is made, the cuttings which will be necessary will damage to a deplorable degree the natural beauty of the East Cliff, whose grandeur has hitherto been the chief pride of Hastings. The Corporation of the town has decided to petition against the Bill; and many of the inhabitants of the town are fully alive to the danger, and realise the importance of preserving the natural features of the cliff, which forms so great an attraction to the best class of visitor. "The destruction of the *hill*," it has been said, "will be the destruction of Hastings."

The Council regrets that it has not been possible to make any progress in Parliament this session with the Land Dedication Bill, which has been drafted at the instance of the Council. It is convinced that the greater facilities afforded by the Bill for the preservation of interesting and beautiful places would be welcome to landowners and valuable to the nation.

The Council concludes its Report with an expression of regret at the loss it has sustained by the death of Mr. F. C. Penrose, who had represented the Royal Institute of British Architects in the Council since the formation of the Trust. The Council gladly welcomes Mr. G. F. Bodley, R.A., who has been nominated by the President of the Royal Institute to serve in the place of Mr. Penrose. The trustees of the British Museum have nominated Viscount Dillon and Sir Edward Poynter, P.R.A., to serve on the Council, while Professor Boulger has taken the place of Dr. Dudley Buxton as the nominee of the Selborne Society.

THE BUILDERS' BENEVOLENT INSTITUTION.

THE fifty-sixth annual general meeting of this Institution was held on Wednesday afternoon, at the offices, 31 and 32, Bedford-street, Strand, W.C., the President, Mr. William Higg, in the chair.

The minutes of the last meeting were read and confirmed, and the Annual Report was read and adopted. The Report stated that the past year had been a most trying one for most charities, and this Institution had felt the effects. There had been an appreciable falling-off in the annual subscriptions, but this, in a large measure, had been balanced by the successful results of the President's appeal at the last annual dinner, when contributions amounting to about 1,200*l.* were received. Several changes had been introduced in connection with the payment of annuities, by which the recipients had been spared every possible inconvenience in obtaining their monthly allowances, the anxiety of the President and Committee being that those who are unfortunate enough to need the assistance of the Institution might receive the same without trouble and expense. Since the last Report seven men and four women have been added to the Pensioners' List. Each application was most carefully investigated by a member of the Committee, all the eligible candidates were elected, thus saving a contested election. During the year three pensioners had died. There are now twenty-six men and thirty women receiving annual pensions of 39*l.* and 27*l.* respectfully. The Committee desired to place on record its deep obligation to the President, whose zealous attention to his Presidential duties, generosity to the Institution, and solicitude for the pensioners, had made him a benefactor indeed to the charity. The success attending the last annual dinner was owing to his personal efforts and influence, and to the cordial co-operation of his supporters. The Committee took the opportunity to thank the trustees (Sir Arthur Charles Lucas, Bart., Mr. F. J. Dove, Mr. T. F. Rider, Mr. J. Howard Colls, Mr. T. Stirling, and Mr. J. T. Bolding), the honorary auditors (Mr. J. T. Bolding and Mr. R. J. Ward), and the dinner stewards for their services to the Institution. The Committee had the pleasure to announce that Sir Weetman D. Pearson, Bart., M.P., had accepted the Presidency for the ensuing year. The annual dinner will be held in the Whitehall Rooms, Hotel Métropole, Charing Cross, on Thursday, November 26.

The audited accounts were then passed. The total cost of management has this year been 268*l.* 15s. 11d.—200*l.* less than the cost the year before; the annual subscriptions amounted to 540*l.* 14s.; the interest on invested capital was 802*l.* 3s. 10d., and the amount paid to pensioners was 1,657*l.*

It was agreed to make a record on the minutes of the Committee's satisfaction at the result of Mr. Costigan's first year of office as Secretary of the Institution.

Sir Weetman D. Pearson, Bart., M.P., was, on the motion of the Chairman, elected President for the ensuing year, and a vote of thanks to the retiring President, Mr. W. Higgs, was, on the motion of Mr. J. Howard Colls, heartily agreed to.

Mr. Colls was thanked for his services as hon. treasurer, and was re-elected, and the present Committee were re-elected with the addition of Mr. W. Higgs.

A vote of thanks was passed to the auditors, Mr. R. J. Ward, F.C.A., and Mr. J. Bolding, and these gentlemen were re-elected.

On the motion of Mr. C. Bussell, seconded by Mr. Colls, it was agreed, "That the pensions for males be increased from 3*l.* 5s. to 3*l.* 10s., and pensions for females from 2*l.* 5s. to 2*l.* 10s. per month."

The meeting then terminated.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon in the County Hall, Spring-gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend Battersea Borough Council 15,000*l.* for the erection of working-class dwellings, 2,336*l.* for street-lighting purposes, and 4,127*l.* for street improvements; Stepney Borough Council 12,400*l.* for street improvements and 2,790*l.* for electric lighting and street lighting; Wandsworth Borough Council 1,250*l.* for erection of river wall; Camberwell Borough Council 10,000*l.* for the erection of working-class dwellings; Poplar Borough Council 5,000*l.* for sewerage works; Hackney Union Guardians 17,000*l.* for poor law purposes; Kensington Guardians 2,500*l.* for similar purposes; and the School Board for London 12,370*l.* for improvements at industrial schools. Sanction was also given to the following loan:—Hackney Borough Council 6,500*l.* for electric lighting.

Jobbing Works: Schedule of Prices.—The General Purposes Committee reported as follows:—

"The standing orders of the Council provide that, in the case of jobbing works carried out by the Works Committee, the estimates, measurements, and certificates of the supervising officers shall be based upon schedules of prices agreed upon between the manager of works and the supervising officer concerned, and approved by the General Purposes Committee. The schedules of prices for jobbing works carried out under the direction of the engineer and the valuer have recently been revised, but the schedule at present in operation with regard to architectural jobbing works, which was based on that in use by the School Board for London, was adopted on February 26, 1895, when the Council decided to allow 12½ per cent. above the prices in the schedule, this percentage being arrived at after consideration of the percentages above schedule prices at which the School Board for London had let their contracts for jobbing works. In consequence of an advance of the rates of wages of various classes of artisans this percentage was on November 17, 1899, increased to 14½, and owing to a further increase in the rates of wages the Council on July 13, 1897, fixed the percentage at 16½, and this percentage is at present in operation.

Jobbing works may be divided into two groups, viz.:—

a. 'Measured work,' *i.e.*, work the extent and nature of which can be accurately measured and valued according to the prices in the schedule.

(*b*) 'Day work' or 'time work,' *i.e.*, work the

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nature and extent of which is either so trifling on the one hand, or so speculative on the other, as to make it impossible to give even an approximation of the probable cost; also work which has to be executed under circumstances so peculiar as to place it outside the range of the ordinary schedule rate for measured work, and work which it is found impossible to measure.

The schedule value of all jobbing works which the architect directs to be executed as 'day work' is calculated on the basis of the actual number of hours worked by the men and the actual quantities of materials used, at the prices for such time and materials as shown in the schedule, plus the adopted percentage. The rates of wages inserted in the schedule are those in force when the schedule was compiled in 1895, and in nearly all cases the rates now paid are in excess of those in the schedule. The architect and manager have agreed that in order to correct this anomaly all the labour rate items should be eliminated from the schedule, and that in the case of all accounts rendered for labour in jobbing works executed as day-work, the practice prevailing in Government departments of adding 15 per cent., in respect of establishment and general charges and profit, to the actual rates paid by contractors should be adopted. Such percentage is, however, not to be considered as covering the expense of a special foreman ordered by the architect for day-work of such a character as to require such services in addition to those of the district jobbing works foreman. The schedule value of materials used in connexion with day work will, of course, be calculated as indicated in recommendation (*b*) of this report. As, however, the percentage allowed above schedule prices was raised from 12½ to 14½ in consequence of increases in rates of wages, the architect and manager propose that if all labour rate items be omitted from the schedule, the percentage to be added to the prices of all remaining items should be reduced to 13½, this figure being arrived at by adding 1 per cent. on account of the increased cost of materials to the 12½ per cent. adopted in 1895.

We concur in the proposals submitted above, the effect of the adoption of which briefly stated will be that in future accounts for architectural jobbing works the schedule value will be arrived at by adding (*a*) 13½ per cent. to the schedule price of all items in the schedule (from which all labour rate items will be eliminated), and (*b*) 15 per cent. to the actual wages paid on jobs executed as day-work. The Council of course understands that the 13½ per cent. is not added in the case of (*b*), and that the schedule value is used for purposes of comparison only, the actual cost being paid in all cases."

The Committeee recommended accordingly, and the recommendations were agreed to.

Tramway Traction.—The debate was resumed upon the Report by the Highways Committee on the subject of the electrification of the Council's northern tramways. At the previous meeting the portion of the Report recommending the conduit system for about twenty-six miles of tramways was agreed to. The remainder of the recommendations, now to be considered, were in favour of the overhead trolley system for about twenty-eight miles of tramways.

After a brief discussion this part of the Report was deferred in order to afford an opportunity for obtaining the definite views of the Borough Councils on the subject.

Open Spaces.—It was recommended by the Parks Committee that a sum of 3,670*l.* be voted for the laying out of Brickfield Gardens, Limehouse.

Mr. Beachcroft pointed out that it was proposed to erect a bandstand, gymnasium, conveniences, shelter, and watchbox on an open space of less than two acres. There must be some limit to their expenditure. No one begrudged small open spaces, but their cost was becoming too great. The up-keep of the parks and open spaces, which was 130,000*l.*, represented half the cost of the maintenance of the drainage system, and he considered they were going a little too far.

Mr. Campbell, while regretting the heavy cost, warmly supported the acquisition of open spaces in the East End of London.

The recommendation was agreed to.

It was also agreed:

"That the estimate of 818*l.* submitted by the Finance Committee, be approved; and that subject to the necessary Parliamentary authority being obtained, the Council do agree to contribute one-half of the cost of acquiring Brunswick Square as a public open space, such contribution not to exceed 818*l.*, and to be made conditionally upon the Council of the Metropolitan Borough of Camberwell undertaking to acquire, and to lay out and maintain, the land as a public open space . . . .

That the estimate of 1,175*l.* submitted by the Finance Committee be approved; that an expenditure of that amount be authorised for laying out Nelson-square-garden, Blackfriars-road; and that the Parks Committee be authorised to invite tenders and enter into any necessary contracts in connection with the work. . . .

That the estimate of 4,650*l.* submitted by the Finance Committee be approved, and that the expenditure of that sum be authorised for the purchase of a portion of the Mountsfield estate having an area of about 5¾ acres for the purposes of a public open space, subject to the Lewisham Borough Council contributing a sum of 2,250*l.*, being one-half of the purchase money. . . .

Letting of Property by Public Auction.—The Corporate Property, Charities, and Endowments Committee reported as follows:—

"The Council on April 7 last sanctioned the submission of certain properties to public auction during the month of June, and for the purpose authorised an expenditure of 200*l.* For various reasons it was found impossible to hold an auction before July 13 next, and for this date a room at the Mart has been engaged. In the interval circumstances have necessitated some slight alterations being made in the list of properties to be submitted, with the result that the plots which we suggest should now be offered for letting are as follows:—

Commercial land: Holborn to Strand—Lots 4, 5, 6, and 7; Southampton-row—Lot 8; Mare-street, Hackney—Lots 1 to 15; Long-lane, Borough—Lots 1, 2, and 3; Tower Bridge southern approach—Lots 14, 15, 16, and 21.

Rehousing Sites: Tower Bridge-road southern approach; Clarence-street, Rotherhithe.

The commercial land will be offered upon lease for 80 years and otherwise in accordance with conditions approved by the Council, adapted in detail as circumstances necessitate. The rehousing sites are offered at a nominal rent of 1*s.* per annum upon lease for 99 years, intending lessees being asked to make offers of a premium for the lease, and required to submit plans for the approval of the Council and of the Home Secretary. In a previous Report we stated that we had been advised that, with a view to testing the value of these sites, it would be of little use to offer either other than upon lease for 999 years, which was equivalent to parting with the freehold. We accordingly recommended that the Clarence-street site shall be offered for letting for a term of 999 years, but the Council substituted 99 for 999. Having prepared the conditions we forwarded a copy to the Housing Committee for their observations, in the hope that the proposals set forth therein would receive their concurrence. After consultation with the valuer, the Housing Committee have expressed their inability to approve of the conditions on the ground that they will not in any way form a true test of the real housing value of the sites. The Housing Committee point out that the primary object of the Council in deciding that the sites should be submitted to public auction was that an effective test of the correctness of the officers' estimates should be obtained. We recommend—(*a*) That the course of action taken by the Corporate Property Committee in postponing, until July 13, 1903, the submission of properties to public auction, be confirmed. (*b*) That all the above-named properties be offered for letting upon the conditions set forth in the report. (*c*) That the seal of the Council be affixed to the formal appointment (in duplicate when ready) of Mr. Andrew Young as auctioneer and agent in connexion with the auction."

The report was referred back for further consideration.

Underground Rooms in St. Pancras.—The Public Health Committee reported:—

"As the result of inquiries which we caused to be instituted with regard to the existence of underground rooms separately occupied in contravention of the provisions of Section 96 of the Public Health (London) Act, 1891, our attention was called to a large number of illegally occupied underground rooms in the Metropolitan Borough of St. Pancras. We communicated with the Borough Council on the subject and they stated in reply that they recognised the fact that there was a large number of underground dwellings in the borough, and that they harboured a great number of persons who were driven to take refuge therein by the dearth of other dwelling accommodation. They also stated that they considered that the well-being of the poorer inhabitants was best served by elasticity in the restrictions with regard to underground dwellings until such time as the County Council, the Borough Councils and private enterprise had provided sufficient dwelling accommodation to relieve the pressure. On receipt of this letter we caused a detailed inquiry to be made with the result that it was found that over 400 tenements in the borough, affording accommodation for more than 1,000 persons, were occupied separately although they contravened the provisions of the law relating to underground rooms beginning to be occupied after 1855. Ten of these tenements, accommodating twenty-nine persons, did not even conform to the standard prescribed for underground rooms let antecedent to 1855. In communicating these facts to the Borough Council we stated that we could not accept the reasons given by them as sufficient to justify the Borough Council in allowing the law to be contravened, and we expressed the hope that the Borough Council would, on further consideration, give instructions for the provisions of Section 96 of the Public Health (London) Act, 1891, to be enforced.

On March 19, 1902, the Borough Council replied that they were causing a complete inspection of all the underground rooms within the borough to be made, and that they would proceed at the earliest opportunity to consider their position with regard to such rooms when they had all the data before them, the matter being of considerable magnitude and great seriousness.

On May 23, 1903, the Borough Council forwarded a copy of a report by Dr. Sykes, their Medical Officer of Health, upon the results of the inspection, and stated that with a view to dealing with illegally occupied underground dwellings, the report had been referred to the Housing of the Working Classes Committee.

The Report discusses some legal difficulties arising under Section 96 of the Act, and refers to the subject of hygienic requirements in underground rooms generally. Dr. Sykes states that it is undesirable at present to enter upon the requisites of the Act of 1891. As regards underground rooms not complying with the requisites of the Act of 1855, he groups the rooms in four divisions comprising eight classes. The defects of the room in three of these classes can, Dr. Sykes states, be more or less easily remedied, and in two other classes of rooms the defects can be remedied in particular instances. To one class, there are no rooms to be assigned, and in the remaining two classes the defects are practically irremediable, viz., Class I., *i.e.*, rooms less than 7 ft. high from floor to ceiling, containing 113 rooms, and Class III., *i.e.*, rooms with the ceiling less than 1 ft. above the ground level, containing 527 rooms. Dr. Sykes suggests that the rooms should be dealt with consecutively and at intervals, 'so as to avoid the serious effects of suddenly displacing a large population.' We recommend that a letter be addressed to the St. Pancras Borough Council stating that the London County Council considers it of great importance that steps should be taken to enforce the provisions of Section 96 of the Public Health (London) Act, 1891, with regard to underground rooms in the borough, and asking what action they are taking upon the report of their Medical Officer of Health on this subject."

Mr. Macdonald said a deplorable state of affairs was brought to light in the Report. Unfortunately, people were turned out of one street and went into another. It would be well if there was more unity of action with regard to the enforcement of the Act.

Mr. Leon considered that it would be well if the County Council superseded the Borough Councils in the administration of the Act.

Dr. Cooper said the difficulty was that the duties under the Act devolved on the Local Authorities, and there were twenty-nine different ways of administering it.

The Report was adopted.

Ground Plan and Annual Map of London.—It was agreed:

(*a*) That the charge for the 6-in. annual map of London be fixed at 1*s.* per sheet, or 35*s.* per copy.

(*b*) That advertisements be issued acquainting the public that the Ordnance survey has been brought up to date, and that tracings of any particular property on the scale of 5 ft. to the mile can be obtained upon the following terms:—

To public authorities, upon making their own tracing, 5*s.* per acre, or 7*s.* 6*d.* per acre if tracing is supplied.

To the general public, tracings of any one house will be supplied upon payment of a fee of 2*s.*, and in the case of adjoining houses a further fee of 6*d* for each house.

Theatres, &c.—Applications as to the following works were agreed to:—

Widening of passage way on east side of Town Hall, Spa-road, Bermondsey, from 3 ft. 6 in. to 10 ft. (Borough Engineer and Surveyor for the Borough Council of Bermondsey).

Coliseum building on site of houses abutting upon St. Martin's-lane, Bedfordbury, and May's-buildings (Mr. F. Matcham for Mr. O. Stoll). The building will accommodate 2,939 persons, including standing room.

Alteration to His Majesty's Theatre, Haymarket, including the provision of a new floor of offices above the existing dressing-rooms (Messrs. Romaine-Walker, & Besant for Mr. Beerbohm Tree).

Additional dressing-room accommodation at the London Hippodrome (Mr. Matcham).

New theatre, corner of High-street, Lewisham, and Hither Green-lane, to accommodate 1,330 persons, seated and standing (Messrs. Briggs & Jeyes).

Extension of stage at Queen's Hall, People's Palace, Mile End-road, E. (Mr. C. Brandon).

Indication of Houses of Historical Interest.—On the recommendation of the Historical Records and Buildings Committee it was agreed to erect memorial tablets on the following houses of historical interest in London,

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viz.—(1) Holly Lodge, Campden Hill, Kensington (Lord Macaulay); (2) No. 22, Theobald's-road (Earl of Beaconsfield); and (3) No. 4, Whitehall-gardens (Sir Robert Peel).

Christ's Hospital.—The same Committee reported:—

"The Council will know that the buildings originally comprising Christ's Hospital, Newgate-street, have nearly all been demolished. They contained many features of exceptional interest, and of these it is very desirable that there should be some adequate record. Owing to the pressure of work in the architect's department, however, it was not possible for this to be secured by ordinary means, and in these circumstances, five officers of that department, viz., Messrs. Brooke, Peyto, Wylde, Hallam, and Young undertook in their own time to take measurements and particulars of the most interesting portions of the buildings. As a result they made eight drawings of great value which they have allowed to be reproduced for the use of the Council. We feel sure that the Council will appreciate the action taken by the above-mentioned officers in the matter."

Housing.—The Housing of the Working Classes Committee reported as follows, the recommendation being agreed to:—

"On October 7, 1902, the Council accepted the tender of Messrs. F. and F. H. Higgs, amounting to 23,000*l.*, for the erection of Durham Buildings, York-road, Battersea. These dwellings consist of two blocks of five-story buildings, and the contract provided that the second block should be commenced on the completion of the first. We have since found it possible to arrange for the second block to be commenced at once, and Messrs. Higgs have agreed to do this on terms favourable to the Council. . . . We recommend that the seal of the Council be affixed to the supplemental agreement with Messrs. F. and F. H. Higgs in connexion with the erection of Durham-buildings, York-road, Battersea."

Improvement.—The Improvements Committee recommended, and it was agreed, that the supplemental estimate of 2,000*l.* submitted by the Finance Committee be approved, and that the Improvements Committee be authorised to incur further expenditure on capital account up to 2,000*l.* in connexion with the widening of Southampton-row to 105 ft., between Fisher-street and Theobald's-road, necessitated by the proposal to construct in the thoroughfare an open approach to the tramway subway.

The Council adjourned soon after seven o'clock.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—On July 4 some of the members made a sketching visit to Whalley and Lytton Churches and to Stonyhurst College, the Early Renaissance portion of which provided some interesting sketching.—The rain unfortunately prevented a good attendance at the visit to the car depôt in Hyde-road. Mr. J. Gibbons, the architect, kindly explained the design and construction of his very interesting building, the first part of which is now approaching completion.

COMPETITIONS.

CHILDREN'S HOME, CROYDON.—The first premiated design in this competition was that submitted by Mr. J. Hatchard Smith, 41, Moorgate-street Buildings, E.C.; the second was by Messrs. Wills & Anderson, 4, Adam-street, Adelphi.

RELIEF STATIONS, CROYDON.—The first premiated designs for two relief stations at Croydon were those submitted by Messrs. Wills & Anderson, 4, Adam-street, Adelphi.

METROPOLITAN ASYLUMS BOARD.

THE usual fortnightly meeting of the Metropolitan Asylums Board was held on Saturday last week at the offices, Victoria Embankment, Sir R. Hensley in the chair.

Correspondence was received from the Local Government Board with reference to the additional accommodation which it is proposed to provide for ambulance nurses at the South-Eastern Ambulance Station, stating that they considered it desirable that the Asylums Board's Architect should confer with the Board's Architect on the subject. The Southwark Guardians wrote protesting against the proposal to pull down the temporary buildings at the North-Eastern Hospital, and to erect permanent buildings in their place.

Fountain Hospital Buildings.—The Hospitals Committee submitted a Report dealing, among other matters, with the proposal to erect a residence at the Fountain Hospital, Tooting, for the Medical Superintendent. On January 24 last the plan adopted by the Board was forwarded to the Local Government Board for their approval. In connexion with this Dr. Downes wrote stating that the question had been raised as to how far it was desirable to add a permanent building to an ostensibly temporary hospital. Dr. Downes having expressed a desire to confer with the Asylums Board on the matter, the Committee had an interview with him, the result of which was that the Committee instructed the architects, Messrs. Aldwinckle & Son, to report "on the possibility and probable cost of substituting non-flammable material for the present matchboard lining and other woodwork . . . and on the life of the external structures." The architects' report had been before the Works Committee, who requested them to see the Superintending Architect of the London County Council. Having conferred with the Architect to the London County Council, Messrs. Aldwinckle submitted a further Report on the question of minimising the risk from fire, in the course of which they stated that the licence under which the hospital was erected expired in November next. The general construction was far in advance of ordinary temporary buildings, and showed no signs of deterioration after a lapse of ten years. "The buildings all stand upon brick and concrete bases, and the floors are laid upon 6 in. of concrete throughout. All passages are paved with tiles or asphalt laid upon cement concrete, except those of the staff homes, as are also the floors to the ward kitchens, &c." All the subways containing steam or hot-water pipes were of brick and covered with fireproof floors. "The whole of the buildings are covered externally with galvanised iron. There is a complete system of telephones, fire-alarms, and fire-extinguishing apparatus. The cost of erection was 128,000*l.*, and the hospital had been found extremely economical for administrative purposes. The Report continued: "In view of the recent fire at Colney Hatch Asylum, it is felt that, although the several buildings are very substantially erected, there are some steps which might be taken to minimise the risk of fire, and it is very desirable . . . . . to continue the hospital in its present sphere of usefulness." The architects recommended that the following works should be carried out:—The removal of the whole of the matchboarding with which the walls and ceilings are lined internally; filling in between the fir quartering of all external walls with brickwork in cement, making the walls solid; lining the walls and ceilings internally of all the ward pavilions, eighteen in all, with fibrous plaster on wire netting, or with granitic plastering, the ceiling in either case to be laid on metal lathing; lining the walls and ceilings of all the remaining temporary buildings with "uralite"; substituting fireproof partitions for all deal framed or boarded partitions in the homes for nurses and servants; substituting teak for deal flooring in the corridors of those buildings, and providing an extra escape door to each of the buildings. The removal of the whole of the roofs and columns from the connecting covered ways, and the substitution of cyanide paint for all internal paint work. The cost of the several works was estimated by the architects to be 13,200*l.* Having discussed the whole matter, the Committee recommended that the work be carried out at the estimated cost. This was agreed to. The question of the erection of a residence for the Medical Superintendent was allowed to stand over pending a decision as to the future of the hospital.

Tooting Bec Asylum.—The same Committee submitted a statement showing that the total expenditure incurred by the Board in respect of Messrs. Johnson & Co.'s contract for the main portion of the Tooting Bec Asylum (the whole of the buildings with the exception of the receiving home for children and the new ambulance station) had been 202,550*l.* 17*s.*, or 1 072*l.* 10*s.* 10*d.* less than the contract sum of 204,523*l.* 7*s.* 10*d.* That amount did not, however, represent the actual saving, inasmuch as during the progress of the building works amounting in value to nearly 2,500*l.* were ordered by the Board, which were not contemplated when the tender was taken. Among those new works was a pathological room (290*l.*), a granite road and tramway for heavy traffic at the back entrance to the asylum (750*l.*), laying rain-water drains in concrete (600*l.*), fitting up additional padded rooms (226*l.*), additional electric bells and telephones (196*l.*), alterations to main coal-store and approaches (164*l.*), and sundry minor works. The actual saving would, therefore, be about 4,500*l.* A considerable part of the saving was due to the Managers substituting revised plans in the case of the laundry, the net saving effected being 1,557*l.* 17*s.* 6*d.* The contract was exclusive of certain subsidiary contracts, amounting to 20,447*l.*, for laundry machinery, fittings, &c.

North-Eastern Hospital.—Mr. Helby again brought up a motion rescinding the resolution of the Board on March 7 last approving of steps being taken for pulling down the wood structures at the North-Eastern Hospital. After a lengthy discussion, in the course of which the Chairman stated that when the buildings were put up it was ordered that they should be of the most fragile character, Mr. Helby's motion was, on a division, carried by 24 votes to 17.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

St. Pancras, West.—An addition to the London Temperance Hospital on the east side of Hampstead-road, St. Pancras (Mr. J. A. Tregelles for the Board of Management of the Hospital).—Consent.

Westminster.—One-story shops upon part of the forecourts of Nos. 76, 78, 80, 84, 86, and 88, Grosvenor-mansions, Victoria-street, Westminster (Mr. F. G. Richardson for Mr. M. Jenks).—Consent.

Hammersmith.—A modification of the conditions imposed as to the erection of an iron, concrete, and glass shelter in front of the new King's Theatre, Hammersmith-road, Hammersmith, so far as relates to the fixing in the sides of the shelter of the words "King's Theatre" (Mr. W. G. R. Sprague for Mr. J. B. Mulholland).—Consent.

Islington, West.—A projecting iron sign with lamp at the "Lincoln Arms" beerhouse, No. 52, York-road, Islington (Mr. A. Dixon for Messrs. Whitbread & Co., Ltd.).—Consent.

Marylebone, East.—Two projecting signs at No. 8, Oxford-street, St. Marylebone (Messrs. Sims & Woods for Messrs. Tobias Brother).—Refused.

Wandsworth.—Ten houses on a site on the south side of Replingham-road, Southfields, Wandsworth, abutting also upon Elborough-street and Trentham-street (Mr. G. Ryan).—Refused.

Woolwich.—An addition to No. 19, Plumstead-road, Woolwich (Mr. H. O. Thomas) for Messrs H. R. W. Pritchard & Co.—Refused.

Width of Way.

Strand.—A building (to be known as the London Coliseum) abutting upon St. Martin's-lane, May's Buildings, Bedfordbury, and Taylor's-buildings, Strand (Mr. F. Matcham for the London Coliseum, Limited).—Consent.

Islington, West.†—Buildings on the north-east side of Wellington-road, and south-west side of Adam's-place, Holloway (Mr. E. J. Harrison for Mr. R. Loomes).—Consent.

Woolwich.—Retention of a building at the rear of No. 48, Princes-road, Plumstead (Mr. J. O. Cook for Mrs. S. Fuller).—Consent.

Width of Way and Lines of Frontage.

St. George, Hanover-square.†—A projecting porch and oriel window to a new building upon the site of Nos. 41 and 43, Maddox-street, St. George, Hanover-square (Mr. W. S. Weatherley for Mr. E. Arnold).—Consent.

Deptford.—A building on the site of Nos. 112, 114, and 116, Kender-street, New Cross, Deptford (Messrs. E. Runtz & Co. for Mr. G. Newman).—Consent.

Norwood.—A one-story shop on the east side of Dalberg-road, Water-lane, Brixton, with external walls at less than the prescribed distance from the centre of the roadway of Effra-terrace (Mr. H. P. Wyatt for Messrs. W. H. and F. Baker).—Refused.

Deviation from Certified Plans.

St. George, Hanover-square.—Deviations from the plans certified by the District Surveyor, so far as relates to the proposed rebuilding of Nos. 41 and 43, Maddox-street, St. George, Hanover-square (Mr. W. S. Weatherley for Mr. E. Arnold).—Agreed.

Strand.—Deviations from the plans certified by the District Surveyor, so far as relates to the proposed erection of a building upon the site of Nos. 36, 38,

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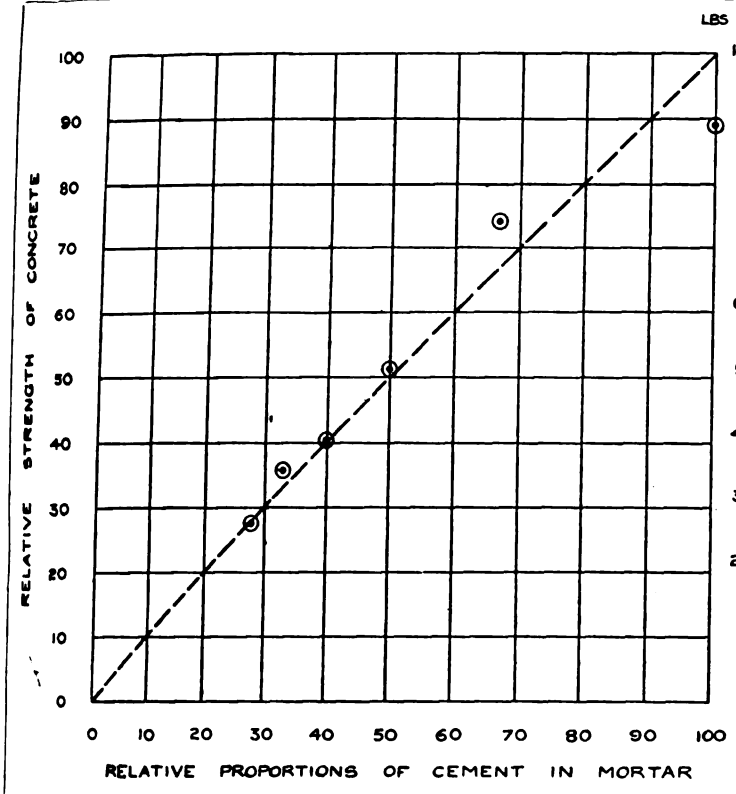

Fig. 2.

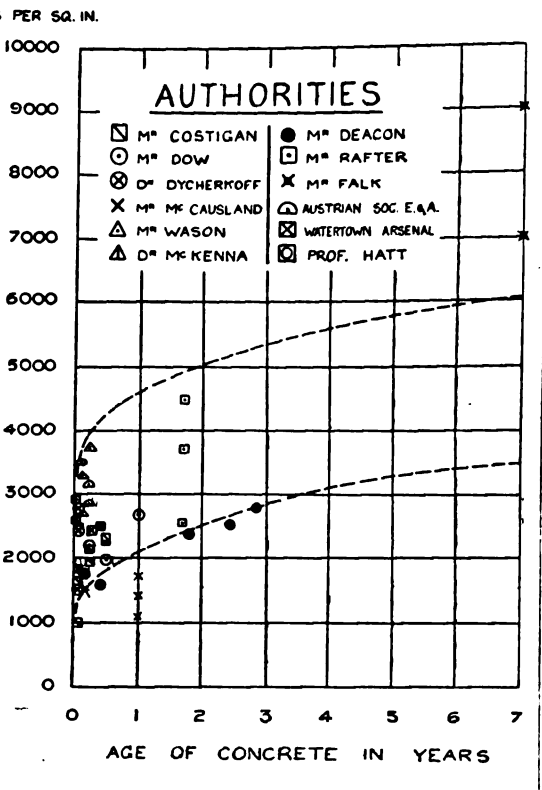

Fig. 4.

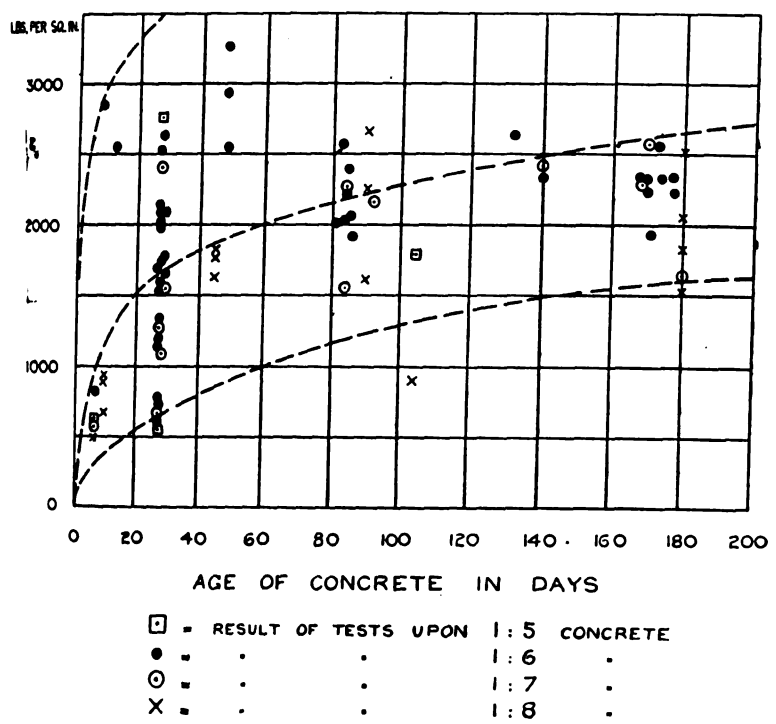

Fig. 3.

Illustrations to Student's Column.

and 40, Glasshouse-street, Regent-street (Messrs. D Cubitt, Nichols, Sons & Chuter for Mr. H. J. Marsh).—Agreed.

Formation of Streets, &c.

Wandsworth.—That an order be issued to Mr. A. E. Chasemore sanctioning the formation or laying-out of a new street for foot traffic only on the site of Nos. 13 and 15, High-street, Putney, to lead from High-street to Brewhouse-lane, and an iron roof over such street (Mr. T. S. Jay).—Agreed.

Hammersmith.—The widening of Heath-place, Uxbridge-road, Hammersmith, to 40 ft. (Messrs. Richardson & White for Messrs. Griggs Brothers).—Consent.

Dwelling-houses on Low-lying Land.

Lambeth, North.—Three buildings on low-lying land situated at New-cut, Lambeth (Messrs. Flood & King for Messrs. E. H. and H. C. Ruscoe.—Consent.

*** *Recommendations marked † are contrary to the views of the Local Authorities.*

The Student's Column.

CONCRETE-STEEL.—III.

THE PROPORTIONS OF CONCRETE (*Continued*).

WHATEVER may be the proportions chosen, the value of the concrete will materially depend upon the thoroughness of mixing. In his "Treatise on Masonry Construction," Professor Ira O. Baker says that: "It is possible to increase the strength of really good concrete 100 per cent. by prolonged trituration and rubbing together of its constituents." In practice it is frequently cheaper to use more cement or concrete and less labour, but for concrete-steel work no substitute can be accepted for the most thorough mixing of the ingredients. Good concrete can be secured either by hand or by machine mixing, but in the former case the difficulty is to get the work done properly. The material must be turned over thoroughly, the shovels must find their way to the boards, and the mixture must be picked up from the bottom and turned over and over again. This is hard work, and, especially in warm weather, the men are inclined to become optimistic, and to believe that a batch of concrete is finished, when in reality it is only about half mixed. When machine mixing is adopted, no adverse human intellect opposes the completion of the process, and the result is far more likely to be satisfactory. Various forms of concrete mixers are available in the present day. A simple and effective apparatus now in use on the Vauxhall Bridge works consists of a horizontal vessel of segmental form provided with a series of stirring blades on a central shaft. The receptacle has an open top and can be rotated about the shaft so as to tip out the contents when required, while the revolution of the blades still continues. Ballast is brought in skips along a tramway ending opposite the hopper of the machine, each skip containing the exact quantity for a batch of concrete, and the necessary volume of cement is measured into a box on the opposite side of the hopper. The materials are tipped into the machine at the proper time, and sufficient water is added from a tap in a convenient position. The entire apparatus is below the level of the decking, so that it is easily managed and the process can be observed without trouble. Some useful data as to the relative strength of hand and machine mixed concrete are recorded in the Report of the Watertown Arsenal for 1897,* relate to two series of concrete piers, one series being hand mixed and the other machine mixed. The average compressive strength of the former was 989 lbs. per square inch, and of the latter 1,098 lbs. per square inch, thus showing an advantage of 11 per cent. in favour of machine mixing. Another test made at the same place shows an advantage of more than 25 per cent. in favour of machine mixing. Other essential points connected with the manipulation of concrete employed in combination with steel are uniformity and sufficiency of ramming, and the careful bonding of fresh and set concrete so that monolithic construction may be secured. Care must also be taken to ensure perfect contact between the concrete and the steel. As will be shown later, the tensile resistance of concrete is not taken into account in the

* Report of the Watertown Arsenal, 1897. "Tests of Metals and other Materials for Industrial Purposes," pp. 349-385.

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design of concrete-steel floors, beams, and other members subject to flexure. Consequently little is to be gained by increasing the proportion of cement in the concrete for those parts that are in tension. But the opposite is the case in connexion with compression, which is resisted chiefly by the concrete. If the strength of concrete in the compression portions be increased with the idea of reducing the depth of floor panels, it does not follow that the cost will be correspondingly reduced. The moment of resistance for a rectangular beam being $R = fbd^2 \div 6$, it is evident that resistance is directly proportionate to the square of the depth, and a small decrease of depth consequently means a comparatively large decrease of strength. At the same time, as the quantity of concrete decreases proportionately to the first power of the reduction in depth, the saving of concrete will be comparatively small. Further, the cost of concrete decreases less rapidly than the quantity, inasmuch as cost always includes expenses, which are unaffected by a slight diminution of depth. A further point worthy of mention, and confirmed by the recent investigation of M. Considere, is that the cracks appearing in exposed tension members are more serious in rich than in poor mixtures of concrete. In compression members, however, there are satisfactory reasons why richer proportions should be adopted. In the first place, the concrete is largely, if not entirely, relied upon for resistance; and in the second, it appears from the results obtained by M. Considère that as a consequence of the first load the elastic limit of the concrete increases very considerably with the proportion of cement. Consequently, where high resistances are necessary, it may frequently be desirable to use cement freely, especially as the increase of cost will not be great. Columns and foundations are of far more importance than beams and floor joists, for their failure may involve the collapse of an entire building, whereas the failure of a floor, although sufficiently undesirable, is of less consequence. Finally, the use of richer concrete for compression members may sometimes permit the adoption of a smaller cross-section, thus reducing the space occupied by columns and stanchions, an advantage that will often be appreciated by those occupied with the design of buildings.

THE PHYSICAL PROPERTIES OF CONCRETE.

From what has already been said, it is clear that the widest differences are to be expected in records as to the strength of concrete. Even in iron and steel, which by comparison are simple in nature and constitution, considerable variations exist, but when either material is ordered from the maker subject to the provisions of a given specification there is every reason for anticipating more or less exact compliance with the expressed requirements. Concrete cannot be purchased in the manufactured form, and the physical properties of the finished article vary from case to case, even when the ingredients are of apparently uniform quality, and when the greatest care is taken to ensure uniformity of treatment. Portland cement itself is now made according to scientific principles, and is carefully tested by all reputable makers; the tests, however, cannot be conducted upon the material in its manufactured state, but only after manipulation, the influence of which is a variable quantity. Sand and aggregate vary from place to place, and in the same place from day to day or hour to hour. There is little wonder, therefore, that the results of experiments upon concrete, conducted in scientific laboratories, do not afford the guidance desired by the architect and the structural engineer. Nevertheless, the data obtained by purely scientific investigation are of much value, for they serve to demonstrate the great possibilities of concrete construction, and lead practical men to think of improved methods by the aid of which higher standards of strength may be attained. In the notes which follow, some of the most reliable records, collected from various sources, are presented in a form which is intended to be convenient for comparison and reference.

Part of the resistance of concrete to crushing is due to the frictional resistance of one piece of aggregate to motion along the face of another piece. It is also the fact that the cement adheres more tightly to the irregular surface of broken stone than to the smooth surface of pebbles. Table III. gives some figures calculated from the results of a series of experiments made in 1897 by Mr. A. W. Dow, for the Engineering Department of the District of Columbia, U.S.A. The tests were made upon 12 in. cubes, and it is worthy of note that the gravel concrete shows an important increase of strength with age. According to the results obtained from another series of forty-eight experiments upon 4-in. cubes,* it appears that the compressive strength of gravel-concrete is less than 80 per cent. that of concrete made with broken stone. From these figures it may be inferred that an aggregate of broken stone is specially suitable for all members in which compressive strength is the chief factor for consideration. So far as we are aware, no records are available for showing the relative merits of gravel and stone concrete for use in members where tensile strength exists and is resisted by steel reinforcement.

Table III.—Relative Compressive Strength of Gravel and Broken Stone Portland Cement Concrete.

Age when Tested.	Strength of Gravel Concrete. (Stone Concrete = 100.)	No. of Tests.
10 days.	76	2
45 ,,	91	2
3 months.	119	2
6 ,,	73	2
12 ,,	108	5

Possibly the rounded surfaces of the pebbles may not be disadvantageous in the case of flexure, by permitting an infinitesimal "slip," similar to that which is known to occur between the concrete and steel embedded therein. Providing the volume of mortar is approximately equal to the voids in the aggregate, the strength of concrete increases with the quantity and the strength of cement used. This aspect of the case is demonstrated by Fig. II., in which are plotted some of the results of a series of experiments made by Mr. G. W. Rafter* upon 12-in. cubes, the voids of the aggregate being practically filled with mortar varying from 1 : 1 to 1 : 6 in composition. Proportionately similar results were also evidenced by the French experiments to which reference has already been made.

Some recent data as to the resistance of concrete to direct compression are summarised in Table IV., and the results condensed in this table are plotted in Fig. III., with the exception of figures relating to ages beyond six months. The figures in the first three lines of Table IV. show clearly the increase of strength with age, and similar evidence is afforded by tests conducted during the progress of the work at the Vyrnwy dam.† The following summary shows approximately the crushing strength of concrete blocks tested on the works at various ages :—

Table V.—Average Compression Strength of Portland Cement Concrete Blocks Tested at the Vyrnwy Dam.

Average Age when Tested.	Average Strength.
1·2 months.	1,772 lbs. per sq. in.
3·5 ,,	1,586 ,,
21·0 ,,	2,372 ,,
29·0 ,,	2,519 ,,
34·0 ,,	2,799 ,,

Other experimental data not quite suitable for inclusion in Table IV. will be found in Table VI.

However satisfactory it may be to know that the strength of concrete grows with age, a matter of more immediate practical importance is to be acquainted with its properties, and to be able to predict the probable behaviour of

Table IV.—Compressive Strength of Portland Cement Concrete Cubes of Various Proportions and Ages, in lbs. per sq. in.

Proportions.	Age when Tested. Four Weeks.	Six Weeks.	Three Months.	Six Months.	Twelve Months.	Size of Cube.	Authority.
Parts.	lbs.	lbs.	lbs.	lbs.	lbs.	in.	
1 : 2 : 4	1,712	—	2,182	2,332	—	12	Mr. Costigan, Proc. Can. Soc. C.E., 1901-2.
1 : 2 : 5	991	—	1,997	2,240	—	12	
1 : 2 : 6	—	1,756	2,190	1,987	2,670	12	Mr. Dow, Eng. Dept., Washington, 1897.
1 : 2 : 3	2,783	—	—	—	—	12	Dr. Dycherkoff, in "Der Portland Cement und seine Anwendungen in Bauwesan."
1 : 2 : 5	2,414	—	—	—	—	12	
1 : 3 : 5	1,661	—	—	—	—	12	
1 : 3 : 6½	1,534	—	—	—	—	12	
1 : 2 : 4	—	2,734	—	—	—	6	Dr. McKenna, Columbia University, U.S.A.
1 : 2 : 4	—	3,283	—	—	—	6	
1 : 2 : 3	—	—	—	—	1,751	6	Mr. McCausland, Proc. Am. Soc. C.E., vol. xxix.
1 : 2 : 5	—	—	—	—	1,090	6	
1 : 3 : 4	—	—	—	—	1,432	6	
1 : 3 : 5	—	—	—	—	1,002	6	
1 : 3 : 5	—	—	3,187	—	—	12	Mr. Wason, Proc. Am. Soc. C.E., Vol. xxvii.
	—	—	4,263	—	—	12	
1 : 3	—	3,500	—	—	—	4	Report of Austrian Soc. Eng. and Archts., 1895.

Table VI.—Compressive Strength of Portland Cement Concrete Blocks of Various Proportions and Ages, in lbs. per sq. in.

Proportions. Cement.	Sand.	Aggregate.	Age when Tested.	lbs. per sq. in.	Size of Block.	Authority.
1	1	voids filled	600 days	4,467	12-in. cube	Report of New York State Engineer, 1897
1	2			3,731		
1	3			2,553		
1	3	6	28 days	2,455	8 in. by 8 in. by 12 in.	Mr. Wason, Proc. Am. Soc. C.E., Vol. XXVII.
1	2	4	7 years	7,000	4-in. cube	Mr. Falk, Proc. Am. Soc. C.E., Vol. XXIX.
1	3	5	7 years	9,000		
1	2	4	0 days	2,880	12 in. by 8 in. dia.	Prof. Hatt, Purdue Univ., U.S.A., 1902
			12 days	2,575		
1	—	3	39 days	2,850	3½ in. by 3½ in. by 10 in.	Report of Austrian Soc. Eng. and Archts., 1895
				3,175		
—	—	—	27·31 days	1,853	6-in. cube	Tests at Watertown Arsenal, 1893
			36·39 days	1,950		
			51·65 days	2,426		
			75·88 days	2,481		
1	2	4 (cinder)	8 days	502	12 in. by 8 in. dia.	Prof. Hatt, Purdue Univ., U.S.A., 1902

* "Cements et Chaux Hydrauliques." Paris, 1893.

* Report of the New York State Engineer. 1897.
† Report as to the Vyrnwy Dam, by George F. Deacon. 1885.

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concrete during the earlier stages of hardening. This is the critical period in most structural works when loads must be carried by the concrete before its maximum strength has been developed. From the data now presented it is clear that the compressive strength of concrete is an extremely variable quantity, but that with adequate proportions and careful manipulation there should be no difficulty in securing a compressive strength of 2,500 lbs. per square inch with 1:6 concrete at the age of two or three months. The figures indicate that considerably greater strength may be attained with richer proportions and under specially favourable conditions, but where concrete is mixed, as usual, on the site of the works to be executed, it cannot be recommended that the ultimate resistance should be estimated at more than 2,500 lbs. per square inch. The limit suggested by the middle curve in Fig. III. is 1,700 lbs. at one month and 2,200 lbs. at three months, and by the bottom curve 700 lbs. at one month and 1,200 lbs. at three months; but it should be remembered that the results in the diagram refer almost exclusively to 1:6 and 1:8 concrete, and that the middle curve practically represents the average for the former mixture, and considerably less than the average for the latter. Fig. IV. is a diagram combining the averages given in Tables IV., V., and VI. This diagram serves to show the gaps remaining to be filled by further experimental research, and to suggest that the compressive strength of well-made concrete is probably very much greater than has been supposed hitherto.

The compressive strength of coke concrete is said by Professor Ira O. Baker to vary from 600 lbs. to 700 lbs. per square inch, but this estimate appears to be somewhat high.

Correspondence.

THE ANCIENT LIGHTS BILL.

SIR,—In your Leader on "The Ancient Lights Bill" there is one consideration that I did not notice mentioned, *i.e.*, would not the relaxation of the law relating to light and air lead to crowding of buildings in towns even more than at present? That is a consummation that the *Builder*, I take it, would not devoutly wish. Is not an abundant supply of light and air necessary to health, and would not the law relating to light and air be beneficial if it were made even more stringent?

EDWARD PARKE.

STRATFORD-ON-AVON.

SIR,—As a letter has appeared in the Press from Mr. Sidney Lee upon the alleged vandalism at Stratford-on-Avon, in which, under a misapprehension, he implies that the British Archæological Association had made accusations of deliberate vandalism against the Corporation of that town, I ask your permission as Hon. Secretary to say that such was not the case. As to the communications that have passed between the local authorities, Mr. A. Flower, and myself on behalf of my Council, I can only say we have been treated with the greatest courtesy, and, I trust, our views have been expressed with the same consideration. Our contention is that it is better to leave the present red brick fronts to the old houses in Henley-street rather than to "restore" them into pseudo-antiques.

GEO. PATRICK.
Hon. Secretary,
British Archæological Association

A TOUR IN BELGIUM.

SIR,—As I am going on a cycling tour in Belgium shortly, architecturally bent, I am taking the liberty of asking whether you or any of your readers know of any places, large or small, in the vicinity of the route we propose taking, of architectural interest.

The route we had mapped out was Bruges, Ghent, Brussels, Namur, Liege, Aix-la-Chapelle, Cologne, and down the Rhine to Rotterdam, and perhaps Amsterdam.

I think this route will include a good deal, but perhaps your experience could suggest something better.

SYDNEY SEARLE.

BOOKS RECEIVED.

HEATING AND VENTILATION OF HOUSES (No. 3 of "Rural Handbooks"). By C. F. Townsend, F.C.S. (Dawbarn & Ward. 6d.)

BRITISH FIRE PREVENTION COMMITTEE.—Mr. Edmund Woodthorpe has resigned his position on the Executive of this Committee.

GENERAL BUILDING NEWS.

CHURCH, MARYLEBONE.—The Bishop of London consecrated on the 30th ult. the new Church of St. Cyprian, which is situate in Dorset-square, Marylebone. Designed by Mr. J. N. Comper, it is in the English style. The church has cost 13,000*l.*

CHAPEL, BIRDWELL, YORKSHIRE.—A new chapel at Birdwell is being erected for the Methodist New Connexion. The existing Sunday-school is being demolished, and the present chapel is to be converted into a Sunday-school, the new fabric being erected on the adjoining site. The accommodation will be for 350 persons, and an organ loft is also provided, the estimated cost being 1,500*l.* Mr. P. A. Hinchcliffe, Barnsley, is the architect.

CHAPEL, WORSBOROUGH, YORKSHIRE. — At Worsborough Dale, on the 9th inst., a new chapel was opened. The chapel at Worsborough Dale has been erected by the Ebenezer Wesleyan Reform body. The new building consists of a chapel to seat 350 worshippers, with school of equal accommodation, in addition to four class-rooms, kitchen, &c., underneath. The plans were prepared by Mr. G. Moxon, of Barnsley. The total cost has been 1,900*l.*

CONGREGATIONAL CHURCH, MONKWEARMOUTH.—On the 8th inst. the foundation stone of the Roker Baths-road Church, Monkwearmouth, Sunderland, was laid. Messrs. Jos. Potts & Son, are the architects, and the church will cost about 5,000*l.* Mr. J. B. Stott is the contractor.

TRURO CATHEDRAL.—The nave of Truro Cathedral has been completed, and it was opened on the 15th inst. The building operations, which began four years ago, have cost 40,000*l.* The work has been carried out from the designs of the late Mr. J. L. Pearson, R.A., under the superintendence of his son, Mr. F. L. Pearson. The western portion of the cathedral, now completed, comprises the nave and aisles with western double porch or narthex, south porch, and western towers. The nave is 112 ft. long, 29 ft. wide (the same width as the choir), and about 70 ft. high. It is divided into four bays, 28 ft. wide intersected by transverse ribs. A western gallery some 20 ft. above the floor is erected over the western bay, carried on comparatively low arches, the sprandrels of which are enriched with sculpture.

SCHOOLS, KINGSWOOD, GLOUCESTERSHIRE.—New schools are to be erected at Hanham-road, Kingswood, on the main road leading from Kingswood to Hanham. The design of Mr. J. Mackay, architect, Kingswood, was accepted by the late Kingswood School Board, and has been approved by the County Education Committee. The building will be Elizabethan in style, and the schools will afford accommodation for 990 children — 330 in each department for boys, girls, and infants. The boys' and girls' departments are each 88 ft. by 81 ft. in dimension, and between the two schools there is a distance of 60 ft. The infant department is set back a distance of 30 ft. from the boys' and girls' schools. Each school comprises a central hall and six class-rooms, and the rooms are so arranged that the head teacher obtains an uninterrupted view from the hall of all the rooms. Teachers' rooms and cloakrooms will be provided. The heating will be by hot water on the low-pressure system. Beneath the boys' school a room will be provided, 60 ft. by 20 ft. in extent, for the purpose of practical instruction in carpentering and other manual work; and below the girls' school a room, 72 ft. by 25 ft., will be erected for the purposes of laundry-work and cookery.

SCHOOL, EBBW VALE.—The Bedwellty School Board have approved plans for new schools in Mount Pleasant-road, Willowtown, Ebbw Vale, and ordered them to be forwarded to the Board of Education. The school is to consist of two departments—lower mixed and an infants'—and to accommodate 420 scholars. Mr. David Morgan (Messrs. James & Morgan, Cardiff) is the architect.

RESIDENTIAL CLUBS FOR BUSINESS MEN.—A company has lately been formed under the name of "Ingram Houses, Ltd.," for the purpose of providing residential clubs for clerks and young men engaged in business. The company have already secured a freehold site in Stockwell-road, Brixton, and Mr. Arthur T. Bolton, architect to the company, has prepared plans (which the London County Council have passed) for a building to accommodate 270 residents in separate bedrooms measuring at least 7 ft. by 10 ft., and which will comprise a lecture-hall, available for entertainments and concerts, or as a gymnasium; a library; a smoking-room; two billiard-rooms for six tables; a dinner-hall for 200 at one time; together with bathrooms, a bicycle-house, passenger-lifts, and electric lighting. The four freehold houses, Nos. 40-6, in Stockwell-road have been acquired at a total cost of 10,827*l.*, and Messrs. Widnell & Trollope's estimate of the cost of the new buildings amounts to 40,000*l.* The calculated outlay for furniture and equipment is 6,000*l.* The expenses of management are computed at 3,480*l.* per annum, and the annual receipts from rent of bedrooms, with an average of 250 men in the house, at 6,000*l.*

WORKHOUSE, FYLDE.—The foundation-stones of the new workhouse for the Fylde Union were laid on the 2nd inst. The contract for the new building is 43,994*l.* The site on which the new building is being erected is in the township of Wesham, about a mile from the present workhouse, and is just over twenty statute acres in extent. Provision will be made for 300 inmates, but none for children. The number of inmates in the house at present is 139. The architects are Messrs. Heywood & Harrison, of Lytham and Accrington, and Mr. G. Wilson, of St. Anne's-on-the-Sea, is the sole contractor. The building is to be completed by June 1, 1906. Accrington pressed brick, with facings of terra-cotta and stone, will be used, and glazed bricks in the dining-hall and other parts of the interior. The structure will have a southern aspect. The offices and boardroom will be in Wesham-lane.

CONGREGATIONAL CHURCH, KEYWORTH, NOTTINGHAM.—The stone-laying ceremony in connexion with the new Congregational church at Keyworth took place on the 2nd inst. Messrs. Cooper & Sons, of Nottingham, are the contractors, and Mr. R. C. Sutton, also of Nottingham, is the architect. The church, which will possess seating accommodation for 300 people, is to be built in the Gothic style, the exterior being of red brick with stone dressing. On the right of the recess chancel at the pulpit end will be the organ-chamber, and vestry accommodation will be provided on the left. The floor of the chancel, pulpit, and Communion-table is to be raised three steps above the floor of the church.

CHURCH, MARSDEN COLLIERY, DURHAM.—The foundation stone of a new church has just been laid at Marsden Colliery. The structure, which is being built from plans prepared by Messrs. J. Potts & Son, architects, Sunderland, will consist of nave, chancel, and vestry, and there will be a bell turret on the west gable. The nave will contain sitting accommodation for 200 persons. Marsden lime-stone, with freestone dressings, will be used in building the outer walls, and the seats and other internal fittings will be of pitch pine. Mr. W. D. Allison, of Whitburn, is the contractor.

NEW BUILDINGS IN ABERDEEN.—The Plans Committee of the Town Council has passed the plans of the following new buildings:—Addition to janitor's lodge and greenhouse in connexion with botanical garden at the Grammar School, for the Aberdeen School Board, per Mr. J. A. O. Allan, architect; ice factory on the east side of Stells-road, for the Aberdeen Steam Trawling & Fishing Co., Ltd., per Messrs. Brown & Watt, architects; re-building of premises on the north side of Palmerston-road, for the Great Grimsby Coal, Salt, and Tanning Co., Ltd., per Messrs. Brown & Watt, architects: three dwelling-houses on the north side of St. Clement-street, for Mr. J. D. Mackie, solicitor, per Messrs. W. Henderson & Son, architects (amended plan); alterations and additions in connexion with dwelling-house No. 8, Albyn-place, for Dr. J. E. Milne, per Mr. Duncan Hodge, architect; four dwelling-houses on the east side of the private lane running southwards from Fonthill-road and at the rear of certain of the houses in Polmuir-road, for Mr. James Fyfe, per Mr. John Rust, architect (amended plan); sheds and office on the south side of South Esplanade West, for Messrs. Alexander Adam & Co., slaters, per Mr. William Smith, architect; two dwelling-houses and shop on the east side of King-street at its junction with Seaforth-road, for Mr. David Courage, per Messrs. Brown & Watt, architects; two dwelling-houses on the west side of Blenheim-place, for Mr. William Hepburn, per Mr. George J. Milne, architect; dwelling-house on the west side of Pitstruan-place, for Messrs. Cameron & Watt, architects; dwelling-house and shops on the east side of Holborn-street at its junction with Howburn-place, for Mr. James Mearns, per Messrs. Cameron & Watt, architects; amended plan of (*a*) alterations and additions in connexion with the premises Nos. 27-31, Broad-street, and (*b*) a building at the rear on the site of a one-storied building facing the Guestrow, for the New Loan Co., per Mr. John Rust, architect.

PUBLIC SCHOOL, WINCHBURGH, LINLITHGOW.—An addition has just been made to the Winchburgh Public School by Kirkliston Public School Board. The additions give accommodation for 250 scholars, making a total accommodation of 500. Mr. James Jerdan, Edinburgh, was the architect, and the total cost, including a house for the head-master, will be about 4,000*l.*

NEW ENGINEERING WORKS, LEEDS.—Messrs. Graham, Morton & Co., makers of conveying machinery and colliery plant, are building a large new engineering works in Hunslet, Leeds. The works comprise three large bays 50 ft. span over 400 ft. long, together with engine and boiler-house, &c., and other outside buildings. The works will be driven by electric motors, the current being generated by their own machinery. There will be two electric cranes in each bay, or a total of six cranes. There is a railway siding running into the works, and the trucks will be able to run right through the workshop. Mr. Maurice Graham, the active partner in the concern, has lately paid two trips to the United States for the purpose of visiting their engineering shops, and he has applied the information obtained in regard to description of tools and method of organisation, in these new buildings, which will be finished about the end of October.

INEBRIATE HOMES FOR LANCASHIRE.—Lieut.-Colonel Smith, R.E., held an inquiry at the County Hall, Preston, on the 8th inst., into the application of the Lancashire Inebriates Acts Boards for sanction to borrow a sum of 60,000*l.* for the purpose of inebriates' homes, female division, at Langho, near

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Blackburn. Mr. Clare, Clerk to the County Council, explained the scheme, and said the buildings had already been erected to accommodate 112 women, and without any further expenditure on administrative buildings, the accommodation could be doubled. At present the county had twelve male and 493 female inebriates in other homes. The male and female block would be 400 yards apart, and the total cost of the female reformatory, including twelve houses, chapel, sewage, and other arrangements would be 73,418*l.* Three hundred and twenty acres of thickly-wooded land had been purchased, at a cost of 17,500*l.*, the average cost being 52*l.* per acre. Drainage would cost 4,000*l.*, but this work had not yet been completed. Mr. Littler, architect, and Mr. Wood, engineer, gave evidence, and the inquiry concluded.

CHANCEL SCREEN, MILVERTON CHURCH, SOMERSETSHIRE. — A chancel screen has just been dedicated at Milverton Church by Archdeacon Askwith The new chancel screen is 20 ft. long, and is 13 ft. 6 in. high up to the cornice, without measuring the central cross. It stands upon a new granite step, and is built of oak. It is divided into seven compartments, the central one, which is kept as wide as the main approach from the nave, forming the entrance from the latter into the chancel. Into the lower parts are introduced a number of old fifteenth century panels from other parts of the church. Messrs. Harry Hems & Sons, Exeter, carried out the work.

WESLEYAN SCHOOLROOM, ABERYSTWYTH.—The memorial-stones were laid on the 9th inst. of the new schoolroom of the Wesleyan Chapel, which occupies the site of a bit of old Aberystwyth, adjoining the chapel, and at the corner of Great Darkgate-street and St. James's-square. The building is to seat 400, and is built of local blue stone with freestone dressings. The architect is Mr. John Lewis Evans, and the contractor Mr. Edward Jenkins.

GLASGOW UNIVERSITY EXTENSION.—New buildings for the extension of Glasgow University some time ago received the sanction of the University Court, and at a meeting recently estimates for their erection were approved of, and the work will be forthwith commenced. Provision will be made for the departments of Physiology, Materia Medica, and Forensic Medicine and Public Health in one building, while another will be devoted to the department of Natural Philosophy. The entire cost, including equipment and fittings, will be between 90,000*l.* and 100,000*l.* For designs for both buildings a limited competition took place, and the plans submitted by Mr. James Miller, architect, Glasgow, were selected.

PREMISES, NORWICH.—At the Market-place end of London-street, Norwich, the premises of Jarrolds, Ltd., are being rebuilt. The architects are Messrs. Skipper.

HEREFORD CATHEDRAL.—The Dean of Hereford has issued an appeal for the sum of 5,000*l.* towards the rebuilding of the west front of Hereford Cathedral, after designs by Mr. Oldrid Scott. The Dean adds, in his appeal, that later a further sum of 5,000*l.* will be required for the front of the side aisles.

EXTENSION OF THE VICTORIA HOSPITAL FOR CONSUMPTION, CRAIGLEITH, EDINBURGH.—New pavilions have been erected at the Victoria Hospital for Consumption, Craigleith, Edinburgh. The extension consists of two pavilions of two wards with six beds in each, and one pavilion of two wards with four beds in each, and will increase by twenty beds the accommodation of the Hospital. The additions, &c., are estimated to cost about 7,000*l.* The extensions are from the designs of Messrs. Sydney Mitchell & Wilson, architects, Edinburgh.

FREE LIBRARY, MOTHERWELL, EDINBURGH. — The accommodation of the new library for Motherwell consists of lending library for 30,000 volumes, reading-room for 100 readers, juvenile room, reference library, ladies' room, lecture-hall and museum, recreation-rooms, committee-room, librarian's room, librarian's house, and the necessary book store, staff-room, lavatory, &c. The architects are Messrs. Greig, Fairbairn, & Macniven, Edinburgh. The cost of the buildings is estimated at 9,000*l.*

COLONY FOR EPILEPTICS, CHALFONT ST. PETERS. —A new central administration house for the colony of the National Society for Employment of Epileptics is being erected at Chalfont St. Peters. Mr. C. Grieve, of London, is the architect.

SANITARY AND ENGINEERING NEWS.

WATER SUPPLY, GOSFORTH, &C.—The Whitehaven Rural District Council have adopted a scheme of water-supply for the six parishes of Gosforth, Ponsonby, Haile, St. John's, St. Bridget's and Lowside Quarter, at an estimated cost of 13,800*l.* There will be over twenty miles of mains, The scheme has been prepared jointly by Mr. G. Boyd, Surveyor to the Council, and Mr. Harry W. Taylor, A.M Inst.C.E, Newcastle.

COUNTY BRIDGE, YALDING, KENT.—The new Hampstead-lane bridge, Yalding, has just been opened. The contract was entrusted to Messrs. G. E. Wallis & Sons, Maidstone, whose tender amounted to 4,128*l.*, which included the cost of the steel flooring supplied by the Cleveland Engineering Co, Ltd. The new bridge has a waterway of 21 ft., and a clear headway of 9 ft. 6 in. The foundations beneath the water, which are of cement concrete, rest upon clay, and are protected by sheet piling. The retaining and abutment walls are backed with concrete, the facings of the abutments, plinths, copings, &c, being in cast cement concrete, manufactured by Mr. G. G. Girling, of Woolwich. The floor of the bridge consists of two main outer steel girders, carrying Hobson's patent steel flooring plates, placed traversely, and covered with concrete. The roadway is 16 ft. 6 in. wide, and there is also a footpath on one side 4 ft. in width. The gradients throughout are 1 in 20, and the total length of the bridge is 445 ft. The architect was Mr. F. W. Ruck, County Surveyor.

SEWERAGE SCHEME, PENN, STAFFORDSHIRE.—On the 8th inst., at St. Philip's Church Assembly-rooms, Penn Fields, near Wolverhampton, Colonel W. Langton Coke, M.Inst.C.E., held an inquiry on behalf of the Local Government Board into the application of the Seisdon Rural District Council for sanction to borrow 14,000*l.* for sewerage purposes. Mr. Herbert Taylor (Clerk), in explaining the matter, said at present there was no system of sewerage, in the proper sense of the word, and it was the general opinion that a scheme was necessary. The District Council had purchased twenty-three acres of freehold land at Merry Hill, at a cost of 1,134*l.*, and the scheme proposed was gravitation, with septic tanks and continuous filters. The effluent would run over the land, and there would be a broad irrigation before it entered a stream. The cost of the collecting sewers would be 6,141*l.*, and the works would cost 3,500*l.* The district was in the unique position of not having any loans, and its rateable value was 90,000*l.* Evidence in support of the application was given by Mr. R. E. W. Berrington (Civil Engineer).

PIER, YARMOUTH.—The work which has been proceeding for some time upon the renovation and enlargement of the Wellington Pier and the construction of a pavilion has been nearly completed. The work has been carried out under the supervision of Mr. Cockrill, the Borough Surveyor.

FOREIGN.

FRANCE. — MM. Loviot and Cassien-Bernard, architects, have applied to the Council of Paris for permission to construct, on the site of the old Cirque des Champs Elysées, a concert-room to seat 1,500, with two adjoining pavilions, one for a refreshment-room the other for a post office.—— MM. Constantin Meunier and Charpentier have completed the model of the monument to be raised by subscription to the memory of Zola. The monument includes a granite pedestal on which an inscription will be engraved. On the right is a figure of a mother with her infant, and two other children, on the left an artisan, in working dress, looking at the family group. The portrait statue of Zola surmounts the pedestal. —— The President of the Republic has inaugurated the new buildings for the Conservatoire des Arts et Métiers, which are to contain laboratories. —— The Town Council of Cognac has decided on rebuilding the Hôtel de Ville there.——M. Gabaret, architect, of Pau, has obtained the first premium in the competition opened by the town of Tarbes for the rebuilding of the Hôtel de Ville.——M. Patouillard has been appointed architect of the works at the Bibliothèque Nationale.——The Hôtel St. Fargeau, which contains the historic library of the City of Paris, is to have extensive repairs. —— M. José de Charmoy, the sculptor, has completed the model for a monument to Edgar Poe, to be erected at Baltimore.——M. Girault, the architect of the Petit Palais, has been commissioned to rebuild the tribunes at the Longchamps racecourse, which he has promised to complete by May of next year.——The death is announced, at the age of eighty-six, of M. Michel Fichot, a draughtsman who had devoted his talent almost entirely to the illustration of the monuments of Champagne and the surrounding districts. His first publication was the "Voyage Archéologique dans le Department de l'Aube." He made numerous drawings for the "Magasin Pittoresque," and produced also a "Voyage Archéologique en Champagne," a monograph on the Church of St. Denys, and the "Statistique Monumentale" of the Department de l'Aube, a considerable work, of which five volumes have appeared, but which is still unfinished.

NEW BATHS, CAPE TOWN.—Tenders will shortly be issued for the erection of the public baths proposed to be erected in Caledonian-square, Cape Town. The first-class pond is 100 ft. by 40 ft. wide, with a tiled gangway, dressing-boxes, and foot-bathing tubs, cold water showers, swimming-club committee and dressing-rooms, diving stages, spring-boards, water-chute, &c. A gallery, capable of seating about 500 people, surrounds the pond. The second-class pond is 75 ft. by 35 ft., and is provided with the usual accessories and gallery, but the general internal appearance is simpler in construction and decoration. The ladies of both classes, as well as the gentlemen, are given access to the large baths direct from their entrance halls. The slipper baths are altogether about fifty in number, including a few vapour baths, and each sex and class have a waiting-room situated between the entrance-hall and the range of bath-rooms. The slipper baths are so situated in relation to the large baths, that in the case of the men's accommodation, one attendant could supervise the whole. Pay-boxes, cloakrooms, stores, and superintendent's and matron's rooms are provided in the most convenient places near the entrance. The estimated cost of the scheme, without including the groups of Turkish baths, is 35,000*l.*

INDIA.—Several new stations on the Bassein-Henzada branch of the Burmah railways have recently been opened.——A second outlet for the regulation of the supply of water for the Panngzin lake in the Minbu district has recently been provided. The water is supplied from the Irrawaddy river.——The Government of India has sanctioned the expenditure necessary to construct protective works at the Torsa bridge on the Eastern Bengal and Southern railway.——The raising of the crest of the Pegu river embankment to prevent the flood water of the river from entering the canal has now been completed. A new lock has been constructed at Minywa.——Several ancient monuments near Madras have been reported upon by the superintending engineer of the Public Works Department with a view to their being repaired.—— *Indian Engineering* says that teak timber of a very high class is to be found in the Kentung Forest, bordering on the Mekong River.——A hospital for women is about to be erected in Bombay. Mr. John Begg, consulting architect to the Government, in consultation with Dr. Boyd, has prepared plans of the new building.——The Chief Engineer of the Public Works Department, Madras, has made an estimate for the construction of a municipal hospital, with subsidiary buildings, at Madura.——A special commission has been appointed to inquire into the construction of a central railway station in Colombo. ——The Nizam's Government has sanctioned the expenditure of four lakhs of rupees for the erection of a new mint house.——Five and a half lakhs of rupees have been sanctioned for providing accommodation for British infantry at Dalhousie.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Messrs. Harding & Vick, timber merchants, have removed from 57, Gracechurch-street, to Founder's Hall, 13, St. Swithin's-lane, E.C.——Mr. W. Duncan Tucker has opened a new timber yard and sawmills at High Cross, Tottenham, to be worked in conjunction with his existing steam joinery works in Lawrence-road, South Tottenham.——Mr. H. W. Buxton, architect, Felixstowe, has removed his office from Lorne-buildings, Victoria-parade, to 26, Hamilton-road, Bank Corner, Felixstowe.

REREDOS, ST. ERTH CHURCH, CORNWALL.—A new reredos has been erected at St. Erth Church. It is constructed of West of England grown oak, and is in the fifteenth century style, occupying the whole of the space beneath the east window. It has been made from a design by the Rev. R. Medley Fulford, formerly F.R.I.B.A. The work has been carried out by Messrs. Harry Hems & Sons, of Exeter.

LONDON MUNICIPAL BUILDINGS.—On the 13th inst. the Select Committee of the House of Lords, of which the Duke of Bedford is chairman, considered the Local Government Provisional Order (No. 5) Bill, the object of which is to confirm provisional orders granted to the Metropolitan Boroughs of Hampstead, Holborn, and Lambeth, by the Local Government Board, and authorising these boroughs to acquire certain lands compulsorily for the erection or extension of municipal offices and buildings. The London County Council opposed in order to obtain the insertion of a saving clause preserving the operation of the Metropolis Management Acts and the London Buildings Acts. Ultimately the Committee found against the insertion of the clause.

PROPOSED NEW MUNICIPAL BUILDINGS, TORQUAY.—The Finance Committee of Torquay Town Council reported at the last meeting of the Council that they had carefully surveyed the plan of the site at Castle Corner for the proposed new municipal buildings as well as the adjoining properties, also a diagram showing the result of the three trial pits which had been sunk, and were pleased to report that they were satisfied from the Borough Surveyor's statement that there would be no difficulty—so far as obtaining a satisfactory foundation for the building was concerned. As a result of a conference between the Town Clerk and the Borough Surveyor, the suggested accommodation to be provided in the building was submitted and approved by the Committee. Provision was made in the scheme for offices for the Town Clerk, Borough Surveyor, Water Engineer, Borough Accountant, Borough Treasurer, the rate collectors, the Medical Officer, committees, reception and other rooms for the Mayor, an office for inquirers in connexion with the Electrical Department, Town Hall and Assembly Room, a Council Chamber, and other offices. The Committee recommended that invitations be issued to architects to submit sketch plans and designs, with an estimate of the cost in each case for the erection of municipal buildings, the cost of which complete should not exceed 30,000*l.*, premiums of one hundred guineas, fifty guineas, and twenty-five guineas respectively to be offered for the three designs placed first, second, and third respectively

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by an assessor to be appointed by the President of the Royal Institute of British Architects. Mr. Rockbey proposed the adoption of the report. Mr. Kerswill seconded. Alderman Appleton thought the present a most inopportune time to bring forward this scheme. He moved, as an amendment, that the question be postponed for the present. Alderman Winter seconded. The Mayor ruled Alderman Appleton's amendment out of order on the ground that the Council had already passed a resolution to the effect that the time had arrived when it was desirable to take into consideration the question of municipal buildings. Mr. Ball thereupon moved that the question be referred back to the Committee to obtain plans from three local architects. Mr. Mortimer seconded, but ultimately Mr. Ball agreed to the matter being referred back with instructions to prepare a further report.

JOINT COMMITTEE ON MUNICIPAL TRADING.—At a sitting of the Joint Committee on Municipal Trading on Thursday of last week, the Earl of Crewe presiding, evidence was given by Mr. Cockerton, the Official Auditor of the London County Council, and Mr. Hartley, a member of the Bradford Town Council. Mr. Hartley said that he considered the most pressing form of municipal enterprise needed at the present time was the provision of houses for the working classes. In Bradford private enterprise had entirely failed in the matter of providing the cheapest class of house, and the Municipality was the only body that could properly deal with the problem. He thought that sixty years would be a reasonable term to allow for loans for building purposes.

PROPOSED REFUSE DESTRUCTOR AT GORTON, MANCHESTER.—Colonel R. A. Durnford, R.E., Local Government Board Inspector, held an inquiry on the 9th inst., at the Gorton Town Hall, into an application by the Gorton District Council for sanction to borrow 8,816*l.* for the provision of a refuse destructor on a site adjoining the Gorton outfall sewage works. The site is between 400 and 500 yards from the Belle Vue Gardens, and Mr. Charles Jennison opposed the application because of its proximity to the gardens. The inspector afterwards inspected the site and said the result of the inquiry would be intimated in due course.

GASWORKS, STRABANE.—On the 9th inst. a Local Government Board inquiry was opened in the Town Hall, Strabane, by Mr. A. D. Price, Engineering Inspector, for the purpose of hearing an application for a loan of 15,000*l.* for the erection of new gasworks made by Strabane Urban Council, and also for a loan of 240*l.* in respect of the acquisition of a house for James M'Gillion under the Small Dwellings Act. Mr. Charles Hunt, M.Inst.C.E., gave evidence as to the sufficiency of the estimate, and explained the system intended to be introduced. He was sure the result would be most successful.

METROPOLITAN CATTLE MARKET.—At their meeting on June 19 the Court of Common Council had before them a scheme for the rearrangement and partial rebuilding of the Cattle Market at an estimated outlay of some 50,000*l.* The cattle market at West Smithfield was abolished in pursuance of a Report made by a Commission of Inquiry, 1849, into the Meat Supply of the Metropolis, and on June 13, 1855, was opened (by Prince Albert) the present market, which had been laid out, at an expenditure of about 500,000*l.*, on an area of 15 acres at Copenhagen Fields, Islington, after plans and designs prepared by J. B. Bunning, the City Architect, and illustrated in our issue of December 2, 1854. From a financial point of view the market, it appears, has not proved a very profitable undertaking. In December, 1896, the Corporation of the City of London sold for 16,000*l.* to the Islington Vestry, for purposes of an open space and recreation ground, some of the surplus lands, consisting of about 5½ acres, lying on the south side of the market area, and in that same year introduced a Bill in Parliament for powers to set apart spaces upon the estate for the temporary use of vendors of goods and miscellaneous commodities, and to levy tolls and charges in respect of such goods and the use of the spaces allotted to their sale. The central clock tower marks the site of Copenhagen House, a favourite resort of holidaymakers, which is named "Coopen-hagen" in the map in Gibson's edition, 1695, of Camden's "Britannia," and is depicted in a woodcut on columns 857-8 of Hone's "Every Day Book," Vol. I. The fields lay between Maiden-lane, now York-road, and the old bridle-way, Hagbush-lane, since Caledonian-road. The house was pulled down in April, 1853; its name survives in Copenhagen-street.

THE COLISEUM, ST. MARTIN'S-LANE, WESTMINSTER.—At the meeting of the London County Council on Tuesday, the Theatres and Music Halls Committee reported as follows:—"We have considered plans submitted by Mr. F. Matcham, on behalf of Mr. Oswald Stoll, of a building, to be known as the Coliseum, which it is proposed to erect upon the site of houses abutting upon St. Martin's-lane, Bedfordbury, and May's-buildings. Part of the site was formerly a public thoroughfare (Turner's-court), but we are informed that this court was closed by a magistrate's order made on April 19, 1902, under the provisions of the Housing of the Working Classes Act, 1890, on the representation of the Westminster City Council. It was reported to the Statistical Sub-Committee of the Housing Committee that, in connexion with the clearing of this site, 357 persons of the working class had been or would be displaced, and this information having come to our knowledge we adjourned the consideration of the plans to ascertain what steps the applicants proposed to take to provide for the rehousing of these persons. Mr. Matcham thereupon stated that his client had transferred to the Westminster City Council in return for the surrender of the public rights over Turner's-court land and property to the value of 25,000*l.*, and that in addition to this he had paid 5,000*l.* as a contribution to the funds of the City Council for the purpose of street widenings in the district. He further stated that his clients had authorised him to undertake that they would assist in the widening of Chandos-street, already suggested by the Westminster City Council, by setting back the portion of the building in that street to the new frontage-line approved by the Council and the City Council, by which a minimum width of 45 ft. will be provided for Chandos-street, and that, in the circumstances, his clients thought that he had done all that could be expected of him. The scheme, moreover, appears to be one which will result in a very desirable public improvement. The building is shown to accommodate 2939 persons (including standing room), and the plans are satisfactory from the point of view of the theatre regulations. We have also been informed that there is no objection under the Building Act. We regret that it does not appear possible for the Council to require steps to be taken for rehousing the persons displaced, and we recommend 'That Mr. Matcham be informed that . . . the Council will be prepared to grant a certificate. . . . '" This was agreed to.

BLACKPOOL TECHNICAL SCHOOL COMPETITION.—The firm of architects who received the first premium in this competition write: "We notice that in announcing the award for the Blackpool Technical School Competition you give our name as Potts, Son, & Pickup. We should be much obliged if you would correct this in your next issue, as the name of our firm for some years now has been Potts, Son, & Hennings." The mistake was not ours.

GASWORKS, MANCHESTER.—Colonel A. G. Durnford, an Inspector of the Local Government Board, held an inquiry in the Mayor's Parlour, at the Manchester Town Hall, on the 10th inst., into an application for sanction to borrow a sum of 253,570*l.* for purposes of the Corporation gas undertaking. Mr. J. G. Newbigging, the Chief Engineer, stated that the increase in the demand for gas during the past five years was equal to 8½ per cent. After hearing other detailed evidence the Inspector closed the inquiry and visited the different gasworks of the city.

LEGAL.

ARCHITECTS' CHARGES.

AT the Lincolnshire Assizes recently, Messrs. W. Watkins & Son, architects, Lincoln, claimed damages from Messrs. Curtis & Mawer, house furnishers, Lincoln, for professional services. The defendants had their premises enlarged, at a cost of 6,756*l.*, but ceased to employ the plaintiffs when the work was commenced. The plaintiffs, therefore, charged 2½ per cent. for their plans, and 1½ per cent. for getting out the quantities, minor extras bringing the total to 289*l.* 11*s.* 9*d.*—For the defence, it was urged that the three Messrs. Mawer went to plaintiffs, and distinctly asked what was the exact amount they would charge if engaged, and if in answer to a question like that, they said 4 per cent., it was not fair for them to turn round afterwards, and say they were keeping another 2½ per cent. up their sleeves.—The jury found for the plaintiffs, and judgment was entered accordingly. — *Sheffield Telegraph.*

LITIGATION OVER WORCESTER'S SEWAGE SCHEME.

THE case of the King *v.* the Corporation of Worcester came before a Divisional Court of King's Bench, composed of Justices Wills and Channell, on the 13th inst., on a rule calling upon the Corporation to show cause why a return to a peremptory writ of mandamus for the carrying out of a sewage scheme should not be taken off the file of the Court, and calling upon each member of the Corporation individually to show cause why a writ of attachment should not issue against them for disobedience to the writ of mandamus which the Local Government Board had obtained in July, 1897, and which had been served on ten of the then members of the Corporation. The present rule was obtained in March last, and that, with the copy of the writ of mandamus, was served on the forty-eight then members of the Corporation. Of the ten members of the Corporation originally served with the writ of mandamus only seven were members in March, at the time of service of the rule with the copy of the writ. The return to the writ of mandamus was that the Corporation were carrying out a sewage scheme, as commanded, and that a contract for the execution of the works had been entered into.

At the conclusion of the arguments of counsel their lordships ordered that as regards the seven members of the Corporation the writs of attachment should be made absolute, but would lie in the office until November 15 to give them an opportunity of applying for a further stay on the ground that they had taken the necessary steps showing they were prepared to obey the order of the Court. The order as regarded the forty-one other defendants would stand over until that date.

Mr. Justice Wills, however, warned these forty-one defendants that they would stand in great peril if they did not take proper steps to prove there would be no more delays.

The Attorney-General, the Solicitor-General, and Mr. Sutton appeared in support of the rule; Mr. Willis Bund for the Corporation; and Mr. Macmorran, K.C., and Mr. J. B. Matthews for the individual members of the Corporation.

ACTION AGAINST THE CHICHESTER CORPORATION FOR NUISANCE.

MR. JUSTICE CHANNELL, in the King's Bench Division on the 11th inst., had mentioned to him the case of Lord Gifford *v.* the Mayor and Corporation of Chichester on an adjourned summons arising out of Lord Gifford's action against the defendants in respect of a nuisance in connexion with their outfall works at Bosham, close to the plaintiff's residence at Old Park. On May 23 last the plaintiff asked that a day might be fixed for final completion of the works being carried out by the defendants to remedy the nuisance, an injunction having been granted restraining the defendants from continuing the nuisance; but there was a stay of execution pending the construction of the works in question. The defendants alleged that the work had been substantially completed, it only remaining for them to have several hundred tons of shingle delivered. The summons was adjourned by his Lordship for six weeks on the understanding that if the plaintiff was satisfied with the progress of the works it should not be brought on again.

Mr. Wills, for the plaintiff, now said that while the application of May 23 had had a magical effect, the nuisance had not yet been remedied. Instead of employing only seven barges, the defendants now had fourteen engaged in the work, and the average deliveries of shingle had increased from 500 tons per week to 730 tons. Between 800 and 900 tons still remained to be delivered, and the plaintiff's contention was that although there had been considerable improvement the work should have been completed by this time. At the present rate of delivery the shingle ought to be delivered within a week, and he (counsel) suggested that his lordship should now make an order for the works to be completed within a fortnight.

Mr. Boxall, K.C., for the defendants, said that the defendants still wanted 1,500 tons of shingle, and asked that the application should stand over for six weeks.

His Lordship said that the injunction would be further suspended for three weeks, and at the end of that time the plaintiff would be entitled to proceed against the defendants by way of sequestration, or otherwise, if he then alleged that the nuisance existed. He did not want to encourage such proceedings, but he made the order with the view of keeping up the compulsion on the defendants, which had been the only thing that had started them into anything like activity.

Order accordingly.

ACTION AGAINST THE TICEHURST RURAL DISTRICT COUNCIL.

THE case of Pakenham *v.* The Ticehurst Rural District Council, came before Mr. Justice Buckley in the Chancery Division on the 10th and 11th insts. This was an action brought by the plaintiff, Sir Francis John Pakenham, K.C.M.G., against the defendants, to obtain a declaration that certain pipes and ditches on the plaintiff's estate at Burnhurst, Hurst Green village, were vested in the defendant Council, and that they should be ordered to cover them so as to prevent their becoming injurious to health.

Mr. S. O. Buckmaster, K.C., and Mr. Geo. Lawrence appeared for the plaintiff; and Mr. J. M. Astbury, K.C., and Mr. R. J. Parker for the defendants.

In opening the case counsel stated that the plaintiff was the owner of the estate through which the system of drainage passed, and he had owned the estate for some time, but he did not go into residence there until June, 1902. After that date he discovered that the smells from the system of drainage were exceedingly offensive and injurious to health. Complaints were made in consequence. There was a cesspool on the estate, which received the sewage from several buildings which were not on the estate as well as from the Queen's Hotel.

Mr. Astbury interposed, and observed that the pipe which drained into the cesspool and the overflow pipe from the cesspool could not be a sewer within the meaning of the Act. The defendants neither made the cesspool nor the connexions. The plaintiff had chosen to connect the cesspool with a ditch on his estate, and he must take the consequences. The defendants did not make the ditches on the plaintiff's land; and if the plaintiff did not like the prevailing system he must alter it himself.

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Evidence was then called on behalf of the plaintiff as to the character of the water taken from the ditch. Dr. Stevenson, the official analyst to the Home Office, producing samples of the water, which he described as being highly concentrated and very offensive.

Mr. Astbury, on behalf of the defendant, said that they could not have a sewer where there was no outfall. For a sewer they must have something which took the sewage away. In this case there was a stoppage at the point marked "S" on the plan and only a small amount of liquid could pass the little pipe at "S," then sank into the ground and deodorised. A hundred yards past the point marked "T" the sewage entered a stream which did not belong to the plaintiff at all. That was a trespass which could be stopped.

Evidence was called on behalf of the defendants to the effect that sink water was seen running through one ditch which caused a nuisance and that the cesspool overflowed, which was an infringement of the by-laws.

In the result, his Lordship held that the plaintiff had failed on a small point of the case to prove that the open drains were sewers, but had succeeded on the greater point of the case in showing they were sewers. He awarded the plaintiff 10s. nominal damages and defendants would have to pay the plaintiff two-thirds of the costs of the action.

Judgment accordingly.

PAVING EXPENSES IN STOKE NEWINGTON.

THE case of Bull *v.* the Mayor, &c., of Stoke Newington came before a Divisional Court of King's Bench, composed of the Lord Chief Justice and Justices Wills and Channell, on the 14th inst., on the appeal of Mr. Bull from an order of the magistrate holding that he was liable to pay the apportionment charges in connexion with the paving of a road in the district of Stoke Newington. The question at issue was whether there was a taking-over of the road by the respondents, the then District Board in 1869 having received a payment or payments from the then owners, and made up the roads and paths. The magistrate found that there was a want of jurisdiction on the part of the then Board in 1869, and also in 1881, and that the appellant was now liable to the respondents for the paving charges under their order of apportionment. It was argued for the appellant that the respondents' resolutions in 1902 adopting the road and ordering it to be paved, and apportioning the charges for the same were inoperative, having regard to the previous resolution and action of the District Board.

At the conclusion of the arguments of counsel, the Lord Chief Justice, in giving judgment, said that the facts were peculiar, and there was no general decision on the point raised before the Court. There were certain lines of authority well known. If the Local Authority had taken definite action and thereby treated a certain street as a new street, or taken it over so that it became repairable by the public authority, then it could not be treated as a new street so as to put upon the frontagers the cost in accord with the decision of the cases on the record. Another line of cases went to show that, although the Local Authority might have done certain repairs under the Public Health Act or the Metropolis Management Act, it did not follow that the street became a new street and a subsequent apportionment could be enforced. Then there was the further question, When did a street become a new street? The magistrate found in this case as a fact that the street became a new street in 1891, and not till then. He also found as a fact that the apportionment proceedings by the District Board in 1869 and 1881 were abandoned. His Lordship did not think that the Court ought to send the case back to the magistrate, as it was of opinion that the magistrate had the whole of the facts and documents before him when he came to the conclusion that he did come to. If the proceedings in the past were abandoned so that the street did not become a new street, and the then Local Authority did nothing, then the decision was right. This Court was of opinion that the magistrate's finding that the former apportionment proceedings were abandoned was right, and the appeal would, therefore, be dismissed.

Justices Wills and Channell concurred.

ACTION AGAINST THE KEYMER BRICK AND TILE CO.

MR. JUSTICE JOYCE in the Chancery Division on the 14th inst. concluded the hearing of the case of the Attorney-General (at the relation of the Chailey Rural District Council) *v.* The Keymer Brick and Tile Co., Ltd.

This action was brought for an injunction to restrain the defendants from committing or permitting a nuisance arising from the accumulation of house refuse of an offensive character on their land at Ditchling, in Sussex.

His lordship, after hearing the evidence, in giving judgment, held that the plaintiff was entitled to the relief sought. He accordingly granted a perpetual injunction against the defendants, their contractors, servants, and agents restraining them from unloading, or bringing, or causing to be brought, or permitting to be deposited, any filth, dust, rubbish, night soil, or refuse, or other noxious or offensive matter, upon the land in question so as to occasion any nuisance, or annoyance, or injury to the health of the public.

Mr. Macmorran, K.C., Mr. Younger, K.C., and Mr. Redcliffe appeared for the Attorney-General; and Mr. Hughes, K.C., Mr. Marshall Hall, K.C., and Mr. Mathold for the defendant company.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

16,300 of 1902.—J. KULHANEK: *Transportable Buildings.*

The method of constructing semi-permanent and transportable buildings essentially characterised by the fact that the separate portions or panels of the wall, that is to say, those portions which lie between the joint with another wall and window or door aperture, or the foundation and the window openings, or the window or door openings, and the roof, are constructed of connected plates, preferably provided of artificial stone of suitable kind, upon which the uprights for the reception of the windows or doors, and the casings for the same, are permanently fixed in such a manner that, upon the connexion of the respective panels, the door or window uprights and casings also appear to be jointed together, so that for the completion of the door or window it is only necessary to hang the same in the casing.

18,537 of 1902.—T. BAMFORTH and A. ROBERTSON *Vent Dampers of Kitchen Ranges.*

In a kitchen range a vent damper plate having the slide guides around the vent opening formed as an integral part thereof by bending or doubling the edges of the plate, in conjunction with a sliding damper having its edges similarly formed to engage with the said slide guides.

18,967 of 1902.—J. J. JAMES: *Catches or Fastenings for Doors, Windows, and the Like.*

An automatic fastener for doors, French-windows, casements and the like, consisting of a catch having a hook-like engaging part, and eccentrically pivoted to a horizontally-disposed bracket or carrier plate, combined with a vertical peg or projection, one of the said parts being mounted upon the inside of the door or the like, whilst the other is fixed to the door frame, or its equivalent, in such a manner that on the door being fully closed, the peg or projection will act upon the parts of the catch at points beyond the centre, and thereby cause the hooked part thereof to engage behind the peg or projection, and thus fasten the door or the like; means being provided for the movement of the catch in the reverse direction by hand when the door requires to be unfastened.

19,087 of 1902.—F. STUMPF: *Fasteners for Doors and the Like.*

A safety door fastener having a bolt which slides in a catch during the opening of the door, said catch being spring actuated and movable in the direction of the door movement and a fixed guide attached to the door post.

22,201 of 1902.—T. R. P. PLUMBER: *Ball Valves for Flushing and Other Water Cisterns.*

In a flushing cistern a valve consisting of a ball that will float upwards when forced from its seat under the water and a suitably formed cage to hold the ball so as to secure its return to its seat when the water level falls, the cage being so constructed that part of it can be pulled up, the ball being raised from its seat by a ring or projections under it, which ring or projections are moved by a lever or other means.

28,211 of 1902.—I. LIGHTER: *Mortising and Tenoning Machine*

In a mutually operated mortising and tenoning machine a base, having a fixed standard thereon, a reciprocating plunger mounted in bearings on said standard, and an oscillatory fulcrum-post at one side of the standard, and a feeding device connected with, and actuated by, the fulcrum-post.

2,837 of 1903.—H. HOTZ: *Hinge Fittings for Doors, Windows, and the Like.*

Hinge fittings for doors, windows, and the like, comprising a slotted socket, in the interior of which a lever is disposed, which is turnable on an axis, and one end of which is weighted by a ball, which enters a cavity in a ring or the like after said ring is inserted into the slot.

6,361 of 1903.—W. MULLER: *Mitering, Mortising and Tenoning Machines.*

A mitering, mortising, and tenoning machine having a circular saw mounted on a shaft with suitable adjustment behind, vertically adjustable rotary cutters, and a vertically, horizontally, and angularly adjustable work holder, provided, if desired, with a scale for angular adjustment.

8,006 of 1903.—W. W. MACLAY: *Continuous Burning Portland Cement Kilns.*

A continuous burning Portland cement kiln, comprising a shaft like structure having openings at the bottom and provided with a combustion chamber, a throat above said combustion chamber, and a pre-heating chamber above said throat, in combination with a regulable suction device connected with said pre-heating chamber, and with a valve or damper located between said pre-heating chamber and the top of the kiln, so that the draft exerted through the combustion-chamber by the suction device may be regulated by adjusting the said damper.

9,134 of 1903.—L. DIENELT: *Flushing Cisterns.*

A flushing cistern with fixed siphon, in which the siphoning is effected by renewed inlet of water and by the overflowing of the same into the draw-off pipe, characterised by the fact that the double valve which is normally held closed by the float ball lever allows of the inlet of the water by means of a bent lever, the latter pressing down the float ball lever, and that the water rising in the bell overflows into the draw-off pipe, thus effecting the emptying of the cistern.

9,401 of 1903.—L. G. LEFVER: *Double-walled Furnaces.*

A double-walled furnace in which air for combustion is admitted through an opening at the top of the rear wall, and, passing downwardly, divides and passes upwardly about the remaining surface of said wall and then passes to the side walls, the inner plates of which are corrugated and inclined, the air so heated finally passing through lower openings to the grate.

9,677 of 1903.—C. E. LONG: *Fasteners for Windows and the Like.*

In fasteners for windows and the like, having a pivoted arm carried by the first frame or member and adapted to receive angular motion, to interlock or grip a segment or equivalent engagement device upon a plate carried by the second frame or member; forming or fitting the segment carrying plate with a key operated lock, and forming a lock bolt-hole in the pivoted arm, so that when in its engaged position the lock bolt-hole of the arm will be located above the bolt of the lock, whereby on operating the key-operated lock the pivoted arm is secured against unwarranted operation from either the exterior or the interior of the windows or the like.

9,686 of 1903.—P. LIEVENS and G. JAHN: *A Safety Apparatus for the Prevention of Burglary.*

A safety apparatus against burglary applicable to any door, shutter, window, or other means of closure, consisting in a detonator or other alarm-signal, the percussion apparatus of which is held back by a hook at the time of closing the door, said hook being thrown back by an angle piece fixed on the door frame, and thus holding the percussion apparatus and letting it go at the time when the door is opened; in combination with a bolt which moves forward or remains motionless according to the position of a secret mechanism, for preventing or allowing an alarm signal to sound.

11,043 of 1903.—J. BOHLEN, G. A. WRIGHT, and F. E. HOOD: *Sash Fasteners.*

A sash fastener comprising a casing with an inwardly projecting intermediate stop, inwardly projecting flanges between the said stop and one end of the casing, and a spring-actuated bolt slidingly mounted in the said casing, and having an elliptical enlargement, with opposite notches to engage the said flanges and hold the bolt retracted, the opening between the flanges and the elliptical enlargement being of such relative dimensions as to permit the said enlargement to be drawn through the opening when the bolt is properly turned.

23,811 of 1902.—E. CUMMINGS: *Chimney Cowls and Ventilators.*

This invention relates to improvements in chimney cowls and ventilators, and consists in forming over the top of the usual hollow stem of the cowls a series of cones, and providing angular air-chambers, or suction valves, in and around the cones to create a great up draught and prevent any down draught.

8,467 of 1903.—T. POTTERTON: *Kitchen Ranges and Boilers therefor.*

This invention relates to improvements in kitchen ranges and boilers, and consists of two grates and a boiler constructed in independent sections, which are inter-connected to maintain an efficient circulation of water. The lower of the two grates is surrounded by sections of the boiler. The flue for both grates is zigzag, and runs between the back and front parts of the upper boiler.

18,005 of 1902.—E. R. STONE: *Life-saving and Salvage Apparatus for Buildings.*

Life-saving and salvage apparatus comprising a track adapted to be fixed upon the front of a building or buildings above the highest point to which access is to be afforded, a runner or carrier mounted upon the said track and carrying a ladder extending to the ground, means for traversing the said runner or carrier with the ladder and means for securing the lower end of the said ladder.

18,443 of 1902.—G. DALTON: *Machines for Crushing Stones, Ores, and the Like.*

This consists in the arrangement and combination on a straight or bent rocking toggle or lever, having at the end thereof opposite to the head or boss a rectangular slot through the same, provided with a thrust block at one side and an adjustable wedge piece at the opposite side and formed in the lower part below an eccentric as an oil-well bath with the said eccentric on the driving or actuating shaft working in said slot.

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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1,411 of 1903.—W. H. WHEATLEY (F. BILLET): *Means for the Removal of Dust from the Interior of Buildings.*

Purifying the interior of buildings by brushing, rubbing, and beating the walls, partitions, and surfaces of the said places, and the furniture and objects appertaining thereto, and at the same time drawing off by suction the air which is thus charged with dust and germs, and filtering this dust-charged air by passing it through dry or wet filtering substances.

3,483 of 1903.—F. KRUGER and J. DENKELMANN: *Manufacture of Fireproof Bricks or Material.*

The manufacture of fireproof artificial stone, bricks, blocks, or material consisting in adding a mixture of finely-ground waste of specular gypsum, or other unburnt gypsum, and a small proportion of finely-ground asbestos or soapstone to a heated liquid mass of silicate of soda or potash, and mixing the whole until a thoroughly homogeneous mass is obtained, charging moulds with the same and heating them to a red heat.

5,757 of 1903.—T. O. BARRETT: *Method of and Means for Jointing Earthenware and other Pipes or Tubular Connexions.*

In jointing earthenware and like pipes the combination of an internal screw threaded, serrated, or corrugated socket having radial holes with a freely fitting spigot having external screw threads, serrations, or corrugations.

6,076 of 1903.—P. T. SHIELDS: *Floors and Ceilings.*

The combination of the side walls and beams, anchors held to the said walls, tie-rods connecting the said beams and anchors, a filling held by the said beams and rods, flooring strips positioned upon the beams, a filling arranged between the said strips, and flooring boards arranged upon the said strips, leaving an air space between the boards and filling.

7,364 of 1903.—K. ZUCKER: *Cross Jointing of Iron Bars.*

The process of cross jointing iron bars of equal cross section, consisting in providing in the one bar or in the web of the one bar an aperture having a bridge or bridges with lateral slits below it, said aperture being of cross-section adapted to receive the second bar.

9,355 of 1903.—G. GEISSLER, SEN., AND G. GEISSLER, JUN.: *Process for the Manufacture of Cement.*

This consists in the manufacture of cement by burning or sintering the mixture of raw material, and subsequently granulating the product, and the employment of oxygen to aid the burning of the materials in the kiln or furnace.

10,170 of 1903.—H. H. WAINWRIGHT: *Metal Bound Concrete Kerbing.*

The combination in kerbing of a mass of concrete shaped to the face of the kerb, and a metal corner bar therefor inserted in said mass of concrete, and having a head positioned at the corner of said mass, an integral web extending longitudinally of said head and backwardly on the axial plane of said head, and connected with the sides of said head by obtusely angled lines and an integral longitudinal dovetail along the inner edge of said web, whereby said corner-bar is interlocked with said mass of concrete.

10,306 of 1903.—R. ILNEMANN: *Fireproof building blocks and slabs for walls, ceilings, partitions, and the like.*

In building blocks or slabs having one or more openings passing through them from top to bottom, the method of making the interior of the said holes in the form of one or more helical grooves or recesses, which become filled with liquid cement poured into the openings after the blocks or slabs have been fitted together.

10,335 of 1903.—C. A. BALPH; *Floor Constructions*

A floor construction comprising a beam or girder having a main bottom flange and one or more flanges or projections on the web longitudinal thereof, said flanges or projections being located on the lower half of the said web, and above the main flange of said beam or girder, and concrete embedding said beam or girder.

10,410 of 1903.—J. H. TURNER and G. M. REED: *Gully Traps.*

The application to gully traps of a grid capable of being locked in position.

17,360 of 1902.—T. JONES: *Bricks.*

A building brick having one or more of its faces moulded to represent roughly hewn rock.

17,418 of 1902.—C. RUBITSCHUNG: *Manufacture of Artificial Asphalt Stone or the like.*

A method of manufacture of a transportable stony material adapted to be made into artificial stone moulding or paving material by the use of heat and pressure, consisting in mixing a small quantity of preliminarily heated thin liquid tar, freed from ammonia water, with a multiple weight of more highly heated filling material, until a dry mortar that does not stain is produced, and thereupon energetically cooling the loose divided mixture and preventing the formation of lumps.

17,724 of 1902.—E. PARRY, F. W. BIDDER, and E. J. SCOWN: *Frames and Covers for Manholes and the Like in Pavements and Roadways.*

In manhole covers, supporting the cover by external brackets on internal stools or supports cast with the main wall of the frame and independently of the inner gutter wall, whereby the tilting of the cover is prevented, ample provision being made all round the cover for ventilating the manhole, and the use of a number of small holes which readily fill up with dirt is avoided.

17,377 of 1902: P. COTTANCIN and A. VYE-PARMINTER.—*Material for Reinforcing Concrete, Cement, and the Like, and the Application Thereof.*

For reinforcing concrete and the like, wire, rods, tubes, or chains bent into loops, spirals, curves, or helices, or combinations of these and set in the material to be reinforced.

MEETINGS.

SATURDAY, JULY 18.

St. Paul's Ecclesiological Society.—Visit to Chigwell, under the general guidance of Mr. R. Howard Wall. Leave Liverpool-street at 2.44 p.m., booking to Chigwell.

Incorporated Association of Municipal and County Engineers.—Lancashire and Cheshire District Meeting at Widnes and Runcorn.

JULY 20 TO 25.

The Architectural Association.—Annual excursion, Worcester and district.

TUESDAY to FRIDAY, JULY 21 to 24.

British Association of Waterworks Engineers.—Eighth Annual General Meeting, Bolton.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

July 3.—By GEORGE SYMONDS (at Diss).

Diss, Norfolk.—Walcott Hall Estate, 131 a. 2 r. 4 p., f. £4,000
Three freehold cottages 155
Two freehold building plots 130
Shimpling, Norfolk.—Shimpling Place Estate, 237 a. 2 r. 18 p., f. 4,450
Bridge and Hill Farms, 53 a. 0 r. 25 p., f. 800
Five enclosures, 20 a. 0 r. 14 p., f. 460

By ALFRED PRESTON (at Diss).

Hinderclay, Suffolk.—The Grove Farm, 113 a. 0 r. 35 p., f. and c., p. 1,050

By HUNTER & HUNTER.

Tottenham.—Bruce-gr., freehold building land, 1 a. 3 r. 15 p. 2,400
Fulham.—493, Fulham-rd., e.r. 40*l.*; also l.g.r. 5*l.*, u.t. 50 yrs., g.r. 1*l.* 605
Shepherd's Bush.—34, St. Stephen's-av., u.t. 50 yrs., g.r. 10*l.*, y.r. 34*l.* 290
62, Westville-rd., f., y.r. 17*l.* 295

By THURGOOD & MARTIN.

Fleet-st.—Nos. 143 and 144, s., area 1,150 ft., f., y.r. 270*l.* 16,350
1, Hare-pl.; also The Mitre Tavern adjoining, area 1,225 ft., f., y.r. 320*l.* 9,550
Colne Engaine, Essex.—The Over Hall Estate, 161 a. 1 r. 25 p., f. 3,300

By TYSER, GREENWOOD, & CRIER.

Chiswick.—Burlington-la., Leamington Villa, f., e.r. 60*l.* 920
86, Paxton-rd., f., w.r. 33*l.* 16*s.* 405

July 4.—By SPELMANS (at Norwich).

Norwich.—23a, Distillery-st., f., y.r. 6*l.* 100
Marlingford, Norfolk.—Cottage, Post-office and 0 a. 2 r. 10 p., c. 110
Nine cottages and 1 a. 2 r. 38 p., c. 360

July 6.—By DENT, DALLAS, & Co.

Putney.—85, 87, 89, and 91, Fawe Pk.-rd., u.t. 91 yrs., g.r. 24*l.*, w.r. 174*l.* 4*s.* 850

By FULLER, MOON, & FULLER.

Battersea.—85, Battersea Pk.-rd., s., and 1, Savona-st., s., f., y.r. 66*l.* 550
Croydon.—11, 12, and 13, Princess-rd., f., y.r. 93*l.* 12*s.* 800

By P. & G. GREEN.

Peckham.—30, Talfourd-rd., f., y.r. 36*l.* 530
23 to 31 (odd) and 37, Albert-rd., f., y.r. 196*l.*... 3,095
83, Commercial-rd., u.t. 40 yrs., g.r. 5*l.* 5*s.*, w.r. 35*l.* 2*s.* 180

July 6.—By WM. HOUGHTON.

Romford, Essex.—Heath Park-rd., two freehold building estates, 32 a. 0 r. 5 p., f., p. 9,800
Brentwood-rd., a freehold building estate, 9 a. 1 r. 33 p. 2,800
Walthamstow.—St. Mary's-rd., The Coffee Tavern, f., p. 1,650
Old Charlton, Kent.—Nadine-st., a building site, f. 165
Church-la., a freehold building site 125
Church-la., a building site, 3 a., f. 680

By KING & CHASEMORE.

Newdigate, Surrey.—New House Farm, 107 a. 2 r. 26 p., f. 2,300
Duke's Wood, 100 a. 1 r. 36 p., f. 1,250
Charlwood, Surrey.—The Glover's Estate, 303 a. 1 r. 23 p., f. 6,900
Page Wood Estate, 60 a. 0 r. 17 p., f. 2,050
Welland Enclosures, &c., 31 a. 2 r. 29 p., f.... 1,350
Newdigate, Surrey.—Enclosures of land, 33 a. 2 r. 9 p., f. 1,450
Cider Mill enclosures, 40 a. 3 r. 37 p., f. 1,100
Cider Mill Farm, 79 a. 0 r. 18 p., f. 3,425

By C. SPARROW & SON.

Finchley.—44, Percy-rd., f., w.r. 39*l.* 445
Woodhouse-la., Melrose, f., e.r. 60*l.* 850

By S. WALKER & SON.

Dormans, Surrey.—The Approach, The Lodge and 0 a. 0 r. 32 p., f. 170
Furzefield Chase, &c., five freehold plots of land, 19 a. 0 r. 21 p. 1,430
Furzefield Chase, carpenter's shop and yard, area 0 a. 1 r. 16 p., f., y.r. 10*l.* 100

By HOWKINS & SONS (at Rugby).

Swinford, Leicester.—Cattell's Farm, 55 a. 3 r. 5 p., f. 2,250
Cottage and enclosure, 3 a. 2 r. 25 p., f. 350
Shawell, Leicester.—Bull Close, 4 a. 1 r. 5 p., f... 230
Shawell Plot, 4 a. 1 r. 5 p., f. 107

By A. CECIL GRIMWADE (at Hadleigh).

Bildeston, &c., Suffolk.—The Bush Farm, 138 a. 3 r. 1 p., f. 2,050
Kersey, Suffolk.—Bridges Farm, 88 a. 3 r. 13 p., f. £950
A freehold field, 8 a. 1 r. 22 p. 120
Hadleigh Hamlet, &c., Suffolk.—The Red House Farm, 160 a. 2 r. 37 p., f. 2,150
The Hollies Farm, 100 a. 2 r. 25 p., f. 1,550

By KEITH & SMITH (at Hadleigh).

Monks Eleigh, Suffolk.—The Bridge Farm 119 a., f. and c. 2,025

July 7.—DEBENHAM, TEWSON, & Co.

City of London.—2 and 4, Finsbury-st.; 11 to 16 Ropemaker-st.; 4, 5, and 6, White-st.; also the Moorgate Works, area 11,650 ft., u.t 990 yrs., g.r. 1,453*l.*, y.r. 4,580*l.* 44,000

By CLARKE & Co.

Kensington.—7, 9, 11, and 13, Fairholme-rd., u.t. 69 yrs., g.r. 36*l.*, e.r. 203*l.* 1,440

By C. W. DAVIES & SON.

Islington.—24, Upper-st. (s.), f., e.r. 160*l.* 2,580
Caledonian-rd.—36, Edward-sq., u.t. 37 yrs., g.r. 5*l.*, w.r. 46*l.* 16*s.* 280

By PHIBBS GIBSON.

Belvedere, Kent.—Belvedere Pk., Temple Mount and 1 a., f., e.r. 80*l.* 1,000
Ealing.—1, 1a, 2, and 2a, Oxford-ter., f., w.r. 106*l.* 12*s.* 925

By HAMPTON & SONS.

South Kensington.—37, Thurloe-sq., u.t. 24 yrs., g.r., &c., 19*l.* 10*s.*, p. 1,760
Surbiton Hill, Surrey.—Langley-av., Fairholme and ½ a., f., p. 2,980

By HARDS & BRADLY.

Greenwich.—20, London-st. (s.), y.r. 58*l.* 1,085
Dartford, Kent.—Barham-rd., f.g.r. 23*l.*, reversion in 88 yrs. 550
Lewisham.—33 and 35, Dermody-rd., f., y.r. 70*l.*.. 1,030

By PERCIVAL HODSON.

New Southgate.—Belle Vue-rd., f.g.r. 18*l.*, reversion in 76 yrs. 440
Holly Pk.-rd., f.g. rents 30*l.*, reversion in 76 yrs. 750

By LESLIE MARSH & Co.

Kensington.—6, Bolingbroke-rd., u.t. 83 yrs., g.r. 12*l.*, e.r. 65*l.* 600
South Kensington.—50, Warwick-rd., u.t. 83 yrs. g.r. 18*l.* 18*s.*, e.r. 110*l.* 800

By WALTON & LEE.

Tooting.—Totterdown-st., a block of freehold building land, 13 a. 1 r. 29 p. 20,350

July 8.—By CHETWYND, LLOYD, & DEAN.

Brondesbury.—43, Buckley-rd., u.t. 84 yrs., g.r. 10*l.* 10*s.*, y.r. 65*l.* 700
Finsbury Park.—40 and 42, Gillespie-rd., u.t. 63 yrs., g.r. 12*l.*, y.r. 68*l.* 545

By FLICK & SON.

Mile End.—6, 7, 1, and 9, Silas-st., u.t. 64 yrs., g.r. 14*l.*, w.r. 135*l.* 4*s.* 930

By MAY & ROWDEN.

St. James.—1A, King-st. (business premises, &c.), u.t. 40¾ yrs., g.r. 65*l.*, y.r. 300*l.* 5,700

By RUSHWORTH & STEVENS.

Belgravia.—11, West Halkin-st. (s.), u.t. 25½ yrs., g.r. 20*l.*, y.r. 250*l.* 2,400
South Kensington.—9, Pelham-cres., u.t. 92½ yrs., g.r., &c., 10*l.* 5*s.*, y.r. 110*l.* 500
20, Pelham-cres., u.t. 15½ yrs., g.r., &c., 14*l.*, p. 730
Milborne-gr., u.t. 28 yrs., g.r. 5*l.* 10*s.*, y.r. 55*l.* 500
Hendon.—16, 18, and 20, Follard-rd., u.t. 77½ yrs., g.r. 13*l.* 10*s.*, w.r. 80*l.* 12*s.* 405
Stoke Newington.—Carysfort-rd., f.g.r. 8*l.*, reversion in 83½ yrs. 205
Coulsdon, Surrey.—Fairdene-rd., f.g.r.'s 21*l.*, reversion in 97¼ yrs. 480

By TERSON & SON.

Tottenham.—4 to 12 (even), Victoria-cres., s., also stabling and premises in Russell-rd., u.t. 73 yrs., g.r. 47*l.* 7*s.*, y.r. 222*l.* 1,590
Finsbury Park.—10, Alexandra-rd., u.t. 70 yrs., g.r. 12*l.* 12*s.*, p. 460
Crouch Hill.—No. 15, s., u.t. 85 yrs., g.r. 6*l.*, w.r. 76*l.* 16*s.* 650

By WOOTTON & GREEN.

Stamford Hill.—Seven Sisters-rd., f.g.r. 28*l.*, reversion in 72 yrs. 660
Harringay.—73, Rosebery-gdns., u.t. 96 yrs., g.r. 6*l.* 6*s.*, e.r. 32*l.* 250

By DOUGLAS YOUNG & Co.

Brixton.—92, Dalyell-rd., u.t. 61 yrs., g.r. 6*l.* 6*s.*, w.r. 66*l.* 6*s.* 350
Wandsworth.—51, Eglantine-rd., f., y.r. 38*l.* 620

By MADDISON, MILES, & MADDISON (at Yarmouth).

Caister, Norfolk.—Denmark House and ½ a., f. .. 800
Freehold house and builder's premises, y.r. 15*l.*. 288
Five copyhold cottages 190

By Messrs. BALLS (at Braintree).

Finchingfield, Essex.—Hobtoes Farm, 40 a. 0 r. 12 p., f. 480
Locksmith's Farm, 102 a. 1 r. 4 p., f. 1,162
Stambourne, Essex.—Two freehold fields, 24 a. 0 r. 15 p. 365
Hempstead, Essex.—Three enclosures, 19 a. 0 r. 36 p., f. 210
Prentices Farm, 77 a. 1 r. 11 p., f. 600
A freehold occupation, 5 a. 0 r. 5 p. 205

July 9.—By H. J. BLISS & SONS.

Clerkenwell.—35, St. John's-la., s., f., y.r. 45*l.* .. 760
Stepney.—32 to 40 (even), Eastfield-st., and 57a, Aston-st., f., w.r. 152*l.* 2*s.* 1,350
48, Eastfield-st., s., and 70 and 72, Aston-st., f., w.r. 118*l.* 6*s.* 1,000
Hackney.—49 to 57 (odd), Brunswick-st., with three workshops in rear, u.t. 56 yrs., g.r. 100*l.*, w.r. 481*l.* 10*s.* 2,650
Stratford.—16 to 32 (even), Mortham-st., u.t. 66½ yrs., g.r. 27*l.*, w.r. 198*l.* 18*s.* 1,100
Holloway.—Seven Sisters'-rd., f.g.r. 48*l.*, reversion in 27 yrs. 2,825
Battersea.—St. John's Hill, f.g.r. 36*l.* 16*s.*, reversion in 50 yrs. 1,030
New Southgate.—Friern Barnet-la., f.g.r. 9*l.*, reversion in 55½ yrs. 220
Leyton.—Beaumont-rd., f.g.r. 30*l.*, reversion in 64 yrs. 670
Dalston.—2, Mayfield-rd., s., u.t. 14 yrs., g.r. 3*l.*, y.r. 32*l.* 16
Hackney.—3 to 8, Morpeth-rd., with plot of land in rear, u.t. 22 and 27½ yrs., g.r. 36*l.* 6*s.*, w.r. 213*l.* 12*s.* 850

By CANE & Co.

Peckham.—56 to 62 (even), Kirkwood-rd., u.t. 67 yrs., g.r. 14*l.*, w.r. 124*l.* 16*s.* 8*d.* 1,040

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Peckham—40, 42, 44, and 48, Parkstone-rd., u.t. 61 yrs., g.r. 21*l.*, w.r. 166*l.* 8s. £940

By EDWIN EVANS.

Feltham Hill, Middlesex.—Poplar Farm, 91 a. 3 r. 7 p., f. and c., y.r. 20*l.* 6,000

Notting Hill.—209, Ladbroke-gr., u.t. 62 yrs., g.r. 12*l.*, e.r. 83*l.* 510

Wandsworth.—102, Chatham-rd., f., e.r. 36*l.* 8s. .. 350

72, Webb's-rd., u.t. 84½ yrs., g.r. 6*l.* 10s., y.r. 32*l.* 250

Battersea.—54, Northcote-rd. (s.), f., y.r. 60*l.* 580

167, Battersea-rise (s.), f., y.r. 60*l.* 985

Tooting.—76 and 78, Longley-rd., f. y.r. 54*l.* 760

Lambeth.—41, Crozier-st., u.t. 28½ yrs., g.r. 5*l.* 12s., w.r. 65*l.* 305

Balham.—107 and 109, Ramsden-rd., u.t. 65½ yrs., g.r. 11*l.* 5s., y.r. 60*l.* 590

By FAREBROTHER, ELLIS, & CO.

Strand.—Nos. 194, 195, and 196 (*Graphic* premises, &c.), area 4,000 ft., f., p. 63,000

By E. H. HENRY.

Streatham.—18, Riggindale-rd., u.t. 83½ yrs., g.r. 10*l.* 10s., e.r. 50*l.* 535

By NEWBON, EDWARDS, & SHEPHARD.

Clapton.—38, Clifden-rd., u.t. 83 yrs., g.r. 6*l.*, y.r. 32*l.* 290

136, Chatworth-rd. (s.), u.t. 76 yrs., g.r. 10*l.*, y.r. 65*l.* 475

Highbury.—38, Aberdeen-rd., u.t. 54½ yrs., g.r. 9*l.*, e.r. 50*l.* 415

Holloway.—23, Fonthill-rd, u.t. 62 yrs., g.r. 7*l.* 7s., e.r. 40*l.* 340

Chiswick.—60, Wellesley-rd., u.t. 65½ yrs., g.r. 6*l.* 12s., y.r. 40*l.* 330

1, 3, and 5, Blenheim-rd., u.t. 63 yrs., g.r. 12*l.*, y.r. 92*l.* 785

By NOTT, CARTWRIGHT, & ETCHES.

Pimlico.—130, Lillington-st., u.t. 23 yrs., g.r. 6*l.* 13s. 6d., y.r. 40*l.* 290

57, Upper Garden-st., u.t. 50 yrs., g.r. 20*l.*, e.r. 80*l.* 450

65, 67, and 69, Sutherland-st., u.t. 30 yrs., g.r. 24*l.*, w.r. 293*l.* 1,575

66, Westbourne-st., s., u.t. 17½ yrs., g.r. 5*l.*, M. py.r. 65*l.* 490

Tooting.—97, Trevelyan-rd., u.t. 73 yrs., g.r. 4*l.*, w.r. 28*l.* 12s. 200

By STIMSON & SONS.

Old Kent-rd.—Nos. 114 and 116, s., f., y.r. 120*l.* .. 2,130

14 and 15, Massinger-st., f., w.r. 79*l.* 12s. 755

Brixton.—40, Overton-rd., u.t. 60 yrs., g.r. 13*l.* 16s. 3d., y.r. 65*l.* 440

41, Nursery-rd., u.t. 65 yrs., g.r. 4*l.* 10s., w.r. 33*l.* 16s. 255

Newington Causeway.—101 to 119 (odd), 108 to 126 (even), Rockingham-st., u.t. 19 yrs., g.r. 16*l.*, y.r. 566*l.* 12s. 3,200

Streatham.—73 and 75, Barrow-rd., u.t. 75½ yrs., g.r. 18*l.* 18s., y.r. 90*l.* 770

Norwood.—37, 39, 41, and 43, Camden Hill-rd., u.t. 47¾ yrs., g.r. 24*l.*, y.r. 126*l.* 685

Brixton.—85, Angell-rd., u.t. 59 yrs., g.r. 7*l.* 10s., e.r. 55*l.* 400

Belvedere, Kent.—65, Woolwich-rd., f., e.r. 50*l.* .. 570

By J. T. PEAT (at Redhill).

Charlwood, Surrey.—A building plot, 1 a. 3 r. 20 p., f. 125

Reigate, Surrey.—2, Hardwicke-rd., with workshop, forge, &c. 800

4, 6, 8, and 10, Hardwicke-rd., f., e.r. 62*l.* 8s. .. 600

July 10.—By P. J. DIXON & SON.

Islington.—120, Englefield-rd., u.t. 38 yrs., g.r. 7*l.*, e.r. 55*l.* 570

Bethnal Green.—Punderson's gdns., a freehold building plot 215

By HOLLINGSWORTH & COLLVER.

Stepney.—25, 26, and 27, Maidmans-st., u.t. 40 yrs., g.r. 12*l.*, w.r. 135*l.* 4s. 800

By JONES, LANG, & CO.

Windsor, Berks.—29, High-st., s., f., y.r. 220*l.* .. 4,000

Fulham.—25, Winchendon-rd., u.t. 90 yrs., g.r. 7*l.*, y.r. 42*l.* 410

By SPENCER, SANTO, & CO.

Oxford-st.—82, Berwick-st., s., f., y.r. 250*l.* 5,765

Soho.—36, Frith-st. (warerooms), f., y.r. 270*l.* 6,110

By WEATHERALL & GREEN.

Shanklin, Isle of Wight.—Glenbrook and 2½ acres, u.t. 960 to 970 yrs., g.r. 60*l.* 10s., p. 2,250

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 15 6	per 1,000 alongside, in river.	
Rough Stocks and Grizzles.....	1 12 6	,, ,,	,,
Facing Stocks....	2 12 0	,, ,,	,,
Shippers	2 5 0	,, ,,	,,
Flettons	1 8 6	,, at railway depôt	
Red Wire Cuts ..	1 12 6	,, ,,	,,
Best Fareham Red	3 12 0	,, ,,	,,
Best Red Pressed Ruabon Facing	5 0 0	,, ,,	,,
Best Blue Pressed Staffordshire ..	4 5 0	,, ,,	,,
Do. Bullnose	4 11 0	,, ,,	,,
Best Stourbridge Fire Bricks	4 8 0	,, ,,	,,
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers.....	13 0 0	,, ,,	,,
Headers	12 0 0	,, ,,	,,

PRICES CURRENT (*Continued*).

BRICKS, &c.

	£ s. d.		
Quoins, Bullnose, and Flats.....	17 0 0	per 1,000 at railway depot.	
Double Stretchers	19 0 0	,, ,,	,,
Double Headers..	16 0 0	,, ,,	,,
One Side and two Ends.....	19 0 0	,, ,,	,,
Two Sides and one End	20 0 0	,, ,,	,,
Splays, Chamfered, Squints.....	20 0 0	,, ,,	,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,, ,,	,,
Quoins, Bullnose, and Flats.....	14 0 0	,, ,,	,,
Double Stretchers	15 0 0	,, ,,	,,
Double Headers..	14 0 0	,, ,,	,,
One Side and two Ends.....	15 0 0	,, ,,	,,
Two Sides and one End	15 0 0	,, ,,	,,
Splays Chamfered, Squints.....	14 0 0	,, ,,	,,
Second Quality White and Dipped Salt Glazed	2 0 0	,,	less than best.

	s. d.	
Thames and Pit Sand	6	0 per yard, delivered.
Thames Ballast	6	0 ,, ,,
Best Portland Cement	30	0 per ton, delivered.
Best Ground Blue Lias Lime..	20	6 ,, ,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s 6d. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE — Including Farleigh Down, delivered on road waggons, Paddington depot.....	1	6½ per ft. cube.
Farleigh Down, delivered on road waggons, Nine Elms depôt	1	8½ ,, ,,
PORTLAND STONE (20 ft. average)— Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or PimlicoWharf	2	1 ,, ,,
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2	2½ ,, ,,

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer in blocks	1 6	,, ,,
Grinshill ,, ...	1 10	,, ,,
Darley Dale in blocks..	2 4	,, ,,
Red Corsehill ,,	2 5	,, ,,
Closeburn Red Freestone	2 0	,, ,,
Red Mansfield ,,	2 4	,, ,,

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. ,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,, ,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,, ,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,, ,,
1¼ in. to 2 in. ditto, ditto	0 6	,, ,,
BEST HARD YORK— Scappled random blocks	3 0	per ft. cube ,,
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. ,,
6 in. Rubbed two sides Ditto	—	,, ,,
3 in. sawn two sides slabs (random sizes)	1 2	,, ,,
2 in. self-faced random flags.....	0 5	,, ,,

Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
,, ,, ,, 3 in. do.	1 2½	,, ,,

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1900 at ry. dep.
20×12 ,, ,, ,, ..	17 6	,, ,,
20×10 best seconds ,,	12 15 0	,, ,,
20×12 ,, ,, ,,	13 10 0	,, ,,
16×8 best ,,	7 0 0	,, ,,
20×10 best blue Portmadoc ..	12 5 0	,, ,,
16×8 best blue Portmadoc	6 5 0	,, ,,
20×10 best Eureka unfading green....	15 2 6	,, ,,
20×12 ,, ,,	17 2 6	,, ,,
18×10 ,, ,,	12 10 0	,, ,,
16×8 ,, ,,	10 5 0	,, ,,
20×10 permanent green	11 0 0	,, ,,
18×10 ,, ,,	9 5 0	,, ,,
16×8 ,, ,,	6 10 0	,, ,,

TILES.

	s. d.	
Best plain red roofing tiles..	42	0 per 1,000, at rly. depôt.
Hip and valley tiles....	3	7 per doz. ,, ,,
Best Broseley tiles	50	0 per 1,000 ,, ,,
Do. Ornamental Tiles	52	6 ,, ,,
Hip and valley tiles....	4	0 per doz. ,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57	6 per 1,000 ,, ,,
Do. ornamental Do.	60	0 ,, ,, ,,
Hip tiles	4	0 per doz. ,, ,,
Valley tiles.....	3	0 ,, ,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51	9 per 1,000 ,, ,,
Do. Ornamental Do.	54	6 ,, ,, ,,
Hip tiles	4	1 per doz. ,, ,,
Valley tiles.....	3	8 ,, ,, ,,
Best "Rosemary" brand plain tiles	48	0 per 1,000 ,, ,,
Do. Ornamental Do.	50	0 ,, ,, ,,
Hip tiles	4	0 per doz. ,, ,,
Valley tiles	3	8 ,, ,, ,,

PRICES CURRENT (*Continued*).

WOOD.

	£ s. d.	£ s. d.	
	At per standard.		
Deals: best 9 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0	
Deals: best 3 by 9.....	14 10 0	15 10 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0	
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.	
Deals: seconds.....	1 0 0	less than best	
Battens: seconds	0 10 0	,, ,,	
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0	
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0	
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.	
¾ in.	1 0 0	,,	
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0	
Seconds	4 5 0	4 10 0	
Small timber (8 in. to 20 in.)	3 12 6	3 15 0	
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0	
Swedish balks	2 15 0	3 0 0	
Pitch-pine timber (20 ft. average)..	3 5 0	3 15 0	
JOINERS' WOOD.			
White Sea: First yellow deals,	At per Standard.		
3 in. by 11 in.....	23 0 0	24 0 0	
3 in. by 9 in.	21 0 0	22 10 0	
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0	
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0	
,, ,, 3 in. by 9 in.	17 10 0	19 0 0	
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0	
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0	
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0	
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0	
Do. 3 in. by 9 in.....	18 0 0	19 10 0	
Battens.....	13 10 0	15 0 0	
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0	
Do. 3 in. by 9 in.	14 10 0	16 0 0	
Battens.....	11 0 0	12 10 0	
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0	
Do. 3 in. by 9 in.	13 0 0	14 0 0	
Battens	10 0 0	12 0 0	
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0	
,, ,, 3 in. by 9 in.	13 10 0	14 10 0	
Battens.....	11 0 0	12 0 0	
Second white deals 3 in. by 11 in.	13 10 0	14 10 0	
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0	
,, ,, battens.....	9 10 0	10 10 0	
Pitch-pine: deals	16 0 0	18 0 0	
Under 2 in. thick extra	0 10 0	1 0 0	
Yellow Pine—First, regular sizes ..	33 0 0	upwards.	
Oddments	22 0 0	24 0 0	
Seconds, regular sizes	24 10 0	26 10 0	
Yellow Pine Oddments	20 0 0	22 0 0	
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6	
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6	
Small ,, ...	0 2 3	0 2 6	
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6	
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8	
¾ in. do. do.	0 0 6½	. . .	
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11	
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0	
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0	
Teak, per load	17 0 0	22 0 0	
American Whitewood Planks— Per ft. cube	0 4 0	. . .	
Prepared Flooring—	Per square.		
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6	
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0	
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6	
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6	
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0	
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6	
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6	
1 in. by 7 in. do. do. do.	0 14 0	0 18 0	
¾ in. by 7 in. white do. do.	0 10 0	0 11 6	
1 in. by 7 in. do. do. do.	0 11 6	0 13 6	

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered. Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON— Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
,, ,, galvanised.....	16 0 0	. . .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	. . .
,, ,, to 24 g.	10 15 0	. . .
,, ,, to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.....	14 5 0	. . .

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PRICES CURRENT (*Continued*).

METALS.

	Per ton, in London. £ s. d.	£ s. d.
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.....	16 0 0	. . .
" " 22 g. and 24 g.	16 10 0	. . .
" " 26 g.....	18 0 0	. . .
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	. . .
" " 22 g. and 24 g.	12 15 0	. . .
" " 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in. ..... (Under 3 in. usual trade extras.)	9 5 0	9 15 0

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 5 0	. . .
Pipe in coils	14 15 0	. . .
Soil pipe.....	17 5 0	. . .
Compo Pipe	17 5 0	. . .
ZINC—Sheet—		
Vieille Montagne ..... ton	27 5 0	. . .
Silesian	27 0 0	. . .
COPPER—		
Strong Sheet ..... per lb.	0 0 10½	. . .
Thin ..... "	0 0 11½	. . .
Copper nails ..... "	0 0 11	. . .
BRASS—		
Strong Sheet..... "	0 0 10	. . .
Thin " ..... "	0 0 11	. . .
TIN—English Ingots ..... "	0 1 5	. . .
SOLDER—Plumbers' ..... "	0 0 6	. . .
Tinmen's ..... "	0 0 8	. . .
Blowpipe ..... "	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths.....	1¾d. " "
21 oz. thirds	3¾d. " "
" fourths.....	2½d. " "
26 oz. thirds	4d. " "
" fourths.....	3¼d. " "
32 oz. thirds	5d. " "
" fourths.....	4¼d. " "
Fluted sheet, 15 oz.	3d. " "
" 21 oz.	4d. " "
½ Hartley's Rolled Plate	1¾d. " "
⅝ " " "	2d. " "
¾ " " "	2¼d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels..	per gallon	0 2 0
" " " in drums.....	"	0 2 4
Boiled " " in pipes or barrels..	"	0 2 3
" " " in drums.....	"	0 2 7
Turpentine, in barrels	"	0 3 6
" in drums	"	0 3 8
Genuine Ground English White Lead	per ton	20 10 0
Red Lead, Dry	"	20 0 0
Best Linseed Oil Putty.....	per cwt.	0 8 0
Stockholm Tar.....	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak.....	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches.....	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Egyptell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper.....	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

T. M. (Below our limit.)

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted*

ABINGER (Surrey).—For additions and alterations to the Scarlett Arms, Abinger, for Lord Abinger's Trustees. Mr. C. H. Burstow, architect, 6, West-street, Horsham, Sussex:—

J. Harrison.....	£393 0	Warren & Killick .	£368 0
E. & J. H. Holden	378 0	Reeves & Port,	
J. Knight	370 0	Rudgwick*.....	362 10

BRANKSOME.—For new cemetery for the Urban District Council. Mr. S. J. Newman, Surveyor to the Council, Branksome, Parkstone:—

	Front Fence, Entrance-gates, &c.	House, Office, Conveniences, &c.
Baker & Pearcey	£782 3 3	.. £695 0
Hoare & Sons, Bournemouth	796 9 3	.. 633 10*
Jones & Son	718 0 0	.. 700 0
Jones & Seward	729 0 0	.. 665 0
Bayley & Sons, Bournemouth	678 0 0*	.. —

BRISTOL.—For the erection of a new hotel at Knowle, Bristol, for Messrs. J. & J. Usher, Ltd., New City Brewery, Bristol. Mr. Thos. Scammell, architect and surveyor, 1, St. Stephen-street, Bristol:—

W. Church.....	£2,993	Perkins & Son.	£2,550
Eastabrook & Sons..	2,934	C. A. Hayes.....	2,550
Denby & Co.	2,799	F. Chown.....	2,500
E. Clark.....	2,795	T. R. Lewis.....	2,500
E. Love.....	2,585	Wilkins & Gosling*	2,475

[All of Bristol.]

CAMBRIDGE.—For rebuilding premises Nos. 28, 29, and 30, Burleigh-street for Messrs. E. Bland & Co. Mr. Paul Bausor, architect 9, St. Andrew's-street, Cambridge. Quantities by the architect:—

The Oak Building Co., Ltd.	£1,570	Prime & Sons, Cambridge*	1,401
Kerridge & Shaw ..	1 560		

[All of Cambridge.]

HORLEY (Surrey).—For additions to Timberham, for Mr. F. E. Charles. Messrs. Thomas Dinwiddy & Sons, architects, Greenwich, and 54, Parliament-street, S.W.:—

Nightingale & Sons	£1,015	T. Wickens, Charlwood*	£870
Bushby & Son	949		

ITCHINGFIELD (Horsham).—For the erection of a billiard-room and other additions and alterations to the Warren, Itchingfield, for Mr. F. Hulme King. Mr. C. H. Burstow, architect, 6, West-street, Horsham:—

Reeves & Port	£765 0	William Potter	£640 17
G. Potter.....	725 0	Rowland Bros.	633 0
Dewdney Bros.....	680 0	James Wadey, Five	
Hillman & Murrell	660 0	Oaks, Billingshurst*	460 0

LONDON.—For the erection of a clerk of works' office on the Norbury Estate, Croydon, for the L.C.C.:—

Roberts & Co.* £143 10

LONDON.—For the provision of cleft oak pale fencing along a portion of the southern boundary of the Totterdown Fields Estate, for the L.C.C.:—

Rowland Bros.* £201 10

LONDON.—For Ingram House, Stockwell-road, S.W., for the Ingram Houses Co., Ltd. Mr. Arthur T. Bolton, architect, 2, The Sanctuary, S.W. Quantities prepared by Messrs. Widnill & Trollope, surveyors, Broad Sanctuary-chambers, Great Tothill-street, S.W.:—

Foster & Dicksee ..	£47,777	Shillitoe	£43,000
Trollope & Sons ..	43,950	Higgs & Hill	42,354
Holloway Bros.....	43,731	Rudd & Sons‡.....	40,500

‡ Accepted on a reduced scheme.

LONDON.—For alterations and additions to the Northern Hospital, for the Metropolitan Asylums Board:—

Foster Bros.....	£2,017	Wall & Co.	£1,835
W. D. Tucker.....	1,974	Voller & Goodfellow*	1,757
Arthur Porter	1,867		

[Surveyor's estimate, £1,300.]

LONDON.—For re-forming pipe trenches and repairing corridor floors at the South Western Hospital, for the Metropolitan Asylums Board:—

H. & C. Davis	£935 0 0
J. C. Mason	675 12 6
Hall & Sons	661 9 0
Coleman & Co., Brixton*	602 15 0

[Engineer's estimate, £612.]

LONDON.—Accepted for the supply of the following materials to the Metropolitan Asylums Board on schedule of prices for twelve months:—

Builders', Engineers', and Smiths' Ironmongers.

Items.		Items.	
Jukes, Coulson, Stokes, & Co.	89	Mosers, Ltd.	9
Pryke & Palmer	60	Easterbrook, Alleard, & Co.	3
O'Brien, Thomas, & Co.	12	Hobdell, Way, & Co...	1
Franklin & Son.....	10	Carlton Iron Foundry Co.	1
Buck & Hickman.....	9		

Plumbers' and Gasfitters' Ironmongers.

Items.		Items.	
Pryke & Palmer	82	Buck & Hickman.....	15
Mosers, Ltd.	34	Hayward, Tyler, & Co.	5
Harris & Dawson	16		

Electrical Accessories.

Items.		Items.	
General Electric Co. ..	24	Edison & Swan United	
Baxter & Caunter	18	Electric Light Co. ..	3
Pryke & Palmer	15	The Johnson & Phillips'	
Sun Electric Co.	5	Electric Cable Works	2
Siemens, Bros., & Co., Ltd.	4	Siemens' Electrical Appliances	1
Goossens, Pope, & Co.	3		

PENGAM (Wales).—For the erection of sixteen houses for the Building Club. Mr. P. Vivian Jones, architect, Hengoed, viâ Cardiff:—

E. Hughes, Capel-street, Bargoed, viâ Cardiff, £162 per house.

ST. ALBANS.—For additions to workhouse infirmary, for the Guardians. Mr. H. E. Hansell, architect, Station Buildings, St. Albans. Quantities by Mr. J. G. Herbertson, St. Albans:—

Vail & Williamson	£3,677 0	F. W. Stanley....	£3,594
C. W. Dumpleton	3,676 0	Miskin & Sons* ..	3,517
G. Dunham	3,640 0	J. T. Bushell	3,499

[All of St. Albans.]

SUPPLY of Certain Classes of TIMBER for use in M.T. Centres, on Running Contracts, for the School Board for London:—

Description of Timber.		John Stewart.	R. Garrard & Co.	The London School Furniture Co.	Hahn & Co.	Cobbetts, Ltd.*	Ingram, Perkins, & Co.*	Wm. Mallinson & Co.	J. Latham, Ltd.
		d.	d.	d.	d.	d.	d.	d.	d.
2½ in. by 1¼ in. yellow deal	per ft. run	2	1¼	1	—	1	¾	2½	1
1¼ in. by 9 in. "	"	3¼	3¾	3½	—	2½	3	7	4
¾ in. by 9 in. "	"	2½	2½	2⅜	—	2	1½	5	2⅜
¼ in. by 11 in. yellow pine	"	4	3½	4	—	2½	3½	4	4
⅜ in. teak.....	per ft. super	5	4	4½	4½	4	3½	5	3½
¼ in. "	"	4½	3	3¼	3½	3	2½	4	2⅜
¼ in. oak	"	3	2½	2	2½	1⅞	2	2½	2½
¼ in. "	"	2½	1½	1⅜	2	1¼	1½	2	1½
¼ in. mahogany.....	"	4¼	3½	3	4½	2¼	3½	5	3½
¼ in. "	"	4	2½	2½	3·	1½	2½	3½	2½
1 in. satin walnut	"	4	4	3	4½	3	2½	4	2⅜
½ in. "	"	3½	3	2⅜	4	2⅞	2½	3½	2⅜
½ in. "	"	2½	2½	2⅞	3½	2½	1½	3	2½
½ in. "	"	2½	2½	2½	3	1⅞	1⅝	2½	2
½ in. American walnut.....	"	7½	7	8	8½	6½	5½	7½	6
⅝ in. "	"	6½	5	5	5½	4½	4½	6	4½
⅝ in. "	"	5	4½	4½	5	3½	3½	5	3½
⅝ in. "	"	4	3½	3	4	2½	2½	3½	2½
⅜ in. cedar	"	5½	5	3½	—	4	3	4	3½
½ in. "	"	5½	3½	2½	—	3	2½	3	2½
½ in. basswood	"	2½	3	2½	3	2½	2½	3	2⅜
⅜ in. "	"	2½	2½	2½	2½	1½	1⅜	2½	2⅛

[*See also Page 89.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Machinery for Lifting Boats	Austrian Government	100,000 Kronen, 75,000 Kronen, and 50,000 Kronen	Jan. 3, 1904
*School for Boys	Governors of Acton Co. School	2nd and 3rd, 30*l.* and 20*l.* respectively	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
*Reconstruction of Sewers	Corporation of London	Engineers' Office, Public Health Department, Guildhall, E.C.	July 21
Paving Setts, &c.	Wallasey U.D.C.	W. H. Travers, Engineer, Public Offices, Egremont, Cheshire	do.
Flooring and Roof Works at Schools, Bowerham	Lancaster School Board	T. Cann Hughes, Town Hall, Lancaster	do.
Additions to Schools, Manningtree, Essex	The Wesleyans	J. W. Start, Surveyor, Cups Chambers, Colchester	do.
Sewerage Works, &c., Burgh-by-Sands	Carlisle R.D.C.	Surveyor, 14, Bank-street, Carlisle	do.
Boundary Wall at Hospital, Ystrad	Rhondda U.D.C.	W. J. Jones, Engineer, Council Offices, Pentre, Glam.	do.
Warehouse, Church-street	Trowbridge Industrial Society, Ltd.	W. W. Snallum, Architect, Church-street, Trowbridge	do
Farm Buildings	Haslingden Guardians	J. K. Hay, Union Offices, Pikelaw, near Rawtenstall	do
Boundary Wall, Coombe Top	Thornhill U.D.C.	J. H. Dyson, Council Offices, Thornhill	do
Road Works, Clydach Vale	Cambrian Collieries Company, Ltd.	L. W. Llewellyn, Clydach Vale	do.
Timber Yard, Regent-street, Bootle	L. & Y. Railway Company	R. C. Irwin, Hunt's Bank, Manchester	do.
Two Bridges, Byfleet, Surrey	Chertsey R.D.C.	W. Durrant, Spinney Hill, Addlestone	do.
Additions to Bank Premises, High Cross-st., St. Austell	Capital & Counties Banking Co., Ltd	F. C. Jury, 1, Alma-villas, St. Austell	do.
Villa, Stairfoot	.....	E. W. Dyson, Civil Engineer, 14, Market-hill, Barnsley	do.
Eight Cottages, Whickham	.....	Hannington & Co., Ltd., Guildhall Chambers, Newcastle	July 22
Post Office Buildings, Pavement, Todmorden	.....	J. Horsfall, Architect, Todmorden	do.
Bridge Works, Kirby Sigston	Northallerton R.D.C.	W. Fowle, Council Offices, Northallerton	do.
Well Sinking, &c., Rathmichael	Rathdown R.D.C.	R. M. Butler, Civil Engineer, 12, Dawson-street, Dublin	do.
Water Supply Works, Whippingham	Isle of Wight R.D.C.	H. E. Stratton, Pyle-street, Newport, Isle of Wight	do.
Thirty-five Cottages, Blaengarw (Wales)	Queen-street Building Society	J. M. Williams, Architect, Blackmill	do.
Sewers, &c.	Newnham U.D.C.	W. F. Jones, Architect, 21, George-street, Gloucester	do.
Station Buildings, Church Fenton, near Leeds	N. E. R. Co.	W. E. Bell, Architect, N. E. R. Co's. Offices, York	do.
Shelter, Roseburn Park	Edinburgh Town Council	R. Morham, Architect, City Chambers, Edinburgh	do.
Works at Church, James-street, Neath	The Deacons	P. Thomas, Gnoll Park-road, Neath	do.
House and Shop, Beamish	Mr. J. Tait	T. E. Cressling, Architect, Front-street, Stanley, Durham	do.
Schools, Whitehaven	Hogarth Mission Committee	J. S. Moffat, Architect, Whitehaven	do.
Additions to Workhouse	Lichfield (Staffs) Guardians	D. C. Marks, Architect, St. Mary's Chambers, Lichfield	do.
Kerb Setts	Ramsgate Town Council	T. G. Taylor, Engineer, Albion House, Ramsgate	do.
Store Premises, Linthwaite	Slaithwaite Indus. Society, Ltd.	J. Berry, Architect, 3, Market-place, Huddersfield	do.
*Sewerage Works	City of Westminster	Work's Department, Westminster City Hall, Charing Cross-rd., W.C.	do.
*Painting and Decorating Town Hall, &c.	Metropolitan Borough of Chelsea	Borough Surveyor, Town Hall, Chelsea, S.W.	do.
*Decorative Repairs at Union Offices	Southwark Union	G. D. Stevenson, Architect, 13 and 14, King-street, Cheapside, E.C.	July 23
*Decorative Repairs at Infirmary, E. Dulwich	do.	do.	do.
Additions to the Greyhound Inn, Bargoed, Mon.	.....	D. F. Pritchard, Crumlin, Mon	do.
Chapel, Grove-place, Port Talbot	.....	Mr. Rees, Glynderwen, Grove-place, Port Talbot	do.
*Furnishing Hargher Clough Schools	.....	A. J. Shaw, A.R.I.B.A., & T. H. Vowles, Mercantile Chmbs., Burnley	do.
Sewage Disposal Works	Trowbridge U.D.C.	W. H. Stanley, Civil Engineer, Trowbridge	do.
Two Houses, Westcliffe, Southend-on-Sea	Essex County Council	F. Whitmore, Architect, Duke-street, Chelmsford	do.
Paving Works, &c., Newton-road	Tunbridge Wells Town Council	W. H. Maxwell, Civil Engineer, Town Hall, Tunbridge Wells	do.
Cast Iron Pipes (1,300 tons)	Manchester Corporation	C. Nickson, Town Hall, Manchester	do.
Sinking Well, near the Hall Farm	Aldeburgh (Suffolk) Corporation	J. C. Gordon, Surveyor, Aldeburgh	do.
House, Moresby, near Whitehaven	Mr. Peter Gunn	J. S. Stout, Architect, 36, Lowther-street, Whitehaven	do.
School	Currie (N.B.) School Board	W. Baillie, Architect, 223, Hope-street, Glasgow	do.
*Buildings for Electric Lighting Works	Heston and Isleworth U.D.C.	Town Hall, Hounslow	do.
*New Coast Guard Station, near Faversham	*The Admiralty	Director of Works Department, Admiralty, W.C.	July 24
Stabling, &c., Rhymney	.....	T. Roderick, Architect, Merthyr Tydfil	do.
Storm Water Drain, &c., Pershore	Worcestershire County Council	J. H. Garrett, Surveyor, Shirehall, Worcester	do.
Rebuilding Jabez Chapel, Duffryn Gwaun	.....	G. Morgan & Sons, Architects, Carmarthen	July 25
Banking Premises, Rothie-Norman, N.B.	.....	R. G. Wilson, Architect, 181a, Union-street, Aberdeen	do.
Sewerage Works, &c.	Bacup Corporation	W. H. Elce, Civil Engineer, Bacup	do.
Chapel, &c., Hafod	The Wesleyan Trustees	A. O. Evan, Architect, Pontypridd	do.
Twenty Houses, Waunllwyd, Mon	The Building Club	R. L. Roberts, Architect, Abercarn	do.
Road Works, Old Road	Frinton-on-Sea (Essex) U.D.C.	T. W. Golds, Surveyor, High-street, Thorpe-le-Soken	July 27
Cast Iron Pipes, &c.	Walton-on-Thames U.D.C.	W. H. Radford, Civil Engineer, King-street, Nottingham	do.
Steel Tram Rails (350 tons)	Cheadle U.D.C.	C. R. Brady, Civil Engineer, 13, Warren-street, Stockport	do.
Twenty-eight Houses, Tirphil	Graig Rhymney Building Club	T. Roderick, Architect, Merthyr Tydfil	do.
Schools	West Hartlepool School Board	R. Holt, Architect, School Board Offices, West Hartlepool	do.
Sewerage Works, Cottimore-lane	Walton-on-Thames U.D.C.	W. H. Radford, Civil Engineer, King-street, Nottingham	do.
Asphalt Works	Lanchester Parish Council	H. Knowles, Council Offices, Burnhope	do.
Breakwater	Aberystwyth Corporation	A. T. Walmisley, Engineer, 9, Victoria-street, S.W.	do.
Ninety-one Houses, Rhymney	Twyn Carno Building Club	T. Roderick, Architect, Merthyr Tydfil	do.
Public Library, Market-road	Chelmsford Town Council	Chancellor & Son, Architects, Chelmsford	do.
*Timber Breakwater Harbour Entrance	Aberystwyth Corporation	A. T. Warlmisley, 9, Victoria-street, Westminster, S.W.	do.
*Granite, Gravel, and Hoggin	Barnet U.D.C.	Not supplied	July 29
*7 ft. Disinfector, Cook-road, Wantead Flats, E.	Wanstead U.D.C.	Not stated	do.
*Steam Roller with Attendant, &c.	do.	Surveyor, Council Offices, Wanstead, E.	do.
Sewerage Works, Edenbridge	Sevenoaks R.D.C.	C. E. Bruges, Civil Engineer, 1, Victoria-street, Westminster	do.
Alterations to Town Hall	Devizes Corporation	Borough Surveyor, 15, Market-place, Devizes	July 30
Seventy-two Houses, Aberaman	Pleasant View Building Club	T. Roderick, Architect, Clifton-street, Aberdare	do.
*New Coast Guard Buildings at Hayling Island	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue, W.C.	July 31
Cast Iron Pipes (1,200 tons)	Glasgow Corporation	J. R. Sutherland, Engineer, 45, John-street, Glasgow	Aug. 1
*Builder's Works at Foleshill Works	Coventry Corporation Gas Commit.	Engineer and General Manager, Gas Works, Coventry	do.
Cattle Ring at Market	Shrewsbury Corporation	W. C. Eddowes, Borough Surveyor, The Square, Shrewsbury	Aug. 3
*School in Grovelands-road, Reading	The Reading Education Committee	C. Smith & Sons, Architects, Friar-street, Reading	Aug. 4
*Band Stand, Conveniences, &c., Limehouse	London County Council	General Constn. Section, Architect's Department, 18, Pall Mall, S.W.	do.
Sewers, &c.	Hale (Cheshire) U.D.C.	F. J. Lobley, Civil Engineer, Hale, Cheshire	do.
Sewerage Works, Talgarth, Herefordshire	Hay R.D.C.	R. E. W. Berrington, Civil Engineer, Bank Bldngs., Wolverhampton	do.
*Painting, &c., Chapel in St. Leonards-street Workhouse	Stepney Union	Master of the Workhouse, St. Leonards-street, Bromley-by-Bow, E.	Aug. 6
*Roadmaking	Couchmore Estate Thames Ditton	C. & F. Rutley, 11, Dowgate Hill, E.C.	do.
*New Lighthouse Dwellings at Portland Bill, Dorset	Trinity House Corporation	The Trinity House, London, E.C.	do.
*New Coastguard Buildings at Cemaes	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue	Aug. 7
*Sewerage Works, &c., Muswell Hill, &c.	Hornsey U.D.C.	Engineer to the Council, Council Offices, Southwood-lane, Highgate	Aug. 10
Chapel, Kidwelly, Wales	The Trustees	J. Anthony & Sons, Anchor House, Kidwelly	Aug. 15
*New Public Offices, Fire Station, &c.	Maldens and Coombe U.D.C.	William Hope, Seymour-road, Hampton Wick	Aug. 31
Factory Buildings, Long Eaton	.....	E. R. Ridgeway, Architect, Long Eaton	No date.
Three Houses, Glebe Estate, Hunstanton	.....	G. Fitt & Co., Ltd., Architects, Norwich	do.
House, Norman-road, Stalybridge	.....	T. George & Son, Architects, Old Square, Ashton-under-Lyne	do.
Five Cottages, Steer Point, near Plymouth	.....	Corderoy & Co., 12, George-street, Plymouth	do.
Works at Schools, Hastings-road	Swadlincote School Board	C. F. Underhill, Architect, Glencoy, Swadlincote	do.
Club Premises, Mickley, Northumberland	District Club Co., Ltd.	W. Dixon & Sons, Architects, St. John-street, Newcastle	do.
House, Perry Green, Much Hadham, Herts	Mrs. D. M. Crane	Ansell & Ansell, Architects, 14, St. Dunstan's Hill, E.C.	do.
Boundary Wall at Cemetery, Westgate-road, Newcastle	The Burial Board	Liddle & Browne, Architects, Newcastle	do.
Laboratory at School, near Oldham	.....	C. T. Taylor, Architect, 10, Clegg-street, Oldham	do.
Two Houses, Parcmain, Building Estate, Carmarthen	.....	A. Soppitt, Carmarthen	do.
Free Library	Dalton-in-Furness U.D.C.	W. Richardson, Surveyor, Dalton-in-Furness	do.
Offices, Great Wilson-street, Leeds	Middleton Colliery Co. Ltd.	E. Hill, Architect, 13, Oxford-row, Leeds	do.

[See also next page.

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Inspector of Nuisances	Chepstow U.D.C.	Council Offices, Chepstow	July 25
Surveyor	do.	do.	do.
*Assistant Lecturer	Borough Polytechnic Institute	105*l.* per annum	July 27
*Surveyor of School Buildings	Middlesex Education Committee	300*l.* per annum	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, lv. *Contracts*, lv. vi. viii. x. & xvi. *Public Appointments*, xviii.

TENDERS (*Continued*).

SUPPLY of the FOLLOWING ARTICLES, on Running Contracts, for the London School Board :—

	Cupboards.						Abacus Frames.		Towel Rollers.	Rollers	Tables.			Platforms.	Tables.		
	No. 1.	No. 4.	Map and Rack.	Stock and Map.	Large Science.	Modelling.	With Stands.	Without Stands.			4 ft. 6 in. by 3 ft.	Small Kindergarten.	Pedestal		Laundry.	Trestle Tops.	Trestles
	each.	each.	each.	each.	each.	each.	each.	each.	each.	each.	each.	per doz.	each.	each.	per doz.	each.	each.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.
H. Bouneau	8 0 0	2 2 6	7 17 6	6 6 0	11 17 6	18 0 0	0 12 3	0 7 2	2 4	0 9	*2 2 0	*6 12 0	6 16 6	1 0 0	13 19 0	0 18 0	*6 0
Brake & Co	—	—	10 7 0	7 17 0	—	—	1 1 6	0 16 6	3 9	1 2	—	—	—	—	—	—	—
J. Cox	—	—	*6 10 6	*3 17 6	—	—	0 13 6	0 9 3	*1 6	*0 6	—	—	—	—	—	—	—
T. Cruwys	8 5 0	2 3 0	9 0 0	6 15 0	11 0 0	18 0 0	—	—	—	—	—	—	—	—	—	—	—
A. Duncan	*6 15 9	*2 2 0	—	—	—	—	—	—	—	—	3 3 0	7 4 0	8 0 0	*0 19 7	*13 16 0	*0 10 3	7 6
Educational Furnishing Co., Ltd.	—	—	—	—	*7 0 0	16 0 0	—	—	—	—	—	—	—	—	—	—	—
Galbraith Bros.	—	—	7 7 0	4 12 0	—	—	2 2 0	1 10 0	3 6	2 6	—	—	—	—	—	—	—
Garvie & Sons	—	—	11 8 3	7 6 3	—	—	—	—	—	—	—	—	—	—	—	—	—
General Builders, Ltd.	10 10 0	3 15 0	—	—	14 10 0	25 7 6	—	—	—	—	—	—	—	—	—	—	—
Gloucester Joinery Co., Ltd.	—	—	10 15 0	7 15 0	—	—	—	—	—	—	—	—	—	—	—	—	—
Gelding & Ansell	—	—	—	—	17 0 0	19 10 0	—	—	3 6	1 0	—	—	—	—	—	—	—
Goodall, Lamb, & Heighway, Ltd.	9 0 0	2 12 6	—	—	—	—	1 18 0	1 15 0	2 6	0 9	2 11 0	9 19 0	7 7 4	1 18 0	15 0 0	0 10 7	6 7
Hammer & Co., Ltd.	8 15 0	2 14 0	9 5 0	6 8 0	—	—	0 13 0	*0 7 0	4 0	2 0	2 10 0	7 4 0	7 7 0	1 3 0	15 6 0	0 15 0	6 9
Harrod's, Ltd.	—	—	11 10 0	7 10 0	—	—	—	—	3 9	1 2	—	—	—	—	—	—	—
London School Furniture Co.	8 10 0	2 3 3	7 14 0	6 5 0	—	—	*0 11 6	0 7 4	2 6	0 9	—	—	—	—	—	—	—
Marchant & Hirst	9 0 0	3 0 0	—	—	—	—	—	—	—	—	2 7 0	13 4 0	6 5 0	1 8 0	17 8 0	1 4 6	7 6
North of England School Furnishing Co., Ltd.	—	—	9 13 0	5 15 6	—	—	—	—	—	—	—	—	—	—	—	—	—
Parkstone Steam Joinery Co.	—	—	—	—	13 0 0	18 0 0	—	—	3 3	0 9	—	—	—	—	—	—	—
T. R. Roberts, Ltd.	—	—	20 0 0	12 8 8	—	—	3 15 0	2 5 5	8 1½	3 9½	—	—	—	—	—	—	—
Shoolbred & Co.	14 14 0	3 12 6	—	—	—	—	—	—	—	—	4 0 0	12 18 0	11 18 0	1 15 6	22 10 0	0 15 0	12 6
R. Smith	—	—	—	—	11 10 0	*13 13 0	—	—	—	—	—	—	—	—	—	—	—
Spence & Sons	9 11 0	2 17 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Spencer & Co.	17 0 0	3 15 6	—	—	17 10 0	24 0 0	—	—	—	—	—	—	—	—	—	—	—
Wallis & Co., Ltd.	—	—	—	—	14 10 0	16 16 0	—	—	—	—	—	—	—	—	—	—	—
Waring & Sons, Ltd.	—	—	—	—	—	—	—	—	—	—	3 2 0	9 9 0	*5 19 6	1 13 :	14 14 0	0 16 6	7 9
											2 6 0	13 4 0	6 6 6	1 7 6	15 18 0	1 4 6	6 6

SUPPLY of GYMNASTIC APPARATUS, on Running Contracts, for the School Board for London :—

Articles.	F. H. Ayres.	Geo. Spencer.*	T. Cruwys.*	Gamage, Ltd.	Goff & Co.	‡ Adolf A. Stempel.
SECTION A.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Adjustable parallel bars ..... each	5 0 0	4 12 0	4 10 0	5 17 6	8 0 0	6 0 0
Do. fitted with steel core ,,	5 11 0	5 5 0	5 0 0	6 13 6	8 15 0	8 0 0
Fixed parallel bars ..... ,,	2 18 0	2 2 0	2 5 0	3 3 0	4 0 0	3 10 0
Do. fitted with steel core ,,	3 9 0	2 16 6	2 15 0	3 18 6	4 15 0	5 10 0
Adjustable "iron" horizontal bar ..... ,,	3 0 0	3 3 0	4 0 0	4 7 6	5 15 0	5 10 0
Do. do. with india-rubber ½ in. thick, properly fixed to pedestals ..... ,,	3 10 0	3 10 0	4 3 0	4 18 9	6 8 6	—
Adjustable vaulting horse ..... ,,	8 8 0	6 0 0	5 19 0	7 15 9	10 15 0	10 10 0
Fixed vaulting horse ..... ,,	7 0 0	4 10 0	4 10 0	6 6 0	7 0 0	8 15 0
Spring board ..... ,,	0 17 6	1 0 0	1 0 0	1 3 9	4 18 0	1 7 6
Do. fitted with indiarubber at ends ,,	1 5 6	1 8 0	1 5 0	1 14 6	5 10 0	1 10 6
Climbing rope ..... per foot run	0 1 3	0 1 1	0 1 1	0 1 4	0 1 6	0 2 6
Flying rings ..... ,,	0 1 2	0 1 6	0 0 11	0 2 3	0 3 2	0 12 6 (each)
Knotted rope ..... ,,	0 1 6	0 1 0	0 1 4	0 1 7	0 1 6	0 2 6
Plaited rope ..... ,,	0 1 7	0 0 9	0 1 4	0 1 6	0 4 3	0 3 0
Spliced rope ..... ,,	0 1 8	0 0 9	0 1 6	0 1 6	0 2 9	0 3 0
Rope ladder ..... ,,	0 1 8	0 1 6	0 1 9	0 1 11½	0 2 3	0 2 6
Stirrups ..... ,,	0 1 2	0 1 6	0 0 11	0 2 3	0 8 6 (pair)	0 12 6 (each)
Trapeze ..... each	1 6 0	0 7 6	0 17 0	0 2 3	0 15 0	1 11 6
Jumping stands ..... ,,	0 14 6	0 12 6	1 0 0	0 15 9	1 12 0	1 17 6 (pair)
Mat ..... per foot square	0 1 3	0 0 11	0 0 11½	0 0 11½	0 1 4	0 1 4
Mattress ..... ,,	0 1 5	0 0 10½	0 0 10	0 0 11	0 1 6	0 1 9
Punching ball, fixed complete	1 5 0	0 17 6	0 13 0	0 17 6	1 15 0	0 13 0
SECTION B.						
Ringroll (fixed and finished) .. at per foot run	0 7 6	0 7 9	0 9 11	0 11 3	1 3 6	0 8 6
Double portable boom, including standards, sliding seats, &c., fixed in position ..... ,,	0 10 0	0 3 6	0 5 6	0 19 6	{ 9 9 0 (each) }	0 8 3
Low forms, fixed in position .. ,,	0 2 1	0 2 0	0 1 11	0 2 9	1 10 0 (each)	0 2 2
Portable horizontal ladder, with necessary fittings, fixed in position ..... ,,	0 8 0	0 3 0	0 5 9	0 3 4	0 7 6	0 9 6
Rails for dumb and bar-bells .. ,,	0 1 5	0 0 10	0 1 0	0 1 0	0 1 3 (each)	0 1 2½

‡ This contractor quotes for apparatus of his own design and pattern, and not in accordance with the Board's specification. His prices do not include fixing.

SHIREHAMPTON.—For new Parish Hall for the Parish Council, Shirehampton, Bristol. Mr. F. Bligh Bond, architect, Star Life Building, St. Augustines, Bristol. Quantities supplied :—

	A. With slates.	B. With tiles.
W. H. Roe	£3,326 0 0	£3,315 0 0
Heard & Son	2,951 0 0	2,935 0 0
Perkins & Sons	2,920 0 0	2,900 0 0
J. Chapman	2,915 10 6	2,881 12 7
Cowlin & Sons	2,883 0 0	2,873 0 0
T. R. Lewis	2,860 0 0	2,843 0 0
E. Love	2,803 0 0	2,772 16 0
J. Flower	2,770 0 0	2,738 0 0
C. A. Hayes*	2,715 0 0	2,687 0 0

SLINFOLD (Sussex).—For alterations and additions to business premises for a new post-office at Slinfold, for the trustees of the late Mr. Charles Child. Mr. C. H. Burstow, architect, 6, West-street, Horsham :—

G. Marden	£474	Hillman & Murrell	£450
James Wadey	465	Reeves & Port	441
Rowland Bros.	459	T. Ayling, Slinfold*	353

TAMWORTH.—For the erection of stabling, &c, the Leys, and 5, Colehill, for the Committee, Tamworth Industrial Co-operative Society, Ltd. Mr. J. W. Godderidge, architect, 4, Bolebridge-street, Tamworth :—

Stabling, &c.

Clarson & Son	£2,100 0	Watton & Sons, Tamworth*	£1,999 15
B. Musson	2,066 0	E. Williams	1,870 0

Offices, Colehill.

E. Williams	£963	Clarson & Son, Tamworth*	£954

WYMONDHAM.—For alterations and additions to Wicklewood workhouse, Wymondham, for the Forehoe Union. Mr. J. Owen Bond, architect, 15, Upper Kingstreet, Norwich :—

Chapman & Son	£2,795 0	Young & Son	£2,347 0
Scarles Bros.	2,713 0	Gill	2,334 0
Taylor	2,654 0	Semmence	2,331 0
Holmes & Son	2,638 0	Greengrass	2,321 0
Skipper & Bartram	2,588 10	Hawes	2,303 0
Bowden	2,588 0	Blyth	2,290 0
Smith	2,446 18	Gunton & Palmer, Costressey*	2,187 12
Boddy & Son	2,359 0	Hannent	2,184 14

[*See also next page.*

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WISBECH.—For improvements at the Union Workhouse. Mr. F. Burdett Ward, architect, 7, York-row, Wisbech (and Spalding). Quantities by the architect.

—	Section I. Alterations to Old as per Schedule of Prices.	Section II. New Sanitary Annexes. (a) Building.	Section II. New Sanitary Annexes. (b) Plumbing.	Section III. Re-Drainage.	Estimated Total (including Alterations).
F. W. Currington	—	—	£458 10 0	—	—
E. R. Lankfer	—	—	419 19 0	—	—
R. Dye	15 p. c. above	£1,432 0 0	507 0 0	£251 0 0	£2,650 0 0
J. Guttridge	at par	1,490 17 4	402 18 10	285 16 6	2,579 12 8
R. Shanks	10 p. c. above	1,421 0 0	440 0 0	236 10 0	2,537 10 0
J. S. Johnson	7½ p. c. above	1,275 0 0	515 14 0	305 1 0	2,525 15 0
G. J. West	20 p. c. above	1,343 13 6	424 15 0	273 16 0	2,522 4 6
Elworthy & Co.	2½ p. c. below	1,269 0 0	470 15 0	258 10 0	2,328 5 0
Girling & Co.	6 p. c. below	1,236 0 0	441 4 0	263 0 0	2,316 4 0
J. W. Wilkinson, Elm*	at par	1,150 0 0	459 10 0	208 1 0	2,217 11 0*

For heating apparatus, hot-water services, and ventilating appliances:—
Dawson & Co., Ltd., Stalybridge £480
[Fourteen other firms tendered.]

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence, will be ready on the 22nd inst.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.
Six lines, or under ..... 6s. 6d.
Each additional line ..... 1s. 0d.

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Six lines (about fifty words) or under ..... 4s. 6d.
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Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).
FOUR lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.
PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

B. NOWELL & CO.
STONE MERCHANTS & CONTRACTORS.
Chief Office.—*Warwick Road, KENSINGTON.*
Norway, Guernsey, and Leicestershire Granite, Kerb, Pitching, and Yorkshire Stone.
ESTIMATES GIVEN FOR EVERY DESCRIPTION OF ROAD MAKING.

WHITBY.—For the erection of a farmhouse, The Grange, for Messrs. Foster. Mr. E. H. Smales, architect, 5, Flowergate, Whitby. Quantities by architect:—

A. Palframan	£627 16 6	Robinson Harland, Whitby*	£498 10 0
J. Harrison	505 15 0		

J. J. ETRIDGE, Jr.
SLATE MERCHANT,
SLATER and TILER.
Penrhyn - Bangor,
Oakeley - Portmadoc,
and every other description of Slates, except American, Ready for immediate delivery to any Railway Station.
RED SANDFACED NIBBED ROOFING TILES ALWAYS IN STOCK
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BETHNAL GREEN, LONDON, E.

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Architects, Engineers, Surveyors, Builders, and all users of Drawing Materials.
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TRACING CLOTHS,
DRAWING PAPERS,
SENSITIZED PAPERS, SUN COPIES, &c.
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The Architects and Engineers' Supply Association,
74-76, GREAT QUEEN STREET, LONDON, W.C.

THE BATH STONE FIRMS, Ltd.
BATH.
FOR ALL THE PROVED KINDS OF
BATH STONE.
FLUATE, for Hardening, Waterproofing, and Preserving Building Materials.

HAM HILL STONE.
DOULTING STONE.
The Ham Hill and Doulting Stone Co.
(incorporating the Ham Hill Stone Co. and C. Trask & Son, The Doulting Stone Co.).
Chief Office:—Norton, Stoke-under-Ham, Somerset.
London Agent:—Mr. E. A. Williams, 16, Craven-street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

SPRAGUE & CO., Ltd.,
LITHOGRAPHERS,
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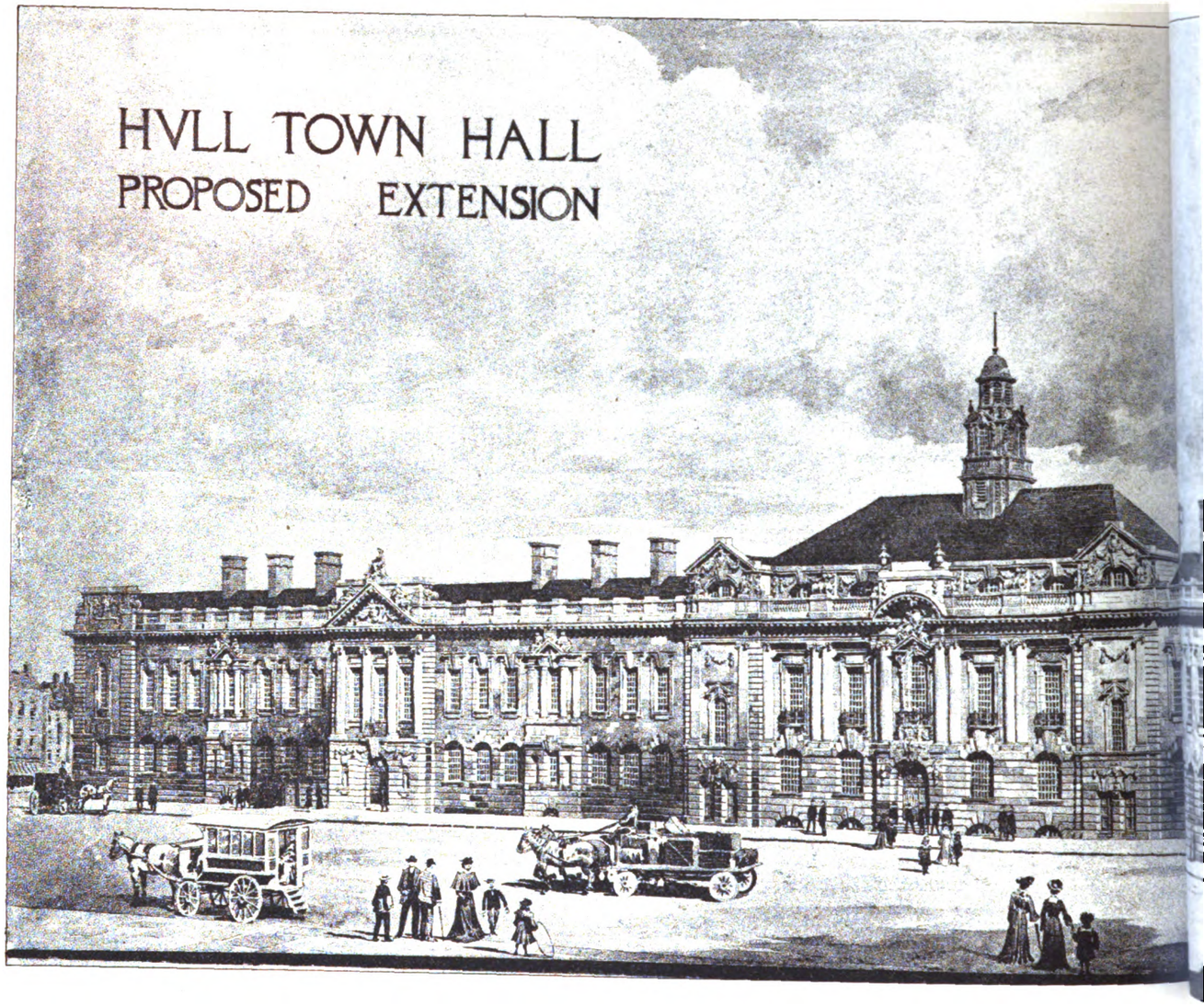

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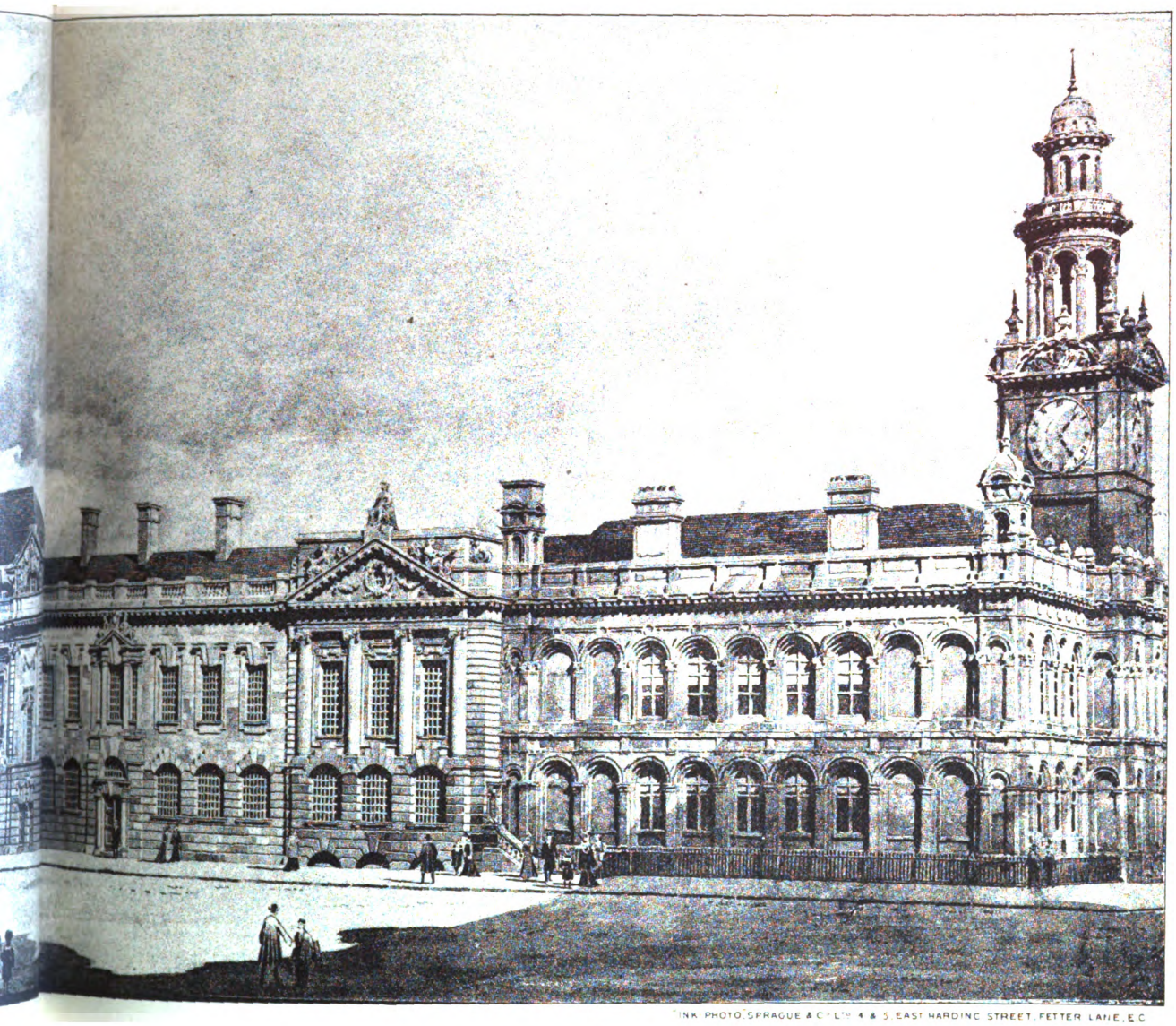

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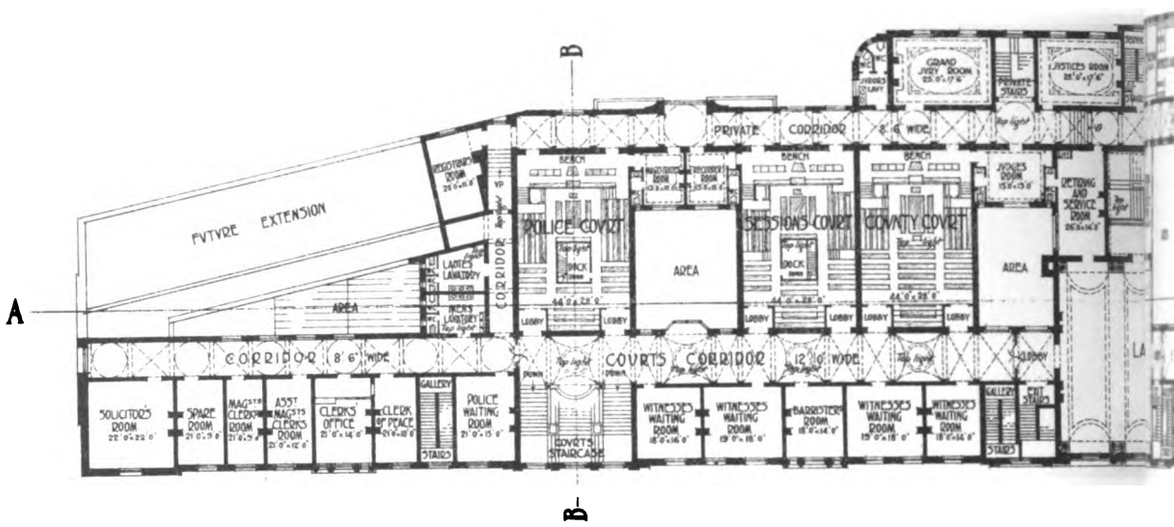

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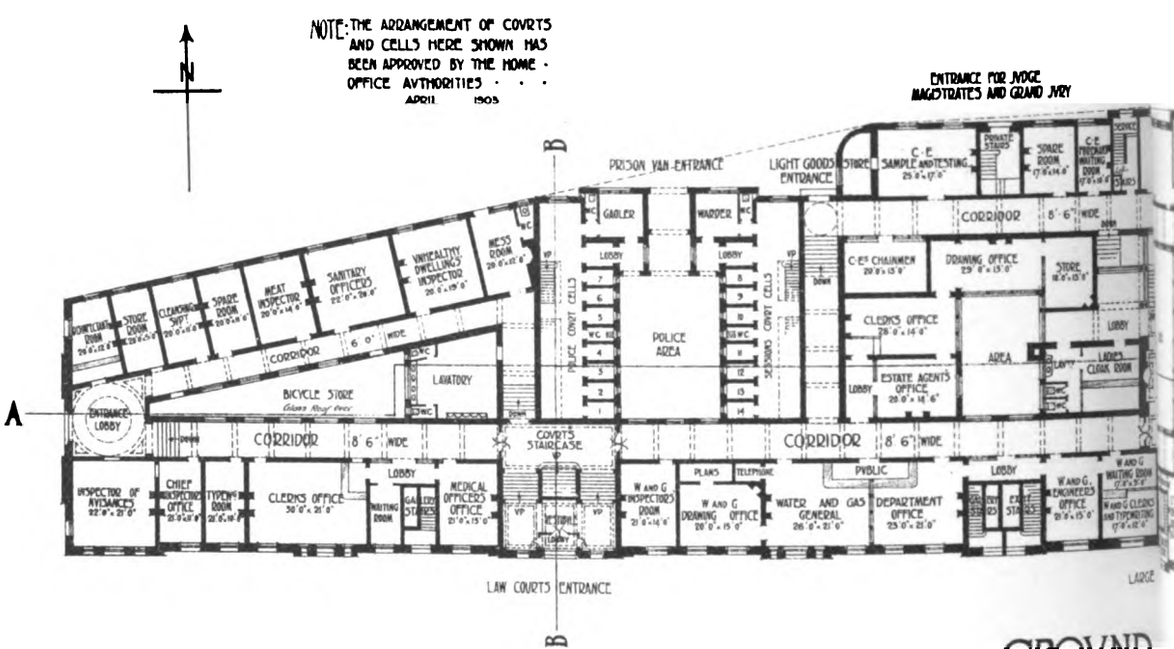

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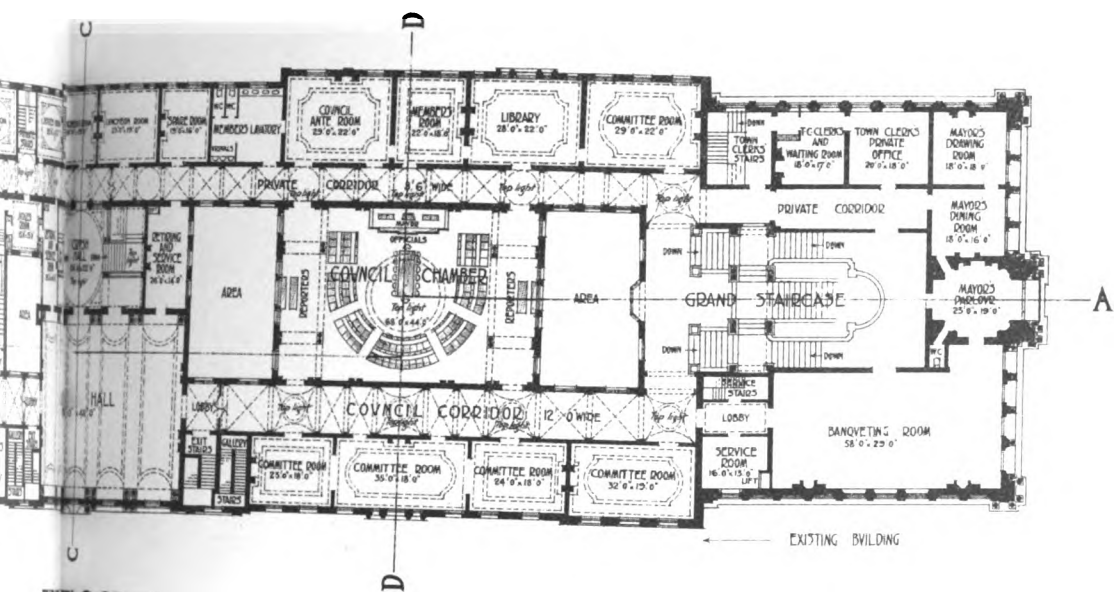

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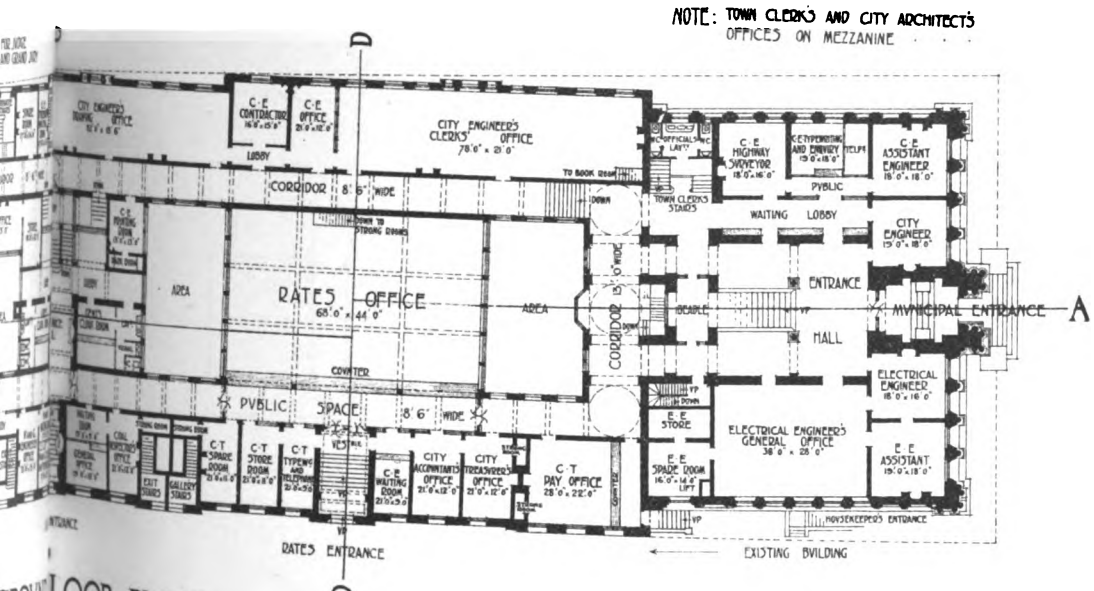

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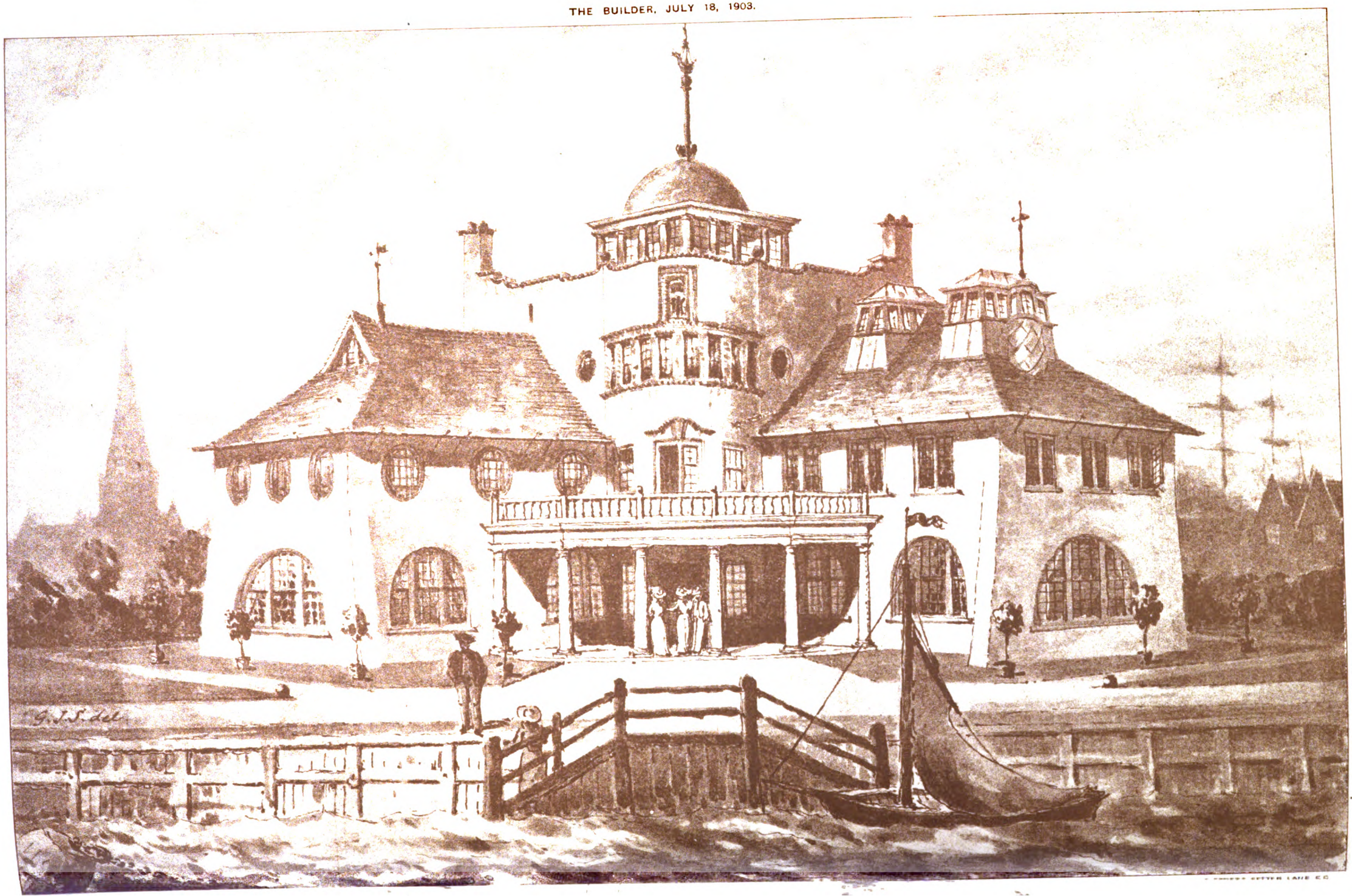

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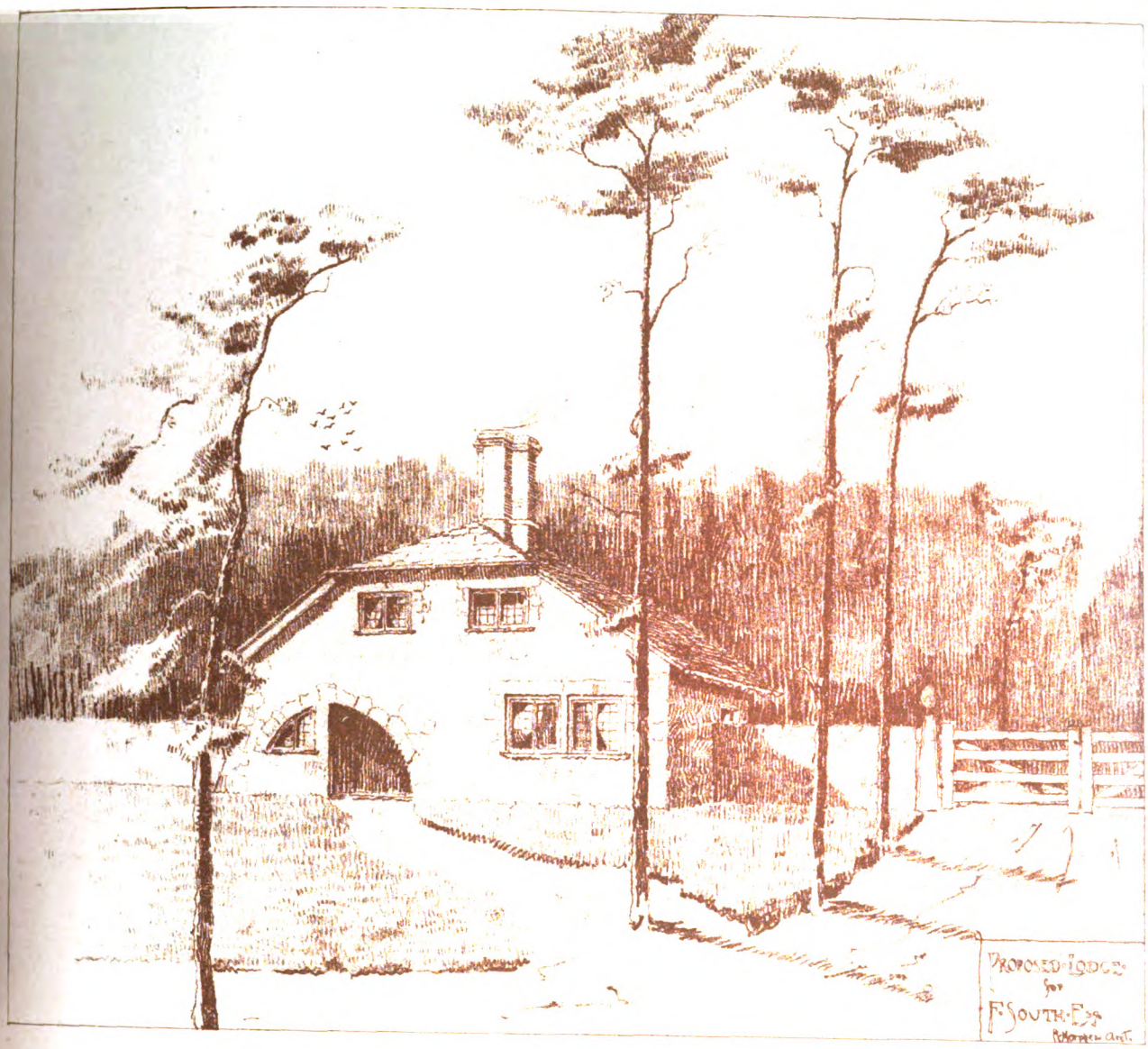

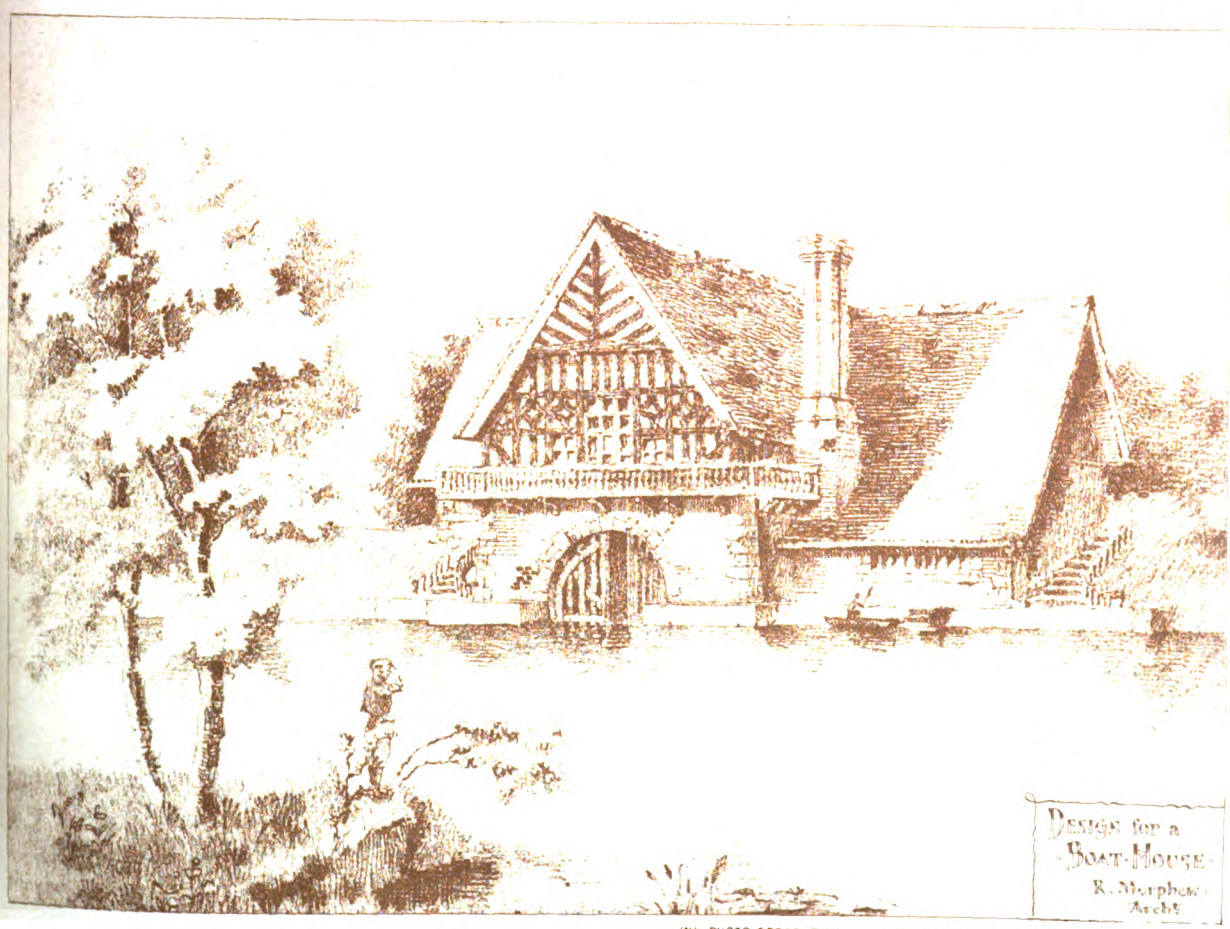

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"A MONUMENT": MARBLE.—By Mr. Henry Pegram.

SCULPTURE AT THE ROYAL ACADEMY.

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The Builder.

VOL. LXXXV.—No. 3155. JULY 25, 1903.

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Guilds and Art.

THE importance of the mediæval trade guilds has during the last twenty-five years become more appreciated from the investigation of historical students. These investigations have, however, been chiefly directed to the effect of guilds on the commercial and political progress of their age. Their effect upon art has hitherto been scarcely sufficiently realised. In England, certainly, we cannot speak of the influence of the guilds on the national school of painting, because the English school of painting, or English painting (as the French say we have no school) is of modern growth. But in Holland the influence of the guilds on Dutch art in the sixteenth and seventeenth centuries was remarkable. A great painter, like a great poet, is born, not made, and the Guilds of Amsterdam did not produce Rembrandt. But the patronage of the Guilds of Holland unquestionably encouraged and stimulated national art, and it made painters more respected; it made them, too, a section of the professional class without restraining their artistic freedom; and it illustrates the advantage to art of the respectful and intelligent patronage of the State, which, whilst it cannot turn a mediocrity into a genius, can unquestionably smoothe the path of genius and keep from it many of the harassing and hindering forces with which it is surrounded. Millet was no better painter because he was constantly on the verge of starvation; and Rembrandt was unquestionably more fruitful and more forceful through the patronage and the encouragement of the burghers of Amsterdam. The present moment, when we are again once more launched into the season of Continental travel, is a fitting time to refer to this point in the history of art, and to note shortly how it is illustrated in Holland.

The guild or corporation period in the history of Dutch art extends, speaking broadly, from about 1525 to 1670, and is conterminous with some of the greatest episodes in the history of Holland. The presidents and "boards" of the various Dutch guilds signalised and made memorable their term of office by giving to some painter a commission to represent them in their corporate capacity. One of the earliest results of this patronage is the Corporation picture in the Ryks Museum at Amsterdam, by Dirck Jacobs; whilst one of the latest and one of the finest is Rembrandt's portrait of the Syndics of the Clothmakers' Guild of Amsterdam of 1661. But of all the works which came into being in this period the most remarkable is unquestionably Rembrandt's world-famous "Night Watch" in the Museum at Amsterdam, which was painted in 1642. It represents a captain of arquebusiers and his company leaving the guard-house; but it was primarily intended as a portrait group, as was the equally famous "School of Anatomy at the Hague," though, by the genius of the artist, a collection of portraits has been turned in each instance into a lifelike and vivid pictorial episode. And we have to remember that but for this public patronage Rembrandt would never have painted these priceless works, and in this connexion it is interesting to bear in mind that each of the sixteen members of the Guild whose portrait appears in the "Night Watch" paid the painter 100 gulden. Not only in these pictures of Rembrandt, but in the numerous fine groups by Van der Helst, and by Hals, the representation of each person forms an admirable portrait by itself, and if alone would be valued as a first-rate work. We are thus able to form some idea of the extraordinary artistic results of the custom of Guild portraiture and of its effects on European art, in producing innumerable portraits—in the case of Rembrandt, pictures full of life and vigour, and representations in various forms of a phase of Dutch society at the very time when the Dutch, by their struggle for independence, had created for themselves historic fame.

The Guild pictures, through Rembrandt's genius, unquestionably find their highest expression in the Museum at Amsterdam, where the famous "Night Watch," placed, as many of our readers know, at the end of the Rembrandt room, is flanked on one side by Hals' company of Arquebusiers and Van der Helst's similar picture containing thirty-two figures, and on the other by Guild pictures by Elias and Van der Helst. It is, however, at the less-visited collection in the Stadthuis, or Town Hall, at Haarlem that the effect of this patronage of painters by the leading men of a city is most perceptible. For there all the walls of the largest room are covered with representations of civic worthies, one side alone being entirely occupied with works by Frans Hals, beginning with his picture, jovial and strong, of the Arquebusiers of St. George, painted when he was six-and-thirty, and concluding with the much more refined Managers of the Hospital for Old Men and Women—two pictures, the one showing the men and the other the women by whom the municipal institution was carried on, and painted when Hals was over eighty years of age, in 1664. If we were criticising in detail the various Corporation pictures at Haarlem, it would be interesting to refer to the noticeable works of Pot, Pieter Soutman, Jan de Bray, and Versponck, every one of which is of interest not only as a work of art but as handing down to us phases of national life which, without the Corporation patronage of which we have spoken, would be known only to scholars who had studied the municipal history of the towns of Holland.

It must be confessed that there is something not a little regrettable in the fact that, in our own country, in an age when money is abundant, and considerable artists are among us, so little is done by the State for art—and in the word "State" we include all public bodies—and one cannot but feel ashamed when we contrast what is done in England by public bodies to-day with the results of the patronage of art by the leading men of the Dutch towns in the sixteenth and seventeenth centuries. It is impossible to suppose—looking somewhat beyond the guild or corporation pictures—that Amsterdam, and Haarlem, and Leyden would have produced so many works of art had it not been for the encouragement which artists

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received from the leading men of those towns—not as private individuals, but as members of municipal communities. They were fortunate in having at hand one great artist after another, and supreme among them Rembrandt; but this fact does not lessen our respect for men who, amidst national dangers, were constantly employing the artists who had been reared in their towns on works which have handed down for centuries the names of these sturdy and enlightened burghers. It must be admitted, however, that public assistance to artists, whether they be painters or men of letters, though it may help them, cannot prevent financial misfortune and place them in an assured position without individual prudence. For, in spite of his public commissions, Franz Hals became bankrupt in 1652, and Rembrandt four years later. Those who are in favour of individual effort without public help have in these facts arguments of some value. But the misfortunes of Rembrandt and Hals might well have come earlier, and might have had worse consequences, had it not been for the public patronage which these painters received; for it was after his bankruptcy that Hals painted some of the most noticeable Corporation pictures which are now placed in the Town Hall of Haarlem, and they appear, if only from the point of view of the desirability of artistic production by the best masters, to justify the patronage which Hals received from the citizens of Haarlem and Amsterdam during his long life.

THE ROYAL COMMISSION ON SEWAGE-DISPOSAL.

THE third Report of the Commissioners appointed in 1898 to inquire and report as to the methods which may properly be adopted for treating and disposing of sewage was issued two or three months since; and, as at least two or three years will elapse before the final Report appears, it may be useful at this stage to consider the evidence which the Commissioners have already accumulated and the conclusions to which this evidence has led.

Five Blue-books have now been issued. The first, or "Interim Report," bears the date, July 12, 1901, and, although it contains only thirteen pages, six of which deal merely with the appointment of the Commission, it is a document of great importance, as it gives three "conclusions" at which the Commissioners had arrived after considering the evidence which they had received and the information which had been collected up to that date. Early in 1902, Volume II. of the Interim Report was published—a bulky volume of nearly 600 pages, containing the evidence given by experts and others on thirty-five days from June 22, 1898, to May 22, 1901. This was soon followed by Volume III., "Appendices," containing more than 500 pages of letterpress and forty-three diagrams and plates. The second Report, dated July 7, 1902, runs to about 150 pages, and consists of ten Reports submitted by experts appointed by the Commissioners for the purpose of their investigations; this also is illustrated by plates and diagrams. The third Report (about thirty pages) deals with trade effluents and the need of setting up a central authority for the purpose of settling differences between Local Authorities and manufacturers.

The conclusions and recommendations of the Commissioners are contained in the first (or interim) and third Reports, but it is, of course, probable that these will be modified or extended as a result of the investigations which are still being carried on. They are, however, extremely interesting as showing the trend of opinion, and the probability of important alterations of sanitary law and of the Local Government Board's practice being made as a result of the inquiry.

The volume of evidence contains the answers to more than 10,000 questions. The first person to be examined was Mr. A. D. Adrian, C.B., Assistant Secretary to the Local Government Board. His evidence deals principally with the growth of the general statute law on the subject, the effect of the existing laws, and the past and present practice of his Department when dealing with schemes of sewage-disposal. Scottish law and practice were described by Mr. A. Murray, of the Local Government Board (Scotland), and Irish by Mr. L. E. H. Deane, Engineering Inspector of the Local Government Board (Ireland). Officials of important public authorities were examined, including three officers of the Mersey and Irwell Joint Committee (Mr. W. H. Wilson, solicitor; Mr. R. A. Tatton, M.I.C.E., Chief Inspector; and Mr. Frank Scudder, F.C.S., F.I.C., Acting Chemist); two officers of the West Riding of Yorkshire Rivers Board (Mr. Trevor Edwards, Solicitor; and Dr. H. M. Wilson, Chief Inspector); Mr. Wm. Naylor, Chief Inspector of the Ribble Joint Committee, and Alderman H. F. Hibbert, a member of the same Committee; the Medical Officers of Health for the counties of Derbyshire (Dr. Sidney Barwise), Essex (Dr. J. C. Thresh), Durham (Dr. T. E. Hill), and Glamorgan (Dr. W. Williams); and the City or Borough Engineers of Ripon, Exeter, Leicester, Harrogate, and Reigate. Among the other engineers who were examined were Messrs. W. Santo Crimp, Colonel Ducat, W. D. Scott-Moncrieff, J. Garfield, Baldwin Latham, W. J. Newton, George Chatterton, D. Balfour, and G. R. Strachan. The chemists included the veteran Sir Edward Frankland (a member of the Royal Commission of 1868 on River Pollution), Sir Henry Roscoe (Scientific Adviser to the Mersey and Irwell Joint Committee), Dr. W. E. Adeney, Dr. Samuel Rideal, Mr. W. J. Dibdin, Mr. W. H. Harrison (Chemist to the Leeds Sewage Committee), Mr. G. J. Fowler (Chemist to the Manchester Sewage Works), Mr. J. Barnes, Mr. W. S. Curphey, Prof. E. A. Letts, Prof. P. F. Frankland, and Dr. J. A. Voelcker (Chemist to the Royal Agricultural Society). The principal bacteriologists were Dr. A. C. Houston, Dr. G. McGowan, Dr. E. E. Klein, and Professor H. Marshall Ward. Dr. G. Sims Woodhead (Director of the Research Laboratories of the Royal Colleges of Physicians and Surgeons) and Dr. G. V. Poore (the well-known writer on sanitary matters), were also examined, as well as Dr. Theodore Thomson, a Medical inspector of the L. G. B. Evidence as to the effect of sewage on fishes was given by the Hon. T. H. W. Pelham, Assistant Secretary to the Board of Trade (Fisheries and Harbour Department), and by Professor Herdman, of University College, Liverpool. Colonel Harding, who is one of the Commissioners, and also Chairman of the Leeds Sewerage Committee, and Mr. C. J. Whittaker, Chairman of the Accrington and Church Outfall Sewage Works, also gave evidence. Some of the gentlemen already mentioned are associated with particular systems of sewage treatment, and others who fall into the same category are Messrs. T. Cosham, A. T. Hope, H. B. Jagger, F. W. Stoddart, Wm. Brown, W. C. Sillar, H. Wollheim, and Frank Candy.

Objection has been taken to the evidence obtained by the Commissioners on the ground that no managers of sewage-farms were examined, but a good deal of evidence on the land-treatment of sewage was given by other witnesses, and independent investigations have been carried out on behalf of the Commissioners, and will be published in another Report. It is clear that there is no intention of shirking inquiry into this method of sewage-disposal, or of accepting the conclusions of previous Royal Commissions as the last word on the subject.

Much of the evidence is of course now matter of common knowledge. There is also a good deal of repetition, and some of the evidence was scarcely worth printing, even in a Blue-book. But the names we have given are a sufficient guarantee that valuable information has been collected, and that different aspects of the question have been duly presented. Lawyers, doctors, engineers, chemists, bacteriologists, inventors, and representatives of public bodies have given the fruits of their own experience, and the result is a mass of evidence of great value. It would be impossible in a single article to give a detailed account of this evidence, but some of the most salient features may be noted. Probably the most important point is the general agreement of the witnesses that the hard-and-fast rule of the Local Government Board with regard to land-treatment ought to be modified. On the second day of the inquiry, Mr. Tatton, the Chief Inspector of the Mersey and Irwell Joint Committee, strongly advocated such a modification, although he was of opinion that, if suitable land is obtainable, filtration through land is the most permanent and satisfactory method of treatment. He mentioned several towns in the Mersey and Irwell watershed, where the only available lands were clayey, and where, in consequence, land-treatment had failed. Dr. H. M. Wilson, Chief Inspector of the West Riding of Yorkshire Rivers Board, gave somewhat similar evidence—"stiff clay land," he said, "such as we meet with frequently in the West Riding, is useless for sewage-disposal." The scarcity of land conveniently situated for irrigation areas, and the admixture of trade-waste with sewage, were other objections which Dr. Wilson raised against land-treatment in the West Riding. On the latter point, he said, "Broad irrigation on land for the sewage of manufacturing towns is, I am quite sure, a failure generally." At the same time he thought that the average of land filtration in the Riding is better than the average of artificial filtration, "because, probably, mismanagement of the land does not lead so rapidly to bad results as mismanagement of the artificial filters." Mr. Naylor, Chief Inspector of the Ribble Joint Committee, stated that in his district good effluents were being obtained from artificial filters as well as from land, and added, "I have no hesitation in saying that they are each and all capable of producing a satisfactory effluent, and were I empowered by any authority to choose, it would be

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largely on the matter of expense—on the initial cost of the installation of filters—that I should decide." Sir Henry Roscoe said, "There is no doubt that land filtration is an excellent system where you can adopt it, but I say there are a great many cases in which you cannot adopt it." Dr. Barwise, Medical Officer of Health for the County of Derby, declared that land which will purify sewage "is much rarer than is generally supposed. At any rate, so far as the County of Derby is concerned."

Many questions were asked for the purpose of ascertaining the opinions of witnesses as to the relative merits of land treatment and the various so-called "artificial" methods of purification, but in many cases direct answers were not obtained. Many witnesses agreed that land-treatment is an excellent system where suitable land in sufficient quantity can be obtained, but were also of opinion that some artificial methods give excellent results under good management. In other words, the selection of a method of sewage-disposal must depend upon local circumstances.

Some witnesses believed that, as a general rule, land treatment is preferable to artificial processes, while others held the contrary views. Dr. Rideal for example, when asked if he could say, generally, that artificial filtration is in all respects as satisfactory as land-treatment, replied, "Undoubtedly, I say it is better."

The "artificial" process of purification, commonly known as the bacterial system, was carefully inquired into by the Commissioners, and its value was demonstrated by many witnesses, although clear evidence on a number of points was not forthcoming. The possibility of pathogenic organisms passing through the filters is one of the questions about which the Commissioners were not satisfied, and independent reports were, therefore, prepared by Professor Boyce and Drs. Houston, MacConkey, and others, under the Commissioners' instructions. The results of some of their investigations will be found in the Second Report. Dr. Houston contributes a "provisional note" on the bacteriological qualities of crude sewage and of sewage-effluents; the note is somewhat uncertain, Dr. Houston's conclusion being that "the treatment of sewage on land, although perhaps more satisfactory from the bacteriological point of view than its treatment in bacterial beds, would not seem to by any means entirely remove the danger arising from the discharge of effluents into potable rivers; . . . . the effluents alike from land and from bacteria beds contain *B. coli, B. enteriditis sporogenes*, and *streptococci*, often in abundance." In a report on the presence of anthrax at Yeovil, Dr. Houston declares that the anthrax bacillus passed the septic tank and the coarse coke-bed, and probably also the fine bed. With reference to the sterilisation of effluents—a practice which has been advocated by some writers—he says, "It may be doubted if there are any germicidal agents known which are innocuous to man, the lower animals, and fish life, when used in the strength necessary to destroy anthrax spores." A special report on the sterilisation of effluents is, however, promised, and we agree with Dr. Houston when he says that the subject merits the most careful consideration on the part of the Commission.

The potentially dangerous nature of sewage and sewage-effluents is shown in another contribution by the same writer, giving the results of the subcutaneous inoculation of animals with crude sewage and with effluents. Here again Dr. Houston expresses a guarded preference for land-treatment—"Land effluents, in my experience, are usually less pathogenic than effluents from bacteria-bed processes of sewage-disposal." Dr. MacConkey, in his report on the longevity of the Bacillus Typhosus in sewage and sewage-effluents, seems to be rather more favourable to bacterial treatment, believing that, as a general rule, if these bacilli do reach biological beds or septic tanks, "they are present in such small numbers and the conditions are so adverse to their existence, that they will not survive the treatment."

The self-purification of rivers is discussed by Professor Boyce and Drs. Grünbaum, MacConkey, and Hill, in a long Report dealing specially with the River Severn. In the main it confirms the results obtained by other investigations. We need only point out that near the source of the river Bacillus coli was not found in the water, while at the asylum immediately above the town of Shrewsbury the number was only thirteen per cubic centimetre; the sewage of Shrewsbury increased the number to 600 per c.c. at a point four and a half miles below the asylum: a further flow of six and a half miles reduced the number to forty-eight per c.c.; but seven miles below this point the number was nearly the same—namely, thirty-six per c.c.

Before considering the recommendations of the Commissioners, brief mention should be made of the Appendices contained in Vol. III. of the Interim Report. Mr. Tatton contributes two reports and a diagram on the methods adopted in the Mersey and Irwell Watershed for purifying trade-wastes and sewage. There is also an exhaustive report of 220 pages on the methods of sewage-treatment adopted by the Local Authorities in the West Riding of Yorkshire, and a much shorter report on those in the Ribble Watershed. Mr. Scudder gives a number of analyses of sewage-effluents in the Mersey and Irwell area, and a diagram showing the results obtained at the Manchester sewage works. Plans of sewage-purification works and diagrams of results are contributed by Mr. Dibdin, Col. Ducat, Dr. Adeney, Sir Henry Roscoe, Dr. Rideal, Mr. C. J. Whittaker, and Mr. T. Cosham; and Doctors Houston and MacConkey show graphically some bacterial and chemical results of sewage purification. Much of the matter contained in this volume is of great practical value, but we must now pass on to the commissioners' conclusions and recommendations contained in the Interim and Third Reports.

The three conclusions published in the Interim Report of July 12, 1901, are of great importance, and have already led to a modification of the Local Government Board's practice. We give them in a condensed form:—

I. "We doubt if any land is entirely useless. . . . We are, however, forced to conclude that peat and stiff clay lands are generally unsuitable for the purification of sewage, that their use for this purpose is always attended with difficulty, and that where the depth of top soil is very small, say, 6 in. or less, the area of such lands which would be required for efficient purification would in certain cases be so great as to render land treatment impracticable."

II. ". . . . We are satisfied that it is practicable to produce by artificial processes alone, either from sewage or from certain mixtures of sewage and trade-refuse, ... effluents which will not putrefy, which would be classed as good according to ordinary chemical standards, and which might be discharged into a stream without fear of creating a nuisance." . . . .

III. "We consider it of the utmost importance that the simplest possible means should be provided for adequately protecting all our rivers, and we are further of opinion that it will be desirable, probably for some time to come, that scientific experiments should be carried on in order to ascertain all the real dangers of pollution, against which they should be protected."

In another paragraph of the third conclusion, the Commissioners briefly indicated the nature of the authority which might be set up for dealing with the pollution of rivers, but we may pass at once to the Third Report, where this point is more fully considered. The final recommendations include the formation of a central authority and of a number of rivers boards throughout the country on the lines of those already existing in the West Riding of Yorkshire, the Mersey and Irwell Watershed, and the Ribble Watershed. These rivers boards would be a first Tribunal of Appeal between manufacturers and local authorities, except in the cases of local authorities refusing:—(1) To allow a particular trade effluent to enter into their sewers, and (2) to construct or enlarge sewers for the purpose of a particular manufactory. For the present, at any rate, these two points would be decided by the central authority. In addition to the powers which rivers boards will possess under the existing law the Commissioners propose that they shall have control over the water supplies of their respective areas. The central authority will be a new department of the Local Government Board, and will exercise a general supervision over the whole country, and will have power to hold inquiries and to compel the purveyors of water to remove, as far as possible, all causes of contamination.

The Third Report contains also the Commissioners' recommendations on the subject of trade-wastes. These include some important alterations of the existing law so as to make it the duty of the local authority to provide such sewers as are necessary to carry trade effluents as well as domestic sewage, and to give manufacturers the right, "subject to the observance of certain safeguards," of discharging trade effluents into public sewers. What these safeguards may be will depend upon local circumstances, and local authorities will be empowered to frame regulations, which will, however, require confirmation by the central authority, before they can be put in operation. The Commissioners are of opinion that a special charge should be levied on those manufacturers who do not comply with the regulations of the local authority as to preliminary treatment of trade-wastes. Very properly, too, all manufacturers are to be placed on the same footing, whether they have or have not obtained a prescriptive right of discharge into sewers.

There can be no doubt that the preliminary conclusions and recommendations of

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the Commissioners are of great importance, and that alterations of law and practice will necessarily follow. But the labours of the Commission are not yet at an end. Dr. McGowan is preparing a paper with a view of settling the value of different methods of analysing sewage effluents. A systematic investigation of the land-treatment of sewage on farms of different kinds of soil has been completed (although not yet published), and a similar investigation of artificial processes of various kinds is now being made at about thirty places, and will be completed in about a year. The Commissioners will then report on the different methods of treating sewage. Evidence is also being taken as to the discharge of sewage, &c., into tidal waters, and investigations are being made as to the practicability of destroying the potentially dangerous micro-organisms which are common to sewage effluents. Finally, the Commissioners propose to consider the methods available for the satisfactory disposal of manufacturing effluents when not mixed with ordinary sewage. The inquiry promises, therefore, to be exhaustive, and there is little doubt that, when all the reports have been issued, they will prove of the greatest value not only in this country but throughout the civilised world; but two or three years must elapse before the real value of the Commission can be assessed with any degree of accuracy.

NOTES.

The Motor Bill.

THE only important amendment made by the Lords in Committee in this Bill at present, is that on Clause 3 which extends the provisions requiring licenses to all drivers, amateur as well as professional. There seems very little prospect of the Bill becoming law this Session, and perhaps this is hardly to be regretted, since the majority of the Upper House appear hardly to appreciate the strong feeling throughout the country on this question, which will, indeed, make itself apparent at the polls, unless a satisfying measure is put forward before a general election. To those experiencing the damage to trade and serious inconvenience in the country, it is somewhat surprising to find the noble lord in charge of this Bill using the automobile argument that the trade in motor-cars must not be hampered, and must be encouraged. The names of the popular motor-car makers do not suggest an English origin, whereas those chiefly suffering from the reckless use of the cars are English farmers and English ratepayers. If it be argued that the industry is at present in foreign hands because it has lacked encouragement in England, it is surely a new departure in this country to legislate for any particular industry.

Stonehenge.

THE Commons and Footpaths Preservation Society is appealing to the public for funds to preserve the public right of access to Stonehenge; that is to say, to compel Sir E. Antrobus to remove his wire fence. The Society say—"The avowed object in inclosing Stonehenge and obstructing these public ways is the preservation of the monument, and the Society believes that Sir Edmund Antrobus has used the proceeds of the toll he has levied in paying a caretaker and conducting investigations touching the monument. It is unnecessary to observe, however, that the motive with which an inclosure is made does not affect its legal character. Sir Edmund Antrobus has asserted the right to exclude the whole nation from Stonehenge, and if this assertion of right is acquiesced in, the nation will be deprived of that free access to the monument which it has enjoyed time out of mind." That the erection of such a fence round Stonehenge has completely altered the character of the monument in relation to the surrounding country, destroyed the sense of solitude, and constitutes an eyesore of a most objectionable character—in all this we entirely agree; but is it quite correct to say that no damage has been done in past times by the numbers of persons who have visited Stonehenge? We think we have heard statements to the contrary. However, we certainly object very much to the wire fence.

International Exhibition, Manchester.

MANCHESTER proposes to hold an International Exhibition in 1905. No provincial town in the kingdom, we feel assured, would carry out such a scheme better than Manchester; but it seems to us very questionable whether international exhibitions should be attempted at all except in capital cities. The international element is generally little more than nominal. Foreign firms and foreign artists will not go to the cost and risk of exhibition except in capital cities which represent a whole kingdom. The Glasgow Exhibition was a very good one as far as it went, but the international element was of the smallest; the exhibition was practically an English and, to a very great extent, a local one; and we expect that it will be the same with Manchester. Therefore we cannot look with great cordiality on the project. The multiplication of such exhibitions is likely to defeat their own end; the public will become tired of them.

London and Southampton Canal.

IN these days we live among rumours of ship canals in every part of the world. The latest proposal is for the construction of a canal to provide for the navigation of large vessels between London and Southampton. On the face of things there does not appear to be urgent necessity for such an undertaking, as the new waterway would not connect an inland city with the sea, as in the case of the Manchester Ship Canal, nor would it even join two seas, as in the case of the proposed Forth and Clyde Ship Canal. It is true that it would be possible to pass from the English Channel, to the North Sea, but there are several bridges on the Thames which would be in the way of large vessels. The port of London is in a notoriously bad state, and it may be that the promotors of the latest scheme hope to benefit by this fact. At present two companies have been formed for the purpose of promoting Bills in Parliament, each with the object of carrying a canal from the vicinity of Teddington through Surrey and Hampshire to Southampton Docks. Several locks would be required, and the suggestion made by one company is that these should be operated by electricity. It is also proposed that an electric tramway should be constructed alongside the canal, with motors for the haulage of vessels. The same scheme further provides for the erection and equipment of central stations from which electricity would be distributed in various areas along the line of the canal. The total length of the canal would be sixty-four miles, and the idea is to make it of sufficient width and depth to provide for the accommodation of the largest vessels. Whether a ship canal is wanted or not, there is clearly room for additional means of water carriage in this country, as well as for the development of the electrical industry.

Electrical Stations and the Factory Act.

THE Factory and Workshop Act, 1901, created one or two new classes of factories, and amongst non-textile factories dealt with electrical generating stations in the following terms:—"Any premises or that part of any premises in which electrical energy is generated or transformed for the purpose of supply by way of trade, or for the lighting of any street, public place, or public building, or of any railway, mine, or other industrial undertaking." If our statutes were drawn in the Board Schools we should hardly expect to find language so carelessly used and a sentence so badly compiled as in this definition. The words, "for the supply by way of trade," followed by "or other industrial undertaking" after the places enumerated as being supplied tend to convey the notion that the Act was to apply only where electric energy is supplied by way of trade. This is, however, not the case, as it has recently been held in the case of the Mile End Guardians *v.* Hoare that it applies to an engine-house in a workhouse used in supplying electricity to the workhouse, which was "a public building." It follows that it equally applies to churches, and those responsible for such generating stations will be wise to see that they infringe none of the provisions of the Factory Act.

Wireless Fire-Alarms.

WE have received from M. Emile Guarini, of Brussels, an account of a very simple system of automatic fire-alarms by means of wireless telegraphic methods, which deserves to be widely known. M. Guarini is well known as one of the pioneers of wireless telegraphy, and his successful experiments in signalling between Brussels and Antwerp some years ago were useful, not only in demonstrating the value of this system of telegraphy, but also what was of much greater importance at that date, its limitations. For automatic fire-alarms he proposes to use instead of the usual thermometer, battery, bell, and connecting wires, a transmitter in every protected building and a receiver at the fire-station. The transmitter consists of a mercury thermometer, which, when the mercury rises to a certain point, completes a local circuit which energises a magnet, and this, attracting its keeper, starts an interrupter driven by clockwork in the primary circuit of an induction coil kept in some fireproof part of the building. The secondary transmits signals in the usual manner by means of a long vertical wire, and the receiver at the fire-station duly records the message sent by the interrupter on a Morse printer. This message may be, for example, the name of the house, the number of the street, &c. Several thermometers in the same building can be attached to the electro-mag-

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net, and if these thermometers are placed in well-chosen positions very early intimation can be given of a dangerous rise of temperature. M. Guarini points out that the system could easily be arranged so that progressive messages could be sent as the mercury rose up the scale, but this would rarely be wanted. It seems to us that a possible drawback to this method is that the receiver would be susceptible to disturbances from outside electrical apparatus which might be working in the neighbourhood. Also, if two signals came at the same time, it would be impossible to decipher the message. We think, however, that the method is a very promising one and well worth the attention of electricians.

The Court House, Marylebone.

SOME structural alterations are being carried out at the Watch House and adjoining Court House in Marylebone-lane, which now serve for the Town Hall of the Borough of St. Marylebone. The alterations, which comprise the removal of the old cells in the basement and the "lock-up," are made under the superintendence of Mr. J. P. Waddington, Engineer and Surveyor to the Borough Council. The trophy of coat-arms—being those of Harley, Earl of Oxford, with a difference—on the east front of the older portion of the building, bears the date "A.D. MDCCXXIX.," and an inscription, "St. Marylebone Watch-House rebuilt A.D. MDCCCIV." The former Watch House stood at the same spot on what had been the site of the church of St. John, by the side of the Tyburn-road, leading westwards from the Pound of St. Giles's Parish. The Court House was erected eighty years ago on ground at the north side of the church where had stood the St. Marylebone Parish Pound.

Union of Two City Churches and Benefices.

THE Bishop of London is about to issue a commission to enquire into and report upon the proposed union of the benefices of the rectory of St. Michael, Cornhill, and the rectory of St. Peter-le-Poor, Old Broad-street, with St. Bene't-Fink, Threadneedle-street. The church of St. Bene't-Fink, in Broad-street Ward, was founded by Robert Fink, or Fincke, after whom Finch-lane is named, and having been rebuilt by Wren in 1670-3, at a cost of 4,129*l.* 16s. 10d., was pulled down to make way for the east end of Tite's Royal Exchange, the materials being sold in January, 1846. The church, having a tower with a leaden swelling cupola carrying a lantern, was ten-sided on plan; the interior presented a singular effect due to the arrangement of the six Composite columns with arched spaces between them as well as at the ends of the aisle, so as to form a series of arched recesses around the sides with a small elliptical cupola rising from above the columns. The Peabody statue is situated in the space formerly occupied by the church. The parish of St Bene't-Fink was united for ecclesiastical purposes with that of St. Peter-le-Poor, of which the church was built in 1790-2, after Jesse Gibson's plans and designs in the Classical style, in place of one that had been erected in 1540, and was enlarged in 1615-30, of which there are two views in the *Gentleman's Magazine* of April-May, 1789, and one by West and Toms of 1736. At the demolition of the old church, in pursuance of an Act passed in 1788, the brasses were sold to a plumber in the Minories. Gibson's church was set back and stands over the former burial-ground; the interior forms a rotunda having a diameter of 55 ft. and a domical ceiling. Wren rebuilt the church of St. Michael, Cornhill (with the exception of the tower), in 1672-5 after the Italian manner, with an arcade of Doric columns which supports a plain groined ceiling. The tower, begun in 1421, had survived the Great Fire; but having suffered much damage from the memorable storm of November 26-7, 1703, it was rebuilt by Edward Strong the younger, mason, in 1718-22, after designs by Wren, based in part upon those of its predecessor and principally upon those of the tower at Magdalen College, Oxford, erected in 1492-1505. It measures 25 ft. on plan, and rises to a total height of 130 ft. Wren's drawing, 1716, is in the King's Collection, British Museum. Sir G. Gilbert Scott and Mr. W. A. Mason carried out some extensive alterations and added the north porch about forty years ago. In 1885 the interior was redecorated throughout by Messrs. G. Trollope & Sons, under Mr. Charles Reilly's directions and superintendence. The patronage vests in the Drapers' Company by conveyance to them in 1503 from the abbot and monks of St. Mary's Abbey at Evesham. The organ, by Renatus Harris, 1684, was rebuilt in 1849 by Robson, and has since been improved and fitted with electrical action by Bryceson.*

Egyptian Antiquities at University College.

ONCE more the usual two rooms at University College are filled with the various articles discovered by Professor Petrie during the year. The principal work of the past year has been the dissection of ten successive temples which were superposed on the old temple site at Abydos. In the first window are pieces of sculpture from the crypt of Osiris, and also what are pronounced (we think rather too positively) to be subjects set as models for a school of sculptors which is said to have existed here—casts of eyes, &c., supposed to be intended as copies to work from. There are hardly enough of these pieces to base a theory of this kind on; but Egyptian discoverers are apt to be very sure of everything, so few people are in a position to contradict them. A tall jar shaped rudely like a column, with striations at the neck, is interesting; one among many examples of the way in which architectural forms dominated everything. A small-scale sculpture of the head of a camel, considered to date from 4,800 B.C., is a curiosity, inasmuch as representations of this animal have not hitherto been found until the Greek period. Some black pottery, mostly low-shaped cups with the mouth narrower than the middle circumference, are said to be of Greek origin, and similar to examples found in Crete at the late neolithic age. A small glazed case on the centre table contains many objects of great interest: among others some ivory carvings of great delicacy of workmanship, and a lotus cup of green and purple glaze, copied from an architectural capital of the bud form, with even the raised die at the top, to take the architrave, copied. At No 13 table is shown what is said to be the earliest architectural example of the winged disc or low-relief globe carved in stone. The set numbered 16, in the middle window of the second room, includes some of the most interesting things in the collection, especially a group from a burial of the XVIIIth dynasty, among which is a small well-modelled figure of a nude woman seated, with a necklace of beads twined round it, just as it was found. A large bronze ibis head, in group 17, is an unusual example. On a table in the centre of the first room are numerous examples of fresh papyri found at Oxyrhynchus by Messrs. Grenfell and Hunt, not yet published, with the English translations appended. Among these are the lease of a house (a long document); the wills of two persons; an invitation to dinner—apparently from its wording the guest was invited to accompany the writer to a dinner at some great man's house; and an invitation to a wedding dinner or supper—the translation runs thus: "Dionysius wishes you to dine with him on the occasion of the marriage of his children at the house of Ischyrion to-morrow the 30th at (9?) o'clock"; the hour seems to be uncertain. These invitations are of the second century A.D. The Oxyrhyncus papyri (of the Græco-Roman period) may be regarded as almost modern in comparison with the other part of the collection; but few relics so interesting have been found, in the light they throw upon private life in a time so far removed from our own.

* On March 28, 1857, we published two illustrations to show the new porch and the alterations effected in the lower two stages of the tower, with the circular window—the stone-carving being by Mr. Philip. The wooden carved fittings, pulpit, reading-desk, bench-ends, chancel-gates, &c., were executed by Mr. Rogers, and designed by him and his son, Mr. W. H. Rogers, under the direction of Scott and Herbert Williams, architects, 1858-9.

The late Mr. Whistler.

THE death of Mr. Whistler removes from among us one of the most striking and original personalities in the world of art; for the interest in connexion with Whistler centred as much on himself as on his works. His eccentricity, his defiant individuality, his frank and abnormal vanity (probably in great part assumed to bewilder the Philistines), his faculty of cutting sarcasm, combined to render him one of the most picturesque figures of his time, and probably did quite as much as his artistic productions to enhance his celebrity. He was fooled to the top of his bent by a clique of extravagant admirers, whose exaggerated enthusiasms he probably laughed at in his sleeve; and he latterly, on taking up his abode in Paris, got the length of the foot, so to speak, of the French art-critics and fashionable amateurs, and made them pay the piper while he called the tune. His life was a brilliant comedy—amusing, doubtless, both to author and spectators; though he once averred that it had been a series of misfortunes, commencing from the time when he failed to pass his final school examination in Massachusetts, being found "deficient in Chemistry and Religion." As to the value of his art-work there will probably long be differences of opinion; but there can be no doubt that he was an artist of original genius, who produced some works of real inspiration, such as the portrait of his mother (which came very near being refused at the Royal Academy) and the portrait of Carlyle, and might have produced many more could he have taken

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himself more seriously. His "Symphonies" in this and that colour, clever enough in a way, were tricks of painting thrown out to mystify the public, and have already lost their popularity; and his lithographs, which were thrust upon us as marvels by some so-called art-critics, were mere sketches of the slightest kind, such as scores of other men could easily have produced. The best of his etchings, on the other hand, are typical examples of what line etching should be; though here again it must be said that there is no annual exhibition of the Society of Painter-Etchers which does not show some works equal to the best of his. For an artist to have achieved such a position that his name gives a factitious value to works otherwise slight is, however, itself a proof of genius; an etching by Whistler may not in itself be superior to an etching by two or three other artists whose reputation depends mainly on etching, but still it is an etching by Whistler. In time the extravagant adulation of his special clique of admirers (he had no imitators) will find its proper level, and he will take his place as an artist of original but rather eccentric genius, remarkable for some of the things he did accomplish, but still more remarkable for what he might have done had his aims been steadier and more concentrated—a comet rather than a star in the artistic firmament.

THE INTERNATIONAL FIRE PREVENTION CONGRESS.

LAST week we printed Mr. Bernard Dicksee's long paper on "Fire Preventive Clauses in the London Building Act," which was read at Caxton Hall, Westminster, before the Building Construction and Equipment Section of the International Fire Prevention Congress. The following is our report of the further proceedings of the Congress:—

Mr. E. Marsland (District Surveyor under the London Building Act) said that Mr. Dicksee had called attention to very serious defects which the London Building Act contained as to the protection of buildings from fire, and he thought there were three points they ought to emphasise. It had been shown over and over again that the windows were often the source from which fire spreads from one building to another, and that they had no provision in the Act to deal with that; and, indeed, he did not know of any town which had regulations with regard to the protection of windows. Therefore, he thought that if such windows could be given protection, such as by having wire glass or steel shutters, or tin-bound shutters, as were used in New York, it would be a great advantage in the prevention of the spread of fire. Another condition which ought to be insisted upon was the protection of iron-work. People thought that if they had their building constructed of iron they had a fire-resisting building. It was absolutely not so, and, in fact, a good many of the buildings constructed with wooden joists were more fire-resisting than those buildings built of iron; and he thought the Congress should insist on making it a point that all rules regarding buildings should have regulations that all iron-work should be protected. Another point was the protection of lifts, and here he was somewhat at issue with Mr. Dicksee. He did not believe it was any good, if they had a lift running through a building, and enclosed with fire-resisting materials, sealing that lift at the top. He thought they ought to put a skylight on top, so that when the heat went up it would break the glass and give vent to the smoke and heat. If the lift was sealed at the top it would simply drive the flame out to the different floors. Therefore, he advocated a light iron and glass roof for the lift.

Professor Woolson (New York) said he hesitated to say anything about the paper because he lacked an intimate knowledge of the details of the building construction in New York, except in certain particular lines in which he had been interested. He would like to add his meed of praise for the very exhaustively and logically written paper, in which Mr. Dicksee had called attention to points one by one, and referred to their exact legal status, and the necessity, therefore, for legal and other preventive regulations. He was a little surprised, however, that more stress was not laid upon the question of factory construction and the use of sprinklers, and more especially automatic sprinklers, for extinguishing fire when a fire occurred when no one was present. In America they were very insistent upon that, and had legislated on it, and were loud in their praise of sprinkling appliances; and he had no doubt but that Mr. Hexamer, of Philadelphia, would speak on that point. He did not notice whether in London they had any regulation with regard to the total height of buildings, but with them in New York that was a very important problem. It was being fought out on two sides: There were the owner's who wished to build their buildings as high as they could, and as high as they believed it was profitable to do so; and on the other hand there were those people who had charge of the preservation of life and property, and who believed they were getting too high. As they knew, in New York they build buildings of thirty stories and over, and the tendency was to get above twenty stories. They were not faced with that problem now in London, but they might be in the future, and he rather thought it might have been dealt with in such an exhaustive paper as they had heard. He considered that the points made by Mr. Marsland with regard to the protection of iron and steel were exceedingly good. It was a very important matter, and Americans were a little surprised that England had not faced it more seriously than they had so far. He understood that it was very hard to bring these things about, and it took huge experience to bring people to a realisation of the necessity, but they had had their lessons in England as well as in America as to the fact that iron and steel did not protect life and property as well as a heavy building of wooden construction. Such heavy buildings might be undesirable in other ways, but they were certainly slow burning, and iron and steel were certainly not slow resisting.

Mr. C. A. Hexamer (Philadelphia) said he agreed with Mr. Marsland about the lifts; they had just gone through a revision of the building laws in the City of Philadelphia, owing to the action of the underwriters, who had added to the rates in certain districts. He had the honour of sitting on the Commission which revised the laws, and he had occasion to study the building laws of some of the larger cities in America. The Commission drew from those laws what material they thought would be of value to Philadelphia, and the general trend of their efforts was to the following ends: 1, the restriction of area; 2, the restriction of height; and, 3, protection of floor openings. These three points were considered most essential in the construction of buildings towards the end that fires might be controlled or be avoided. They restricted the area of any non-fireproof building to 7,500 sq. ft., and the height of such a building was 60 ft. or five stories. They recognised a slow burning construction by allowing a larger area—an area of 15,000 sq. ft., and a larger height of 85 ft. Then they restricted the area of the so-called fireproof building to 25,000 sq. ft., but they put into their regulations that there might be an unlimited area on the first floor only provided that the other floors were restricted in area by fireproof partitions, and provided that the entire building be protected by automatic sprinklers. They had also in St. Louis a provision that the area of a slow burning building can be increased by the introduction of automatic sprinklers. Another important point was the protection of the metal parts of the structure, not only in fireproof buildings but in buildings of slow burning construction, where the girders were frequently of steel. It was absolutely required by their law that all such metal should be protected by a fireproof material, and they left it to the architect to decide what material it should be, for, unfortunately, they had not yet come to a conclusion as to what was the best material for the purpose. They believed that the new buildings which would be constructed according to the new laws would tend very largely to reduce the fire hazard. He had listened with great interest to the question of the Act being retrospective, and that was a very important point, for while new buildings were going up there were a great many old buildings. In Philadelphia they gave up the question entirely, except as to one point, which was the protection of open shafts or lift-ways in existing buildings. An officer might go into a building where there was a defective elevator shaft and require that such a shaft shall be enclosed by a fire-resisting material, and if it was lined with wood to require that metal be substituted, and that at each floor there should be provided trapdoors which the law said must be closed when the work of the day was done. They had taken into the new law the question of apartment houses, hotels, schools, and hospitals, and they would not allow any apartment house or hotel of over four stories in height to be erected unless fire-resisting material was used. No school or hospital of over two stories was allowed. The law was also very explicit as to theatres, and required amongst other things that there should be complete sprinkler protection with regard to the stage and dressing-rooms. In most of the American cities they had their building commissions or bureaus of building inspection, and to these bureaus the architect had to submit his plans, and the bureau employed a competent engineer to examine them. He would like to draw attention to one thing they had in Philadelphia for protection in case of fire—and it was, so far as he knew, more largely used in Philadelphia than in any other city—he meant the tower fire-escape, which was provided in all buildings of over 7,500 sq. ft. It was a brick and stone enclosure going to the roof, containing a stairway which might be of fireproof material or not, but the main point was that there was no external communication between the brick tower and the building itself. There was, therefore, no danger of smoke getting into this tower fire-escape and cutting off the exit. Egress from the building was by a platform on the outside of the building, and from that platform into the tower fire-escape. Where the buildings were larger there were two or three tower escapes, and he considered they were most valuable both for saving life and property and for giving firemen the opportunity of reaching any story of the building.

The Chairman (Mr. A. Darbyshire, F.S.A.) proposed a hearty vote of thanks to the reader of the paper, which was agreed to.

Mr. Dicksee, in reply, said there were one or two points he would like to refer to. First as to lifts. Mr. Marsland advocated a skylight for the top. He did not advocate the reverse. He suggested that the wells in all cases should be carried to the roof, but he said nothing about the covering on the top of the lift. There was, however, also the question that in many cases these lifts did not go to the top of the building at all, in which case he thought they must be covered with a fire-resisting floor. He did not refer to sprinklers, because there was no mention of them in the Building Act. The Building Act was a matter of construction and building, and not of equipment. Undoubtedly sprinklers were very much coming into use, but he could not help calling to mind a case which happened years ago, when Her Majesty's Theatre was burned down. That theatre was supposed to be provided with a huge tank, and the whole stage was to be deluged by an automatic sprinkler if a fire happened. But the tank got out of order, and for years there had been no water in it. That was the difficulty, for in all these cases the building inspector had no right to enter a building and inspect it at any time. They had no control over the maintenance of machinery, and unless there was some supervision of those sprinklers it seemed to him they would be generally found wanting just when they were required. The question of the height of buildings was dealt with in the London Building Act, but in a section which was not a purely fire section, and so he did not refer to it. They were limited to 80 ft. in height, so that they were safe from the American sky-scrapers. Theatres were dealt with under a special Act, and the London County Council were the authority, and had the power to make by-laws, and they had made a most comprehensive set of by-laws to which no exception could be taken except on the ground of their severity. The Council had also the power to enter theatres erected before the passing of the Act, and to require a reasonable standard of safety being maintained. Mr. Hexamer referred to trap-doors in the lift, but he thought the same objection applied to trap-

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doors as to sprinklers: No one could ensure that those trap-doors were closed.

The Planning and Arrangement of Large Retail Commercial Establishments.

Mr. Ellis Marsland, District Surveyor, then read a paper on "The Planning and Arrangement of large Retail Commercial Establishments." He said there were at least four points to be taken into consideration. Firstly, the interests of the proprietor; secondly, the safety and convenience of the customer; thirdly, the local building regulations; and fourthly, the claims of the fire department. Considering firstly the interests of the proprietor, they might be detailed as follows:—Plenty of window space, plenty of floor and wall space upon which he might erect his counters and fittings, and plenty of light, preferably from the north. The customer required ample staircase and elevator accommodation, plenty of gangway space, and easy exit and egress. The building regulations might require a limited amount of cubical space; therefore the building, if a large one, would have to be divided into compartments, and these shut off from one another by fire-resisting doors. The fire department claimed that any outbreak of fire might be quickly localised, the occupants passed to a place of safety, and that short work be made of any outbreak by reason of its being attacked from more than one point. Also that adjoining premises be not unduly endangered. This was the problem set the architect in planning and designing a building of this character. Much, of course, depended upon the site and its disposition, and he felt that any observations he might make would be of more practical importance were he to submit the problem in a concrete form, rather than discuss it in the abstract. He therefore assumed a site with the not unusual accompaniment of a frontage to two streets. The site, for the purposes of the paper, would have a frontage to the respective streets of 70 ft., or 22 metres, and a depth of, say, 200 ft., or 66 metres. It was also assumed that the building regulations limit the cubic capacity of buildings of this class to 250,000 cubic feet, as in the London regulations. This was done because he felt that dividing a building of this description into compartments was a right course, in the same way as it was considered the right principle for a vessel to be divided into watertight compartments. It was also assumed that the fire department was efficient, and would be soon upon the scene in the event of an outbreak.

"With these conditions in view, we will proceed to deal with our site, upon which I propose to place a building four stories in height, which would mean some 55 ft. from the ground floor to the level of the top of the topmost story. The cubical contents of such a building would require that it be divided up into three compartments. The plan and section shown to the meeting indicate generally the attempted solution of the problem. I have adopted what may be termed the *well and compartment* system, and we will proceed to determine how far it meets the requirements of the four points with which I commenced this paper. The proprietor has, I suggest, ample floor and wall space; his counters, fittings, and show-cases can be disposed as he wishes, and the light is provided by means of large lantern lights from the roof, throwing a flood of light down the well on the several floors, in addition to any side lighting that, perhaps, might be available. The customers have six ample staircases running from ground floor to roof, with an elevator provided to each. The door openings in the compartment walls are opposite one another and in direct line with the exits into either street. Should an outbreak of fire occur in any compartment, the customers on each floor would pass through the doorways, and could make a safe exit in either direction. It is necessary that all the floors and supports be of fire-resisting construction, and all iron and steel work protected by concrete or hollow tile casing. There being nothing but the contents to burn, the task of the fire department would be a simple one for the following reasons—That a fire on any floor could be attacked from above and below; the openings in the party walls would be a means of getting readily at the seat of the fire, and at the same time affording a chance of escape in an emergency. The well and lantern would form a shaft for the escape of smoke, and the flat roof would afford access to this from the several staircases. The fire-resisting doors in the openings could with facility be closed, and the fire confined to one compartment. In a building of this class it would be necessary to provide for receipt and dispatch of goods, and also for offices and staff accommodation. Any unpacking, packing, or bulk store department, if situated in the basement, should not communicate with the upper part, except by lift, placed outside the building, enclosed with walls carried up through the roof and covered with a light roof of iron and glass, and the openings on each floor protected with fire-resisting doors. It is advisable that the offices and counting-houses be in an adjoining annexe, and the dining and sleeping accommodation for the staff placed over and in this annexe, with separate exit and staircase and fire-resisting floors. . . . ."

In the discussion which followed, Mr. H. Wilmerding (Philadelphia) said he could quite see how the plan would be a great benefit where the laws required a subdivision of the area as they did in this case. Mr. Marsland's total floor area for the store which he set up as an example was about 14,000 sq. ft. At Philadelphia they had one store which had a single floor area of 100,000 sq. ft.; that store was ten stories high. Lighting of such a store for the day would be impossible, and therefore they had largely abandoned the idea of getting daylight for the display of goods, and trusted to electricity. In most large department stores they had done away entirely with the central light well, and made the floors as fireproof as possible, so that they had the departments horizontal and not vertical. He merely mentioned this to show the different conditions in different parts of the world.

Mr. W. H. Hunter (Manchester) said he had had to devote a great deal of attention to the matter of fire prevention, both from the point of view of petroleum, and also from the point of view of building construction, and he was just now engaged in constructing buildings which, except in one word, would come under the heading of that paper—that was the word "retail." The buildings he was constructing were transit sheds, and would, he believed, when complete, be the largest in the world. He hesitated to interpose in the discussion on the last paper because he thought that they had a difference of opinion on one point between two District Surveyors in London, and he was a little surprised when Mr. Dicksee replied to find that the difference as to the covering of the lifts had disappeared. Mr. Marsland had expressed the opinion that the packing and unpacking of cases should be carried on in the basement, and that the lift should be carried outside the building to the roof. He agreed with the lift being placed outside the building, but Mr. Marsland went on to say, "covered with a light roof of iron and glass." That he could not understand. He could not imagine how gentlemen acquainted as District Surveyors must be with the chemical operation that took place during any fire could advocate a system of construction which would convert these lifts into a funnel—into practically a draught funnel. There was no one there, he felt sure, who could differ from him when he said that any process of combustion was accompanied at once with the evolution of large quantities of carbonic gas; and, secondly, that these quantities of carbonic gas of themselves, if they were confined, would furnish the most efficient method of putting out a fire that could be devised—better than the sprinklers that had been suggested by the American representatives present, and which, he might say, he used very largely. He should have thought in the case of a building such as that suggested, as regarded the lift the great object would have been to seal the roof, to stop any passage of air, and therefore to avoid the introduction of fresh oxygen which was necessary for combustion, and to retain in that shaft all the carbonic gas which had been evolved in the conflagration.

Mr. Hexamer (Philadelphia) remarked that the question of the opening at the top of the elevator shaft was one to which a great deal of attention had been given in America; and if they could hermetically seal the whole of the building there was no doubt that the carbonic gas generated would soon do away with the fire. But windows and doors were there, and the oxygen would be provided. The great difficulty to the firemen entering a building was the smoke, and he certainly felt that the open top of the lift was the best method of getting rid of the smoke, and then they could get at the fire. The ordinary way to get rid of the smoke was the breaking of the roof. Their building law provided that the roof over the stage of a theatre should be so arranged that in case of fire two-thirds of the roof opened automatically.

Mr. R. J. Lake said that, as a practical man who was responsible for the safety of buildings and for the safety of lives employed in buildings, he was particularly struck with one point in the paper, which was that Mr. Marsland placed first the claims of the proprietor. They as practical men were deeply indebted to theorists to tell them what they should do, and to explain the grounds on which they put forward their advice; but they, unfortunately, found too often that theorists might be wrong. They had seen evidence of that in the discussion at the Congress, for they were told that the theories as to the use of iron and concrete were exploded fallacies or nearly so. They had to consider the protection of life and the protection of property, and in the case of the protection of life no sacrifice was too great. But with regard to property his point was that they must not seek to protect it in a way which would tax the property to an overwhelming degree, and he thought it would be well if some of their able men devoted some attention to see if a crowded community could not have some system of mutual protection so that they might regard with some complacency the ravages of fire. He had had experience of fire curtains, which were an inexpensive and almost sure protection against the spread of fire, and it had often struck him that much might be done by some compulsory or partly compulsory application of fire curtains to all buildings in course of construction.

Colonel Fox (London Salvage Corps) agreed that bricks and timber were more fire-resisting than iron or steel, and said he found from experience when he was working on the ground or first floor of a building, and the second or third floor was on fire, that he and his men could stop until the fire came through the floor; but if the building was of iron construction he was "in a funk" as to the safety of his men, to say nothing of himself. At a fire a short time ago they were at work when an iron girder came tumbling through the ceiling. The provision of iron shutters had not been mentioned, and he thought they should be provided. With regard to the packing department there was always a danger in these great emporiums, and he did not agree that it should be in the basement. He would have the packing department at the top, with the light from the roof, so that if there was a fire they could get it over as quickly as possible, and if they had a good concrete floor the damage the lower floors would not be much. He believed in letting the smoke off at all hazards.

A vote of thanks having been accorded,

Mr. Marsland said, in reply, that he and Mr. Hunter must agree to differ. He certainly believed in getting the smoke away from the building, for otherwise it spread to every part of the structure.

Mr. A. B. Markrusowski then read a paper in French, entitled "Some Notes on Fire Prevention, having Particular Regard to Theatre Safety," after which he moved the following resolution:—"That this Congress expresses its opinion that theatres should be inspected twice a year, once at the beginning of the season, and once in the autumn, when the heating apparatus is put into operation; (2) that the capacity of places of amusement be gauged on the number and the width of exits; (3) that for each 100 persons present there should be one exit 1 mètre wide, and that for each 250 persons there should be provided a fireproof staircase not less than $1\frac{5}{10}$ mètres wide, and that each corridor shall be at least $2\frac{1}{2}$ mètres wide."

Mr. Hexamer seconded the resolution.

Mr. J. H. Dyer remarked that when the Fire Brigades Union was in Buda-Pesth they saw an enormous tank covering the stage, and twice a year the fittings were cleared away and the place deluged. In America they had reduced the insurance rates 50 per cent. where sprinklers were provided. He thought they in England were a little bit conservative. He had learned a good many things from America, and hoped to learn a good many more.

The resolution was then agreed to.

Congress Banquet.

In the afternoon a reception was held of the colonial and foreign official delegates and im-

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perial delegates and others at the British Fire Prevention Committee's Testing Station, Portland-terrace, Bayswater, and a fire-resisting demonstration took place. Visits of inspection were also made to other parts of London, and in the evening the Congress banquet was held at the Criterion Restaurant. His Grace the Duke of Marlborough, K.C., presided, supported by a large number of distinguished delegates and others.

The toast of "The King" was proposed by the Chairman, who said that he had addressed the following telegram to Lord Knollys, to be conveyed to the King:—"We, the assembled official delegates and members of the International Fire Prevention Congress, representing fifteen foreign and colonial Governments, several Departments of the Home Government, some 200 British and foreign municipalities, many of the technical societies interested in the subject, and the professional and volunteer fire brigades from all parts of the world, desire to convey our respects to the King, and trust that he may be spared for many years to rule over the British dominions and further the development of those international, scientific, and benevolent services with which his Majesty's name has always been associated." The Chairman said he had had the honour to receive the following telegram in reply:—

"I have had the honour of submitting to the King the telegram which I have received from you on behalf of the official Delegates and Members of the International Fire Prevention Congress, and I am commanded by his Majesty, in reply, to request you to thank them for him for their cordial good wishes. The King sincerely trusts that the deliberations of this important and representative body will lead to a further development as to the best means to be adopted in regard to the prevention of fire, and to the saving of life in cases of fire."

The Chairman also proposed "The Sovereigns and Presidents of Foreign States," which was duly honoured, after which he submitted "The Colonial and Foreign Official Delegates." He felt that this toast meant practically "Success to the International Fire Prevention Congress." There was no doubt that year by year they saw an increased desire on the part of the public to know more about fire appliances, and there could not be a better example of this increased desire than the presence that night of so many distinguished Delegates and representatives. He thought that this was the first time it had been attempted to bring together under one roof the representatives from the different countries of the world who were interested in fire prevention. He thought this would be regarded in the future as an epoch-making Congress by those who were interested in fire prevention, and who had tried to find better remedies for dealing with fire outbreaks. The first object of the Congress had undoubtedly been a philanthropic one—*i.e.*, to prevent, as far as possible, the terrible accidents to life and the great loss of property due to fires. How much of the wealth of the world was lost annually by fires? He was informed that in this country it was something like 10 to 12 million pounds, and some 20 to 30 million pounds in the United States. It was the object of the Congress to discover the best means of saving the lives and the property of society.

M. Lépine, Prefect of Police, Paris, representing the Ministry of the Interior, France, and Prince Alex. Lvoff, President of the Russian Imperial Fire Prevention Society, representing the Ministry of Interior, Russia, having responded, Mr. E. O. Sachs, Chairman of the British Fire Prevention Committee, took the chair, as the Duke of Marlborough had to attend the ball that evening at Buckingham Palace. The following gentlemen also responded to the toast: Chief Officer Giersberg, Berlin (representing the Ministry of Interior, Prussia); Chevalier Goldoni, President of the Italian Fire Brigades' Federation (representing the Ministry of Interior, Italy); Professor E. M. Woolson, Columbia University, U.S.A. (representing the City of New York); and the late Premier of South Australia, Sir J. Cockburn (representing the Commonwealth of Australia).

Chevalier Goldoni then presented to the Chairman, for the British Fire Prevention Committee, a gold souvenir medal from the Ministry of the Interior, Italy.

Professor Woolson, in the course of his reply, said he came from a new world, and as he wandered through the streets of dear old London he was more and more impressed by the magnificent buildings and the beautiful works of art, some of them dating back so many years. The object of the Peace Congress was to save life from the horrors of war; the object of the present Congress was to save life from the horrors of fire.

Sir J. Cockburn said that a young country like Australia was deeply interested in the subject of fire-resisting construction, because it had still a great deal of its building in front of it. The Commonwealth was about to select a capital site, and before long they hoped to see arising in that new city buildings which would be designed according to the most up-to-date and approved methods of fire-resisting construction.

Mr. C. Hexamer, President of the National Fire Protection Association, U.S.A., then proposed "The British Fire Prevention Committee and the Congress." The Fire Prevention Committee had done wonders in bringing together that Congress, in the publication of its papers, and in the arrangements for the Congress deliberations throughout. In the United States the matter of protection against fire was in a measure a selfish one: the insurance companies, the underwriters who saw their profits dwindling away year after year because of losses from fires, took up the matter and studied the subject and experimented with a view to preventing such losses. The British Fire Prevention Committee, however, consisting of architects and engineers and others, took up the matter in a humanitarian way. They erected their testing station, made their tests, and had promulgated the knowledge they had gained, not only in this country, but throughout the world. The impetus given by the Congress would be felt in every country, and he hoped that the Congress would soon be held in America.

The Chairman, in reply, said the Committee was five and a-half years old, and it was formed soon after the great Cripplegate fire in London. The Committee had done their best to get hold of some of the primary facts of fire-prevention before launching out into such an ambitious project as that of this Congress. He firmly believed that the Congress would be of use, for there was a uniformity of agreement that the work accomplished was of a satisfactory character; that the discussions had been interesting; that new points of view had been raised; and that important results and resolutions had been arrived at. What the Committee had done had depended a great deal on a number of workers. Mr. Ellis Marsland, the Hon. Secretary, had, from the very commencement of the work of the Committee, been indefatigable, and to him they owed much for the excellent Congress arrangements. They had also to thank Mr. James Sheppard, ably assisted by Mr. Max Clarke, in whose hands had been the publication of the printed matter of the Congress. There had also been other workers who had done their best to ensure the success of the Congress. The Committee wished to prevent fire outbreaks and to popularise the subject, and they wished the profession to arrive at those technical results and facts which would be useful to the community. When the facts were given and were popularised, then every householder would, in his own family, form his own private fire-prevention committee, and then there would be no necessity for the British Fire-Prevention Committee.

The representatives of the French, Belgian, and Italian Fire Brigades' Federations then made several presentations, on behalf of their respective societies, *i.e.*—to Mr. Edwin O. Sachs, the silver official medal of the Italian Fire Brigades' Union, and the Hon. Membership of the French Fire Brigades' Federation, with insignia; to Mr. Ellis Marsland, Hon. Sec. of the British Fire Prevention Committee, the Hon. Membership of the French, Italian, and Belgian Fire Brigades' Federations, with insignia; to Mr. Max Clarke, the Hon. Membership of the Belgian and Italian Fire Brigades' Federations, with insignia; to Mr. James Sheppard, the Hon. Membership of the Belgian and French Fire Brigades' Federations, with insignia; to Mr. Charles E. Goad, the Hon. Membership of the Belgian Federation, with insignia.

Lieut.-Colonel Fox (London Salvage Corps), then proposed "The Colonial and Foreign Fire Service," and Count Kamarowski (President, International Fire Brigades' Council), M. G. Guesnet (Past President, French Fire Brigades' Federation), Herr Reg. Czermack (Hon. President, Austrian Fire Brigades' Federation), Count Victor Szechenyi (President, Hungarian Fire Brigades' Federation), and Chief Officer Welsch (Fire Brigade, Ghent), responded. "The Colonial and Foreign Technical Professions" was the next toast, proposed by Major-General Festing, C.B., F.R.S., and responded to by Privy Councillor Stübben (late City Architect, Cologne), Mons. Eugene Geveart (Chief Engineer, Ministry of Public Works, Belgium), and J. P. Gray (Vice-President, the Boston Manufacturers' Mutual Fire Insurance Co.). "The Congress Visitors" was proposed by Mr. Max Clarke (Member of Executive, British Fire Prevention Committee), and responded to by General Sokoloff (Imperial State Councillor, St. Petersburg), Colonel Sextus Meyer (Chief Officer, Fire Brigade, Copenhagen), Chief Officer J. Meier (Fire Brigade, Amsterdam), Chief Officer Thomas (Liverpool), the Mayor of Kensington, and Hon. Capt. Dyer (Vice-President, National Fire Brigades' Union). "The Congress Executive" was proposed by Chief Officer Westphalen (Fire Brigade, Hamburg), and responded to by Mr. Ellis Marsland (Hon. Secretary, British Fire Prevention Committee).

Fire Tests.

On Wednesday afternoon, as already announced, and on Thursday afternoon, testing operations were conducted, and there was a large attendance on both days at the testing station in Porchester-road, Bayswater. The arrangements for the testing operations were in the hands of Mr. Ellis Marsland and Mr. Max Clarke, and the visitors were received by the Chairman of the British Fire Prevention Committee (Mr. Sachs) and by Sir John Taylor, and other members of Council. The first test was with an armoured door by the Curfew Armoured Door Co., of Manchester, and was of one hour's duration. Two specimens of doors were under observation—one a hinged door and one a sliding door. The second test was with a partition by Messrs. Van der Vygh, of Amsterdam, and was of one hour and a half's duration at increasing temperature from 180 deg. Fahr. The thickness of the partition was 2½ in.

Thursday's test was a two-hours' test, with a gradually increasing temperature, of a Karri timber floor, provided by Miller's Karri and Jarrah Wood Company, comprising Karri rebated boarding on bearers.

Fireproofed Wood as a Building Material.

On Thursday, Professor Woolson, Columbia University, New York, read the following paper before Section III. ("Storage of Oils and Spontaneous Combustion") of the Congress:—

"In the construction of large buildings, the question of fireproofness has at last assumed its proper position at the head of all other questions concerning the manner of construction. As representatives of this twentieth century, we congratulate ourselves upon our advanced civilisation, and our industrial and scientific development, but it is a lamentable fact that numerous problems of vital importance to the life and happiness of our race are still unsolved through stupid neglect. Two of these problems are fireproof construction and sanitary regulation of disease. There is little cause for complaisancy over these subjects when contrasting the world's condition to-day with that of two or three centuries ago. Fortunately, we are at last waking to the gravity of the situation, and material advancement has been made in the past decade. It has taken us 2,000 years to learn that great conflagrations are the result of human neglect and ignorance, rather than visitations of Divine wrath. The same is true of widespread plagues and distributed malignant diseases.

We have made marvellous progress during the past few hundred years in the method and magnitude of our building operations. The introduction of iron and steel into this class of construction marked an era in architectural history. With their advent came the use of the term 'fireproof construction.' It was fancied that steel beams, iron columns, and tile or concrete floors would make a building indestructible. Alas, we know to our sorrow that the term 'fireproof' is often a delusion! Buildings, as generally constructed during the past twenty-five years, were no barrier to fires,

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and, as a matter of fact, not so safe as if built of solid wooden beams. These would at least be slow-burning, and not wreck the whole building by the buckling of columns and beams as soon as heated.

Our cities are filled with magnificent structures, marvellously constructed, but a very small percentage of them are at all fireproof. It is absolutely true that our great cities to-day are but little less inflammable than they were in 1666, when this city was swept by fire from Tower to the Temple, with results sufficiently awful to make a period in history. Similar conflagrations have occurred with painful frequency all over the world since that time, and now, after a lapse of 250 years, are still of yearly occurrence. Were it not for the high efficiency attained by the noble body of men, the firemen, in all our cities, consequences of fire would be far more appalling than they are. This is particularly true in America, where the craze for high buildings has made the fireman's work doubly hazardous.

The time has come when all permanent construction should be strictly incombustible. That the public has awakened to this fact is evidenced by this gathering of representative men from all parts of the world to discuss the various methods of solving the problem. The necessity of fire prevention is beginning to be appreciated. Energy and money are freely spent in exploiting all kinds of fireproof construction. Fortunately the public has lost its credulity, and no longer accepts the statement that a system of construction is fireproof unless it is proven to be such by practical test. Your chairman is one of the pioneers in this class of experimental testing. His splendid work during the past few years, by sifting the meritorious processes from numerous trashy ones, has aided greatly in classifying the many proposed methods of fire protection.

In the United States during the past few years, much investigation of this character has been done by the New York City authorities, also by the National Board of Underwriters at at their testing laboratory in Chicago, and by the Insurance Engineering Experiment Station in Boston. All are doing excellent work. I am informed that much similar work is being accomplished by experts in various continental cities. I regret that I have been unable to secure records of their work. If this class of investigation receives the support it deserves, the results will be invaluable, and reduce to a minimum the fire hazard of large buildings. Among the various materials for reducing fire risk is the so-called 'fireproof wood.' It is upon this subject your executive has kindly requested me to address you to-day.

First of all, let us have a clear understanding of what is meant by the term 'fireproof wood.' For the information of those unfamiliar with the subject, it should be stated that the term 'fireproof wood' is a misnomer; for all such woods will burn if exposed for a sufficient time to a high degree of heat. Strictly speaking, the processes of treatment do not make the woods *fireproof*, but simply render them fire retardants. Fire-resistant wood is a much more logical term. The public has been somewat deceived by the representatives of certain processes who make the silly claim that wood treated by their methods are rendered absolutely incombustible. Such statements are foolish, for they lead to expectations of resistance which cannot be achieved. When the deception is discovered it causes unjust criticism and mistrust of the whole product. The term 'fireproof wood' is a trade name, and should not be taken in a strictly technical sense.

New York City is probably now using more fire-resisting wood than any city in the world. This results from two causes: first, the Building Law, which requires that such treated wood shall be used throughout all buildings over twelve stories (150 ft. in height); and, secondly, to the fact that the city proper is too limited in area to spread, and enormously high buildings have become necessary. Scores of buildings erected during the past two or three years are over fifteen stories high, and many of them twenty-five and thirty.

It has been my privilege, under the direction of the Bureau of Buildings, to test most of the wood which has been used in these buildings. For the year ending the first of this month, I have tested and reported upon upwards of 3,500,000 ft. The greatest part of this material was for floors, which were laid on the top of strictly fireproof floor construction of the concrete or hollow tile. The balance of the material was used for trim. An evidence of the magnitude of building construction now going on in that city, is the recent filing of plans with the Bureau of Buildings for one structure in which 2,000,000 ft. of fireproofed wood will be required. I would here add that there are at present three companies supplying this treated wood to the city of New York. There are other companies established for the same purpose in Philadelphia. The impregnation of wood with chemicals to render it fire-resistant is by no means a new idea. Numerous experiments with various chemicals were made as early as 1825 by Fuchs, Gay-Lussac, Boucherie, and later by Löchtin and other Continental chemists. However, it is within the last few years only that the business has been put upon a practical commercial basis.

It is conceded by most experts who have carefully studied the subject that the fireproofing of wood is a safeguard, and, under ordinary conditions, will greatly reduce the fire risk. It will, however, be consumed by continued application of flame, and under certain conditions, especially favourable to fire, may support a slow combustion by itself, but the same conditions of heat would also ruin many other accepted fireproof materials. To my mind, the non-inflammable nature of the material is its greatest value.

When a fire occurs in a room trimmed with ordinary wood, its inflammability makes it immediately dangerous. The flames leap from one point to another, dashing through windows and transoms, thus spreading the fire to adjoining rooms. If the wood is finished with oil or varnish, the flames will run along it with marvellous speed. If finished with well-treated wood this tendency of spreading the flames is reduced to a minimum, even if the burning material in the room is sufficient to ignite the treated wood it burns so slowly that life and property are much less menaced. It would at the worst be a distinctly slow-burning conflagration. That in itself is a great safeguard, because it allows time for the arrival of the firemen.

Numerous inorganic materials are being exploited to replace wood in fireproof construction. If it were possible to find a substitute for wood, which possessed its merits and none of its failings, it would be most desirable. So far, I have never seen anything which had the lightness, strength, durability, cheapness, ease of working, and last but not least, the elements of beauty for decorative purposes which wood possesses. For these reasons it will surely long remain a favourite with architects.

Granting the value of fire-resistant wood as a structural material, the next problem is to determine what degree of fireproofness should be exacted, and how the standard of quality can be maintained. Not being acquainted with the methods employed on this side to accomplish these objects, I will confine my remarks to our practice in New York. In the early stages of experimentation it was customary to build a small house of the wood to be tested, usually duplicated by a house of untreated wood; then applying a vigorous fire both inside and out, and noting results. This method possesses spectacular elements which are very convincing, and while it may be useful as a general test to demonstrate the degree of immunity from fire that a wooden building may be made to possess, the heavy expenditure of time and money required for such a test precludes the possibility of employing it for regular series work. This is the only value such a demonstration possesses, for the results of fire tests made upon wood treated a year or so ago may bear no relation to the product of the same company to-day. It is essential for public safety that regular serial tests should be made upon all material delivered for use, as is the custom in the manufacture of steel, cement, and other structural materials.

Unfortunately there is no recognised test for fireproofed wood. In America a variety of tests have been proposed by different investigators, most of them being the direct application of heat or flame to small test specimens and noting the duration of flame and glow produced, as well as the amount of wood consumed. One method recently proposed makes the amount and character of gas given off from dry distillation of small fragments of wood a basis of classification, but no uniform method has yet been adopted.

An effort was made a year ago by the Building Bureau of New York City, in conjunction with the various fireproof wood manufacturing companies, to decide upon some standard method of test. But the project was abandoned. The present method of testing is as follows:—

When a shipment of lumber is prepared, an inspector proceeds to the works, and selects at random one sample from every 2,000 ft. of material. This is sent to the laboratory and tested: reports being sent to the Building Bureau and the manufacturer. Two tests are applied to each sample. One a 'shavings test,' which is a test used by the U. S. Navy, and the other a test devised by the writer, which for want of a better name is called a 'timber test.'

The shavings test, while useful in a general way determine the flaming properties of treated wood is, nevertheless, unsatisfactory. We are now making series of different tests in an endeavour to supplant it with something more reliable. The test is conducted as follows:—A pan 1 ft. in diameter and 6 in. deep is mounted on legs, the bottom is formed by a heavy wire screen of ½-in. mesh; this wire bottom is covered with a layer of shavings 2 in. deep, and a Bunsen burner is applied underneath for 25 secs.; then the burner is removed, and the lengths of time during which the shavings support (1) flame and (2) glow are recorded, and also the area of shavings burned. The idea of this test is that shavings from properly-treated wood will not support flame any considerable time, and that the flame will gradually die out without material enlargement of the burned area. After test, the remaining shavings are thrown away. There are no means for making a permanent exhibit of the results, except by photographs, which would be difficult to take and quite unsatisfactory. The wood must be accepted or rejected on the judgment of the operator, based upon notes taken while observing the test.

Besides these obvious disadvantages, there are two other strong objections to the shavings test: first, the extreme difficulty of always maintaining the same conditions of flame and heat under the shavings; and, second, the impossibility of securing a uniform quality of shavings for tests. The Navy specifications call for the use of the Bunsen burner with a flame giving about 500 deg. Centigrade = 932 deg. Fahrenheit. Now, Bunsen burners vary considerably in the size of flame they produce, so, although every precaution was taken and the same standard temperatures were determined in each of two flames at some definite point, the results of tests upon the same kind of shavings might show widely different figures, because of the general variation in the character of the flames. Much depends also upon how and where the tests are conducted; whether under a smoke hood with a strong draught, or in an open room where air currents could strike the flame and cause it to sway. The most serious objection, however, to the shavings test, and the one which, in the writer's opinion, is fatal to its use as a standard method of comparison, is the impossibility of making the shavings of uniform size and quality. The samples here exhibited demonstrate the objection made.

These shavings were all made by the same carpenter, and were as nearly alike as possible for him to make them. You will note that some are fine like sawdust, while others are very coarse, with all graduations of size between. Another objection is that in coarse grained wood like oak, the plane, in making the shaving, splits many of the large pores and allows the crystallised chemical to fall out, thus removing a part of the fire-resisting agent. Lastly, no wood in the form of shavings would be exposed to fire in a building. It would seem that further evidence is unnecessary to demonstrate the inappropriateness of this test alone as a standard of comparison. To avoid the difficulties of this and similar tests, the previously mentioned 'timber test' was designed. Though not entirely satisfactory, the results, as a whole, have been gratifying. During the past two years, the writer has conducted over 4,000 tests upon fire-proofed wood, the majority being 'timber tests.' Scarcely any criticism of the method of test has been offered by clients, though the results were often not gratifying.

The specimens for this test are accurately cut to a size 1½ in. by ¾ in. by 12 in. These 'timbers' are tested in pairs by being laid

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across the top of a 6-in. gas crucible furnace, in which a constant temperature of 926 deg. C. = 1,700 deg. F. is maintained. This particular temperature was chosen because it is given by the New York Building Code as approximately the heat of a burning building. At the end of two minutes the specimens are removed, and duration (1) flame and (2) glow noted for each. The temperature is under constant control by means of a Le Chatelier pyrometer, the 'couple' being placed between the two specimens, thus recording the heat exactly at the point of application. The proportions of gas and air are regulated to furnish a vigorous flame 8 in. to 10 in. above the furnace, so imitating an ordinary fire.

After test, the specimens are sawed in two at the middle and tracings made of the unburned wood. These tracings are then carefully measured by planimeter and the percentage ratios to the original cross-section calculated. The percentage of unburned wood is printed upon the tracing of each specimen, and then blue prints are made which become a part of the permanent record.

The tested specimens show a straight line in the cross section on the side not exposed to the fire, whereas the untreated specimens are burned on all sides. This is good evidence of the fire-resisting properties of the wood. In general, the untreated woods show a cross-section area approximately 10 to 25 per cent. less than the treated samples. However, the value of the 'fireproofed' wood cannot be rated by this feature alone. Account must be taken of the tendency to ignite and support combustion. This is indicated by duration of flame and glow after the specimen is removed from the fire. In every instance the contrast in time of flame and time of glow, between the treated and the untreated wood is very marked. The average duration of each taken from 688 tests on four varieties of treated soft woods was 7 and 12 secs. The same data taken from 846 tests on four varieties of treated hard woods was 10 and 14 secs. Similar calculations based upon tests of untreated wood, though not averaged from nearly so many tests, gave forsoft woods, flame 1 min. 19 secs., glow 1 min. 53 secs.; and for hard woods, flame 2 min. 31 secs., glow 6 min. 29 secs.

Those figures give a ratio of 1 to 11 and 1 to 9 for flame and glow between treated and untreated soft woods, also 1 to 14 and 1 to 27 for hard woods. That is, the tendency of untreated woods is 10 to 20 times that of treated woods. This measure of the property of retarded combustion is as important as the determination of the percentage of unburned areas, for in the first stages of a fire minutes are valuable. Experience has shown that a variation of 5 per cent. should be allowed in cross-section area, because of structural differences in the wood, fluctuation in temperature, and personal error in measuring. In fact, like all investigative work, it is never safe to estimate average values from the results of a few tests.

The advantages of this method of test are :—(1) a test piece of uniform size, large enough for practical comparisons, and small enough for numerous tests to be made with slight waste of material, thus ensuring a fair average report; (2) a constant temperature and uniform time of application of heat; (3) an estimate of the tendency to support combustion as indicated by the times of flame and glow; (4) the ability to accurately measure the amount of burn, and make a drawing of same for permanent record—the specimen itself can also be easily preserved for future reference if desired. In brief, every element of the test is practically constant, except the character of the wood and the treatment it has received. Necessarily these must always remain variable.

The lumber is thoroughly dried before testing, and care exercised to keep everything uniform. The specimens are placed on the side which was originally the outside surface of the board faces the fire. This is necessary because the Building Bureau permits 1 in. outside treatment on floor sleepers and other large materials, which is encased in concrete or a coating of other fireproofed wood. It will be noted that hard woods, like long leaf yellow pine, oak, and maple, when treated, differ only slightly in unburned area from untreated lumber. They are naturally "slow-burning" material. It would scarcely be necessary to fireproof hard wood if the preservation of structural strength were the only consideration. But the danger from inflammability should make a surface treatment imperative. Soft woods which waste rapidly under flame should be treated throughout.

Although treated wood has many advantages as a fire retardant, it also has its failings, the worst being its tendency to become hydroscopic. There are processes which claim avoidance of this tendency to gather moisture when exposed to dampness, but I have had no opportunity to prove their merits. Because of this difficulty, the Navy has discontinued the use of fireproofed wood, except for interior trim, furniture, &c. When in this damp condition a new difficulty arises, because the chemicals employed produce a corrosion on metals. Neither of these difficulties appear harmful where the wood is ordinarily dry and protected by paint, varnish, or oils. A strong point in favour of the treatment is, that the wood does not seem to become perceptibly more combustible by the application of oils and varnish. Among the experiments I will make at the conclusion of this paper is one designed to demonstrate this feature. A further defect of treatment is to weaken the wood and make it brittle. Although this does not always result, it is a recognised possibility, and the Navy specifications reject material which has lost over 30 per cent. of its original strength. In New York City no attention is paid to the question of strength, for the method of steel construction does not require the wood to support loads. Whether the treatments are permanent, I am not prepared to state. Our experience with them is too short to predicate a positive opinion. Samples kept in my laboratory two years show no signs of deterioratian, and we have here some samples treated in 1895 which we will test to show they still retain their fire-resisting qualities.

Some processes, however, do employ volatile chemicals, as is evidenced by a bloom which appears on the wood after standing for some time; it is also shown upon the sides of these jars of shuvings which are about two years old. So far as my experience goes with lumber treated for New York City there is very little tendency for this sort of deterioration. Neither has there been any evidence of decay. When used under ordinary conditions of dryness, and protected, as it usually is, I see no reason why well-treated wood should not remain sound and effective indefinitely. However, I believe the question is one to be systematically investigated.

There are two other well-known defects, namely, discoloration and difficulty in working due to hardness. Both of these are increased by excessive treatment, hence the manufacturer is always tempted to lessen the treatment. This fact is the only argument necessary for regularly testing the material as delivered for use. Last, but not least, from a builder's point of view, the wood is costly. But considering the awful destruction of life and property which fire constantly causes, the saving of expense should not be allowed as an excuse for the use of inflammable materials which invite public calamity."

Standards of Fire Resistance.

On Thursday, in Caxton Hall, the following communication was read by Mr. E. O. Sachs before Section VI. (Fire Tests and Standardisation) :—

The Executive of the British Fire Prevention Committee, having given their careful consideration to the common misuse of the term "fireproof," now indiscriminately and often most unsuitably applied to many building materials and systems of building construction in use in Great Britain, have come to the conclusion that the avoidance of this term in general business, technical, and legislative vocabulary, is essential. The Executive consider the term "fire-resisting" more applicable for general use, and that it more correctly describes the varying qualities of different materials and systems of construction intended to resist the effect of fire for shorter or longer periods, at high or low temperatures as the case may be, and they advocate the general adoption of this term in place of "fireproof." Further, the executive, fully realising the great variations in the fire-resisting qualities of materials and systems of construction, consider that the public, the professions concerned, and likewise the authorities controlling building operations, should clearly discriminate between the amount of protection obtainable or in fact requisite for different classes of property. For instance, the city warehouse filled with highly inflammable goods of great weight requires very different protection from the tenement house of the suburbs. The executive are desirous of discriminating between fire-resisting materials and systems of construction affording *temporary* protection, *partial* protection, and *full* protection against fire, and to classify all building materials and systems of construction under these three headings. The exact and definite limit of these three classes is based on the experience obtained from numerous investigations and tests, combined with the experience obtained from actual fires, and after due consideration of the limitations of building practice and the question of cost. The executive's suggested minimum requirements of fire-resistance for building materials or systems of construction will be seen from the standard tables appended for—

I. Fire-resisting floors and ceilings.
II. Fire-resisting partitions.
III. Fire-resisting doors.

But they could be popularly summarised as follows :—

(*a*) That temporary protection implies resistance against fire for at least three-quarters of an hour.

(*b*) That partial protection implies resistance against a fierce fire for at least one hour and a half.

(*c*) That full protection implies resistance against a fierce fire for at least two hours and a half.

The conditions under this resistance should be obtainable, the actual minimum temperatures, thickness, questions of load, and the application of water can be appreciated from the annexed tables by all technically interested, but for the popular discrimination—which the executive are desirous of encouraging—the time standard alone should suffice. It is desirable that these standards become the universal standards in this country, on the continent, and in the United States, so that the same standardisation may in future be common to all countries, and the preliminary arrangements for this standardisation are already in hand.

Standard Table for Fire-Resisting Floors and Ceilings.

Classification.	Sub-Class.	Duration of Test at Least.	Minimum Temperature.	Load per Superficial Foot Distributed.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Pressure.
Temp'rary Protective Class.	A	45mins.	1500° F.	Opti'nal	100sq.ft.	2 min.
	B	60mins.	1500° F.	Opti'nal	200sq.ft.	2 min.
Partial Protective Class.	A	90mins.	1800° F.	1 cwt.	100sq ft.	2 min.
	B	120mins.	1800° F.	1½ cwt.	200sq.ft.	2 min.
Full Protective Class.	A	150mins	1800° F.	2 cwt.	100sq.ft.	2 min.
	B	240mins.	1800° F.	2½ cwt.	200sq.ft.	5 min.

Standard Table for Fire-resisting Partitions.

Classification.	Sub-Class.	Duration of Test at Least.	Minimum Temperature.	Thickness of Material.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Pressure.
Temp'rary Protective Class.	A	45 mins.	1500° F.	2 in. and under.	80 sq. ft.	2 min.
	B	60 mins.	1500° F.	Option'l	80 sq. ft.	2 min.
Partial Protective Class.	A	90 mins.	1800° F.	2½in. and under.	80 sq. ft.	2 min.
	B	120mins.	1800° F.	Option'l	80 sq. ft.	2 min.
Full Protective Class.	A	150mins.	1800° F.	2½in. and under.	80 sq. ft.	2 min.
	B	240mins.	1800° F.	Option'l	80 sq. ft.	5 min.

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Standard Table for Fire-resisting Single Doors with or without Frames.

Classification.	Sub-Class.	Duration of Test at Least.	Minimum Temperature.	Thickness of Material.	Minimum Superficial Area under Test.	Minimum Time for Application of Water under Pressure.
Temporary Protective Class.	A	45 mins.	1500° F.	2 in. and under.	20 sq. ft.	2 min.
	B	60 mins.	1500° F.	Option'l	20 sq. ft.	2 min.
Partial Protective Class.	A	90 mins.	1800° F.	2½ in and under.	20 sq. ft.	2 min.
	B	120mins.	1800° F.	Option'l	20 sq. ft.	2 min.
Full Protective Class.	A	150mins.	1800° F.	4 in. and under.	25 sq. ft.	2 min.
	B	240mins.	1800° F.	Option'l	25 sq. ft.	5 min.

A short discussion took place as to the resolutions, and Chief Officer Welsch, City Fire Brigade, Ghent, then read a paper in French, entitled, "The Necessity of Generally Standardising Testing Operations."

The following resolutions were agreed to:—

"The Congress, having given their consideration to the constant misuse of the term 'fireproof' and its indiscriminate and unsuitable application to many building materials and systems in Great Britain, have come to the conclusion that the avoidance of this term in the general, business, and technical vocabulary is essential."

"The Congress considers the term 'fire-resisting' more applicable for general use, and that it more correctly describes the varying qualities of the different materials and systems of construction intended to resist the effect of fire for shorter or longer periods at high or low temperatures, as the case may be, and they advocate the general adoption of this term in the place of the term 'fireproof.'"

"The Congress confirms the Committee's proposed standards of fire-resistance, subject to certain grammatical amendments, and the standards of fire-resistance shall in future be: 1. The temporary protective class; 2. Partially protective class; 3. The fully protective class (in accordance with the Committee's schedule)."

"The Congress considers that in all reports dealing with the question of fire-resistance and tests, the metric system of measurement, weight and temperature shall be adopted as well as any local system."

"The Congress strongly recommends the establishment of testing stations for fire-resisting materials and their adoption of a universally recognised method of testing; as also the formation of an International Technical Committee, which shall meet at suitable periods to discuss, fix, and modify the universal methods of testing."

"The Congress considers it essential to revise the Building Regulations to accord with the results obtained by the investigation of fire-resisting materials and methods of construction."

"The Congress considers it essential that courses of study should be provided in universities, technical colleges, and schools for the instruction of engineering and architectural students in the fire-resistance of building materials and the methods of construction as based on investigation."

"The Congress considers that the Factory Mutual Insurance system, as adopted in the United States, materially tends to the prevention of fire and the reduction of fire waste."

"The Congress considers it most necessary that fire brigades be placed on a sound legal basis, and that it is advisable that their efficiency be supervised by a Government Department."

"The Congress considers that, having regard to the neglect of precautions against damage caused by lightning, the subject should have the serious consideration of the Government and local authorities, the technical professions, and the fire service."

"The Congress considers that the public authorities should encourage their fire brigade officers to take an active interest in the preventive aspect of fire protection, inasmuch as the result of the fire brigade officers' experience in actual fire practice, if suitably applied in conjunction with the work of architects, engineers, and public officials, would be most useful for the organisation and development of precautionary measures."

"The members of this Congress are strongly of opinion that in the public interest it is of the utmost importance that on the occurrence of every fire an investigation should be immediately made by an official, duly qualified and empowered to ascertain the cause and circumstances connected therewith, reporting the result of such investigation to a public department for tabulation and publication. The whole or part of the cost of such inquiry to be charged to the occupier of the premises where the fire occurred, as may appear desirable in the circumstances of each case."

"The Congress considers it of importance that volunteer fire brigade societies, associations, and unions shall henceforth encourage among the brigades affiliated to these bodies the study of questions of fire prevention."

The permanent International Council's Executive have received the addition of two Vice-Presidents, viz., Count Szcheney, President of the Hungarian Fire Brigades' Federation, and Mr. Edwin O. Sachs, Chairman of the British Fire Prevention Committee.

The Association of Professional Fire Brigade Officers held their meeting at Caxton Hall, Westminster, on Thursday and Friday during the Congress week. The first meeting was entirely devoted to matters of business, the second to papers. Among those participating in the discussions of papers were Mr. Edwin O. Sachs and Lieut.-Colonel Fox, primarily on the subject of "Water Damage." Mr. C. O. Paterson, of Glasgow, presided, and was supported by the Chief Officers of Liverpool, Manchester, Edinburgh, Birmingham and other large towns. The courtesies of the Congress were accorded to the members of the Association.

The preliminary meetings of the International Juries for the Society of Arts medals and for the Steam Fire-engine Section met at the Earl's Court Exhibition during the week, and numerous trials were carried out. Three of the 80 ft. long ladders tried were worked mechanically, and could reach the full height of 80 ft. in less than half a minute.

THE ARCHITECTURAL ASSOCIATION ANNUAL EXCURSION.

THIS year the scene of the annual excursion is in and around Worcester, with the headquarters at the Star Hotel in the Cathedral City. Twenty-two years ago the neighbourhood was visited by the Architectural Association, and many of the buildings seen then will again be noticed, but several places of interest are included in this year's programme which were not visited on the previous occasion.

The programme of the week is really not commenced until Monday morning, but several members arrive on the Saturday and Sunday previous from all parts of the country, and take the opportunity of becoming acquainted with the city and its immediate surroundings before the serious work of the week commences.

Worcester itself is well known and possesses many buildings of a good type, both ancient and modern, and well worthy of careful study, being full of interesting details valuable to an architect. Besides the cathedral, which is picturesquely situated on the banks of the Severn, there are twelve parish churches of varying interest, most of which have been rebuilt since the reign of Queen Anne in the style of the Renaissance. The Guildhall in the High-street is a red brick building of the same period.

On Monday morning, after a heavy rain during the night, which had the good effect of laying the dust in the roads and making the driving very pleasant indeed, a start was made about nine o'clock, and, after going through beautiful country for about an hour, Huddington Church and Court were reached. These buildings are in close proximity to each other and lie about 200 yards from the public road. The church, dedicated to St. James, consists of a chancel, nave and a south chapel. The former is of the sixteenth century and has a large east window of three lights. There are also the remains of an aumbry and piscina in the south wall of the sanctuary. The earliest woodwork in the church is the returned stall in the south side; this has the linen pattern carved on it, and is probably of the fifteenth century. On the north side of the chancel is a high pew, and this is peculiar from having in it two openings to command a view of the east end. The nave, the foundations of which appear to be of late thirteenth century—although there are signs of still earlier work, especially in the south doorway, which may be Norman. The three windows in the north side are of different types, and probably different dates; the westernmost is a simple lancet, while the easternmost, having lost its tracing, its exact original character cannot be ascertained. The font is octagonal, and of the fifteenth century.

The south chapel was probably the Chantry of the Cromlyns or Hodingtons, the original owners of Huddington. The arches between this chapel and the nave are of good character and very pleasing examples of fourteenth century work. In the mutilated capitals of the pillars there are signs of a former screen separating this part of the church from the nave. One of the most interesting features of the church is the north porch, which is made of oak, and very pleasing in its design. Three years ago this church was in a very dilapidated state, being, in fact, described by the late Bishop of Worcester as "the worst church in the diocese," but owing to the interest and energy of the present vicar, the fabric has been carefully restored to the condition in which we now find it.

Adjoining the church is the Court, the former home of the Hodingtons up to A.D. 1450, and from then until 1658 of the Winters, who were so conspicuous in the Gunpowder Plot. The house, which is entirely surrounded by a moat, is a fine old half-timbered one with a lower story of red bricks. The chimneys are of the same material, one in particular being octagonal in form and elaborately cut (see lithograph).

The whole building made a delightful composition and formed an excellent subject for a water-colour owing to the many rich and varied hues of the different materials which were so beautifully blended into one another. Internally there was little of interest, the house having been stripped of its ancient panelling and architectural adornments.

On leaving here, after a stay of two hours, a pleasant drive through undulating and well cultivated country brought the party to Mere Hall (see lithograph), which is a sixteenth-century house built of brick and half timber. The front has a succession of five small gables in the centre with two larger ones forming wings at either end, and an octagonal turret of poor design runs above the roof. The house has been recently painted on the outside in black and white, which gives it a very staring and hard appearance, the more so as in many cases the brickwork has been made to appear as half-timbered work by painting imaginary timbers upon it. The chief interest attaching to this house is the fine approach through an avenue of elm trees to the wrought-iron gates and enclosure forming the entrance court. At the outer angles of this are two corner summer-houses, each about 12 ft. square, built of brick and having ogee-shaped roofs covered with tiles with fairly heavy cornice and modillions under. Luncheon was partaken of here, being served in the garden adjoining the house, and altogether a very pleasant time was spent by the members of the excursion, whether they were inclined to sketch or not, the gardens being very bright and attractive, and containing some beautiful trees.

After this we started to drive to Westwood, the last visit on the programme for the day, which was reached about four o'clock. The mansion is an imposing mass of buildings placed on an eminence in a fine park, in the centre of plantations which radiate from the mansion with wide avenues between each. In front of the principal entrance is a gatehouse of brick with ornamental gables and pinnacles. It consists of a double lodge having in the centre an arched gateway over which is a massive structure of open timber work supporting an ogee and concave pyramidal roof. On the right and left of the gatehouse, and detached from it, are two square buildings with roofs of similar design. The house itself is a square block four stories high, with wings of the same height projecting diagonally from the four corners, each terminating in a square tower surmounted by a lofty pyramidal roof. These latter give a somewhat hard look to the building, and being such prominent features would probably have been more pleasing in appearance had they been similar in treatment to the roof of the gatehouse and detached square buildings previously mentioned.

On the ground floor is a large entrance-hall, with four bay mullioned windows of good size, the upper lights being filled with armorial bearings in coloured glass. The entrance-hall opens upon a large staircase-hall, with walls of great height, extending almost to the roof, and the length of the staircase corresponds with that of the house from N.E. to S.W. It is lighted by five large mullioned windows, and over the centre of the staircase on the second floor is a large gallery open at each end.

On the first floor is the saloon, a fine apartment, immediately above the entrance-hall. It is lighted with four lofty bay windows and the walls are hung with rich old tapestry. The fireplace and ceiling are both very elaborate, the latter being of an eighteenth century char-

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acter. Adjoining is a parlour, panelled to its full height in large bolective and moulded panels, with an enriched ceiling of excellent design. The very richly carved wooden chimney-piece, in the style of the later Renaissance, is a very beautiful example of its style, and was much admired by the members. The party were most hospitably entertained here to tea in the entrance-hall, the owner and his wife being most kind in showing them everything of interest in and about the house. The weather here changed for the better, the grey sky—rather threatening rain at times—which had prevailed all day, giving place to brilliant sunshine, which made a walk round the gardens and adjoining park very pleasant. The gardens here in former times were probably laid out in a formal manner, with wide terraces connecting the two square detached buildings on the right and left of the gateway; but this has all disappeared and given way to winding paths with pleasant lawns and shady nooks, all very delightful, but rather lacking in the dignity of style.

On Tuesday morning most of the members walked to the Fingate-street Station and took train for Great Malvern, arriving there a few minutes after ten, where brakes were in waiting to convey them to Eastington Hall, the first visit in the programme for the day, which was reached after a drive of about one hour and a quarter. This building is now a farmhouse, and a good specimen of a half-timbered dwelling of the fifteenth century. The oak roof of the dining parlour is most elaborately carved. The outside of the building is very picturesque with its many gables and chimneys, and there are many very suggestive details which would be applicable to the design of modern domestic work. The way in which the oriel window in the first floor is connected with the gable by means of a flying arch on to a drop from the bargeboard is very pleasing and uncommon, and gives a great touch of interest to the treatment of a feature of this nature. The bargeboards are of good proportion and elaborately carved.

The composition of the side elevation is very good, with its one projecting gable and massive brick chimney, the upper floor of the former projecting about 2 ft. over the stone wall beneath, and the whole being contained within a roof of one height with a continuous ridge, gives a breadth and restfulness rather wanting in the more broken-up treatment of the front.

The farm buildings are in close proximity to the house, and the whole arrangement, including, as it does, a picturesque dovecote, is very pleasing, and forms a group of buildings worthy of a place in an architect's notebook.

Luncheon was partaken of here, but before it was over rain had commenced, and set in very persistently, and looked very much like continuing for the rest of the day.

The drive to the next place—Birts Morton—was a very wet one, but members continued to look happy, possibly in anticipation of an afternoon spent indoors with some delightful panelling to note, and an instructive hour or two spent in measuring up the plaster ceilings which the house was known to contain.

On arrival at the house it was quite impossible to stay outside owing to the inclement weather, so that the anticipation of the drive was quite realised, with the result that the panelled room and ceiling were probably more sketched, measured and drawn, than they had ever been before.

The house is a timbered mansion of the sixteenth century, with the exception of the gateway, with its massive doors, which are probably of the later part of the fourteenth century. It is surrounded by a wide moat. A bridge conducts, under a lofty stone footway with embattled walls, to an open court. At the front entrance of the house there is a nail-studded, shuttered, yet original, oaken door. The principal hall is now divided by partitions into several rooms. The great dining parlour, wainscoted with carved oak, has an heraldic chimney-piece of fourteenth-century work, and around the room are emblazoned shields of numerous families. A fine banqueting-room on the other side of the Court, 50 ft. by 24 ft., to which there is an exterior stone staircase, is used now for a cheeseroom. The ceiling of this apartment is handsomely ornamented in plaster with the Tudor rose and fleur-de-lys in the compartments.

The church which adjoins is not of particular interest apart from its value in the effective grouping of the buildings generally. It has been restored by a previous vicar in a very unfeeling and uninteresting manner, and internally is quite disappointing.

Another very wet drive of about an hour's duration brought the party back to Malvern, where a stay was made at the Priory, this being the last visit arranged for the day. The church, formerly that of the Priory, is a large and handsome cruciform structure, a mixture of Norman and Perpendicular work with an elegant central tower somewhat resembling that at Gloucester Cathedral. It was probably built about 1080, and the nave with its low pillars and round arches is of that period with a perpendicular clearstory—a fifteenth century alteration, the tower also being of this date. The windows contain much excellent old painted glass, especially those in the south-east chapel, the six windows on either side of the choir, and the east window of the chancel. The building underwent an efficient structural alteration under the late Sir George Gilbert Scott, R.A., who is responsible for the flat lead roofs in place of the high-pitched ones, thereby rendering the whole length of the clearstory windows visible. The reredos was designed by the late Sir A. Blomfield, R.A. The carvings of the stalls are grotesque, and few churches possess such a number of encaustic tiles, which were made at a kiln in the priory under the superintendence of the monks. Upon removing the plaster and whitewash from the interior, it was found that the Norman portion of the walls was constructed of the local hill stone, the Perpendicular being of squared ashlar. The older work has been preserved and the exact line at which the fifteenth century rebuilding commenced, viz., a few feet above the nave arcade, may be readily distinguished.*

* To be concluded in our next.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS:

THE MIDSUMMER EXAMINATIONS.

THE Preliminary Examination, qualifying for registration as Probationer R.I.B.A., was held in London and various provincial centres on June 9 and 10. One hundred and ninety-eight candidates were admitted, and claims for exemption from sitting for the examination were allowed to the number of thirty-five. The remaining 163 candidates were examined with the following results:—

District.	Examined. Total	Passed.	Relegated.
London	82	56	26
Birmingham	9	7	2
Bristol	13	7	6
Cardiff	4	4	0
Glasgow	3	3	0
Leeds	14	11	3
Liverpool	10	8	2
Manchester	21	16	5
Newcastle	7	5	2
	163	117	46

The passed candidates, with those exempted—numbering altogether 152—have been registered as Probationers. The following are their names:—

J. C. Ainsworth, Newton Moor, Hyde; V. Aldridge, Chigwell, Essex; J. G. Allen, West Hampstead, N.W.; A. S. Ash, Far Headingley, Leeds; S. Ash, High Fell, Gateshead; A. R. Ashby, Basingstoke; G. B. Badlay, Leeds; C. R. Bawden, Carshalton; G. W. H. Bean, Hull; A. Beck, Newcastle-on-Tyne; A. E. Beswick, Swindon; J. G. Birch, B.A.Oxon, Chester; R. H. Blackburn, Manningham, Bradford; A. A. Blair, Douglas, Isle of Man; G. P. Bowie, Balham, S.W.; H. E. Brace, Forest Hill, S.E.; H. H. Bradfield, Clapham Common; G. S. H. Bradford, Bray, Co. Wicklow; T. M. Bricknell, Shepherd's Bush, W.; H. Bromley, Folkestone; A. W. G. Brown, Edinburgh; A. H. Brownrigg, East Dulwich, S.E.; H. A. Buck, Acton, W.; C. C. Burrage, Eastbourne; P. Caminesky, Cheetham, Manchester; E. J. Cartaar, Kew Green; R. J. Casement, West Hampstead, N.W.; H. W. Chapman, London; H. L. Charles, Hereford; R. R. Christien, Farnworth, near Bolton; C. W. Clark, Plymouth; J. P. Clark, Tipton, Staffs; F. J. Coghlan, Cheltenham; B. H. Collcutt, Oxford; R. S. Cooper, St. Leonard's-on-Sea; G. A. Cope, Derby; C. W. Cope-Proctor, Clifton, Bristol; J. W. Corney, Settle; A. N. Cotterell, Bristol; R. C. Coulson, Denmark Hill, S.E.; C. Coxall, Chelsea, S.W.; A. Crampton, Southport; W. H. Crauford, Finsbury Park, N.; A. Cunningham, Chelsea; W. W. Cunningham, Glasgow; C. E. Curphey, Douglas, Isle of Man; W. A. Daft, Lenton, Nottingham: H. A. Dalrymple, Edinburgh; P. Dalton, Birkdale, near Southport; E. G. Dawson, Barking; R. A. Dixon, Birmingham; L. J. Dolman, Repton, near Burton-on-Trent; J. Dovaston, Ealing, W.; G. E. Dunnage, Chelsea, S.W.; H. B. Elkington, Bournemouth; H. A. Fairhead, Enfield; W. A. Fiddaman, South Norwood Hill, S.E.; E. W. Filkins, St. Mary Cray, Kent; C. H. Fry, Ipswich; H. B. Gilbert, Reading; S. L. Gilks, Putney, S.W.; F. H. V. Gorely, Sittingbourne, Kent; W. S. Gorringe, Seaford; L. W. Green, London; W. Guthrie, Chelsea, S.W.; E. G. Hallam, Southport; W. G. Halliday, Cheadlehulme, Stockport; G. J. Hands, Olton, Birmingham; D. L. Harley, Bythorne, Blantyre; W. H. Harral, Leicester; D. Harvey, Hull; R. E. Haymes, Leamington; J. B. Healing, East Dulwich Grove, S.E.; A. G. Henderson, Glasgow; N. H. Heppenstall, Milnsbridge; A. L. Higgins, Bradford; H. U. M. Higgins, Highgate, N.; A. D. Holder, Hull; P. Holgate, Darwen; F. E. Ingham, Rhyl; L. L. G. Jeeves, Canonbury, N.; A. H. H. Jenkins, Blackmill, near Bridgend; L. F. Jones, Mitcham; N. Jones, Southport; A. Kay, Pendleton; O. H. Kennedy, London; W. Kerr, Putney, S.W.; F. C. King, Cuttra, co. Down; P. C. Lain, London; M. Leybourne, South Shields; J. Lindley, Manchester; J. Littlewood, Manchester; S. G. Livock, Norwich; F. L. Lloyd, Swindon; R. E. McDonnell, New Ferry, Cheshire; J. McNicol, Stockton-on-Tees; C. C. Makins, Harrow; C. B. Maltby, Southfields, Leicester; L. Mansfield, Tunbridge Wells; K. W. Matheson, Clapton, N.E.; M. D. Mattinson, Weaste, Manchester; T. S. Nash, Plumstead; E. J. Norman, Tonbridge, Kent; G. Nott, Leicester: H. E. Owen, Menai Bridge; C. L. Pace, Didsbury; A. S. Padfield, Cardiff; J. Park, Leeds; B. L. Parry, Poulton-le-Fylde, Lancashire; A. F. Pelling, Durham; J. T. Penfold, Hammersmith, W.; A. W. Phillips, Swansea; A. F. E. Poley, Hampton Hill, Middlesex; J. Pollard, jun., Blackburn; J. A. Quittenton, Warlingham; H. B. Richards, Glasgow; W. H. Riley, Leicester; H. Rippon, Tufnell Park, N.; T. L. Roberts, Wimbledon; B. H. T. Rodd, Feltham; L. H. Ross, Aberdeen; A. F. Royds, Brentwood; A. Rusbridge, Reading; J. R. Shephard, Hull; E. Shorten-Stearn, Ipswich; A. Sickelmore, Shepherd's Bush, W.; C. H. Smith, Mapperly, Nottingham; H. S. Spain, London; M. E. Stahl, Weston-super-Mare; T. Temple, Edinburgh; C. S. Thomas, Neath, S. Wales; A. G. W. Tickle, Kensal Rise, W.; E. F. Tomlins, West Hampstead, N.W.; F. Travis, Lytham; J. S. Turner, Blackheath, S.E.; G. S. Twizell, Newcastle-on-Tyne; H. Vause, Whitby; S. S. Waghorn, Upper Holloway, N.; L. W. Walton, Nottingham; A. S. West, Harrogate; A. Wheatley, Barnsley; V. S. Whitaker, Burnley; J. P. White, Bedford; W. Whitehead, Leeds; E. S. Whitney, Wandsworth Common, S.W.; D. Whittaker, St. Helens, Lancs.; C. W. Wood, London; E. L. Wright, West Bridgford, Nottingham; H. L. Wrigley, Wollescote Lye, near Stourbridge; R. S. B. Wyld, Muswell Hill, N.; W. B. Wyllie, London; S. A. S. Yeo, Exeter; J. G. Young, Ashburn, Alloa, N.B.

The Intermediate Examination, qualifying for registration as Student, R.I.B.A., was held in London and the undermentioned provincial centres on June 9, 10, 11, and 12. One hundred and nineteen candidates were examined, with the following results:—

District.	Number Examined.	Passed.	Relegated.
London	87	34	53
Bristol	5	3	2
Glasgow	4	3	1
Leeds	10	5	5
Manchester	13	5	8
	119	50	69

The passed candidates, who have been registered as Students, are as follows, the names being given in order of merit as placed by the Board of Examiners:—

J. T. Halliday, Oldham; J. Reid, Dalmarnock, Glasgow; J. H. Markham, London; W. H. Bagot, London; W. P. Rylatt, Hull; B. Brown, Bradford; L. Wilkinson, West Ealing, W.; V. G. Santo, Bromsgrove; H. F. Saxelbye, Hull; G. H. Williams, London; G. E. Phillips, Cambridge; W. K. McDermott,

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Borough Green, Kent; C. R. Pinsent, Hampstead, N.W.; N. O. Searle, Clapham Common, S.W.; L. S. Crosbie, Brixton, S.W.; A. Hill, Huddersfield, J. C. Proctor, Benrhydding, Yorks; S. Searle, Harrow; J. W. Farmer, South Woodford, Essex; L. S. Sullivan, London; D. B. Jenkinson, Kimberworth, Rotherham; R. E. Hastewell, Haltwhistle; S. Moss, Eccles; S. W. Hill, Finsbury Park, N.; H. S. Morran, Plumstead, S.E.; H. H. Whittington, Buckhurst Hill, Essex; D. Milne, Dundee; E. J. Dod, Birkdale, Southport; W. C. Lemaitre, London; D. M. O'Connor, B.A., B.E., Brook Green, West Kensington; W. P. Marr, Kingsbridge, South Devon; J. Smith, Glasgow; H. C. Hollis, London; S. Burgoine, London; C. E. Clouting, Cambridge; A. F. H. Daniel, Henbury, Glos.; H. H. Earnshaw, Manchester; C. W. Eaton, Leicester; W. H. Evans, Southampton; J. L. Henderson, Edinburgh; W. H. Hillyer, Shortlands, Kent; P. H. Keys, Harringay, N.; L. A. Phillips, Newport, Mon.; H. P. Roberts, Fulham, S.W.; H. S. Scott, Handsworth, Birmingham; W. J. Stenner, Bristol; C. Stonehouse, Blackburn; E. G. Walker, Upper Norwood, S.E.; R. F. Wheatly, Bromley, Kent; A. W. Wilson, Peterborough.

The Final and Special Examinations, qualifying for candidature as Associate R.I.B.A., were held in London from June 26 to July 3. Of the fifty-five candidates* examined, twenty-two passed, and the remaining thirty-three were relegated to their studies. The successful candidates are as follows:—

E. P. Archer, Finchley, N.; O. M. Ayrton,* London; H. A. Battley, London; T. J. Bee, Sidcup, Kent; H. T. Bill, Birmingham; H. Black, Notting Hill, W.; W. A. T. Carter, Bayswater, W.; G. Church, Warlingham; J. D. Clarke,* Notting Hill, W.; W. E. Couch, Bayswater-road, W.; P. B. Dannatt, Blackheath, S.E.; H. E. Davey, Denmark Park, S.E.; R. R. Gall, Aberdeen, N.B.; J. Green, Handsworth, Birmingham; T. F. Green, Cricklewood, N.W.; E. M. Joseph, London; A. E. Lacey, Ashford, Kent; T. E. Richards, Barry, South Wales; T. Simpson,* London; H. B. Smith, London; S. Warwick, North Kensington, W.; R. Wylie, Gateshead.

The following table shows the number of failures in each subject of the Final Examination:—

I. Design	22
II. Mouldings and Ornament	25
III. Building Materials	13
IV. Principles of Hygiene	14
V. Specifications	11
VI. Construction, Foundations, &c.	12
VII. Construction, Iron and Steel, &c.	13

THE ROYAL INSTITUTE OF PUBLIC HEALTH:

CONGRESS AT LIVERPOOL.

THE annual congress of the Royal Institute of Public Health was opened at Liverpool on Wednesday, the 15th inst., the Earl of Derby, who was appointed President of the Congress, delivering a brief inaugural address in one of the concert rooms of St. George's Hall. The Lord Mayor of Liverpool, who presided, having welcomed the members and introduced the Earl of Derby, the latter was invested by the President of the Royal Institute (Professor W. R. Smith) with the badge of office, and presented with a diploma of Fellowship of the Royal Institute of Public Health. Lord Derby subsequently delivered an extempore address. He said it might be humbling to our pride to be told that we were not the people who first discovered the importance of cleanliness and fresh air as necessary factors in the preservation of health. The Mosaic law laid down a complete set of camp sanitary regulations which might be applied with advantage to the sanitation of modern cities. The structures of the Romans equalled if they did not surpass those of the town builder in these days of competitive contract, and the Roman workman, no doubt, was as well acquainted with the art of scamping if not well looked after as his most modern compeer. Contrasting the condition of towns in the Middle Ages with modern cities, he said there had been all over England an awakening of municipal life and a desire on the part of those who controlled affairs to do their duty to the poorest classes of the people by making the conditions in which they lived as favourable as possible to life and health. Open spaces, good drains, good water, and pure food were held by them to be paramount conditions to be secured to all. In a great seaport like Liverpool many would still remember the old sailing ships—emigrant ships—taking months on their voyage, and contrast the conditions prevailing then and now. Scurvy had practically disappeared, and ships were now well lighted, well ventilated, and carefully regulated. Much of the progress realised had been due to conferences and congresses like the one which they were opening that day, and he hoped the enormous evils still existing would in time disappear from our own and from every country through the interchange of opinion on great scientific questions.

The programme of subjects for discussion was a very lengthy one, the papers being considered in nine sections, including one for ladies, which sat on Thursday, Friday, Monday, and Tuesday, in various lecture rooms of University College. The first section sat on Thursday and Friday last week to consider the question of the

Rehousing of the Poor.

Dr. James Niven (M.O.H., Manchester) first read a paper on "Rehousing the Poor on the Outskirts of Large Cities," with special reference to Manchester; then followed Dr. Spottiswoode Cameron, with a paper having special reference to the scheme being carried out by the Leeds Corporation, the series closing with a paper on the "Housing of the Dispossessed at Liverpool," by Mr. F. T. Turton, Deputy Surveyor of Liverpool. There was a large attendance of delegates of local authorities.

Mr. Austin Taylor, M.P., President of the Section, gave an inaugural address. The section would occupy itself not with the housing problem as a whole, but with the rehousing of the dispossessed, which was the acutest phase of the problem. In rapidly-growing towns areas not now overcrowded might in a few years become so. What was now the fringe might ultimately become the centre of a great city. The German practice was one we might do well to follow. The municipal authorities in Germany had plans carefully prepared beforehand for opening out for building purposes as much of the land surrounding a growing town as might be required for building sites in ten, twenty, or thirty years, and power was given to town Councils to either incorporate the adjoining districts, or to call upon the authorities controlling them to co-operate with town councils in preparing or enforcing plans. He would propose a three-mile limit outside the existing boundaries of growing towns, within which such controlling powers should be given as would enable the municipality to control the general plan of new streets, the preservation of trees, and the style of frontages to all main thoroughfares. Powers were given under Part 3 of the 1890 Act to purchase land for development purposes, but they were obliged to earmark the grants for specific purposes. If the authorities were permitted to vary the purposes as necessity arose in new suburbs for cemeteries or parks instead of buildings, much of what we are now suffering from would be avoided to the benefit of future generations. Every municipality which had to deal with congested districts should map out its work for twenty years in advance, and proceed on a connected system. The difficulties met with in dealing with congested areas would be greatly lessened by simplification of procedure, more favourable financial facilities, relaxing building regulations, and the rating of vacant sites on their capital value. In concluding his address, the President expressed a hope that the recommendation of the Select Committee of the House of Commons in favour of an extension of the term for the repayment of loans to eighty years for buildings would soon be embodied in law.

Dr. Niven (Manchester) said the question of overcrowding was always a very difficult question to deal with. It was difficult for a municipality, upon which the duty of helping the movement of populations outwards devolved, to know when it was best to act, or when to decline to interfere with private enterprise. Cheap and rapid transit must be provided in order that as many as possible of the poorer working-class families might find in outlying districts those conditions of cleanliness, with sanitary surroundings, air space, and light, which were not to be found in central situations. The development of electric trams had greatly facilitated the movement outwards. In Manchester they had been gradually getting rid of back-to-back houses, of which, in 1885, they had 8,000. In different parts of the city they had dealt with 5,000 houses. Five blocks had been turned into model lodging-houses, and the sites of three condemned rookeries had been turned into open spaces. The aggregate effect had been a great movement outwards. After referring to bold and judicious schemes in progress at Liverpool, and the splendid achievements of Messrs. Lever Bros. at Port Sunlight, the Association of Garden Cities, and in the village of Bournville, in providing convenient and sanitary houses at rents of from 3s. 6d. to 5s., 5s. 6d., and 6s. according to the number of rooms, Dr. Niven gave interesting details of the scheme which the Manchester Corporation is carrying out at Blackley, a northern suburb of Manchester. They had purchased an estate of over 230 acres, including 50 acres to be let as allotments for cultivation. On the estate they would put up 150 dwellings, besides fifty-three not of the poorest class, the latter providing models to be followed by private builders. The land was purchased for 150*l.* per acre, which worked out at 7⅞d. per square yard. The Blackley estate was served by two electric tramways which gave a rapid and convenient service. The dwellings were of five types, some which the committee were erecting on a new main road being intended for artisans—not of the poorest class. The scheme, when completed, would include shops, schools, churches, and other institutions as at Port Sunlight, but further powers would have to be obtained to enable the Corporation to provide these features. The scheme was not sufficiently advanced to formulate general conclusions, but it had already had the effect of inducing many families of the labouring class to move outwards.

Dr. Spottiswoode Cameron's paper explained the procedure to be followed under the different parts of the 1890 Act, and detailed the attempts made by the Leeds Corporation to carry out the provisions of the Act. They had experienced difficulties in going before the Local Government Board and in dealing seriatim with small portions of insanitary areas. The moment a partial improvement had been effected the purchase price of the rest of the insanitary area was put up. This had compelled them in certain cases to try to improve instead of demolishing back to back houses. After many hard fights before Committees of Inquiry and both Houses of Parliament, they had at last got command over the whole of one insanitary site of 66 acres at the cost of 300,000*l.* They proposed to open out new and wider streets and gradually to rebuild the whole property. In the meantime, while providing new houses they were loopholing the worst back to back houses to make them more habitable, in order to avoid dishousing tenants more rapidly than they could provide for them new and better dwellings.

Mr. F. T. Turton's paper dealt with the Liverpool scheme by which they provided beforehand for the families they were about to dispossess. Out of 22,000 insanitary houses existing in 1864, when a local Act was obtained, the Corporation had demolished about 8,000, while 4,000 had been demolished for trade and other purposes, and 9,000 remained to be dealt with. The majority of these houses were of the back-to-back construction, with no through ventilation, and only one sanitary convenience to about five houses. The death rate varied from 35 to 65 per 1,000. The cost to the Corporation of these demolitions so far had been about 400,000*l.* On land sold to builders about 800 houses had been erected; but the rent of these builders' houses was more than double that of the houses which were demolished. In Liverpool the average wage-earning capacity of a whole family occupying an insanitary house did not exceed 15s. a week, and very often fell far short of this, while the rents varied from 2s. to 4s. a week. He said it would probably surprise many present to know that some of the tenements had only one room. In Liverpool this was absolutely necessary to pre-

* Six of these candidates entered for the Special Examination, which is for architects in practice not less than twenty-five years of age, and chief assistants over thirty. Candidates are exempted by special resolution of the Council from the Preliminary and Intermediate Examinations and from submitting "Testimonies of Study." These special candidates passed; an asterisk is prefixed to their names in the above list.

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vent the sub-letting of private houses, which was so difficult to control. The financial loss represented one-third of a penny in the pound a year on the rates. If the total results to the municipality were considered, however, the balance would be on the right side.

The discussion on the three papers was opened by Mr. Perry (Dublin), who said that in Ireland they had the greatest difficulty in getting a closing order from a magistrate in the worst cases, because magistrates seemed to take but little interest in the public health. The poorest class had to pay comparatively the highest rents. It was generally from 2s. 6d. to 3s. per room. In order to alleviate the difficulties of the poor, the Dublin Council had introduced the plan of allowing a reduction in the rates by 50 per cent. in certain cases in artisans' dwellings, but the practice was stopped because the Local Government Board threatened to surcharge the Council with the amounts so allowed. It would be a great advantage if they could collect the poor rate. It was very difficult to get rent from poor people when out of work. The slum landlord, on the contrary, was more easy with tenants out of work, and would often wait for his rent until the tenant got work again. To give Local Authorities some latitude might often be advantageous.

Mr. Councillor Colton (Chairman of the Liverpool Housing Committee) said the Committee believed it had got to the bottom rock of this matter in resolving to provide only for the rehousing of the poor who had been dispossessed. They considered that London, Glasgow, and other large towns were providing for the wrong class of tenants. With 9,000 houses still to deal with the prospect was certainly appalling, but not without hope. They had proved that in many cases they could wean the working-man from the habit of going to the public-house, where he went often to avoid the discomforts of home—and no wonder. When he had got a clean, attractive home, instead of being found at the public-house, he was found at home at night, sitting at his own fireside. The multiplication of decent houses must give practical results. They did not intend to build houses that private enterprise could build. The Council saw the importance of this policy from the health point of view, and now pass unanimously in a meeting of 100 members proposals which formerly led to terrific debates.

Alderman Coe (Halifax) said he was greatly interested to learn of the success Liverpool had met with in providing for the dispossessed poor. He wished he could say the same of Halifax. They were all agreed that slums should be got rid of. In Halifax they had an unfortunate experience in trying to carry out the 1890 Act. They cleared off certain slums and got into nice trim, when they applied to the Local Government Board to sanction the outlay of the money they had actually spent. They were rebuked, but they could not feel very guilty, believing that the end justified the means. Then they presented new plans, and the Chairman of the Local Government Board said they could not pass them. They included one-tenement houses, which could never be allowed. He replied, that they required such houses and did not want 12*l.* houses. Were they to be forced to build houses they did not want? They would rather let the land remain as it was. The plans did not pass, added the speaker, we did not build, and the land is empty to-day. The Local Government Board does not know our requirements as well as we do. Municipal authorities ought to be allowed to judge for themselves.

Mr. Reeves, representing a Liverpool ratepayers' Housing Association, said the ratepayers desired the Corporation to build houses in the outskirts. This was impossible while they spent 1,000,000*l.* not in housing, but in dehousing. They had pulled down whole districts, and still had 9,000 insanitary houses left. They had not provided for 25 per cent. of those dispossessed. The losses of the Corporation arose from dehousing instead of housing. They desired the Corporation to build houses for good-paying tenants, and to leave old property alone.

Mr. Baillie Brown (Edinburgh) said that the experience of Edinburgh, as of other large cities, showed that the Act was intended to give a lift up to the inhabitants of slum properties—the lower stratum of society. In Scotland they believed municipalities had nothing to do with building property for workmen in receipt of good wages. The Liverpool Housing Committee was working on safe lines, and the ratepayers were not likely to find fault. The Greenside area in Edinburgh had the reputation of being a plague spot. They sent the medical officer of health, the sanitary inspector, and the surveyor to find out the worst spots, and then, like Leeds, they cleared them out little by little. They took a leaf out of Liverpool's book and obtained land at 5d. per foot, and were thus able to give houses to the very poor at rents they could pay. They found it necessary to provide one-roomed houses, and 50 per cent. of their new houses would have only one room, but with a separate water-closet to each. There ought to be a standard for one-roomed houses. They in Scotland spoke of a one-roomed house of 1,000 cubic capacity.

Councillor Tolson (Exeter), Councillor McGuffie (Liverpool), and Mr. Collins (Gillingham, Kent), continued the discussion, which was adjourned after a resolution had been adopted recommending the Committee to urge the speedy passing into law of the recommendation of the Select Committee in favour of the extension of time for the repayment of loans for buildings under the 1890 Act to a period of eighty years.

Engineering Section.

Professor Hele-Shaw (University College) presided in section 6 in place of Mr. G. F. Deacon (formerly City Engineer of Liverpool), who was prevented from attendance by serious illness in his family. Professor Hele-Shaw, after asking the section to express its sympathy with their President-elect, referred to the remarkable reports of fifty years ago of a former Borough Engineer (Mr. James Newland), which outlined almost all the developments of progress in Liverpool, particularly in regard to the paving of the streets and the construction of sewers, which had been carried out by his four eminent successors. The present mileage of roads was 456 miles, and of sewers 820½ miles, the cost for sewerage works since the passing of the Public Health Act (1875) being 499,000*l.*, for road pavements 1,460,000*l.*, and for new streets and widening of existing streets 1,893,164*l.* The original horse tramways had been turned into electric tramways, which now comprised a total of 100 miles, radiating in all directions from the centre to the suburbs. The total cost had been 1¾ millions sterling.

Great attention had been paid to baths and washhouses in Liverpool which, as far back as 1794 (according to a paper prepared for the section by the Liverpool baths engineer) possessed baths for those who could afford to pay for them. The Corporation had twelve large, complete, and fully-equipped baths in various parts of the city, all containing swimming baths, the majority slipper, vapour, and douche baths, and two had covered gymnasia in connexion with them. A novel description of baths called People's Baths, the first in the United Kingdom, had been established for the working classes, of which Mr. Court's paper spoke as the "cleansing baths of the future." Compared with the ordinary slipper bath, says Mr. Court, they occupy but half the space, consume less than half the water, and in a given time bathe twice the number of persons. By the tonic effects of the spray and shower employed in the "People's Baths," the bathers left cleansed, refreshed, and strengthened.

Without including the Corporation's great outlay for providing water, amounting in the aggregate to over 5,000,000*l.* for works covering in all an area of 100 sq. miles, the expenditure in the City Engineer's Department alone had amounted to 2,500,000*l.* during the past five years. Great as these sums seemed, the President thought no public expenditure brought a better return to the people at large or could be more thoroughly justified.

Professor Hele-Shaw appended to his Presidential address a summary of a paper by himself, "Traction on Road Surfaces," in which he described the results of an original investigation of the phenomena of road resistance for various loads and forms of wheels. The experiments proved that there were laws relating to the resistance of wheels, which in time would be completely known.

Mr. Cooper and Mr. Molyneux (Assistant City Engineers) followed with papers on the "Construction and Maintenance of Carriageways" and on "Mechanical Road Vehicles for Public Works." The first paper dealt with the methods of construction and the materials employed in the various kinds of roads made in Liverpool, and the second reviewed the developments that had taken place in the seven years that had passed since traffic by self-propelled vehicles had been legalised in towns. Mr. Molyneux had come to the conclusion that the use of motor vehicles, particularly for watering the streets, removal of refuse, and other municipal work, might with advantage be extended. A considerable saving would be realised as compared with horse haulage. He advocated the increase of the maximum limit from three tons to four tons in the new Motor Bill.

Mr. Weaver, President of the Association of Municipal and County Engineers, was called upon to open the discussion. He hoped they would be able to obtain beneficial results from the experiments described in Mr. Cooper's paper, but his own quite recent experience was not of the most favourable character. The noise in the street adjacent to the bedroom he had occupied the previous night, was incessant until about two in the morning, and it began again at five; thus he had been able to get only three hours sleep. Could not Mr. Brodie (City Engineer) think of something to reduce the noise on the carriageways? Could he not get some less noisy material as a covering above the clinker and asphalt that would form a good substitute for boulder-paving? With regard to oiling the roads, a system which had been tried at Aldershot, they had come to the conclusion that oiling kept down the dust, but made it very troublesome to keep the roads clean. It was very disheartening when they had got a good road to have some company or corporation coming to knock it to pieces. They could never fully restore it. With regard to mechanical vehicles, their introduction, if we could get rid of horses, would be one of the greatest boons and blessings for every town. Their experience of motor attendants was very discouraging; they were very aggravating at times. But these were evils that time would cure. When they recollected the drawbacks attending the introduction of bicycles and the way in which they gradually got over all difficulties, they could not but be hopeful.

The discussion was continued by Mr. Brownridge (Birkenhead), Mr. Brown (St. Helens), Mr. Stewart (Glasgow), Mr. Ebbetts (Acton), Mr. Hirst (Southport), and other speakers, Mr. Cooper and Mr. Molyneux subsequently replying to the criticisms offered.

Professor Boyce introduced a discussion on "Sewage Effluents and the Construction of Filter Beds." The discussion was long sustained, the following being the chief speakers taking part in it:—Messrs. Ebbetts (Acton), Shand (Cuckfield), and Bell (Glasgow), Professor Boyce replying. A paper by Mr. Court on "Baths Engineering," and one by Mr Brodie (City Engineer of Liverpool) on the "Utilisation of Destructor Products," were taken as read, and the proceedings concluded with a vote of thanks to Professor Hele-Shaw.

Emergency Hospital Construction.

In Section 2, over which Sir Michael Foster presided on Friday last week, a paper on "Hospital Construction" was read by Mr. T. Shelmerdine, City Surveyor, Liverpool. The author discussed, from the architect's point of view, the measures to be adopted on the sudden outbreak of epidemic disease in a large city. Presuming that the ordinary hospital accommodation would be found insufficient, that the outbreak was of a contagious character, and that beds required to be multiplied as rapidly as possible, the architect charged with providing the emergency accommodation would have to consider speed as well as economy in carrying out his arrangements. He would also endeavour to secure that, when the work was completed, the interior arrangements should compare favourably with those existing in a permanent hospital. As rapidity of construction was the most important factor, the life of the construction would be of less importance than usual, yet he had found in his experience of this class of hospital construction that a life of thirty years might be attained. The foundations, drainage, floors, and roof must be as substantial as in a permanent structure, and the cost of construction of an emergency hospital would appear to be relatively high. In the case of the hospital referred to, which showed after thirteen years very little sign of real wear, the comfort and surroundings from the patient's point of view were as good as those of permanent structures

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The buildings being of one story reduced the danger of fire to a minimum.

The reading of other papers followed, and the Section adjourned.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday at the County Hall, Spring-gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend Chelsea Borough Council 2,300*l.* for purchase of site for dwellings; Lambeth Borough Council 10,000*l.* for paving works; Camberwell Borough Council 1,862*l.* for housing purposes; and Woolwich Borough Council 8,500*l.* for the erection of lodging-houses for the working-classes. Sanction was also given to the following loans:—Woolwich Borough Council, 10,000*l.* for erection of town hall; Lambeth Borough Council 7,428*l.* for wood paving works; Fulham Borough Council 37,138*l.* for various purposes; and Hampstead Borough Council 16,6000*l.* for paving works.

Proposed Technical High School for London.—A long debate took place on the following recommendations of the Joint Committee of the General Purposes Committee and the Technical Education Board, appointed to consider the proposal contained in Lord Rosebery's recent letter to the Chairman of the Council as to the provision in London of further opportunities for advanced technological teaching and research:—

(*a*) That the Council expresses its high appreciation of the important proposal contained in Lord Rosebery's letter, and would cordially welcome the establishment of further provision in London for advanced technological teaching and research.

(*b*) That the Council, in response to the request contained in Lord Rosebery's letter, places on record its opinion that, when the land, buildings, and equipment for the proposed additional technological teaching and research are provided to a value of not less than 500,000*l.*, the Council will be well advised to contribute, out of the moneys annually placed at its disposal under the Local Taxation (Customs and Excise) Act of 1890, a sum not exceeding 20,000*l.* per annum, towards such part of the work as falls within the statutory definition of technical education, subject to the following conditions:—

(i.) That a scheme be prepared to the satisfaction of the Council, for the constitution of the governing body, and the adequate representation of the Council thereon.

(ii.) That financial arrangements, adequate to the whole maintenance of the proposed work, are made to the satisfaction of the Council.

(iii.) That, in view of the national scope and utility of the proposed work, substantial contributions towards maintenance be made from funds of a national character.

(iv.) That due provision be made in the scheme to prevent overlapping and secure co-ordination of the work already carried on by the university colleges, polytechnics, and other science and technological institutions; and the proper connexion of the whole with the University.

(v.) That a sufficient number of scholarships, including free places, be placed at the disposal of the Council.

(vi.) That it be considered whether other counties and boroughs should not be invited to contribute towards the maintenance, receiving in return the right to send their picked scholars for instruction under the proposed scheme.

Mr. Beachcroft asked if they had any definite grounds for the belief that they could obtain four acres in South Kensington free of cost.

Mr. Cornwall replied that Lord Rosebery was one of the Commissioners of the 1851 Exhibition, and he took it that he had grounds for making the statement.

Mr. Sidney Low pointed out that this was an important matter, because four acres would not be sufficient for the purpose.

Mr. Sidney Webb pointed out that this site was surrounded with educational Institutions, and the four acres would be all that was required for the supplementary buildings.

The recommendations were ultimately adopted.

Thames Steamboat Service.—The Rivers Committee recommended, and it was agreed, "That the Council do seek for powers in the next Session of Parliament to acquire, take over, and administer the river piers and landing-stages on the River Thames, to construct additional piers and alter the location of the piers from time to time, and to establish an efficient steamboat service on the river."

New Tramways.—A long Report of the Highways Committee was submitted, which concluded with the following recommendations:—

That application be made in the next session of Parliament for powers for the construction by the Council of new tramways, and the reconstruction and doubling of existing tramways, as follows:—

1. Hampstead-road (tramways terminus), across Euston-road and along Tottenham Court-road, to a point near Oxford-street.

2. Westminster Bridge-road (L.C.C. Tramways terminus), viâ Westminster Bridge, Victoria Embankment, and the subway authorised by the London Council (Subways and Tramways) Act, 1902, to join the authorised tramways north of the Strand, with a connexion between the new tramways and the existing tramways at Lambeth Palace-road.

3. Southwark-street (L.C.C. Tramways), at Hop Exchange-corner, viâ Southwark-street, Stamford-street, and York-road, and across Westminster-bridge-road, to Lambeth-palace-road (authorised L.C.C. Tramways).

4. Waterloo-road (L.C.C. Tramways terminus), along that road, to a point opposite the York Hotel.

5. Goose-green, Camberwell (authorised L.C.C. Tramways), viâ East Dulwich-road and Peckham-rye, to the junction of Hall-road and Stuart-road, Peckham.

6. Trafalgar-road, Greenwich (L.C.C. Tramways), viâ Blackwall-lane and Blackwall-tunnel, to the Council's (Northern) Tramways in East India-dock-road.

7. Shepherd's Bush-road, viâ Westwick-gardens (up line), Netherwood-road (down line), Richmond-road, Holland Park-avenue, High Street, Notting Hill, and Bayswater-road, to a point near the Marble Arch.

8. Edgware-road, from a point near the Marble Arch, along that thoroughfare, to the county boundary at Cricklewood.

9. Battersea Park-road (L.C.C. tramways), viâ Battersea Bridge-road, Battersea Bridge, and Beaufort-street, to a point near King's-road, Chelsea.

10. Clapham Common, south side (L.C.C. tramways), viâ Clapham Common, Battersea Rise, and Wandsworth Common, north side, to East Hill, Wandsworth.

11. Streatham High-street (L.C.C. Tramways terminus), viâ Streatham High-road to the county boundary, with the down line viâ Gleneldon-road, Bournevale-road, and Stanthorpe-road.

12. Tooting High-street (authorised L.C.C. Tramways), viâ that thoroughfare, to the new county boundary.

13. Lordship-lane (authorised L.C.C. Tramways), from its junction with Crystal Palace-road, viâ Lordship-lane and London-road, to Dartmouth-road, Forest Hill.

14. Lewisham High-road (proposed tramway No. 15), viâ Malpas-road, Brockley Rise and road, Stanstead-road, and Sunderland-road, to Park-road, Forest Hill.

15. New Cross-road (L.C.C. Tramways), viâ Lewisham High-road, Loampit Hill and Vale, and Lee High-road, to Lee Green.

16. Deptford (L.C.C. Tramways), viâ Blackheath-road and Hill and Shooter's Hill-road, to the Herbert Hospital, Woolwich.

17. Reconstruction and partial doubling of the tramways of the Woolwich and South-East London Tramways Company, from Beresford-square, Woolwich, viâ Plumstead-road, to the terminus in High-street, Plumstead; and construction of new tramways thence, viâ McLeod-road, Basildon-road, and Knee Hill, to the county boundary, near Abbey Wood railway station.

18. Doubling of existing L.C.C. Tramways from London-street, Greenwhich, viâ South-street, Lewisham-road, and High-street, Lewisham, to the terminus at Rushey Green.

The recommendations were all adopted.

Improvements.—The Improvements Committee submitted their Report on the proposals for improvements, for which it was suggested that application should be made to Parliament next Session. The Committee stated that the total net cost to the Council of the suggested county improvements was estimated at 456,534*l.*, after deducting the contributions from the local authorities. If there be added to this an amount in respect of contributions towards the cost of local improvements, say 100,000*l.*, the total amount recommended for the year 1903-4 became 556,534*l.* This was less than the annual amount recommended in some of the previous years. If the Council adopted the Report in its entirety, the net amount voted for street improvements during the fifteen years commencing March, 1889, and ending in March, 1904, would be about 7,875,948*l.*, which represented an average annual vote of about 525,060*l.* The following are the proposals:—

(*a*) Richmond-road (Shepherd's Bush-road to Marble Arch).

(*b*) Edgware-road, High-road, Kilburn, and Shoot-up-hill (Marble Arch to Cricklewood).

(*c*) Battersea Bridge-road (Battersea Park-road to King's-road, Chelsea).

(*d*) Wandsworth Common, north side, and East Hill (Clapham Common to East Hill).

(*e*) Streatham High-road (Streatham Hill to the county boundary).

(*f*) Malpas-road, Brockley-road, Brockley-rise, Stanstead-road, and Park-road (Lewisham High-road to Forest Hill).

(*g*) Lordship-lane (Lordship-lane to Forest Hill).

(*h*) Lewisham High-road, Loampit Hill, Loampit Vale, Lee High-road (New Cross-road to Lee Green)

(*i*) Shooter's Hill-road (Deptford to the Herbert Hospital).

(*j*) South-street, Lewisham-road, High-street, and Rushey Green (Greenwich to Catford).

(*k*) Basildon-road, McLeod-road, and Knee Hill (Beresford-square to the county boundary).

(*l*) Tooting High-street (Tooting High-street to the county boundary).

The recommendations were all agreed to.

It was also agreed to inform the Stepney Borough Council that the Council gives its statutory consent to the widening of Dean-street, between Blakesley-street and Tarling-street.

Theatres, &c.—The following proposals were agreed to:—

Arrangements for the fitting of a fire-resisting screen to the proscenium opening at the Battersea Empire, York-road, Battersea (Mr. S. K. Cozens).

Fitting a fire-resisting screen to the proscenium opening of Gatti's Palace of Varieties, Westminster Bridge-road (Mr. H. P. Drew).

New theatre on the site of the old Prince of Wales' Theatre at the corner of Charlotte-street and Tottenham-street (Mr. F. T. Verity). The theatre will accommodate 1,052, persons, seated and standing.

Fire-resisting platforms on either side of the proscenium wall of the Star Music-hall, Abbey-street, Bermondsey, for switch-board and electric stage lighting purposes (Messrs. Stock, Page, & Stock).

Concert Hall at Town Hall, Upper Market-street, Woolwich (Mr. A. D. Thomas).

Victoria Embankment.—The Bridges Committee recommended, and it was agreed, that an expenditure of 4,250*l.* be sanctioned for re-metalling and various works to the Victoria Embankment; that the work be executed by the Council without the intervention of a contractor; and that the specification and estimate be referred to the Works Committee for that purpose.

Laundry and Mortuary, Epileptic Colony.—The following recommendation of the Asylums Committee was agreed to:—

"That, subject to the approval of the plans by the Secretary of State, the Council do sanction the provision of a laundry and a mortuary and operating-room at the Epileptic colony, at an estimated cost of 3,200*l.*, to be charged to the vote of 89,000*l.* for the erection of the colony buildings."

The Council adjourned shortly before 8 o'clock.

ARCHITECTURAL SOCIETIES.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—In response to an invitation from the Royal Institute of British Architects, that the allied societies should express their opinions on the subject of the statutory registration of architects, a special general meeting of the Leeds and Yorkshire Architectural Society was held on the 16th inst. The President, Mr. Butler Wilson, F.R.I.B.A., was in the chair. A resolution was passed in favour of the "statutory registration of qualified architects," and expressing the hope that the Royal Institute will take early measures to give effect to a principle which would give the profession a recognised status and raise the standard of architectural education and training throughout the kingdom.

APPOINTMENT OF SANITARY OFFICER.—The Local Government Board has sanctioned the appointment of Mr. E. Q. Bilham as an additional sanitary inspector in Bethnal Green, at a salary of 120*l.* per annum.

MANTELPIECE, &C., ADMIRALTY HOUSE, DEVONPORT.—A mantelpiece and overmantel, of statuary marble and Portland stone, have just been carried out and erected in the hall of the Admiralty House, Mount Wise, Devonport. The design was prepared by Mr. W. J. Clarke, the Chief Superintending Civil Engineer at Devonport Dockyard, and has been carried out by Messrs. Harry Hems & Sons, of Exeter. The addition is 11 ft. high. All the names of the various Commanders of the Plymouth station are cut deeply in white statuary marble.

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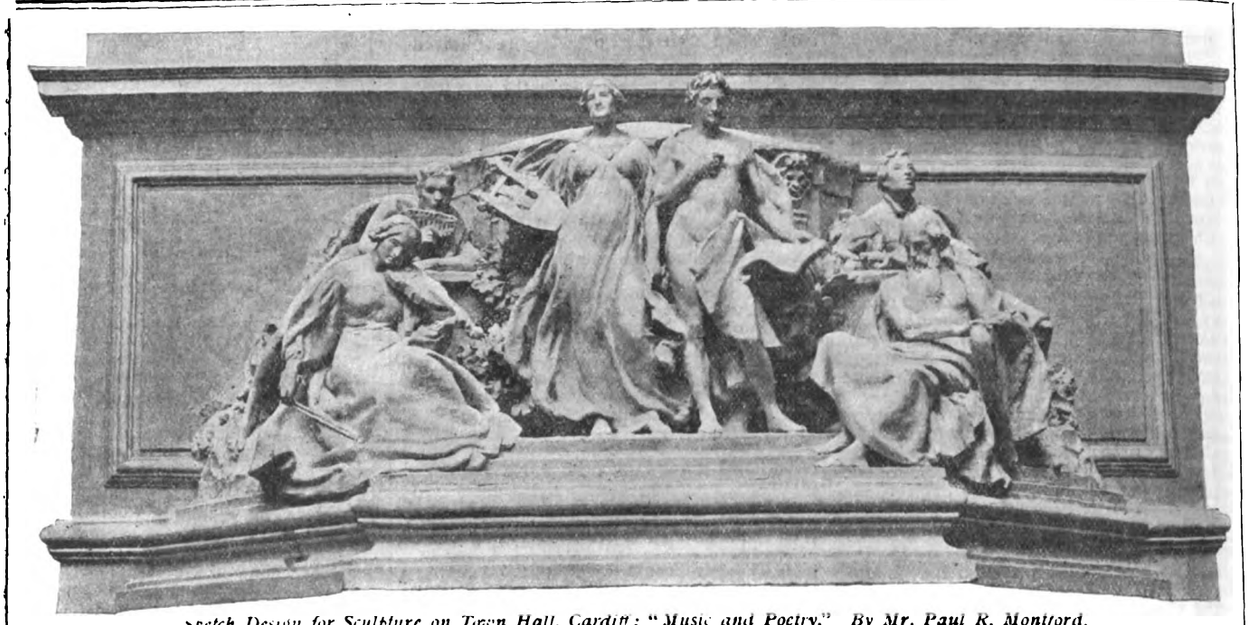

Sketch Design for Sculpture on Town Hall, Cardiff: "Music and Poetry." By Mr. Paul R. Montford.

Illustrations.

MONUMENT TO CHARLES GARNIER, PARIS.

THE illustration, from a photograph, shows the monument to Charles Garnier, the late distinguished French architect, recently erected in front of his principal architectural work, the Paris Opera-House.

The portrait bust which surmounts the monument is an old one, modelled by Carpeaux in 1869, when Garnier was forty-four years of age. The general architectural design of the monument is by M. Pascal—who, it may be mentioned, was formerly engaged in the carrying out of the Opera-House under Garnier's direction.

The two bronze figures are by M. Jules Thomas. The decorative details, escutcheon, garlands, &c., were modelled by M. Germain, Professor of Modelling in École Professionnelle of the Paris Municipality.

Part of the decoration of the pedestal, it will be seen, consists, most appropriately, of a plan of the Opera-House, engraved on a slab of black marble. In the shield-shaped panel between the garlands is the device of the City of Paris—the ship, with the proud motto (so peculiarly expressive of the history of Paris), "Fluctuat nec mergitur."

The whole is a fine example of the taste and originality in design which French artists bring to a monumental work of this kind.

The illustration is from a photograph taken specially for the *Builder* by M. J. Barry, photographer, of Paris.

SKETCHES IN WORCESTERSHIRE.

THESE sketches, by Mr. W. Curtis Green, are given in illustration of places visited by the members of the Architectural Association on their annual excursion, an account of the first portion of which will be found in another column.

Some of the places here illustrated are mentioned in this week's account of the excursion; others will be mentioned in the article in our next issue, when a number of further sketches will be given.

SCULPTURE AT THE ROYAL ACADEMY.

WE give this week some further illustrations of sculpture at the Royal Academy; all of them representing works which have already been singled out for notice in our columns.

Mr. Walker's "Paradise Lost," representing the temptation of Eve, is a bas-relief cut in the marble without any previous modelling, which is Mr. Walker's system of working, as it was that of most of the Renaissance sculptors. Mr. Cockerell's monument is illustrated from a photograph of the plaster model; he sent us also a photograph of the completed work, but it was not calculated to reproduce so well as the one from the model, being too faintly defined in parts.

Mr. Taubman's bronze statue or statuette (it is about half life size) we have already mentioned as one of the most successful and typical specimens of pure sculpture in the exhibition. In the original a butterfly is perched on the extended forefinger, which gives the name to the work and the meaning to the action and pose of the figure; unfortunately this detail, which came out rather faint in the photograph, has disappeared in the reproduction. Mr. Hartwell's "Nellie" is a very pretty and expressive bronze bust; it looks more effective, however, in profile than in the full front photograph which the sculptor has sent us. The other bust, "A Dream of Spring," is by a sculptor, Signor Canonico (of Torino, Italy), whose name and work are new to us; it is a work that hardly seems to answer to its title—at all events the "dream of spring" seems not to be a very happy one; but there is a great deal of originality and character in the head, and the thin hands are most beautifully modelled. The base is well treated with flat decorative foliage of Renaissance type.

We give separately an illustration of a rather rough small-scale model, which is in the Octagon at the Academy, of Mr. Paul Montford's group, "Music and Poetry," intended to be placed as a sculptural decoration on the front of the new Cardiff Town Hall. The central figures represent Music and Poetry in the abstract; those on the left, Ancient and Modern Music; those on the right, Epic and Lyric Poetry. The group is to be executed to a scale of 8 ft. high for the figure, the whole composition being about 24 ft. wide.

The model was selected as the first in a competition for the sculptural decoration of the Town Hall.

ARCHÆOLOGICAL SOCIETIES.

BUCKS ARCHÆOLOGICAL SOCIETY. — The annual excursion of this Society was held on Thursday, July 16, in the neighbourhood of Buckingham. In wet weather the somewhat limited party of members assembled at Verney Junction and drove to Twyford to inspect the Church of The Assumption, which consists of nave, north and south aisles, chancel, &c., built principally in the thirteenth century. The west tower was rebuilt, however, in 1887, when a general restoration appears to have taken place—one of those misnamed operations which included the scraping of the entire stonework; this now has the effect of newness wherein the mark of the "drag" is found in every possible place, and where, curiously enough, many pencil lines are still to be seen which were intended to direct these labours of the Victorian mason. But to the archæologist the interest is centred in the fine south doorway. Bucks is rich in the number and variety of small village churches, amongst which is numbered the famous Norman fabric at Stewkley (here distant some ten miles), and there is scarcely one specimen which does not contain a typical example of the best work in at least one of the four periods of English mediæval building. At Twyford the Norman South door can hardly be surpassed in proportion and beauty of detail. Amongst other points of interest were the old stone floors, the fifteenth-century bench-ends and roofs, which latter retain some of their original colour decoration, some fifteenth and sixteenth-century brasses, a fourteenth-century wall tomb, and a fine purbeck figure of a Crusader. About four miles south of the county town is the village of Hillesden, which was visited, but where time allowed but a hurried inspection of a remarkably fine church. Here, in an inaccessible part of the county, is an exquisite specimen of late fifteenth-century building, comprising nave with aisles, north and south transepts, chancel and chantry-chapel, a sacristy of two stories connected by a large turret staircase and a western tower—an earlier work of the same period; the interior is lofty and extensive, while the whole structure teems with interesting detail. The nave arcades have delicately enriched arches and piers, and a prominent feature in the effect of the interior is the long range of large clearstory windows. The north porch is a most elaborate work of this "Perpendicular" period, having fan-traceried stone vaulting; in all other stonework the detail is unusually small and refined. There is a beautiful chancel screen of the same period, and other interesting oak fittings of later dates. Much attention was directed to the old stained glass of the "St. Nicholas" window in the south transept reputed to date from 1490, and also to fragments of glass in other windows. The churchyard contains an elegant fourteenth-century cross, now in a damaged condition. The church underwent careful restoration and repair by the late Sir Gilbert Scott, R.A.; it is interesting to note from his preliminary report that, being a native of the district, he made frequent visits to Hillesden, and that it was the influence of this beautiful fabric which finally led to his becoming an architect. The church is in excellent preservation, notwithstanding the fact that it was besieged by Cromwell about 1643.

COMPETITIONS.

FORMATION AND LAYING-OUT OF NEW CEMETERY, WELHALL.—The following is the result of this competition:—First premiated design, Mr. J. B. Brodie, C.E., 136, Wellington-street, Glasgow; second, Mr. John Cowan, C.E., 179, West George-street, Glasgow; Third, Messrs. A. & R. McCulloch, architects, 25, Gayfield-square, Edinburgh.

THE ARCHITECTURAL MUSEUM, TUFTON-STREET.—This museum has now been acquired by the Architectural Association, and will be reopened to the public about April next, by which time the necessary alterations will be completed.

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ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A LANCASHIRE and Cheshire district meeting of the members of the Association of Municipal and County Engineers was held at Widnes and Runcorn on Saturday, July 18. The morning proceedings were held in the Council Chamber at the Town Hall, Widnes. Mr. W. Weaver (Kensington), President, occupied the chair, and among those present were Messrs. J. T. Eayes (Birmingham), J. Cartwright (Bury), J. Lobley (Hanley), C. Brownridge (Birkenhead), J. S. Sinclair (Widnes), J. Wilding (Runcorn), Price (Lytham), Hurst (Southport), Cox (Manchester), and Welbourne (Middleton).

The Mayor (Mr. Gossage) received and welcomed the members of the Association on behalf of the town.

The President acknowledged the Mayoral welcome, and thanked the Corporation for the accommodation they had afforded the Association for the meeting.

On the proposition of the President, Mr. Brownridge, of Birkenhead, was re-elected honorary Secretary for the district In acknowledgement, Mr. Brownridge said the meeting was the first since 1897. He hoped it would be a tonic to the district.

Municipal Works of Widnes.

Mr. J. S. Sinclair, A.M.Inst.C.E., Borough Surveyor, read a paper on the Municipal Works of Widnes. He said the borough originally formed part of the manor of Halton as an appanage of the Duchy of Lancaster. In this connexion its history might be traced to a remote period, but its present position as the capital of the chemical industry in England had been entirely attained since the year 1856. From the year 1856 Widnes was governed by a local Board. A Royal Charter of Incorporation was granted on May 26, 1892. The area of the borough was 3,039 acres, including 256 acres covered by water, and situated in the bed of the River Mersey. The estimated population for the year 1903 was 29,000; the total number of dwelling-houses, shops, and premises, 6,125. The average rates during the last five years were :—General district rate, 2s. 5d., and poor rate, 3s. 6d. The average death-rate per 1,000 of population during the years 1901 and 1902 and ten previous years were as follows :—

Years.	
1891 to 1900	19·08
1901	18·0
1902	15·33

The West Bank docks were situated on the west side of Runcorn Bridge, and were owned and managed by the trustees of the Hutchinson estate. The docks had a water area of 12 acres, and about 530 lineal yds. of quay frontage. The level of the still to entrance-gates was ordnance datum, or 4·66 ft. above Liverpool O.D.S. The width of these gates was 35 ft. The value of a 21 ft. Liverpool tide at Widnes was 22 ft. 6 in.; this increase in height was due to the momentum of the tide, high water at Widnes being fifty minutes later than at Liverpool. The range of the tide at Widnes was about 17 ft. at spring tides, and about 8 ft. at neap tides, and steamers and other craft drawing 15 ft. of water could use these docks at spring tides; a 470-tons burthen steamer could be discharged and loaded ready for departing on the next day's tide. The number of vessels using these docks inwards and outwards was about 4,000 per annum, and the gross tonnage was about 356,000 tons per annum.

Widnes Dock was on the east side of Runcorn Bridge, and belonged to the L. and N.W. Railway Co. It had an area of 127 acres, and a quay space of 300 lineal yards. It was approached from the river by a lock 24 ft. wide and 165 ft. in length. The sills of the lock-gates were 6·43 above O.D.S. Adjoining the dock was a reservoir of 279 acres' capacity, for maintaining the dock water level to a minimum depth of 9 ft. The number of craft using this dock inwards and outwards was about 1,900 per annum. The St. Helens and Sankey Canal adjoined Widnes Dock, and also belonged to the L. and N.W. Railway Co. This waterway was one of the oldest in the country, and provided access to the St. Helens coalfields. The number of barges using the canal inwards and outwards was about 4,000 per annum. This canal from the river entrance for a distance of about 1½ miles was used for wharfage and the loading and discharging of materials to the various chemical and soap works. There were 37 miles of streets; of these, 33 miles were adopted highways, repairable by the Council; included in the above were the main roads, 4 miles, 1 furlong, 205 yards in length. All the adopted highways and back passages were lighted by gas-lamps, with the exception of three rural roads. The cost of street lighting was provided for out of the gas profits, and was done by the Corporation Gas Committee. Prior to the year 1896 the cost of public lighting was paid for by the Highway Committee out of the general district rate. The Highway Committee were responsible for the public lighting of the borough, including the determination of the number, capacity, and position of the lamps. The cost of public lighting for the year ending 1903 was 1,630*l.* 16*s.* 10*d.* During the last ten years very few large street-widening schemes had been carried out. All the main roads had been laid out at a minimum width of 42 ft., and land had been acquired in various parts of the borough for the completion of several small schemes of widening and levelling existing roads, which work was being carried out as required by the Corporation workmen. The large square in front of the Town Hall, 200 ft. maximum width, and the street improvement schemes carried out by the late Local Board, showed that the future development of Widnes was not lost sight of in the early growth of the town; but much yet required to be done if the town was to anticipate its future growth and progress, in the developing of wide roads from west to east, and in making provision for additional vehicular and pedestrian traffic in connexion with the Widnes and Runcorn transporter bridge. Since the year 1895 no privies had been erected in connexion with new buildings, but very little progress had of necessity been made with the conversion of the existing wet and offensive midden privies into the water-carriage system, Widnes being almost exclusively a manufacturing town, the emission of black smoke from the works' chimneys, and the peculiar odours of chemical gases discharged into the atmosphere, were not so stringently looked after as in a purely residential district. The chemical works were inspected by an inspector appointed by the Local Government Board, under the Alkali, &c., Works Regulations Acts, 1881 and 1892, who reported annually to the Local Government Board, and who took any necessary steps to investigate complaints of nuisances caused by the escape of works' gases and to enforce the provisions of the Alkali Acts. Very often the black smoke and pungent gases which were complained of were due to carelessness in the management and control of the plant by the workmen, but improved plant and higher chimneys were being erected to mitigate such nuisances. It was considered by some experts that at an early date the existing processes of chemical manufacture would give way to more scientific and sanitary methods, either in the use of gaseous fuel or electrolytic methods, and the chemical town of the future would have no odorous smells, black smoke, or waste deposit heaps to disfigure or distinguish it from other industrial towns. The sewage of the borough was conveyed by three main outfall sewers into the river Mersey. The western outfall sewer was constructed in the year 1880 from plans prepared by Mr. Wallace Copeland, A.M.Inst.C.E. The invert level at the outlet into the river was 2·45 ft. above O.D., and for a distance of 245 lineal yards from the outlet was a creosoted pitch pine timber-framed sewer, 6 ft. by 3 ft. 3 in., and for a further distance of 2,000 lineal yards was a brick sewer, 6 ft. by 4 ft., constructed of 9 in. brickwork, built with acid-proof Buckley blue fireclay bricks, of an average depth of 14 ft. and with a gradient of 1 in 1,000 at the lower end and about 1 in 400 at the upper portion. This sewer was extended by various sized brick and pipe sewers to a distance of nearly three miles in a northerly direction from the outlet, and had two storm overflows into watercourses. The total drainage area connected was about 1,800 acres. The centre outfall sewer was entirely reconstructed by the author in the year 1896; the invert level at the outlet into the river was 7·36 ft. above O.D., and for a distance of 581 lineal yards was a brick sewer 3 ft. 9 in. by 2 ft. 6 in. internal diameter of an average depth of 18 ft., and constructed of 9 in. brickwork built with acid proof St. Helen's bricks in Portland cement mortar with a stoneware invert block bedded on a cement concrete foundation. The eastern outfall sewer was constructed in the year 1885 by Mr. Thomas Higginson, the then Surveyor to the Local Board. The invert level of the outlet into the river was 5·20 ft. above O.D., and for a distance of 350 lineal yards was a 24-in. diameter earthenware pipe sewer with a gradient of 1 in 1,000, the average depth being 12 ft. The portion of this sewer under the Sankey Canal and the L. and N.W. Railway (Warrington line), was by 24 in. cast-iron and wrought-iron pipes, and had a drainage area connected to it by various sizes of pipe sewers of about 200 statute acres. The domestic consumption of water was estimated at 25 gallons per head of population. Several portions of the western outfall sewer having collapsed in the year 1894 the author was instructed to prepare plans and estimates for its reconstruction; and application was made to the Local Government Board for a loan of 1,500*l.* to do this work. The original loan was granted for a period of thirty years, and as twelve years of this still remained the Local Government Board only sanctioned a further loan of 934*l.*, being the value of the unexpired period of the original loan, the balance of 566*l.* being paid out of the general district rate. It was found that the cause of the collapse was due to bad foundations and defective jointing of the brickwork. When this sewer was designed it was anticipated that the foundations on the alluvial soil would be of a treacherous character, and that a large amount of chemical refuse from an adjoining chemical sewer would find its way by percolation around the outside of the brickwork, therefore it was considered that a mortar composition to resist chemical action should be used instead of lias lime as provided for in the remaining parts of the sewer not subject to chemical infiltration. The mortar composition used was three parts of pitch, one of tar, and four of sand applied hot, with a collar joint ¾ in. thick between the two rings of brickwork. Owing to this sewer being at times charged with water flowing in at a high temperature, the mortar composition oozed out of the joints, and this contributed to the cause of the settlement and collapse. The work had to be done during low water of each tide night and day, and very heavy timbering and close pile sheeting had to be used owing to the close proximity of the adjoining wood chemical sewer, the invert level of which was 5 ft. above the sewer that was being reconstructed. The excavation was carried down to a depth of 3 ft. below the sewer invert brickwork and filled with Portland cement concrete the full width of the trench 8 ft. wide, the invert bricks were set in a cradle in two rings about 3 ft. long, and built in place, and the sewer brickwork then completed, and the sides of the trench up to the top of the brickwork made up solid with Portland cement concrete. The remaining portions of the defective sewer brickwork joints were then pointed up internally with Portland cement composed of 1 part cement to 2 parts of sand. The work was done by the Corporation staff, and although a longer length of sewer was rebuilt it was completed within the estimated amount. The central outfall sewer was reconstructed in 1898 at an estimated cost of 3,500*l.* The original sewer had been built in the early history of the town, and was very irregular in line and gradient, and defective in construction. The consent of the Local Government Board having been obtained for this loan, the work was proceeded with by the Corporation staff. The foundation of the greater length of this sewer was on rock, and the pumping plant being maintained in a high state of efficiency, very little trouble was experienced in completing this work. During the construction of the work the dock authorities still continued depositing their dredgings, and after the brickwork of the part nearest the river was completed, and before the trench was properly filled in, the temporary timber bank dam broke, and smashed up the pitch pine 12 in. by 8 in. timber wallings and struts for a length of about 60 lineal yards, but did no damage to the sewer. Two tide flaps were provided, one on the river-wall constructed of timber lined with a lead margin ¼ in. thick, hinged so as to fit tight against the dressed stone wall, and one 3 ft. 9 in. by 2 ft. 6 in. cast-iron tide flap double-hinged to a cast-iron strong frame bolted to the brickwork of the first manhole about 30 ft. from the river wall. The eastern outfall sewer was now about to be reconstructed. During the last five years that this sewer had been under observation, several collapses had taken place owing to the 24-in.

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diameter earthenware pipes being laid on an unstable foundation (alluvial marsh soil); the foundation of these pipes was subject to tidal influence, and the joints were not water-tight; this had caused the sewer to settle in one place 1 ft. 6 in. below the normal line of gradient. The author advised the Town Council to take up this sewer and reconstruct it on 6 in. by 6 in. timber piles, driven down to a solid bearing, with a concrete foundation, 2 ft. 6 in. deep, in which steel rails, about 30 lbs. to one yard, would be embedded, and the 24-in. diameter pipes laid on this foundation, and covered with Portland cement concrete about 1 ft. thick. Application was made to the Local Government Board for the sum of 1,200*l.* for this work; the original sewer loan was for a period of thirty years, and fifteen years of this time had lapsed when the application for this loan was made. This loan has since been obtained, less the sum of 124*l.*, being the value of the unexpired term of the original loan. Only a small quantity of chemical works drainage flowed into the main sewers; the chemical works had separate drainage outfalls into the river. The manufacturers had culverted three water-courses or brooks, and these were maintained and cleaned by the various works owners. In the vicinity of the waste deposit heaps where this refuse adjoined sewers, it was very difficult to prevent percolation, and as this chemical drainage crystallised very rapidly, under certain conditions great care had to be exercised to prevent branch sewers and gully drains from silting up. The Town Hall was erected in the year 1887, from designs submitted in public competition by Messrs. F. & G. Holme, architects, Liverpool. It was in the Renaissance style, and was faced with local grey bricks and relieved with Northwich terra-cotta. The free library and technical schools immediately opposite the Town Hall, were erected in the year 1893 from designs submitted in public competition by Messrs. Woodhouse & Willoughby, architects, Manchester. They were in the Renaissance style, and were faced in the front street elevations with Ruabon bricks and Ruabon terra-cotta dressings. The cost of the buildings (exclusive of land which was given by the Leigh Estate), was 12,970*l.* The Isolation Hospital buildings were situated at Crow Wood, about two miles distant from the Town Hall, and occupied an elevated site about 6 acres in area on the east side of the borough. They were extended in the year 1901 from the designs of Mr. Frank U. Holme, A.R.I.B.A., architect, Liverpool, at a cost of about 8,886*l.* The Victoria Park and Recreation ground, which was situated at Appleton, was opened in the year 1900, and had an area of 33 acres. This park was a gift to the Corporation on the occasion of the late Queen Victoria's Diamond Jubilee. The sum of 13,160*l.* was collected by public subscription, Messrs. Gossages & Timmis contributing 5,000*l.* The Victoria Promenade, situated at West Bank, about two miles from the Town Hall, was presented to the Corporation on the same date as the park. The promenade had a frontage to the River Mersey of about 630 lineal feet, and was formed of two terraces, the upper one, about 60 ft. wide, was level with the road, and the lower terrace, 24 ft. wide, was about 16 ft. below.

Mr. J. T. Eayrs (Birmingham) proposed a vote of thanks to Mr. Sinclair for his paper. Notwithstanding the smoky atmosphere which pervaded the district, one found, in looking at the vital statistics, that it enjoyed a very good record, inasmuch as the death-rate was 15·33. The sewers in the district, he presumed, had manufacturing refuse discharged into them in the shape of acid from the chemical works. If there was any acid in the sewers, whether sulphuric or muriatic, Portland cement stood very little chance. It was not the bricks themselves that were affected, but the lime in the mortar. He would like to know whether any attempt had been made to joint the sewers with sulphur or sulphur, bitumen, and sand.

Mr. Hurst (Southport) remarked that if the velocity of the air abstracted from the sewers had been given, it would have been a better guide than the volume abstracted.

The President said the point which struck him was the economical rate at which the work was done at Widnes. Whether it was the cheapness of the material, or that the men did more work, or the energy of the Engineer in looking after the work, it was done very economically.

The vote of thanks was heartily agreed to.

Mr. Sinclair having thanked the members, they proceeded to visit the cemetery and the park, and were afterwards entertained by the Mayor to luncheon at the Technical Institute. The afternoon was devoted to visits to the transporter bridges works and the Manchester Ship Canal sluices.

Municipal Works, Runcorn.

The members then adjourned to the Institute at Runcorn for the remainder of the business.

Mr. James Wilding, Surveyor and Water Engineer, read a paper on "Municipal Work in Runcorn." He said Runcorn was usually looked upon as a very smoky place, of modern foundation, and mainly notable for the manufacture of chemicals. It was, however, a place having a very long history, which dates from Anglo-Saxon times. The town had grown from a small village to its present size of 17,000 inhabitants. During the construction of the Ship Canal there was additional population of some 3,000 or 4,000. The Runcorn Improvement Act was obtained in 1852, and since that date many improvements had taken place. The town was built on the new red sandstone mainly, and in some few places on the boulder clay, which was found in the pockets of the rock formation. Prior to the construction of the Ship Canal the sewer discharged at seven points into the estuary of the Mersey. These outlets were intercepted by the outfall sewer put in by the Manchester Ship Canal Co. and taken under the canal by a siphon at No Man's Land, and thence to the tideway. The other siphon was at the extreme westerly end of the district. Two men were kept constantly employed by the Ship Canal Co. to clean out manholes and to flush siphons. The siphons were of steel, 3 ft. internal diameter, with 12 in. concrete round the tubes. Chains were worked through them by means of crab winches, and they were flushed by penstocks once a day. The 3,000 ft. of the sewer at the lower end was flushed about twice a week by the discharge of the graving docks at the Sprinch yard of the Manchester Ship Canal Co.'s Bridgewater department. Runcorn practically owed its commercial foundation to the Bridgewater Canal. This great work of Brindley was completed in the year 1776. It formed a highway of considerable importance for many years. This canal between Runcorn and Warrington belonged to the Mersey and Irwell Navigation, but in later years it was acquired by the Bridgewater Navigation Co., who were the successors of the trustees of the Duke of Bridgewater. Now both canals were the property of the Ship Canal Co. The Manchester Ship Canal was very much in evidence in Runcorn. A deep-water lay-by had been constructed by the Ship Canal Co. where very large vessels may berth. A large coasting trade was still carried on, clay, flints, slates, &c., being collected for the potteries and distributed by means of the canal. Salt and coal were largely exported. The total expenditure on private streets since 1892 had been 18,000*l.* First in connexion with the later history of the town was Runcorn Railway Bridge. There were bridges over the Bridgewater Canal; each of them had been widened and improved since Brindley first placed them over the waterway.

In 1894 new by-laws were adopted. They were founded on the model form, and had proved beneficial in raising the quality of buildings. The sizes of timbers incorporated caused some trouble at first, but there was little objection taken now to them. Perhaps the most disputable cases were those referring to joists or other timbers going into the party walls. The difficulty was evaded usually by running the joists parallel to the party walls, but there were some instances where this could not be done. The author was of the opinion that a judicious placing of the joists so as to have at all times at least 4½ in. of brickwork at the side and end of them would be sufficient safeguard against fire. The waterworks now belong to the Council. The properties consisted of a pumping-station on Runcorn Heath, a covered reservoir (having a capacity of 1,000,000 gallons) on Runcorn Hill, and a small pumping-station at Halton. The Technical Institute was erected in 1894, from the plans of Mr. J. Bowden, of Manchester. The design had been prepared for some years prior to the erection of the building. The cost was borne partly by the Science and Art Department, who contributed 1,000*l.*; the County Council, who contributed 440*l.*; Sir John T. Brunner, 1,900*l.*; and the balance by local contributions, the total cost being 3,300*l.*, exclusive of land equipment. An addition was carried out by the author at a cost of 479*l.* The furnishing cost 1,200*l.*

Mr. Lacey (Oswestry) thought if they gave the builders any licence as to joists in party-walls there would be more difficulty in the future.

Mr. J. T. Eayrs (Birmingham) considered that the water supplied for domestic and trade purposes ought to be separately stated.

Mr. Biggs (London) thought in the case of papers relating to towns the average number of persons per house and the density of population per acre should be given.

The President thought it a useful suggestion, and had no doubt authors would bear it in mind.

The Transporter Bridge over the Mersey.

A vote of thanks having been accorded to the author,

Mr. J. J. Webster, C.E., of Westminster, presented a description of the transporter bridge over the Mersey, between Widnes and Runcorn. He said the bridge was of the "transporter" type, and was in design precisely similar to an ordinary stiffened suspension bridge, with the exception that the approaches to the bridge were at a low level—thus dispensing with the very costly high-level approaches—and the traffic, both foot and wheel, was carried over in a car suspended to the underside of the bridge. This principle was designed by Mr. Charles Smith, of Hartlepool, who planned a bridge of this type, about thirty years ago, for crossing the river Tees at Middlesbrough, but it was never constructed. Several bridges of this type had been since built on the Continent; but the general construction of these bridges was entirely different from the Widnes and Runcorn Bridge, the principle only being the same. By a coincidence, and not from design, the Widnes and Runcorn Bridge was on exactly the same site as the one proposed by Telford, and was of exactly the same span, viz., 1,000 ft. between the centres of the towers. The two main towers carrying the cables and the stiffening girder were built, one on the south side of the Ship Canal, and the other on the foreshore on the north bank of the river, and were approached from the earthwork approaches by steel elliptical girders resting on cast-iron columns, carrying a corrugated steel flooring, upon which were laid the timber blocks on concrete, forming a roadway 35 ft. wide between the parapets, the footpaths being 6 ft. wide each. The roadway in front of the towers was widened out to 70 ft. for marshalling the traffic, and for providing space for waiting rooms, &c. The transporter car consisted of a platform 55 ft. long by 24 ft. wide, and was suspended from the trolley by steel wire ropes, so hung that they prevented either side or end oscillation of the car. The car would be capable of holding at one time four two-horse farmers' waggons loaded, and 300 passengers, the latter being protected from the weather by a glazed shelter, with folding doors at the end and side. On the top of the car was fixed the operator's cabin, in which was placed the switchboard, so that the operator had a full view of the course, and had the car quite at his command; he could thus reverse, go ahead, or put on the brakes at a moment's notice. The time occupied by the car in crossing would be about 2¼ minutes, so allowing the time for loading and unloading, it would be capable of making nine or ten trips per hour. The bridge, approaches, and car would be illuminated with the electric light, and fog signals and bells were to be sounded when necessary. The bottom of the car would be about 12 ft. above high-water level, and would clear the Ship Canal wall by about 4 ft. 6 in.

On the proposition of Mr. J. Cartwright (Bury), a vote of thanks was accorded to Mr. Webster for his paper.

REBUILDING OF EAGLE CHURCH, LINCOLNSHIRE.—The foundation-stone of the nave and chancel of Eagle Parish Church, was laid on the 14th inst. Before the work was undertaken, a report was obtained from Mr. J. T. Lee, architect, in which he stated that, with the exception of the west tower, scarcely any part was worthy of preservation. Under these circumstances it was decided to rebuild the nave, chancel, and north arcade, using the old material, as far as practicable, and a contract was obtained from Messrs. Bowman & Sons, of Stamford, for 1,255*l.* It was also intended to rebuild the north aisle and porch, and to repair the Norman font, the whole cost being estimated at 2,000*l.*

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INSTITUTE OF SANITARY ENGINEERS.

THE three days' Provincial Summer Meeting of the Institute of Sanitary Engineers was opened on the 14th inst. at Wolverhampton. The members were received at the Town Hall by the Mayor (Mr. Alderman J. R. Thorne), the Town Clerk (Mr. Horatio Brevitt), and a number of aldermen, councillors, and heads of departments. The visitors included Mr. W. J. Dibdin, of London (President of the Institute), Mr. E. Berrington and Mr. E. R. Walmer (Vice-Presidents), Mr. Arthur E. Ashby (Secretary), and a number of members from various parts of the kingdom.

Mr. Dibdin (the President) read a paper on "The Theory and Practice of Filtration." Mr. Dibdin, in his prefatory remarks, said that the Institute was established six years ago, and consisted of 500 members, who, he made bold to say, were doing a very useful work for the benefit of the whole community. After giving an interesting survey of the rise and progress of various forms of filtering processes, the President observed, in conclusion, that when water is drawn from a polluted source there can be but few, if any, better systems than that of Dr. Clark's process of softening the water wherever possible. The effect is to remove practically all but the last minute traces of impurity, and thus to constitute a second line of defence in case of the breakdown of the filters or one of them, in addition to yielding a supply of water of far greater commercial value by reason of its better adaptability for use in steam boilers, hot-water systems, and the reduced consumption of the domestic soap, which item alone would effect an economy more than equal to the cost.

After a discussion, the President was thanked for his paper, and an adjournment was made for luncheon, when Mr. Dibdin presided, and proposed "The Health of the Mayor and Corporation." In the afternoon the members proceeded by train to West Bromwich to inspect Messrs. Hamblett's blue brick works.

BY-LAWS RELATING TO PLANS OF DRAINS.

THE Public Health Committee of the London County Council brought up the following report at Tuesday's meeting of the Council :—

"The Metropolis Management Acts Amendment (By-Laws) Act, 1890, provides that the powers of the London County Council for making by-laws under Section 202 of the Metropolis Management Act, 1855, shall extend and apply to authorise the Council to make by-laws for the following purpose :—

'Requiring persons about to construct, reconstruct, or alter pipes, drains, or other means of communicating with sewers, or the traps and apparatus connected therewith, to deposit with the sanitary authority of the district such plans, sections, and particulars of the proposed construction, reconstruction, or alteration as may be necessary for the purpose of ascertaining whether such construction, reconstruction, or alteration, is in accordance with the statutory provisions relative thereto, and with any by-laws made under the said Section.'

There are provisos to the effect that any such by-laws shall not require the deposit of any plan or section in the case of any repair which does not involve the alteration or the entire reconstruction of any such pipe, drain, or other means of communicating with sewers, or the traps and apparatus connected therewith ; also that any such by-laws shall not require the deposit of plans, sections, and particulars before the work is commenced in any case in which the alteration of the drains must be carried out at once, but the by-laws may require such deposit to be made within a limited time from the commencement of the work. The bill for this Act was promoted by the Council in order to give effect to the views of a large number of the London sanitary authorities as to the necessity for by-laws of this nature.

Soon after the Act was passed we prepared a draft of by-laws, and forwarded copies of the draft to the late vestries and district boards for their observations, and also communicated with the Royal Institute of British Architects, the Sanitary Institute, and the Sanitary Inspectors' Association on the subject. The suggestions which they submitted were carefully considered, but as by the passing of the London Government Act, 1899, the metropolitan borough councils superseded the vestries and district boards, we thought it desirable before bringing the by-laws before the Council, to ascertain the views of the new authorities on the subject. As a result of the consideration of their suggestions, we made several modifications in the draft, and have been in communication with the Local Government Board thereon. We now submit the by-laws in the form in which the Local Government Board are prepared to approve them.

We may add that the by-laws will be ancillary to the drainage by-laws made by the Council under Section 202 of the Metropolis Management Act, 1855, and which came into force on June 14, 1901. The latter by-laws do not apply to the City of London, and a clause to that effect was inserted therein at the desire of the Local Government Board. It has, therefore, been necessary to add a similar clause to the by-laws which we now submit, and which will be subject to the provisions of Sections 202 and 203 of the Metropolis Management Act, 1855, with regard to confirmation and publication. These sections provide that the by-laws, if made at one meeting of the Council, shall be of no force and effect until submitted to and confirmed at a subsequent meeting. They will also require the approval of the Local Government Board, and when made and confirmed are to be printed and open to public inspection, and copies are to be delivered to any person applying for the same on payment of such sum, not exceeding 2d., as the Council may direct. We recommend that the by-laws set out in the appendix to this Report be made by the Council under Section 2 of the Metropolis Management Acts Amendment (By-laws) Act, 1899, and that the seal of the Council be affixed to copies of such by-laws.

The recommendation was agreed to.

[*By-Laws made by the London County Council under the Metropolis Management Act*, 1855, *Section 202, and the Metropolis Management Acts Amendment* (*By-laws*) *Act*, 1899.

Requiring persons about to construct, reconstruct, or alter the pipes, drains, or other means of communicating with sewers, or the traps and apparatus connected therewith, to deposit with the Sanitary Authority of the district such plans, sections, and particulars of the proposed construction, reconstruction, or alteration as may be necessary for the purpose of ascertaining whether such construction, reconstruction, or alteration is in accordance with the statutory provisions relative thereto, and with the by-laws made under Section 202 of the Metropolis Management Act, 1855.]

Construction of a Drainage System as a Whole.

1. (1) Every person who, in the provision of a drainage system as a whole, is about to construct the pipes, drains, or other means of communicating with a sewer, or the traps and apparatus connected therewith, shall deposit in duplicate with the sanitary authority of the district, at their office, such plans, sections, and particulars of the proposed construction as may be necessary for the purpose of enabling such authority to ascertain whether such construction is in accordance with the statutory provisions relative thereto, and with the by-laws made under Section 202 of the Metropolis Management Act, 1855.

(2) He shall cause such duplicate plans and sections to be clearly and indelibly made on a durable material to a scale (except in the case of block plans) of not less than 1 in. to every 16 ft., and shall, amongst other things, show thereon every floor of any building in connexion with which such pipes or drains are to be used, and the position, form, levels, and arrangement of the several parts of such building, including the roof thereof, and the size and position of every drain, manhole, gully, soil-pipe, waste-pipe, ventilating-pipe, and rain-water pipe, and of any drain passing under such building, and the position of every bath, water-closet apparatus, slop-sink, urinal, lavatory-basin or apparatus, sink (not being a slop-sink), and trap in connexion with the foregoing

(3) He shall also show thereon the positions of all windows and other openings into the building, and the height and position of all chimneys belonging to the building within a distance of 20 ft. from the open end of a soil pipe or ventilating pipe.

(4) He shall at the same time deposit in duplicate with the Sanitary authority of the district, at their office, a detailed description in writing of the intended mode of constructing, jointing and fixing any such drain, manhole, gully, pipe, bath, water-closet apparatus, sink, urinal, lavatory basin or apparatus, or trap.

(5) He shall at the same time deposit in duplicate with the sanitary authority of the district, at their office, a block plan of the premises upon which any such building is to be situated, or any such work is to be carried out (drawn to a scale of not less than 1 in. to every 22 ft.), and he shall show thereon—

(*a*) The block plan of such building.

(*b*) The position of the whole of the buildings on the premises, and so much of the properties adjoining thereto as may be affected by the proposed work.

(*c*) The names of the streets or thoroughfares immediately adjoining the premises, and the number or designation of the premises.

(*d*) The difference of the level between the lowest floor of such building and the adjoining pavement.

(*e*) The level of any yard, area, or ground, or open space belonging to such premises.

(*f*) The lines, size, depth, and inclination of the proposed drainage, and so far as can be ascertained without opening the ground, the lines, size, depth, and inclination of the existing drainage, the surface drains (if any), and if such proposed or existing drainage be in connexion with a building, the arrangements for the ventilation of the drains—the existing pipes and drains and the proposed pipes and drains to be distinctively indicated by different colours.

(*g*) The position and form of every existing or proposed manhole or access chamber, gully, junction, bend, intercepting trap, or any connexion with a sewer.

(*h*) The points of the compass.

Provided, nevertheless, that it shall not be necessary to deposit a block plan in any case where the plans, sections and particulars deposited in accordance with the first paragraph of this by-law clearly show the particulars hereinbefore required to be shown on a block plan.

(16) The plans, sections, particulars, and detailed descriptions hereinbefore mentioned shall be so deposited fifteen days at least before the work is proposed to be commenced ; and in the case where a building is to be erected, before commencing the erection of such building.

Addition to, Partial Construction, Entire or Partial Reconstruction, or Alteration of, a Drainage System.

2. Every person who shall make any addition to, partially construct, entirely or partially reconstruct, or alter any pipes, drains, or other means of communicating with a sewer, or the traps and apparatus connected therewith, shall be deemed to have satisfied the foregoing By-law No. 1 if he shall cause a deposit to be made (in the manner therein provided) of only such plans, sections, and particulars of the proposed addition, partial construction, entire or partial reconstruction, or alteration as may be necessary for the purpose of enabling such authority to ascertain whether such addition, partial construction, entire or partial reconstruction or alteration is in accordance with the statutory provisions relative thereto, and with any by-laws made under Section 202 of the Metropolis Management Act, 1855, and, if in any case plans and sections have been previously deposited in conformity with the foregoing By-law No. 1, it shall be sufficient for him to give in writing with the deposit the date of the previous deposit, and to show the new work on the plans and sections to be deposited, and only so much of the existing work as will enable the sanitary authority to see the relative positions of the new and old work.

Provided that this by-law shall not be deemed to require the deposit of any plans, sections, or particulars in the case of any repair which does not involve the alteration or the entire reconstruction of any pipe, drain, or other means of communicating with sewers or the traps and apparatus connected therewith.

Alterations of Drains in Cases of Urgency.

3. (1) In any case in which an alteration of the drains must be carried out at once, every person who is about to carry out such alteration shall, in lieu of depositing the plans, sections, and particulars referred to in these by-laws, forthwith send to the sanitary authority of the district a notice in writing of any such proposed alteration.

(2) He shall also within two weeks of the commencement of such alteration make the deposits required by these by-laws.

Penalty.

4. Every person who shall offend against any of the foregoing by-laws shall be liable for every such offence to a penalty of 2*l.*, and in the case of a continuing offence to a further penalty of 20*s.* for each day after written notice of the offence given in accordance with Section 202 of the Metropolis Management Act, 1855.

Definition of "Person."

5. In these by-laws the word "person" includes any body of persons whether corporate or unincorporate.

Exemption of City.

6 These by-laws shall not extend to the City of London.

CEMENT IMPORTS TO SPAIN.—The importations of cement at the port of Cadiz are officially returned at 3,021 tons for the year 1901 and 3,634 tons for the year 1902. Two-thirds are stated to be imported from France ; very little comes from the United Kingdom. A new company, the "Sociedad de Cementos Gaditanos," has been formed, which has bought up the small works at Puerto Real and is developing the same with a view to producing 15 000 tons a year.

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APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses :—

Lines of Frontage and Projections.

Fulham.†—A one-story shop upon the forecourt of No. 7, Colehill-lane, Fulham (Mr. C. Botterill for Mr. O. Rowe).—Consent.

Battersea.—Retention of a shop and steps, and the erection of a conservatory in front of No. 68A, Battersea-rise, Battersea (Mr. H. Bignold for Mr. T. Ryan).—Consent.

Fulham.†—A schoolkeeper's house on the south side of Lillie-road, Fulham, adjoining No. 19 (Mr. T. J. Bailey for the School Board for London).—Consent.

Hammersmith.—The fixing of a wooden sign in front of No. 105, King-street, Hammersmith (Mr. T. R. Smith for Messrs. Lipton, Ltd.).—Consent.

Lewisham.—Retention of a building on the northern side and of a building on the southern side of Earlsthorpe-road, Lewisham, each abutting upon Mayow-road (Messrs. J. Edmondson & Son).—Consent.

Lewisham.—The retention of an iron verandah in front of the one-story addition to Inglemount, Inglemere-road, Forest Hill, Lewisham, abutting upon Bampton-road (Mr. W. H. Gritten for Mr. E. Bowen).—Consent.

Strand.—That the application of Messrs. J. Kinninmont & Sons for an extension of the period within which the erection of an iron and stone balcony at the first-floor level in front of No. 7, St. James's-street, St. James's, was required to be commenced, be granted.—Agreed.

Paddington, South.—Six projecting show cases on the pilasters of Nos. 147 to 159 (odd numbers only), Queen's-road, Bayswater (Messrs. Roche, Son, & Neale for Messrs. W. Whiteley, Ltd.).—Refused.

Width of Way.

Deptford.—A Sunday-school building upon the site of Nos. 8, 10, 12, and 14, Besson-street, Hatcham, to abut upon Besson-mews (Mr. A. W. Collier).—Consent.

Limehouse.—Two play sheds on the east side of Dalgleish-street, Limehouse (Mr. T. J. Bailey for the School Board for London).—Consent.

Hampstead.—The new Hampstead Hospital, Haverstock Hill, Hampstead, with a boundary fence at less than the prescribed distance from the centre of a roadway leading to the North-Western Hospital (Messrs. Young & Hall for the Committee of the Hospital).—Consent.

Southwark, West.—The erection of one and the retention of two warehouse buildings at Greenmore Wharf, Bankside, Southwark (Messrs. Waterman & Abrahams).—Refused.

Hackney, South.—Three houses on the south side of Woodbine-cottages and two houses on the west side of a roadway leading out of the south side of Woodbine-cottages, Chatham-place, Hackney (Messrs. Hodson & Whitehead for Messrs. J. & T. G. Smith).—Refused.

Width of Way and Line of Frontage.

Westminster.—Five projecting pilasters in front of a proposed addition to the Victoria Mansions Restaurant (formerly known as the Old Bell tavern), on the south side of Dacre-street, Victoria-street, Westminster (The Westminster Trust, Limited).—Consent.

Line of Frontage and Temporary Building.

Fulham.†—A temporary wood and iron school building and water-closet on the south side of Lillie-road, Fulham, to the westward of No. 19 (Mr. T. J. Bailey for the School Board for London).—Consent

Space at Rear.

St. George, Hanover-square.—A modification of the provisions of Section 41 of the Act with regard to open spaces about buildings so far as relates to the proposed erection of the Grosvenor Hotel Annexe, Victoria Station, St. George, Hanover-square (Mr. C. L. Morgan for the London, Brighton, and South Coast Railway Company).—Consent.

Width of Way and Space at Rear.

Paddington, North.† — Stables, with dwellings over, on a site on the north-west side of Crompton-street, Edgware-road, Paddington (Messrs. Dove, Hunter, & Co. for Mr. H. Ward).—Refused.

Fulham.—Buildings on the south side of Effie-road and east side of Effie-place, Fulham (Mr. W. Jones for the Metropolitan District Railway Company).—Refused.

Deviation from Certified Plan.

Whitechapel.—Deviations from the plan certified by the District Surveyor, so far as relates to the proposed erection of a stable building on a portion of the site of stables at No. 76, Hanbury-street, Whitechapel (Mr. P. E. Culverhouse for Messrs. Tingle, Jacobs, & Co.).—Consent.

Formation of Streets.

Lewisham.—That an order be issued to Mr. R. Stewart sanctioning the formation or laying out of new streets for carriage traffic, to lead out of the west side of Torridon-road and out of the south side of Dowanhill-road, Lewisham (Mr. A. Cameron Corbett, M.P.).—Consent.

Lewisham.—The retention of barriers erected across Stondon Park, Brockley (Mr. A. H. Kersey for Mr. R. Kersey).—Consent.

Kensington, North.†—That an order be issued to Mr. P. Currey, refusing to sanction a modification, approved on July 19, 1878, by the Metropolitan Board of Works for the formation of new streets upon the St. Quintin Estate, St. Quintin-avenue, North Kensington.—Agreed.

Wandsworth.—That an order be issued to Messrs. Boehmer & Gibbs refusing to sanction the formation or laying out of new streets for carriage traffic to lead out of the north side of Kirkstall-road and south-west side of New Park-road, Streatham (Mr. A. Troughton).—Agreed.

Wandsworth.—That an order be issued to Mr. W. E. Wallis, sanctioning the formation or laying out of new streets on a site abutting upon the south-west side of Rosendale-road, Herne Hill, southward of Norwood-road, in connexion with a scheme for the erection of working-class dwellings upon such site, and that the Council do allow a modification of the provisions of Section 41 with regard to open spaces about buildings so far as relates to the erection of one of the buildings with an irregular open space at the rear (for the Governors of the Peabody Donation Fund).—Agreed.

Buildings for the Supply of Electricity.

Lewisham.—A deviation from the plans approved on December 17, 1900, for the rebuilding of a generating station and works at Springfield-road, Wells-road, Sydenham, so far as relates to the formation in the wall of the engine-room of two openings, each 36 in. by 18 in., and two openings, each 6 ft. 9 in. by 3 ft. 6 in., and an increase in the height of the heater-house (Mr. J. F. Jones for the Crystal Palace District Electric Supply Co., Ltd.).—Consent.

*** *The recommendations marked † are contrary to the views of the Local Authorities.*

ROYAL COMMISSION ON LOCOMOTION.

SIR DAVID BARBOUR presided on Friday last week over the resumed sitting of the Royal Commission on Locomotion.

Mr. Maurice Fitzmaurice, the Chief Engineer to the London County Council, was the only witness called. In the course of his evidence he said that the breaking up of streets for laying and repairing pipes, &c., had become a most serious obstacle to locomotion in London. Owing to the general use of wood-paving, the streets necessarily had to be broken up and relaid at comparatively frequent intervals, and between those intervals they were being continually broken up for other purposes. Frequently several companies broke up the streets one after another, causing great inconvenience, which could be avoided if there were some agreement between the companies, or some controlling authority which could insist on the work of the different companies being done at the same time. The water, gas, and other companies had at the present time statutory rights to break up the streets whenever they wished on giving notice. A company breaking up a street for any purpose generally relaid the paving in a temporary way, the Local Authority relaying it permanently at a later date. The temporary paving was frequently dangerous, and often a long time elapsed between the temporary and the permanent laying. No doubt it was advisable for the Local Authority to do the permanent laying of paving, but it must be often difficult for them to keep the requisite staff to enable them to do the work at once, as the amount of work to be carried out varied greatly. The City Corporation had promoted a Bill last year to regulate and control the breaking up of streets in the City, and some powers were required to deal with the question all over London. Witness submitted cross-sections of the Strand and streets in various parts of London, showing the number of pipes, &c., in the streets. Continuing, witness referred to the fact that the London County Council, when making new streets and in many cases of improvements in streets, constructed subways for gas and water mains, electric light, and other cables. He said that there were in London under the control of the Council, fourteen subways, of an aggregate length of five and a-half miles, the length of them varying from about 100 yards in the case of Garrick-street, to 2 230 yards in the case of the Victoria Embankment. The largest pipes in a subway were two 48-in. gas mains in the Commercial-road subway. The cost of subways varied with the size and conditions under which they were constructed. One of 12 ft. by 8 ft. would cost about 18*l.* per yard run for construction. That price might easily be trebled if there were a large number of pipes and sewers to be dealt with. Several of the pipe subways built by the Council were already full, and in many cases it was extremely difficult to get at a leaky joint for repairs, &c. Subways should extend as close as possible to the cellars of the houses on the route, so as to avoid driving side galleries for the house connexions. That, however, could only be done when there was a subway on each side of the street, and even then the construction of deep gullies and the planting of trees might interfere. Until the year 1893 no special powers for the regulation of subways were possessed by the Council, but in that year the London County Council (Subways) Act was passed. Under that Act the Council made by-laws for the regulation of subways, which included a scale of charges to companies and others using the subways. The Council had power to compel all companies, &c., laying new pipes in a street where there was a subway to lay them in that subway. The Council could also, at its own cost, insist on old pipes in a street being relaid in a subway if one were constructed. Witness then explained the nature of the charges levied. The Electric Lighting Companies did not come under the Subways Act, but under the special provisions of the Electric Lighting Orders. The London County Council were now arranging that all paving work, &c., in the few cases under their control should be carried on continuously night and day, a matter to which the witness attached great importance. Another obstacle to locomotion was the holding of large street markets, which greatly interfered with all kinds of traffic, particularly on Saturdays. There might be very considerable improvement in the cleansing of streets by the work being carried out earlier in the morning. The collection of house refuse also required attention. Even from a sanitary point of view the present arrangements with regard to dust carts ought to be altered. The erection of lamp-posts along the centres of all except very wide thoroughfares was a serious obstacle to traffic as they made it impossible for quick traffic to pass the slow traffic. He agreed with Colonel Yorke that there ought to be some regulation with regard to carts outside places of business and places where building operations were going on. Witness then described in detail the means of cross-river communication and went on to give, at some length, a history of street improvements carried out, and in course of being carried out, by the London County Council. Referring to north and south connexions, he said that a number of proposals for new roads had been considered, among them one from the Crystal Palace district to Waterloo-road, near Waterloo Station. From Waterloo the road would be carried across the river by a new high-level bridge between Waterloo and Blackfriars Bridges. One branch of the road might then fall to meet the eastern crescent of the new Holborn to Strand street, and another branch could be continued north by a bridge over Fleet-street between Chancery-lane and Fetter-lane. Rough estimates of the cost of such a road had been prepared. Three types of streets had been taken. Type "A" was a street 150 ft. wide, consisting of footpaths of 20 ft. on each side. The central portion of the street, 30 ft., would be reserved for motor and other quick traffic, and on each side of the central part would be a width of street of 40 ft. for surface tramways and slow traffic. Under the street would be a subway for single-decked tramcars, and there would also be the usual pipe-subways and sewers. Type "B" was a street 100 ft. wide, with a roadway of 72 ft., and two footpaths of 14 ft. each. This type would have a double subway for both quick and slow tram traffic; pipe subways and sewers as usual. Type "C" was the same as type "A" so far as the surface was concerned, but instead of having the tramcars in a shallow subway they would be in two tubes at a deep level. There would, of course, be the usual pipe subways, &c. The cost of the various types, taking the section from the Strand to the county boundary near the Crystal Palace, including 150 ft. of land on each side of the road, had been estimated as follows :—Type "A," works, 4,000,000*l.*; property, 12,000,000*l.*; cost per mile, 2,560,000*l.* Type "B," works, 4,550,000*l.*; property, 10,500,000*l.*; cost per mile, 2,400,800*l.* Type "C," works, 5,125,000*l.*; property, 12 000,000*l.*; cost per mile, 2,740,000*l.* In reply to Sir John Wolfe Barry, witness said that he did not contend that such a road was an immediate necessity, but it would greatly relieve congestion. It had been placed before the Commission on account of its incorporating a bridge over the river between Waterloo and Blackfriars. It would not be advisable, he thought, to attempt to widen Waterloo Bridge on account of the foundations. Continuing, he said that the best way of dealing with streams of traffic which crossed each other was to carry one street above another, as had been done at Holborn Viaduct, but unless a gradient of 1 in 30 was obtained such crossing would not be of much use. The gradient of the Haymarket was 1 in 36. Dealing with the question of tramway communication, he described the tramway undertakings of the Council, and made various suggestions for new connexions, &c. The construction of subways for tramways under many of the streets in London would be accompanied by great difficulties, but they might be made under some of the wide streets outside the districts where the traffic was heavy, and also along the edges of some of the parks. He described how a subway could be made from Hammersmith Broadway via Hammersmith-road, Kensington-road, Hyde Park, Green Park, to Walsingham House, Piccadilly, and compared the

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cost of a shallow tramway subway with the cost of a deep-level tube by taking the last-named route as an example and including also an extension of that route to Bishopsgate and along Kingsland-road to the county boundary. Constructed as a shallow tramway subway, the cost would be just over 5,160,000l., and as a deep-level tube, just over 4,160,000l. The equipment and working expenses of a shallow tramway would, however, be considerably less than those of a deep-level tube, for in the latter case there would be the provision and working of lifts. The principal reason why deep-level tubes had been adopted in London was the presence of the London clay. By keeping deep in that clay sewers, &c., were avoided. Returning to the question of tramways, witness said that a useful north and south connexion might be formed by continuing the tramway in Vauxhall Bridge-road to the Edgware-road in a shallow subway. He concluded his evidence by comparing the subways in New York and Boston with those of London. The system of shallow subways for railways now being constructed in New York would, when completed, give traffic facilities in New York and Brooklyn far ahead of anything contemplated for London. In many cases four lines of rails would be laid in the subways, two for express and two for slow trains. It was necessary, however, to consider the local conditions in New York and London when comparison was made. New York was a long narrow city, 13 miles long and about 1¼ to 2 miles broad. One or two railways running down the length of such a city would obviously carry passengers to practically every part of the city.

BOOKS RECEIVED.

STONES FOR BUILDING AND DECORATION. By Geo. P. Merrill. Third edition. (Chapman & Hall).

The Student's Column.

CONCRETE-STEEL.—IV.

THE PHYSICAL PROPERTIES OF CONCRETE (*Continued*).

COMPARATIVELY few experiments have been made for the purpose of determining the tensile strength of concrete, especially in Great Britain.

Table VII.—Tensile Strength of Portland Cement Concrete.

Proportions.	Age when Tested.	Tensile Strength in lbs. per sq. in.	Authority.
1 : 3	4½ mos.	242	Report of Aust. Soc. Eng. & Archts., 1895
1 : 3	„	254	
1 : 4	—	350	Prof. Brik, 1901.
1 : 2 : 4	26 days	280	Prof. Hatt, Purdue Univ., 1902.
	28 „	360	
	33 „	305	
	35 „	300	
1 : 2 : 4 (cinder)	—	82	

The results given in Table VII., as well as the investigations of Hartig and Durand-Claye, show that the tensile strength of concrete may safely be taken between 200 lbs. and 300 lbs. per square inch.

Among tests of transverse strength those contained in Table VIII. represent the averages obtained from tests of concrete bars under various conditions and at various ages. The investigation made by Mr. Bruce covered 191 tests on concrete bars 30 in. long by 4 in. square, and was chiefly intended to ascertain the growth of transverse strength with age. Many of the tests were upon types of concrete unsuitable for use in combination with steel. The modulus of rupture (f) was calculated by the familiar formula $f = \frac{3}{2} \cdot \frac{Wl}{bd^2}$. Other recent experiments made with the object of determining the transverse strength of concrete, do not add materially to the information contained in Table VIII., and in some cases the conditions are so variable that it is impossible to draw any general conclusions or to compare the results with the averages already given.

According to M. Teret, Director of the Laboratory of the Ponts et Chaussées, Boulogne, the shearing resistance of concrete varies from 0·16 to 0·2 of its compressive strength.

In the light of modern investigation it appears to be perfectly clear that the values hitherto assumed for the modulus of elasticity for concrete are much too low.

Table VIII.—Transverse Strength of Portland Cement Concrete.

Proportions.	Age when Tested.	Modulus of Rupture.	Dimensions of Bars.	Authority.
1 : 3	6 months	654	Not stated	Prof. Hanisch and J. Spitzer.
1 : 3½	„	518	„	
1 : 4	„	384	„	
1 : 5	„	256	„	
1 : 6	„	192	„	
1 : 2 : 3	„	303	30 in. by 4 in. by 4 in.	Mr. Bruce, Proc. Inst. C.E., Vol. cxiii.
1 : 2½ : 5	„	236		
1 : 3 : 5	„	214		
1 : 2½ : 5	28 days	332	30 in. by 10 in. by 10 in.	Prof. C. Bach, Stuttgart, 1895.
1 : 2 : 4	7 years	296	19 in. by 4 in. by 4 in.	Mr. Falk, Proc. Am. Soc. C.E., Vol. xxix.
1 : 3 : 5	„	247	38 in. by 4 in. by 4 in.	
1 : 3 : 5	„	218	19 in. by 4 in. by 4 in.	
1 : 1 : 2	63 days	304	48 in. by 24 in. by 3 in.	Messrs. Fowler & Baker, 1896.
1 : 2 : 4	28 „	540	80 in. by 8 in. by 8 in.	Prof. Hatt, Purdue Univ., U.S.A., 1902.
1 : 2 : 4	7 „	397	40 in. by 8 in. by 8 in.	
1 : 2 : 4	8 „	352	80 in. by 8 in. by 8 in.	
1 : 2 : 4 (cinder)	14 „	129	80 in. by 8 in. by 8 in.	
1 : 2 : 4 (cinder)	11 „	140	40 in. by 8 in. by 8 in.	

Table X.—Modulus of Elasticity of Portland Cement in Compression. (E_c)

Proportions.	Age when Tested.	Value of E_c in lbs. per sq. in.	Method of Computation.	Authority.
1 : 3	35·39 days	4,660,000	From total deformations.	Report of Austrian Soc. Eng. and Archts., 1895.
		5,180,000		
1 : 2 : 3	12 months	1,912,500	For elastic deformation at 500 lbs. per sq. in.	Mr. McCausland, Proc. Am. Soc. C.E., Vol. xxix.
1 : 2 : 5	„	1,240,333		
1 : 3 : 4	„	1,330,500		
1 : 3 : 5	„	1,343,666		
1 : 3 : 6	35·47 days	2,500,000	At 700 lbs. stress.	Mr. Wason, Proc. Am. Soc. C.E., Vol. xxvii.
		2,800,000		
		4,545,000		
1 : 5 (gravel)	6 days	2,088,000	With regard to "set" after previous loads At 750 lbs. per sq. in	Prof. Hatt, Purdue Univ., 1902.
1 : 2 : 4 (stone)	9 days	4,702,000		
„	9 „	3,940,000	„ 1,500 „	
„	14 „	4,340,000	„ 750 „	
„	14 „	3,680,000	„ 1,500 „	
1 : 7½	28 „	386,000	—	Prof. C. Bach, Stuttgart, 1895.
1 : 9	28 „	301,000		
1 : 2 : 4 (cinder)	8 „	580,500	With regard to "set" as above.	Prof. Hatt, Purdue Univ., 1902.

Table XI.—Modulus of Elasticity of Portland Cement Concrete in Tension. (E_t)

Proportions.	Age when tested.	Value of Et in lbs. per sq. in.	Method of Computation.	Authority.
1 : 3	35·39 days.	5,600,000	From total deformation.	Report of Austrian Soc. Eng. and Archts., 1895.
		6,220,000		
1 : 4	—	2,400,000	From deflection of floor at— 100 lbs. stress per sq. in.	Professor Brik, 1901.
		1,900,000	292 „ „	
		1,422,000	328 „ „	
		1,025,000	342 „ „	
		600,000	356 „ „	
1 : 5	2½ 3 months	938,000	From deflection of floor plates.	Professor Melan, 1899.
1 : 2 : 4	35 days	2,700,000	With regard to "set" after previous loads.	Professor Hatt, Purdue Univ., 1902.
	33 „	2,400,000		
	28 „	1,400,000		
	26 „	1,900,000		
1 : 2 : 4	7 years	1,340,500	From elastic deflection of beams.	Mr. Falk, Proc. Am. Soc. C.E., Vol. xxix.
1 : 3 : 5	„	608,333		

Examination of Tables X. and XI. will show the remarkable differences which exist in determinations of the coefficient of elasticity of concrete, both in compression and in tension. According to Professor Hatt and others, the value for E_c is about double that for E_t, while in the well-known tests of the Austrian Society of Engineers and Architects, E_t was shown to be about 20 per cent. greater in value than E_c. In addition to affording another clue to the elastic properties of concrete, Hartig's experiments* serve to suggest a reason for the higher value of E_t, as represented in fig. 5. At zero stress, 3,765,410 lbs. per square inch is the value of the co-efficient both for tension and for compression, while the unit stress increases with tension at a maximum of 549 lbs. per square inch, up to 4,304,394 lbs., and decrease with compression at a maximum of 1,806 lbs. per square inch, to 1,901,214 lbs. Similar results have been observed by Considère and others.

In the course of an extended investigation at the Royal Testing Laboratory,

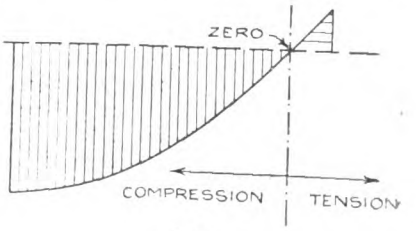

Fig. 5.

Stuttgart, Professor C. Bach has shown that Hooke's law of the proportion between stress and strain does not hold good for concrete. Further, as a result of tests at Watertown

*Civilingenieur: "Das elastiche Verhalten der Moertel und Moertelbindematerialen." 1893.

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Arsenal*, Mr. Wason found that Hooke's law did not apply closely, except within the stress limit of 700 lbs. per square inch. These records help to explain some of the variations as to the value of the modulus of elasticity stated in Tables X. and XI. In the former table it will be seen that the stress at which computations were made range from 500 lbs. to 1,500 lbs. per square inch, and in the latter the range is from 199 lbs. per square inch upwards. The figures in Table XI., relating to tests by Professor Brik, are particularly worthy of study, as they show the great reduction in the value of E as stress is increased. It is also worthy of notice that some results are based upon elastic, and others upon total deformation, thus constituting another reason for considerable differences. As a matter of fact, many of the coefficients represent the modulus of deformation rather than of elasticity. The coefficient of deformation is certainly of service in concrete-steel design, but experimental results should in future be recorded so that no misconception may exist as to their interpretation. Differences in value are also due to the proportions of the concrete, and generally there is much need for additional and more precise data as to the elastic properties of this material. Taking general averages of the figures in Tables X. and XI. we obtain the following approximation :—

Elasticity of Concrete in Compression, 2,800,000 lbs. per sq. in.

Elasticity of Concrete in Tension, 2,400,000 lbs. per sq. in.

Engineers who are concerned with concrete-steel construction now frequently adopt the value of 2,800,000 lbs. per sq. in., for the modulus of elasticity without complicating formulas by drawing any distinction between the values for tension and compression. In some cases it may be prudent to adopt considerably lower figures.

It may here be remarked that the variation of the value for E, with increasing stress intensity, is of considerable importance to the designer of concrete-steel structures, for the more the concrete elongates per unit of stress, the greater is the proportion of stress carried by the steel.

Although, strictly speaking, concrete has no elastic limit, there is a point in test diagrams beyond which a marked change in behaviour is noticeable, and it will be convenient to regard this point as denoting the elastic limit. A careful study of all available records leads to the conclusion that what we may term the elastic limit of concrete in compression, with proportions not poorer than 1 : 3 : 6, may be placed at about 1,000 lbs. per sq. in. In the case of 1 : 2 : 4 mixtures, the elastic limit in compression may be as high as at 2,000 lbs. per sq. in. Variations depend very much upon the proportion of cement used, and the recent investigation of M. Considère, to which further reference will be made in a subsequent article, shows that the elastic limit may be raised very materially by the imposition of test loads upon concrete members. It is well known that the elastic limit of iron and steel may be modified by the intermittent application of loads, but attention has not previously been directed to a similar phenomenon in connexion with concrete.

One constant which has received too little attention from investigators is the coefficient of expansion of concrete. It is generally assumed that this is of approximately equal value with the coefficient of expansion of iron and steel. As general assumptions are not desirable in constructional work, we now give the results obtained from an investigation extending over two years, and conducted under the direction of Professor W. D. Pence in the School of Civil Engineering, Purdue University, U.S.A.† Three series of tests were made, each series including ten tests upon 1 : 2 : 4 concrete. In the first series the aggregate was hand-broken oölitic limestone ; in the second it was limestone broken in a crusher, and a bar of the unbroken stone was also included ; and in the third series it was pit gravel of good quality. The following are the recorded results :—

Material tested.	Coefficient of expansion per deg. Fahr.
Gravel concrete, 1 : 2 : 4 ...	0·0000054
Stone " 1 : 2 : 4 ...	0·0000055
Limestone Rock.....	0·0000054

The above results indicate that the coefficient of expansion of broken stone concrete is not materially different from that of the solid rock from which the aggregate was crushed. From this investigation it may be concluded that the coefficient of expansion of concrete is about 0·0000055 per degree Fahrenheit, this being conveniently borne in mind as "five zeros fifty-five."

Another characteristic of concrete which should be remembered is that, when hardened in air, it shows a decided tendency to shrink, causing internal stresses of considerable intensity. Evidence of this property is afforded by the experiments described by M. Considère in 1899 at a meeting of the French Academy of Sciences. With water-hardened concrete the case is different, and the material expands instead of contracting during the process of setting.

The foregoing records relate exclusively to the properties of concrete without metal reinforcement. It will afterwards be shown in what manner they are modified by combination with steel, and the permissible unit stresses for both steel and concrete will be stated.

* Report of the Watertown Arsenal, 1897.

† Journal of the Western Society of Engineers, Vol. VI., 1901.

OBITUARY.

MR. WHISTLER.—We regret to announce the death, on the 17th inst., at Chelsea, of Mr. James Abbott McNeill Whistler. Mr. Whistler, who was born in 1835 at, we believe, Lowell, in Massachusetts, was the son of Major G. W. Whistler, an engineer, who married a Miss McNeill, of Scotch descent. He joined at the West Point Military Academy in 1851, where he studied during four years. After having been employed as a cartographical draughtsman in the service of the Government, he, in 1857, entered at Gleyre's atelier in Paris, and speedily achieved a name with the thirteen etched plates, known as "The French Set," of which Delâtre published impressions in 1859. He then joined the community of artists at Chelsea, and brought out at intervals the series of etchings of the riverside in London which the late Mr. F. S. Ellis published in a collective form in 1871. In the meantime he exhibited at the Royal Academy rooms various paintings, amongst them being one since known as "The Piano Picture," which he sold to John Phillip for thirty guineas ; "The Little White Girl" (1865), "The Symphony in White" (1867), and "The Balcony" (1870). In 1872 he exhibited there the portrait of Mrs. Whistler (his mother) for which he subsequently won a gold medal, in 1884, at the Salon, where, however, his "Little White Girl" had been rejected in 1863. Mr. Whistler painted also the portrait of Carlyle (1877) which was acquired by the Corporation of Glasgow, one of Sarasate, and portraits of Mrs. Heinemann—authoress of "Via Lucis"—as Kassandra Vivaria, of the Comte Montesquieu-Fésenzac, of Miss Alexander, of Lady Archibald Campbell, and of Mrs. Louis Huth. A criticism by Ruskin upon one of the "Nocturnes" in 1878 gave rise to a lawsuit which resulted in Mr. Whistler, as plaintiff, gaining a verdict with one farthing damages, and inspired his characteristic rejoinder in the shape of a pamphlet under the title of "Art and Art Critics." A notable piece of decorative work by Mr. Whistler is that which he executed in the interior of No. 49 Prince's-gate, Hyde Park, S.W., for the late Mr. F. R Leyland, where he painted the panels of the hall and staircase and dining-room. A prevalent tone of green was adopted for the hall, and the entire height of the staircase, the whole being panelled in shades of willow ; the dado is enriched with panels in imitation of aventurine lacquer decorated with sprigs of pale rose and white flowers ; his general scheme for the dining-room, known as the "Peacock-room," was in turquoise blue and gold, supplemented with a full-length painting of "La Princesse du Pays de la Porcelaine." This painting, the portrait of Carlyle, and the "Fur Jacket," were in the Glasgow Exhibition of 1901. In 1880 Mr. Whistler published a set of his "Venice" etchings, and the series, "Twenty-six Etchings," six years afterwards. Mr. Wedmore's catalogue enumerates 268 etchings altogether. In 1890 Mr. Whistler brought out "The Gentle Art of Making Enemies :" and he printed as a pamphlet a lecture, known as "Ten O'Clock," which he delivered in London in 1885. He was awarded a medal for the works he displayed in the American section of the Paris Exhibition, 1900. We may mention that he married the widow of E. W. Godwin, the architect, and that he passed the later years of his life mostly in Paris, frequently contributing to the exhibitions in the Goupil Gallery. He was an "officier" of the Legion of Honour, a member of the Société Nationale des Artistes Français (New Salon), of the Royal Academy of St. Luke at Rome, the Royal Academy of Bavaria, &c., and in 1886 was elected President of the Royal Society of British Artists.

MR. NIGHTINGALE.—We have also to announce the death of a well-known contractor, Mr. Benjamin E. Nightingale, of Albert Works, Albert Embankment, who died on the 17th inst. at Richmond. He had been in business for forty-eight years, during which time he had carried out many important buildings for eminent architects. Among them the following may be mentioned : The Council Chamber, Guildhall, and the Leadenhall Market, London, from the designs of the late Sir Horace Jones ; churches and St. Olave's Rectory from the designs of the late Ewan Christian ; monasteries and church from the designs of the late John Bentley ; the Stationers' Hall ; Chapel at the Consumptive Hospital, Brompton ; the Centenary Hall at the Royal Masonic Institute for Girls ; various buildings from the designs of the late Mr. E. Greg and the late Mr. I'Anson ; also buildings by Mr. Aston Webb and other eminent living architects. Mr. Nightingale had been President of the Master Builders' Benevolent Institution ; he was a member of the London Master Builders' Association, and of the Bricklayers' and Tilers' Guild.

MR. STEVENS.—We have also to announce the death of Mr. J. G. Stevens, the senior partner in the firm of Messrs. Archibald Smith & Stevens, the well-known lift manufacturers.

GENERAL BUILDING NEWS.

ST. ANDREW'S CHURCH, FROGNAL, HAMPSTEAD.—The newly-erected Presbyterian Church of England, St. Andrew's, Frognal, was dedicated recently. The new church is built in the Early Perpendicular style, is situated at the corner of Frognal-lane and Finchley-road, and has been built of Stamford stone with Bath stone dressings. The tower, which is at the corner, will be surmounted by a short copper-covered spire, and has a vane with a representation of St. Andrew. The height of this above the pathway is over 100 ft. The various entrances, of which there are four, are approached by flights of steps. The internal arrangements include seating for 734, and the whole of the pewing is of oak. The platform is of marble, green and white. The pulpit and choir seats are of carved oak. The recess to the platform is filled partly with rich hangings, over which is a painted glass window, the work of Mr. Dudley Forsyth, of Hampstead. The committee selected the architects, Mr. W. A. Pite and Mr. R. S. Balfour, of Jermyn-street, S.W., in limited competition, and Mr. W. H. Ross has acted as clerk of works. The builders are Messrs. Dove Bros. The church has a hall, committee-rooms, and vestries adjoining, and is electrically lighted throughout. It has cost about 18,000*l.*, including purchase of the land, building of the hall, and fittings.

CHURCH EXTENSION, DOVERCOURT.—The foundation-stone has just been laid of an addition to St. Augustine's Church, Dovercourt. The enlargement will consist of the construction of two bays in the nave, and the provision of a baptistry. This will increase the seating accommodation from 360 to 500. The existing building is of red brick with stone facings, and the architects (Messrs. J. E. K. & J. P. Cutts, of London) have arranged that the additions shall be carried out in the same style. The work is estimated to cost 1,500*l.*

PRIMITIVE METHODIST CHURCH, MIDDLEBROUGH, —The foundation-stones of the new Primitive Methodist Church and lecture hall, which is to be erected in Southfield-road, Middlesbrough, were laid on the 15th inst. The new lecture hall will have a frontage in Southfield-road of 40 ft., and a set back of 30 ft. The main entrance will be from Southfield-road. On the ground floor there will be a lecture hall, 52 ft. long by 34 ft. broad, with infants' class room, tea room, and staircase behind. The school above will be 30 ft. long by 25 ft. broad. There will be five class rooms, one being 29 ft. by 12½ ft. The building will be of brickwork, faced with Normandy bricks, with dressings of Closeburn stone, and the roof will be covered with best Welsh slates. The lecture hall will accommodate 300 people, and will be used for congregational purposes only until the church is rebuilt. Mr. Henry Walker, of Linthorpe is the contractor, and the architect is Mr. T. Davidson, of Newcastle.

RESTORATION OF KILDWICK CHURCH, YORKSHIRE.—This building has just been restored under the direction of Messrs. Paley & Austen, Lancaster, architects.

SCHOOL EXTENSION, PONTYPRIDD —At an extraordinary meeting of the Pontypridd School Board held recently, the Board's Architect (Mr. A. O. Evans) submitted a report on the school accommodation at Coedpenmaen and Treforest. After considering the question, the Board resolved that he should prepare plans showing a rearrangement of the Treforest Schools into a boys' and girls' department, to provide additional accommodation for 120 boys and sixty-four girls, and a new infants' school to be erected to accommodate 400 infants, with a central hall. He was directed to prepare plans for alterations which would cost about 1,000*l.* at Coedpenmaen.—Mr. Evans informed the board that plans for ninety new houses at Treforest had been passed, and would be ready for accommodation before any alteration to the schools could be carried out.

SCHOOL AT LISCARD.—The Wallasey Education Committee have decided to proceed with the erection of the school in Manor-road, Liscard. Mr. Kirby, of Liverpool, is the architect. Accommodation will be provided for 340 boys, 340 girls, and 300 infants.

MUNICIPAL AND OTHER BUILDINGS, HAMILTON. —On the 20th inst. a special meeting of the Town

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Council was held to consider a motion by Provost Keith to acquire ground and to erect a public hall and offices for the burgh. The motion not being supported by the necessary two-thirds it fell. Thereafter, the opinion of Mr. Washington Brown, assessor, was read on the competitive plans for the proposed Municipal Buildings and Public Library, his awards being: 1. Alexander Cullen, municipal buildings, 28,952*l.*; library, 13,762*l.*—total 42,714*l.* 2. M'Carthy & Watson, Edinburgh, municipal buildings, 28,883*l.*; library, 13,098*l.*—total, 41,981*l.* 3. Sinclair & Ballantyne, Glasgow, municipal buildings, 28,535*l.*; library, 13,062*l.*—total, 41,597*l.* Each competitor having exceeded the stipulated limit, it was agreed by twelve to two to adhere to the conditions of the competition.

SCHOOL, SCARBOROUGH.—The foundation-stone of the new adult school in Roscoe-street, Scarborough, was laid recently. The plans have been prepared by Mr. F. Rowntree. On the ground floor they show a library and entrance-hall, with four classrooms, and a billiard-room. Upstairs there is a meeting-room capable of holding 280 people, and a class or clubroom. The intention is to provide not only a reading-room and institute for members, but also accommodation for the meetings of friendly and other societies and clubs.

SUNDAY SCHOOLS AND MEMORIAL HALL, DENBY DALE, YORKSHIRE. — The memorial-stones of Wesleyan Methodist Sunday schools, and Queen Victoria Memorial Hall, Denby Dale, were laid on the 11th inst. The architect is Mr. George Moxon, of Barnsley, whose plans were accepted in competition. The premises comprise an assembly-hall, tea and infants' room, six classrooms, including a church or ladies' parlour, young women's and young men's select rooms, kitchen, lavatories, library, secretary's and other offices, and two rooms for reading, recreation, and social gatherings. The latter two are in the basement. The assembly-hall will provide seating accommodation for 400 persons, and, by means of movable partitions between the tea and one or two other rooms, could be made to accommodate 600. The style is Renaissance. The principal entrance to the schools will be opposite to that of the chapel, and will be surmounted by a statue of the late Queen Victoria. The windows will be of stained glass. Messrs. Allott, Cooke, & Heywood, of Cumberworth, are the masons, and Messrs. John Holmes & Sons, of Denby Dale, the joiners. The cost is estimated at 3,000*l.*

BOARD SCHOOL, CLAPHAM.—On the 16th inst. the Hon. E. Lyulph Stanley (Vice-Chairman of the London School Board) opened the new school which has been built by the Board in Aristotle-road, Clapham, S.W. The building—which will be known as the Haselrigge-road Senior Girls' School—provides accommodation for 452 girls, and has been erected at a cost of over 14,300*l.* Mr. T. J. Bailey is the Board's Architect.

POST-OFFICE MERTHYR.—Arrangements for the erection of the new post-office for Merthyr on the site acquired in John-street have been made and tenders are being invited for the construction of the building. The plans have been prepared by Mr. W. T. Oldrieve, Surveyor to his Majesty's Office of Works.

NEW CLUB-HOUSES IN LONDON.—During the past month or so several changes have been carried out in various houses in the western quarter of the town in order to adapt them for purposes of occupation by some of the more recently established clubs of London. The Automobile Club of Great Britain and Ireland has entered into occupation of No. 119, Piccadilly, formerly the residence of the first Marquis of Cholmondeley and of his widow, which has been converted at a large outlay for purposes of the club. The Imperial Service Club, which consists of officers who served in the South African war, have taken possession of No. 128, Piccadilly, which they acquired at a cost of nearly 100,000*l.* (the furniture included), and which was completed in 1892 for the Piccadilly Club, the house standing on the site of the old Running Horse. The Country Gentlemen's Club have taken No. 12, St. James's-square, a house formerly numbered 10, and until lately the home of the Blenheim Club, and previously of the Pall Mall and the Salisbury Clubs. On May 22 the Ladies' Empire Club was opened at No. 61, Grosvenor-street. In Dover-street No. 45 is being remodelled by Messrs. J. Style & Son, contractors, for the members of the London United Club, and No. 18 is being similarly dealt with by Messrs. Wm. Austin & Co., who supply also the decoration, furniture, and electrical lighting, for the Atlantic Club. An additional building is about to be erected at the rear of No. 68A, Piccadilly, formerly the Avondale Hotel, by Messrs. G. Trollope & Sons for the Grosvenor Club, which has removed thither from the (old) Grosvenor Gallery, opened in 1877, in New Bond-street. The Avondale Hotel forms the western part of the block that was built in 1884 at the corner of Dover-street for Hatchett's Hotel and the New White Horse Cellars, after plans and designs by Messrs. W. S. Weatherley and F. E Jones—illustrated, with two plans, in the *Builder* of November 28, 1885. The Ladies' Army and Navy Club has migrated from Nos. 17-8, Dover-street to much more extensive premises, formerly the Bristol Hotel, in Burlington-gardens.

POST OFFICE, LINLITHGOW.—At a meeting of the Dean of Guild Court on the 9th inst., plans were submitted of the new Crown Post Office to be erected at Linlithgow. The building will be one story, and the accommodation will consist of public office, instrument room, telephone room, boys' room, postmaster's room, large sorting office, postmen's room and store, also lavatory accommodation. The plans, which were prepared by Mr. W. W. Robertson, H.M. Office, Edinburgh, were passed. The site is at the east end of the town, adjacent to the railway station. Messrs. Baikie & Peattie, builders, Bo'ness, have secured the contract for the building.

HIPPODROME, YARMOUTH.—The Yarmouth Hippodrome is to be opened on the 20th inst. The frontage of the building faces the Marine Parade, and is over 100 ft. in length, and of terra cotta and red brick. There are five entrances under the four towers which form a feature of the building; these towers are placed at regular intervals with a large semi-circular arch thrown between each pair. The outside ornamentation is in low relief, the central entrance being flanked by columns. The main entrance is 30 ft. by 20 ft., and has a mosaic-paved floor. This entrance is enclosed by doors, and will be used as a crush and retiring room by those occupying the stalls. The total accommodation of the house is for about 4,000 people. Mr. R. Scott Cockrill, of Yarmouth and Lowestoft, son of the Yarmouth Town Surveyor, is the architect. Mr. Payne, of Norwich, carried out the electric lighting installation, and Mr. W. G. Crotch, of Norwich, designed and executed the ceiling work. The other contractors, &c., are Mr. J. Youngs, of Norwich, builder; Messrs. Dawnay, Ltd., London, for steel construction, for roof and ring; Mr. Atterton, Yarmouth, plumbing and painting.

BELGRAVE HOSPITAL FOR CHILDREN, KENNINGTON.—The Belgrave Hospital for Children, which has been erected at the corner of Clapham-road and Prima road, Kennington, was formally opened by Princess Henry of Battenburg on Monday last. The building is of red brick, and at present only the administration block and one wing have been built. A second wing will be added, when funds allow, on land facing the Clapham-road. There are two large wards, a baby's ward, operating theatre, and the usual administrative offices and kitchen, besides a large out-patients' department. The architect was Mr. H. Percy Adams. An illustration of the building will be found in our issue for May 9, 1903.

SANITARY AND ENGINEERING NEWS.

ELECTRICAL WORKING OF SLATE QUARRIES.—Three-phase plant for power working has successfully stood the test of experience abroad and, to a smaller extent, in this country, and we are glad to notice that it is being adopted in a good many recent installations. The Park and Croesor Slate Quarries of North Wales are now installing this kind of plant for power and traction purposes. A three-phase generator of about 300 horse-power capacity is driven by a water turbine by means of a flexible coupling. An automatic governor is used with the turbine, and a Thury regulator is being installed so that the generator will always maintain its proper voltage whatever the load, and will need very little attention. The transmission line consists of bare copper overhead conductors, and the voltage will be 2,750, which, although high for this country, is quite usual in Norway or Switzerland. In order to supply the six three-phase motors in the mill, the pressure is reduced to 220 volts by means of a transformer. The electric locomotive used for haulage will be supplied with direct current at 500 volts by means of a motor generator situated in the mine itself. We think that the engineer has done wisely in choosing a motor generator in preference to a rotary converter for this purpose. The electrical work is being done by Messrs. Witting, Eborall, & Co., and the turbines are being supplied by Messrs. Gilbert Gilkes.

LOCAL SEWERS. — The Main Drainage Committee reported as follows at Tuesday's meeting of the London County Council: — We have sanctioned, subject to certain conditions recommended by the Engineer, the construction of the following local sewers:—Camberwell.—704 ft. of 12-in. pipe and concrete sewer (reconstruction) on the west side of Peckham Rye, between Troy-lane and East Dulwich-road. Deptford.—1,180 ft. of 15-in. pipe and concrete sewer in Revelon-road, Brockley (in substitution for sewer approved by the Main Drainage Committee on July 18, 1901). Hackney.—1,475 ft. of 12-in. pipe and concrete sewer in Moresby-road, Upper Clapton (renewal of sanction given by the Main Drainage Committee on February 27, 1902). Lewisham.—158 ft. of 9-in., and 232 ft., 211 ft., and 458 ft. of 12-in. pipe and concrete sewers in Grafton-road, Rubens-street, Rutland-road, and Tugela-street respectively.—Shoreditch: 315 ft. of 3 ft. 9 in. by 2 ft. 6 in. brick sewer (reconstruction) in Old-street.—Southwark: 470 ft. of 9-in. pipe and concrete sewer in Nelson-square, Blackfriars-road (for surface water only).—Wandsworth: 980 ft. of 12-in. pipe and concrete sewer in proposed new road on the Mortimer Estate, between Streatham High-road and Garrad's-road.—Woolwich: 1,600 ft. of 9-in. pipe and concrete sewer in Basildon-road, Royal Arsenal Co-operative Society's Bostall Estate, Plumstead (in substitution for sewer approved by the Main Drainage Committee on July 10, 1902).

FOREIGN.

FRANCE.—The "Salon d'Automne" at Paris is actually to be held, in the month of November, in the ground floor galleries of the Petit Palais. The committee is presided over by MM. Besnard, Carrière, and Frantz Jourdain. Following that exhibition the Société des Artistes Décorateurs, presided over by M. G. Dubufe, (assisted by M. Benonville the architect), will organise an exhibition of *objets d'art*, tapestries, decorative painting, furniture &c., to be open from December 15 of this year to February 15, 1904.——M. Choisy, author of "Histoire de l'Architecture," has obtained the Bordin prize for the best work on architecture published during the last ten years.—— The "Envois de Rome" in the section of architecture have been exhibited at the Ecole des Beaux-Arts during the early part of the present month. M. Hulot, a first-year pupil, has sent a study of the pediment of the temple of Venus and of some antique fragments. M. Bigot (second year) exhibits a plan of the Villa Medici, drawings of the cornice of the Farnese Palace, and the temple of Neptune at Pæstum. M. Tony Garnier (third year) has a drawing of the "état actuel" of Tusculum, with details. M. Chiffiot (fourth year) is represented by the general plan of an "attempt to restore a Roman villa of the time of the Cæsars," and a restoration of one of the Pompeiian houses.—— M. Detaille is just completing a large picture for the choir of the Panthéon, the subject being "Chant du Départ."——By an order of the Prefect of the Seine, following the adoption of a recommendation of the Municipal Council, the Service des Beaux-Arts of Paris has been rearranged on a new basis, and all the museums of history and art have been placed under the direction of M. Ralph Brown, who is appointed "Inspecteur-en-Chef des Beaux-Arts of the City of Paris and the Department of the Seine.——There is talk of the restoration of the Hôtel de Sens, one of the finest monuments of the commencement of the sixteenth century. ——M. Tournaire, the architect, has been commissioned to prepare the drawings for the completion, so long delayed, of the Palais de Justice.——The Mairie of Neuilly, illustrations of which were published some years ago in the *Builder*, is to be decorated by some important paintings. In the "Salle des Mariages" there will be "Mariage Antique," by M. Dagnan-Bouveret, and "Age d'Or," by M. Courtois. Four side panels, to be painted by M. Aublet, will symbolise "Naissance," "Premiers Pas," "L'Enfance Studieuse," and "Adolescence." In the Salle des Fêtes, a panel by M. Poilpot will represent "Neuilly in 1870." M. Chartran will reproduce the Château de Madrid and the Court of Francis I.; M. Lapierre will paint a picture of the bridge of Neuilly; M. Schommer, one of Henri IV. and Marie de Medicis crossing the Seine in a ferry-boat; M. Gervex, Louis XVI visiting Parmentier; and M. Bréhan, Louis Philippe and his family.

UNITED STATES.—The use of diamond discs in cutting stone is being largely employed in the United States. It is many years since this method was used in France, and it has always been attended with success. In England we have only adopted it here and there, but for hard and fairly hard stones there can be no doubt that the diamond saw should be used.——The secretary of the Smithsonian Institution has commissioned the firm of Hornblower & Marshall, of Washington, to make plans for an additional building for the United States National Museum. The building is to be fireproof steel framed, and of brick and terra-cotta. Its cost is estimated at 1,500,000 dols.——A Corinthian column of granite, 105 ft. in height, surmounted by a bronze figure of Victory standing upon a globe has been unveiled in San Francisco in honour of Admiral Dewey. The figure is by Mr. Robert J. Aitken, and the architectural design by Mr. Newton J. Thorp. On the sides of the pedestal supporting the column are bronze tablets representing the cruiser *Olympia* and the battleship *Oregon*.

MISCELLANEOUS.

INCORPORATED CHURCH-BUILDING SOCIETY.—This Society held its usual monthly meeting on Thursday, the 16th inst., at the Society's House, 7, Dean's-yard, Westminster Abbey, S.W., the Rev. Canon C. F. Norman in the chair. Grants of money were made in aid of the following objects, viz.:—Building new churches at Broadheath, Christ Church, near Worcester, 80*l.*; Brondesbury, St. Anne, Middlesex, 150*l.*; for the first portion, Jarvis Brook, St. John, near Tunbridge Wells, 120*l.*, and Southgate, St. Andrew, Middlesex, 100*l.*; and towards enlarging or otherwise improving the accommodation in the churches at Dale, St. James, near Milford Haven, 15*l.*; Dalston, St. Philip, Middlesex, 20*l.*; Gilestone, St. Giles, near Cardiff, 20*l.*; Great Sturton, All Saints, near Horncastle, Lincoln, 15*l.*; Lanteglos-by-Fowey, Cornwall, 40*l.*; Llandebie, St. Tybie, Carmarthen, 30*l.*; Mark, the Holy Cross, near Highbridge, Somerset, 40*l.*; and Greetham, All Saints, Lincoln, 45*l.*, in lieu of a former grant of 35*l.* Grants were also made from the special Mission Buildings Fund towards building mission churches at Bensham, St. Hilda, near Gateshead-on-Tyne, 50*l.*; Newlyn, St. Andrew, near Penzance, 40*l.*; and Newton, St. John, near Beaufort, Mon.,

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10*l*. The following grants were also paid for works completed:—Ashton, St. John the Baptist, near Chudleigh, Devon, 35*l*.; Southsea, St. Matthew, Portsmouth, 500*l*. on account of a grant of 1,000*l*.; Nottingham, St. Bartholomew, 100*l*.; Lower Guiting, St. Michael, near Cheltenham, Glos., 35*l*.; Fishponds, St. Mary, Bristol, 40*l*.; Fulham, Christ Church, Middlesex, 175*l*. on account of a grant of 225*l*.; Swanscombe, St. Peter and St. Paul, Kent, 75*l*.; St. Maryiebone, St Cyprian, Middlesex, 250*l*.; Alwalton, St. Andrew, Peterborough, 10*l*., on account of a grant of 25*l*; Eastney, St. Margaret, Portsmouth, 350*l*., on account of a grant of 1,000*l*.; S Crantock, St. Carantoc, near Newquay, Cornwall, 60*l*., on account of a grant of 75*l*.; and Twerton Hill Mission Church, near Bath, 25*l*. In addition to this the sum of 130*l*. was paid towards the repairs of thirteen churches from trust funds held by the Society. The Society likewise accepted the trust of a sum of money as a repair fund for the Church of St. John the Baptist, Stanbridge, Beds.

A NEW FORM OF CHIMNEY SHAFT CONSTRUCTION.—When chimney stacks of circular cross-section are built with bricks having radial edges, a large number of different sizes is generally required, and with the object of simplifying matters a new system of construction has been devised by a German firm The method to which we refer consists in building the outer and inner walls of U-shaped bricks, and in filling the intervening space with concrete as shown in fig. 1. It is said that the result is in every way satisfactory, and that only five sizes

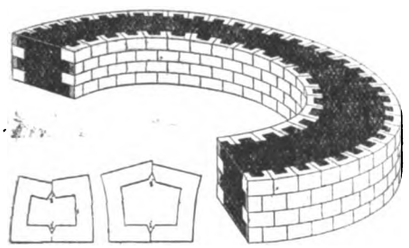


Fig. 2. *Fig. 3.* *Fig. 1.*

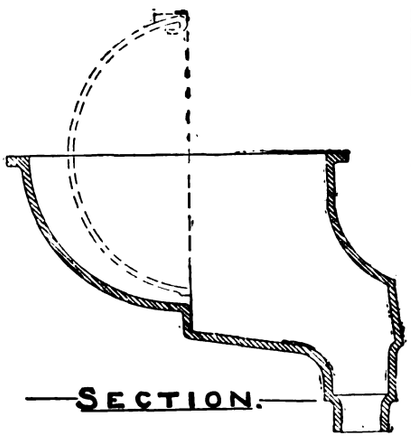
Diagram of Chimney Construction.

of brick are required. The U-section certainly lends itself to a thorough bond between the brick and concrete, and a chimney so built ought to be exceptionally strong, but *we presume it is intended* that the necessary firebrick lining shall be added for the required distance up the interior of the shaft. Fig. 2 illustrates two sections of brick for the outer circle, the bricks being burned in pairs with nicks at the points *i*, *i*, so that they may be separated by a blow from the trowel. Fig. 3 shows similar sections, but of form suitable for the inner circle. This adaptation of concrete is one that seems worthy of consideration.

THE PROPOSED NEW MUNICIPAL BUILDINGS, YEOVIL.—The Yeovil Town Council at a recent meeting considered the awarding of the premiums offered for the best designs for municipal buildings. Architects were required to show by means of ground plans how the space allotted could be arranged to accommodate, as occasion arose for their necessity, a free library and technical institute, a town hall, municipal offices, a corn exchange, a fish, vegetable, and fruit market, a cheese market, and (if possible) a fire station, justices' rooms, county court, a mayor's parlour, &c. The plan was to be arranged, if possible, to provide a wide thoroughfare in place of George's-court from High-street to South-street. On either side of this thoroughfare the buildings were to be arranged. The competitors numbered four, viz., "Ivel," "Sanctoy," "Silverwell," and "Red Circle."—Alderman Pittard now asked whether the plans would become the property of the Council.—Mr. Cole said it was understood that the plans accepted would be paid for.—Alderman Pittard said he did not approve of either of the plans, neither of them answered their expectations.—A suggestion by Mr. Hayward, that there be a division of the first premium, was opposed by Alderman Pittard, who said they were bound to award twenty guineas, according to their agreement, to the competitor who was given first place.—The Council then went into Committee on the matter, and it was eventually agreed that the Surveyor should prepare a statement dealing with the merits of the various schemes, and submit them at a special meeting of the Council.

SOUTH WESTERN POLYTECHNIC.—At the lectures on architectural history given by Mr. Banister Fletcher (and arranged under the auspices of the Board to Promote the Extension of University Teaching of the University of London), the total number of students who entered for the course was sixty-three, and at the examination held at the conclusion of the course eleven students satisfied the examiner (Professor W. R. Lethaby, of the Royal College of Art), and six of these qualified by examination for the Sessional Certificate in Honours. The scheme of instruction consisted of weekly lectures (at which carefully selected notes were given out), illustrated with lantern slides and specially prepared large lecture diagrams, followed by sketching classes and further explanations of the styles under discussion, which were also illustrated by large folio reference books for each style. The majority of students were architect's assistants, pupils and art students, but a considerable number of students interested in architecture as a necessary part of education were present, especially those who are in the habit of travelling or who are interested in historical development. During the coming session, which opens at the Chelsea Polytechnic on Monday, October 5, a series of visits will be arranged to important buildings and museums around London, so that students may be able to become acquainted with the actual details of architecture.

IMPROVED LAVATORY BASIN. — The diagram shows a section of a new form of tip-up lavatory basin made by Messrs. George Jennings. By making the container in the form shown in the section the front portion is not affected when the basin is emptied, splashing is prevented, and the portion of the container which is polluted by the discharge of waste water can be cleansed, as will be seen, without dis-



Jennings's Improved Tip-up Lavatory Basin.

connecting the basin. This we consider a real and important sanitary improvement in lavatory fittings. Tip-up basins are a very convenient method of discharge, but we have always felt it to be a serious drawback to them that one does not know what amount of unwholesome matter is adhering to and accumulating on the surface of the container. This drawback is practically removed by Messrs. Jennings's new form of section.

BIRMINGHAM MUNICIPAL SCHOOL OF ART.—The Museum and School of Art Committee have appointed Mr. Arthur J. Gaskin as headmaster of the Vittoria-street School for Jewellers and Silversmiths, in succession to Mr. R. Catterson-Smith, recently appointed headmaster of the Central and Branch Schools. The appointment was made after consultation with the representatives of the Birmingham Jewellers' and Silversmiths' Association. Mr. Gaskin was educated at the Wolverhampton Grammar School. He joined the Central School, Birmingham, in 1883, and soon became a distinguished student, especially in drawing from the life. Since 1884 he has on two days a week been a master in the advanced classes at the Central School, and assisted in training some of the best known ex-students. Years ago the work of Mr. Gaskin attracted the favourable notice of the late Sir Edward Burne-Jones and William Morris. In 1893 Mr. Gaskin illustrated Hans Christian Andersen's "Fairy Tales," and in the following year "Good King Wenceslas"—the latter published with a note specially written by William Morris. Amongst several of Mr. Gaskin's illustrations published later should be mentioned those to Spenser's "Shepheardes Calendar" issued by the Kelmscott Press in 1896. In 1886 he had exhibited at the Royal Academy his drawing "For those in Peril on the Sea"; since 1898 he has exhibited at the New Gallery in Regent-street, London, many paintings—figure subjects, portraits, and landscapes. He is a member of the Arts and Crafts Exhibition Society, where he has exhibited work in gesso, and jewellery, and other metal-work.

MEAN HORIZONTAL AND MEAN SPHERICAL CANDLE-POWER.—In a paper recently read before the Institute of Electrical Engineers by Mr. Alexander Russell, M.A., reference is made to the mathematical aspect of the rating of incandescent lamps, Nernst lamps, and arc lamps. After defining the mean horizontal candle-power of a lamp as the mean candle-power in a plane perpendicular to its axis, the author points out that some inventors have tried to increase the mean candle-power in particular planes by means of reflectors and refractors, some even thinking they can increase the total quantity of light by this means, but that while the area of the candle-power curve may be increased in particular planes, it does not follow that mean candle-power can be increased in these planes. Some mathematical examples are then given illustrating how the area and the mean value of the radius of the candle-power curve can vary in certain cases Two useful diagrams in the paper show the mean horizontal candle-power curve round a clear bulb 16 c.-p. glow lamp. In the first diagram the value of the curve varies from about 11·9 c.-p. at an angle of 20 deg., to 18·6 at 170 deg., falling again to less than 13 c.-p. at 180 deg. In the second diagram, showing the other side of the same lamp, the variations range from 11·9 at 200 deg., 15·2 c.-p. at 240 deg., and 15·3 at 350 deg. These curves are given for the purpose of illustrating the extraordinary manner in which the horizontal candle-power of an ordinary glow lamp varies in different directions. The author states that the sudden variations are caused by the far side of the bulb acting like a concave mirror and concentrating the light on the photometer screen, while dark bands are produced when a vertical portion of the filament is parallel to another portion of it. Some simple and rapid methods of determining the mean horizontal candle-power are given, and the author then passes to the consideration of mean spherical candle-power which is the mean value of radial lines whose lengths are proportional to the candle-power in these directions. Several simple formulæ and graphical constructions are given for determining the mean spherical candle-power of sources of light, and the paper concludes with the description of some rapid methods of finding mean spherical and hemispherical candle-powers. The simplest practical method of determining the mean lower hemispherical candle-power of an arc lamp is said to consist in measuring its candle-power in directions making angles of 5·7, 17·5, 30, 44·4, and 64·2 deg. with the horizontal, and taking the mean of the results.

THE SANITARY INSTITUTE.—At an examination in Practical Sanitary Science, held in Cardiff, on July 17 and 18, four candidates presented themselves. The following two candidates were awarded certificates: Stephen W. S. Morris and Thomas Powell.

THE SLATE TRADE.—The output for 1902 shows a slight increase, owing to the gradual resumption of work at the Penrhyn Quarries, but is still far below the make of a few years ago. The advance in prices which took place on the 1st inst. both in the Carnarvonshire and Merionethshire quarries does not seem to have affected the demand, which still continues very brisk.

LEGAL.

APPEAL BY BUILDERS AND CONTRACTORS.

THE case of Jones & Willis *v.* Perry Brothers came before the Court of Appeal composed of the Master of the Rolls and Lords Justices Mathew and Stirling on the 16th inst., on the application of the defendants for judgment or new trial on appeal from the verdict and judgment entered at the trial before Mr. Justice Channell and a common jury in the King's Bench Division.

Mr. Lewis Thomas, in support of the appeal, said that the action was brought by the plaintiffs, a firm of iron smiths and founders, for the price of some gates which they had made and fixed at a place called the Portland Market under a contract made between the building-owners, the Portland Market Co., and the defendants, a firm of builders and contractors. The matter arose in this way. The contract entered into by the defendants with the building-owners was in the usual form of the Royal Institute of British Architects, and embodied the bills of quantities and the specification, and under the contract there were five or six iron gates to be erected. The erection of the gates undoubtedly formed part of the contract. The point the defendants went down to trial about was whether the architects had a power under the contract to bind the defendants, the builders, in the circumstances which had happened by an order which they had given to special artists to do special work. The case the defendants made was that the architects had no authority under the contract to bind the contractors for the order they had given to the plaintiffs. At the trial the learned counsel for the plaintiffs put in the contract, and Mr. Justice Channell at first thought that the matter was one which was within the province of the architects to give the order binding the contractors, but on further reflection he came to the conclusion that the work was not work within clause 34 of the contract at all which the architects would have had authority to order on behalf of the contractors. Then the learned judge rather suggested to counsel of the plaintiffs to try to start and run a fresh case altogether, in showing that the power or authority was outside the contract, or that the defendants were estopped from denying the authority of the architects to order the goods in question. The first intimation the defendants had with regard to the goods at all was long after the goods had been delivered, and the goods were not delivered to the defendants at all, but to the plaintiffs' own workmen on the site, and they were erected by the plaintiffs' own workmen on the site. As a matter of fact, the first intimation the defendants had with regard to the matter was long after the defendants had settled everything with the building-owners and received everything they were entitled to have from the building-owners. The contract between the building-owners and the defendants was a large one, between 19,000*l*. and

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20,000*l.*, and was dated December, 1899. The bills of quantities were taken out and supplied to the contractors, and they worked out the prices on the bills of quantities and defendants sent in a firm tender for 19,000*l.* odd, which was accepted. The work was commenced in January or February, 1900. Apart from the defendants' contract there were three or four absolutely independent contracts with regard to the construction of the market. For instance, the engineering work was a separate contract, outside defendants' contract, and so was the electric lighting contract; but under all the contracts the defendants were under a liability under their contract to follow up, after the other contractors had finished their work, and complete the masonry, brickwork, &c. The work having proceeded, in June, 1900, a difficulty arose. The building owners were a company, and apparently the public had not subscribed sufficiently to enable the company to meet their obligations with punctuality. After the defendants had been on the work some months, unknown to the defendants the architects communicated with the plaintiffs, and on November 5 accepted their estimate for the iron gates on behalf of the Directors of the Portland Market Company. In March, 1901, plaintiffs sent their men to the site, but the defendants' contention was that they did not know who the men were working for, there being other contractors at work on the site at the time. Then the company got into very serious financial difficulty, and the architects had instructions from them not to grant certificates to the defendants for work which it was admitted was due to be paid for. The reason was frankly given that if the architect granted a certificate the building owners would not pay it. Then there was a meeting between the independent engineering contractors, Messrs. Westwood, the defendants, and the managing director of the Market Co. The position was explained by the managing director of the Market Co. The contractors were told that the company had received money on the debentures of the company, but that the public had not come in as expected to subscribe for the shares. But it was explained that a Mr. Morrison was willing to advance another sum of 5,000*l.* on the debentures if the shares were taken up to a like amount. It was suggested that these people should take the balance of their money in ordinary shares of the company. On April 6 an agreement was come to between the building owners and the two largest contractors that the whole of the work should be gone into so that it could be ascertained what the total amount they were entitled to receive under the contract was if it was completed. From that amount was deducted the price of all work and materials not put upon the job. It was ascertained that the defendants were, on that footing, entitled to a sum of about 6,000*l.* It was then agreed, and an agreement was then drawn up, that the defendants should receive 2,500*l.* in cash and the balance in ordinary shares of the company which the defendants subscribed for and received as fully-paid shares. In addition the defendants had a bonus of 300 shares. Messrs. Westwood settled on the same footing. At the date of this agreement the defendants knew nothing about the gates having been erected by the plaintiffs, and in making up the accounts between themselves and the building-owners they ruled out the contract price they would have received for the gates, if the contract had been completed, and as a matter of fact they did not receive a penny piece in respect of the gates from the building-owners. Defendants heard nothing more about it until May 11, when they received a letter from the architects, stating they had given a certificate for 197*l.* 10*s.* to the plaintiffs for the ironwork supplied for the job. On May 13 the plaintiffs wrote to the defendants enclosing the architect's certificate and asking for a cheque in settlement at an early date. The defendants denied liability, and the present action was then brought. The learned counsel submitted that the architects, in the circumstances, had no authority to give the certificate or to bind the defendants for the price of the gates.

In the result their lordships, without calling upon counsel for the respondents (plaintiffs), upheld the verdict and judgment in the court below, and dismissed the appeal with costs.

BRIGHTON BUILDING DISPUTE.

In the King's Bench Division on the 17th inst. the case of Horsley *v.* Preston (Maple & Co., third parties), came on for hearing before Mr. Justice Wright, sitting without a jury. The action was brought by the plaintiff, Mr. John S. Horsley, a cycle-maker and agent carrying on business at Brighton, who sought to recover from the defendants 800*l.* damages for injuries to his premises, business, and goods. The defendant, Mr. H. J. Preston, was the proprietor of the Royal York Hotel, which adjoined the plaintiff's premises. Messrs. Maple in 1901 were employed to rebuild the hotel, and during the operations the plaintiff said his premises were surrounded by scaffolding, the walls were injured, and the stock damaged by the dust and dirt, in consequence of which the plaintiff had to employ an extra man and his business suffered considerably. Mr. Preston said he always did his best to protect the plaintiff, who was his tenant, while Messrs. Maple said that every care was taken during the building operations, and they denied that the plaintiff's premises were injured through their negligence. The principal question in the case, however, was as to who was responsible to the plaintiff under the contract made between Mr. Preston and Messrs. Maple & Co.

Mr. H. F. Dickens, K.C., and Mr. Humphrys appeared for the plaintiff; Mr. Boxall, K.C., and Mr. Payne for Mr. Preston; and Mr. Kemp, K.C., and Mr. Kisch for Messrs. Maple.

At the conclusion of the arguments of counsel his Lordship said he would give judgment as between the plaintiff and defendant first. On the principal question of fact witnesses of the highest character, and who were obviously witnesses of truth, differed entirely. The first question was whether the plaintiff's chimney-breast and front wall had been damaged by the new weight put on by the defendant's building. After considering the matter as well as he could, he must come to the conclusion that it was not proved that this was the case. It was for the plaintiff to prove that, and as he thought that the proof was insufficient he was bound to say that the action as against the defendant as regarded that part of the case failed. Then came the more difficult question as regarded the law. He thought all the witnesses agreed that the new weight which had been put on rendered it more necessary than it otherwise was to strengthen the chimney-breast. He thought all the witnesses agreed that the new weight could not safely be carried without doing something to underpin it. That view his Lordship adopted. That was a servitude of weight necessitating that the plaintiff should underpin this structure, and keep it underpinned during his tenancy, and that, he thought, would be a breach of the covenant for quiet enjoyment in plaintiff's lease. He was of opinion that an addition of that kind of servitude did affect the title. Who was liable for that? The defendant employed Maple & Co. to put on that weight, and therefore it seemed to him that the defendant was liable for that. The third head of claim was the little structural damage done by holes made in the walls and ceilings. The defendant never employed Maple & Co. to make those holes. He thought if the contractors had properly performed the work the holes need not have been made, and therefore the interference with the plaintiff's business would never have occurred, and, therefore, the action had been wrongly brought against the defendant. The same thing applied in respect of the injury caused by dust. Then came the question of what damages he ought to give the plaintiff for the breach of the covenant of quiet enjoyment by the servitude of weight. It was a very difficult question to decide. He thought he was bound to take it on the evidence that something must be done. He awarded the plaintiff on that head of claim 100*l.* damages. His Lordship said that the costs would be apportioned as though the issue had been tried by a jury, and Messrs. Maple & Co. would be entitled to the costs of the third party proceedings.

ALLEGED INJURY TO PREMISES THROUGH ACID FUMES.

THE hearing of the case of Roberts *v.* William Pearce & Sons (Ltd.), concluded in the Chancery Division on the 20th inst., before Mr. Justice Farwell. It was an action by the plaintiff, Mr. H. W. Roberts, the owner of the Atlantic Wharf, Bow Common-lane, E., who claimed damages against the defendants, the occupiers of adjoining premises known as "The Chemical Works," Bow Common, the plaintiff's case being that acid fumes and vapours which were allowed to escape from the defendants' premises did great injury to his property and business of a brewer's engineer, coppersmith-founder, &c. The plaintiff also claimed an injunction restraining the defendants from carrying on their business so as to be a nuisance. The plaintiff's main complaint was that in consequence of the escape of the acid fumes and vapours from the defendants' works the galvanised iron roofs on his premises were perforated and injured.

The defendants' case was that their business had been carried on for the past twenty-four years practically in the same way as now, and that they had strictly complied with the provisions of the Alkali Acts, 1881 and 1892.

After hearing a great deal of expert evidence,

His Lordship held that the plaintiff's action failed and dismissed it with costs.

Mr. Eve, K.C., Mr. S. W. Lambert, and Mr. Gibb appeared for the plaintiff; and Mr. Ralph Neville, K.C., Mr. Beaumont, and Mr. Hutchinson for the defendants.

POINT UNDER THE FACTORY ACT, 1901.

THE case of *in re* an arbitration between the London County Council and Tubbs came before a Divisional Court of King's Bench, composed of the Lord Chief Justice and Justices Wills and Channell, on the 17th inst., on a special case stated by the arbitrator.

Mr. Macmorran, K.C., and Mr. Morten appeared for the appellant; and Mr. Danckwerts, K.C., and Mr. Dumas for the respondents.

Mr. Macmorran said the case raised a question under the Factory Act, 1901. If the plans were looked at the Court would see there were two buildings, Nos. 8 and 9, Lensden-place, Finsbury. Both of these premises belonged to Mr. Tubbs. The entrances were from Whitecross-street. In No. 9 not forty persons were employed. No. 8 was a factory in respect of which the London County Council could require certain things to be done as precautions against fire. What the London County Council had done was to treat these premises as one factory, but he (counsel) submitted they could not do that. There was no internal connexion between the buildings, which had separate entrances from the street; but on the first floor there was a little bridge or covered way which connected the two buildings. The premises were in the occupation of Messrs. Fordham, cardboard manufacturers, and he admitted that the work of No. 8 was taken into No. 9 to be dealt with there in the matter of packing, &c. The important question in the case was whether the London County Council by notice were entitled to deal with the premises and require provision to be made as though the premises were one entire factory. The arbitrator, Mr. A. H. Bodkin, said he was of opinion that Nos. 8 and 9 constituted one factory within the statute.

The learned counsel submitted that the gangway did not make the buildings one factory.

Without calling upon counsel for the respondents, the Lord Chief Justice, in delivering the judgment of the Court, said the question was whether or not the arbitrator had gone wrong in holding that the two premises together were practically one workshop within the meaning of the Act. It had been proved to the arbitrator that the people who were employed in the building constantly passed from No. 8 to No. 9 and from No. 9 to No. 8 along the gangway. He was unable to say that the arbitrator had come to a wrong conclusion, and, in those circumstances, the appeal would be dismissed with costs.

Justices Wills and Channell concurred.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

14,590 of 1902.—S. TURTON and W. POULTON: *Boiler Setting, and in Brickwork Provided Therefor and for Similar Purposes.*

The invention consists in providing bricks or blocks in the brickwork or setting of boilers, which bricks or blocks have recessed faces of any form, so as, while capable of yielding a minimum contact surface yield, also a relatively large area of intersticial space without any necessary increase in the width of the brickwork, so as thus to afford an effective insulation.

14,600 of 1902.—S. TURTON and W. POULTON: *Flue Covers Particularly Applicable to the Setting of Steam Boilers.*

This invention consists in providing in the flue-cover blocks a central cavity for air, which is of a shape corresponding to that of the exterior of the respective blocks forming the complete cover. The blocks are preferably so provided and connected together as to form a continuous air-space throughout the length of the boiler. Certain of the blocks may, however, be provided with lateral walls.

14,849 of 1902.—DR. C. J. A. FRANZEK and F. WEIGL: *Manufacturing Porcelain.*

The manufacture of porcelain from an intimate mixture of kaolin and silica schist, with or without the addition of quartz or other raw materials usual in the porcelain industry.

15,693 of 1902.—O. RÉVAI: *Mixing Valves for Hot and Cold Water Supplies.*

Apparatus for supplying water of different temperatures characterised therein, that the cold water is led by direct ascending connexion from the main supply pipe to the mixing-cock, whilst a branch connexion from the main leads water to the boiler or heater, which delivers hot water to a constantly open part of the mixing-cock; the temperature of the water discharged by the latter being regulated by restricting entirely or partially the opening of the cold water pipe by rotation of the mixing-cock, whereby the cold water pressure is entirely or partially transmitted to the warm water in the boiler, the slots of the mixing-cock being so arranged with regard to the openings of the cold water pipe and various eduction pipes that said cock is continually open to the boiler and open to at least one of the eduction pipes, in order that pressure can neither arise in the cock nor in the boiler, whereby in spite of the warm water pipe being continually open, the discharge of cold or mixed water is rendered possible.

18,345 of 1902.—J. WINTERS: *Revoluble Cowls or Tops for Chimneys, Ventilators and the Like.*

In revoluble cowls or tops for chimneys, ventilators and the like, the provision of ball bearings as a support for the revoluble body for the purpose of providing a free running without oil troughs.

18,483 of 1902.—F. DERRETT and S. INWOOD: *Union Couplings or Joints for Soft Metal Pipes.*

A union coupling or joint for soft metal pipes, com-

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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prising two coned sleeves into which the pipe ends to be coupled are inserted and afterwards opened out to fit the coned part of the sleeves, a short piece of jointing barrel coned to fit in the ends of the pipes but leaving sufficient clearance between them to enable them to be further opened out or compressed by the jointing barrel when drawn nearer together, and a nut mounted to turn freely against a shoulder on one of the sleeves and engaging a screw thread on the other sleeve so that when the nut is screwed up the sleeves are forced towards each other and the ends of the pipe compressed between the sleeves and the jointing barrel forming a tight joint.

18,542 of 1902.—F. MITCHELL: *Tie for the Walls of Buildings and the Like.*

A wall tie comprising a central portion with end projecting arms, and a central vertical web, with or without projections from the projecting arms.

8,476 of 1903.—G. HUTH: *Soldering Compound for Cast Iron.*

A soldering compound for cast iron consisting of a mixture of finely-divided metal or metals containing oxygen compounds thereof, a flux that melts under heat, and a substance, such as paraffin oil, that will prevent the access of oxygen to the cast iron already in the cold condition.

10,663 of 1903.—J. SCHELL: *Locks for Doors or Other Purposes.*

In a lock, the combination with a locking bolt and its operating device of a hidden releasing and holding device for securing a locking bolt in both locked and unlocked positions, and formed with holding projections and between such projections, an interval or passage adapted to be brought into registration with the heel of the locking-bolt.

11,618 of 1903.—J. T. FLIPPEN: *Hinges.*

A hinge comprising a securing bolt, a base plate having a perforation and provided with a vertical flange having an inclined edge, a pintle having one end thereof reduced to provide a shoulder and adapted to extend through the perforation to permit the shoulder to lie upon the base plate, means carried by the pintle to engage the underside of the securing bolt to clamp the shoulder against the base plate, thereby detachably securing the pintle and base plate in applied position, and a movable member adapted to have a pivotal connection with the pintle to permit of its riding upon the vertical flange.

15,831 of 1902.—P. W. TOLHURST and H. SKINNER: *Roller Mill for Crushing and Grinding Cement, Clinker, Ore, and the Like.*

In a roller mill the combination with a pair of rolls of a hard shield plate which descends between the upper halves of the rolls to within a short distance of the nip and is held close to, though not necessarily touching, one roll, whilst the inner face of its lower portion which is toward the unprotected roll is approximately at right angles to a line drawn from centre to centre of the two rolls.

16,202 of 1902.—J. KULHANEK: *Construction of Walls and the Like.*

The method of construction of walls for temporary, semi-permanent, and permanent buildings, substantially characterised by the fact that between two parallel walls, composed of slabs of cork, slag, gypsum, or asbestos, small pillars are built in, these pillars consisting of tubes filled with concrete or other suitable material.

8,087 of 1903.—A. B. HUNTING: *Means for Heating by Steam Circulation.*

A system of the class described, comprising a boiler, a heater connected therewith for the passage of steam through it, a pressure pump, a return pipe for the heater connected with the inlet port of said pressure pump, means for connecting the discharge port of said pressure pump with said boiler, and air outlet pipe communicating with the discharge side of the pressure pump to discharge the air accumulated in said pump into the atmosphere.

10,623 of 1903.—V. LAPP: *Apparatus for Heating Air and other Gases.*

Apparatus for heating air and other gases wherein the heating gases are made to flow horizontally through serpentine vertically arranged heating walls, in contact with which the air to be heated is made to flow in the reverse direction to that of the gases, in passing vertically upwards and downwards against the walls.

11,569 of 1903.—D. HALL and J. H. KAY: *Apparatus for Humidifying Air.*

In apparatus for humidifying air in spinning-rooms, weaving-sheds, and like places the combination of one or more troughs for containing pure water heated by steam passing through pipes placed therein, the upper edges of the sides of said trough or troughs being inturned and perforated, a casing of larger dimensions than the troughs in which to place the trough so as to leave an air space under and on each side of said trough, air forced through said space warmed in its passage around the trough and emitted from the perforations in the aforesaid inturned edges of the trough, thereby causing the vapour arising from the water in the trough to circulate in the room without condensation.

11,748 of 1903.—E. LEVI: *Moulding Boxes for the Manufacture of Building Stones.*

A moulding box for the manufacture of building stones consisting of a bottom, and front and back walls attached thereto by joints, removable side walls, and intermediate partition walls parallel to the same, running from the front to the back wall, dividing the space formed by the four walls into regular rectangular chambers; and means for pressing the front and back walls against the side walls and partitions, the bottom of the box having rectangular hollowed channels in each separate chamber, and above the chambers and projecting into them, cross bars which are removably adjusted in slits in the front and back walls, and having in the chambers on the inner side of the front wall projections tapering downward, and on the inner side of the back wall similarly shaped recesses for the purpose of producing stones of a rectangular form, having at their lower side rectangular noses, and at their upper sides corresponding slits, and on the one end recesses tapering away downward and on the other end similarly formed projections.

11,855 of 1903.—J. ARCHIBALD.—*Means for Deadening Sound in Houses and Buildings.*

This invention relates to improvements in means for deadening sound in houses and buildings. Between the joists and the floor-boarding cork strips are inserted, and the space between the joists is filled with granulated cork. The insertion of the cork strips and granulated cork may also be used for the ceiling or the side or division walls of a house or buildings. The cork strips may also be used separately—for example, a cork strip may be placed under or upon a column or stanchion supporting the floor joist.

MEETINGS.

JULY 20 TO 25.

The Architectural Association.—Annual excursion, Worcester and district.

TUESDAY, JULY 28.

Institution of Mechanical Engineers.—Meeting in Leeds, in the Rooms of the Philosophical and Literary Society, Park-row, 10 a.m. The following papers will be submitted: "Economy of Fuel in Electric Generating Stations," by Mr. Henry McLaren; "The Diesel Engine," by Mr. H. Ade Clark; "Roofing Existing Shops while Work is Proceeding," by Mr. R. H. Fowler; "A New Form of Friction Clutch," by Professor H. S. Hele-Shaw, LL.D., F.R.S.; Notes on "Fast-cutting Tools," by Mr. H. H. Suplee, of New York.

WEDNESDAY, JULY 29.

Institution of Mechanical Engineers.—Leeds meeting (concluded). 10 a.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

July 4.—By T. W. GAZE & SON (at Norwich).

Bittering Parva, Norfolk.—Bittering Hall Estate, 286 a. 1 r. 39 p., f. and c. (including the manor and advowson) £5,000

July 6.—By MORRIS, MARSHALL, & POOLE (at Craven Arms).

Clunbury, Salop.—The Llan Farm, 153 a. 1 r. 22 p., f. 2,100
Ox Pasture, 4 a. 1 r. 11 p., f. 225
The Brook House and 25 a. 0 r. 9 p., f. 1,450

July 9.—By COTTON & CHAPPELL (at Birmingham).

King's Norton, Worcester.—The West Hills Farm, 113¾ acres, f., p. 4,850

By NASH & SON (at Farnham).

Wanborough, Surrey.—Little Flexton Farm, 68 a. 1 r. 23 p., f. 1,650
Farnham, Surrey.—Shortheath, a freehold building site, 3 a. 3 r. 13 p. 365

July 10.—By J. HANNAFORD & SON (at Exeter).

West Anstey, Devon.—Churchtown and Blindwell Estate, 195 a. 1 r. 21 p., f. 3,050
Bampton, Devon.—Parts of Barton Ground, 30 a. 1 r. 38 p., f. 1,260
Witheridge, Devon.—Monkey Moor and part of Betham, 90 a. 3 r. 15 p., f. 360
Acre Plot, 1 a. 1 r. 15 p., f. 70
Horestone Farm, 152 a. 2 r. 5 p., f. 900

By H. F. RUSSELL & SON (at Leominster).

Pencombe, Hereford.—Church House Farm, 187 a. 0 r. 33 p., f. 1,850

By SPELMANS' (at Norwich).

Norwich.—60, Mill Hill-rd., f., y.r. 24*l.* 395
13 to 23 (odd), Stone-rd., f., w.r. 68*l.* 9*s.* 4*d.* 755
52 and 54, Mount Pleasant, c., y.r. 30*l.* 535

By Messrs. WOODS.

Tooting.—Fountain-rd., f.g.r.'s 36*l.*, reversion in 94 yrs. 875

July 11.—By C. R. MORRIS SONS, & PEARD (at Taunton).

Pitminster, Somerset.—Cornish Farm, 107 a. 2 r. 12 p., f. 4,025
Duddlestone Farm, 99 a. 3 r. 39 p., f. 3,050

By SEXTON & GRIMWADE (at Colchester).

Great Horkesley, Essex.—Woodhouse and 150 a. 2 r. 38 p., f. 2,150

By T. W. GAZE & SON (at Norwich).

Erpingham, Norfolk.—Erpingham House Estate, 201 a. 1 r. 23 p., f. and c. 5,000
Lime Tree Farm, 16 a. 3 r. 39 p., c. 620
A copyhold cottage and 0 a. 1 r. 32 p. 100

July 13.—By BUCKLAND & SONS.

Winkfield, Berks.—Goodwin's Farm, 24 a. 3 a. 8 p., f. 1,750
Crouch-lane Farm, 96 a. 0 r. 21 p., f. 2,350
Four enclosures of land, 18 a. 3 r. 6 p., f. 450
A freehold meadow, 3 a. 1 r. 30 p. 250
Farnham Royal, Bucks.—Stoke Pogis-rd., three plots of freehold building land 180
Bloomsbury.—5, Hart-st., s., beneficial lease for 15 yrs., y.r. 100*l.* with goodwill 200

By ELLIS & SON.

Aldgate.—High-st., &c., Corporation leasehold ground rent of 400*l.*, reversion in 70 yrs., subject o a renewal fine of 31*l.* 16*s.* £9,500

By G. W. and H. G. POTTER.

Hampstead.—10, Thurlow-rd., u.t. 48 yrs., g.r. 10*l.*, p. 980
40, Parkhill-rd., u.t. 46 yrs., g.r. 12*l.*, p. 675

July 14.—By DEBENHAM, TEWSON, & CO.

Brockley.—112, Tressillian-rd., u.t. 69 yrs., g.r. 12*l.*, p. 715
Kentish Town.—3, St. Alban's Villas, u.t. 45¾ yrs., g.r. 10*l.*, p. 750
St. James'.—19, St. James'-st., beneficial interest in lease of upper floors, u.t. 9¾ yrs., r. 225*l.* .. 400
Teddington.—10 and 11, Princes-rd., u.t 76¾ yrs., g.r. 5*l.*, y.r. 42*l.* 18*s.* 180
Meopham, Kent.—Wrotham-rd., Woodside and Sunset, f., y.r. 40*l.* 495

By HAMPTON & SONS.

Tilehurst, Berks.—Armour Lodge and 1¾ a., f., p. 850

By G. F. HARRINGTON.

Bloomsbury.—6, 12, and 13, Torrington-sq., u.t. 17 yrs., g.r. 36*l.*, y.r. 305*l.* 1,620
17, Torrington-sq., u.t. 20 yrs., g.r. 15*l.*, y.r. 115*l.* 755
67, Torrington-sq., u.t. 17 yrs. g.r. 12*l.*, y.r. 100*l.* 550
Bedford-row.—21 and 23, Millman-st., u.t. 47 yrs., g.r. 12*l.*, y.r. 133*l.* 1,150
Marylebone.—1, Clipstone-st., u.t. 17 yrs., g.r. 8*l.*, y.r. 78*l.* 525
4 and 6, Harley-mews, North, u.t. 18 yrs., g.r. 10*l.* 8*s.*, y.r. 72*l.* 485
Kilburn.—Carlton Vale, f.g.r. 20*l.*, u.t. 45 yrs., g.r. 7*l.* 190

By ROGERS, CHAPMAN, & THOMAS.

Cavendish-sq.—89, Wigmore-st., s., area 1,400 ft., f., p. 6,150
Pimlico.—70, Gloucester-st., u.t. 28¾ yrs., g.r. 10*l.*, p. 625

By WALTER SIMMONDS.

South Lambeth.—91, 93, and 95, Hartington-rd., u.t. 56 yrs., g.r. 15*l.*, w.r. 101*l.* 8*s.* 840
Merton.—2, Nursery-villas, u.t. 78¼ yrs., g.r. 4*l.* 19*s.*, y.r. 30*l.* 280

By SLADE & CHURCH.

Upper Warlingham, Surrey.—1 to 6, Holme-ter., f., w.r. 196*l.* 2*s.* 1,350

By T. W. GAZE & SON (at Ipswich).

Wickham Skeith, Suffolk.—The White House Farm 49 a. 0 r. 10 p., f. 1,000
A freehold cottage and 0 a. 2 r. 2 p. 180
Cotton, &c., Suffolk.—The Boundary Farm, 141 a. 3 r. 34 p., f. 1,925
Mendlesham, Suffolk.—Potter's Farm, 82 a. 1 r. 23 p., f. 730

By JAMES HARRIS & SON (at Alresford).

Bishop's Sutton, Hants.—Church Farm, 734 a. 2 r. 33 p., f. 10,000
Three freehold cottages and 0 a. 2 r. 2 p. 180
Mill House and 1 a. 2 r. 18 p., f. 310

By HOLLIS & WEBB (at Leeds.

Kirk Deighton, Yorks.—A freehold estate, 30 a. 3 r. 30 p. 1,300

By FLEURET, SONS, & ADAMS (at Masons' Hall Tavern).

Lee.—High-rd., the Prince Arthur b.-h., a freehold rental of 45*l.*, reversion in 6 yrs. 4,000

July 15.—By H. E. FOSTER & CRANFIELD.

Peckham.—St. Mary's-rd., f.g.r.'s 20*l.*, reversion in 18 yrs. 705
South Lambeth.—171, South Lambeth-rd., u.t. 43 yrs., g.r. 6*l.*, y.r. 65*l.* 810
Chelsea.—71 and 75, Edith-grove, u.t. 74 yrs., g.r. 15*l.*, y.r. 135*l.* 16*s.* 980
Shepherd's Bush.—11, Rylett-cres., u.t. 76 yrs., g.r 10*l.*, y.r. 36*l.* 400
Barnsbury.—9, St. Clement's-st. and range of stabling, u.t. 37 and 43 yrs., g.r. 43*l.*, y.r. 147*l.* 12*s.* 850

By HAROLD GRIFFIN.

Battersea.—Usk-rd., Spread Eagle Inn, f.g.r. 7*l.* 10*s.*, reversion in 59 yrs. 860
14 and 16, High-st., area 8,000 ft., f. 1,450
High-st., f.g.r. 10*l.*, reversion in 48 yrs. 300
Queen's-rd., f.g.r. 24*l.* 19*s.* 11*d.*, reversion in 55 yrs. 700
Fulham.—5, Harbledown-rd., u.t. 89 yrs., g.r. 6*l.* 2*s.* 6*d.*, e.r. 38*l.* 435

By W. W. JENKINSON & CO.

Lee.—4 and 6, Glenton-rd., f., y.r. 80*l.* 1,000

By F. PERKS.

Wandsworth.—1 to 6, St. Mary's-pl., u.t. 19 and 53 yrs., g.r. 14*l.* 2*s.*, w.r. 133*l.* 18*s.* 740

July 15.—By COBBS (at Faversham).

Faversham, Kent.—2, Market-pl., s., f., y.r. 65*l.* .. 1,175
44, Court-rd., f., y.r. 45*l.* 850

By J. H. BIRTWISTLE (at Blackburn).

Pleasington, Lancs.—Higher Feniscowles Farm, 103 a. 3 r. 5 p., f. 6,000
Higher Feniscowles Hall and 2 a. 2 r. 33 p., f. .. 1,410
A freehold meadow, 3 a. 3 r. 32 p. 350
Feniscowles Old Hall and 1 a. 0 r. 18 p., f., ... 800
Brownlands Farm, 70 a. 2 r. 12 p., f. 3,300
Brownlow-ter., a perpetual yearly ground-rent of 16*l.* 2*s.* 1½*d.* 425
Highway, f.g.r.'s of 13*l.* 8*s.* 11*d.*, reversions in 994 and 990 years 365

July 16.—By BRIANT & SON.

Rotherhithe.—478, Rotherhithe-st., f., w.r. 26*l.* .. 835
Walworth.—1, Finchley-rd., u.t. 47½ yrs., g.r. 4*l.*, e.r. 34*l.* 390

By CHESTERTON & SONS.

Bayswater.—13, Pembridge-cres. (studio and flats), f., y.r. 250*l.* 2,300

By J. G. DEAN & CO.

Balham.—12, Sarsfeld-rd., u.t. 83 yrs., g.r. 7*l.*, e.r. 38*l.* 400

By C. C. & T. MOORE.

Mile End.—Frimley-st., f.g.r. 35*l.*, reversion in 94 yrs. 830
193, Mile End-rd., s., f., y.r. 100*l.* 2,300
195, 197, and 199, Mile End-rd., s., f., y.r. 192*l.* 3,130
Holloway.—619 and 621, Holloway-rd., u.t. 48 yrs., g.r. 5*l.*, y.r. 125*l.* 1,465
pitalfields.—Buxton-st., The Rose and Crown b.-h., a freehold rental of 35*l.*, reversion in 27 yrs. 820
12, North-pl., f., y.r. 42*l.* 710

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By SAUNDERS & SON.

Belgravia.—49 and 51, Elizabeth st., s., u.t. 15¼ yrs., g.r. 16s., y.r. 24l. £2,520
53, Elizabeth-st. (stabling, forge, &c.), area 3,146 ft., u.t. 19¾ yrs., g.r. 8s., y.r. 115l. ... 1,230

By W. G. SHADRAKE.

Tottenham.—57 to 67 (odd), Philip-lane, u.t. 48 yrs., g.r. 12l. 10s., w.r. 130l. 1,220

By STIMSON & SONS.

Old Kent-rd.—No. 35, s., u.t. 72½ yrs., g.r., &c., 18l. 17s., y.r. 220l. 3,025
Wimbledon.—6, 14, 26, 30, and 32, Bernard-gar., u.t. 94½ yrs., g.r. 47l., y.r. 277l. 10s. 2,925
City-rd.—Nos. 226 to 236 (even), also 1 to 34, Eagle-buildings (shops and dwellings), f., y.r. 97l. 4s. 5,100
Kennington Oval.—Oval-chambers (57 tenements and 3 shops), f., w.r. 1,281l. 16s. 9,450
St. Pancras.—155 to 165 (odd), Euston-rd., area 2,700 ft., f., p. 9,000
Euston-rd., &c., f.g.r. 38l. 10s., reversion in 20 yrs. 2,000
Old Kent-rd.—Kinglake-st., f.g.r. 66l. 3s., with reversion in 48 yrs. 1,550
Wimbledon.—25 to 35 (odd), Ashcombe-rd., f., w.r. 210l. 12s. 1,820
Battersea.—34, 36, and 38, Darien-road, f., w.r. 36l. 16s. 800
Southall, Middlesex.—High-st., a freehold house, shop, forge, &c., p. 2,000
South-rd., Home Cottage and Rose Cottage, f., w.r. 44l. 12s. 700

By C. P. WHITELEY.

Willesden.—Church-rd., &c., f.g.r.s. 126l. ....
Walthamstow. — Buxton-rd., &c., f.g.r.s. 141l. 10s. 2,650
Stratford.—Grove Crescent-rd., f.g.r. 12l. 10s. ...
Plaistow.—Albert-rd. f.g.r. 5 27l. 15s. .....
Reversions varying from 74 to 80 yrs., subject to annuities of 225l., lives aged 42, 38, and 36 430
By WORSFOLD & HAYWARD (at Dover).
Dover, Kent.—6, Priory Hill-villas, f., y.r. 32l. 10s. 620
Tower Hill, a block of building and market-garden ground, f. 310
2, Church-pl., f., y.r. 18l. 640
6, Pencester-rd., f., p. .....
Alkham, Kent.—Common Hill House and a meadow adjoining, 3 a. 1 r. 36 p., f., p. 580
A freehold house and 2 a. 0 r. 32 p. 270
Down and wood land, 23 a. 2 r. 8 p., f. 335
Freehold cottage and 6 acres, y.r. 13l. 230
Hougham Court Cottage, f., w.r. 7l. 16s. 120
July 17.—By C. H. BROWN.
Pimlico.—40, Bessborough-st., u.t. 31 yrs., g.r. 11l., e.r. 70l. 570
37, Bessborough-pl., u.t. 31 yrs., g.r. 8l., y.r. 40l. 360
24, Vauxhall Bridge-rd., f., y.r. 50l. 1,000

By MORGAN, BAINES, & CLARK.

Sutton, Surrey.—Sutton Common, West Hill House and 10 a. 0 r. 12 p., f., p. 3,500

By REYNOLDS & EASON.

Shepherd's Bush.—6 and 8, Westville-rd., u.t. 74 yrs., g.r. 13l., w.r. 92l. 6s. 600
Kennington.—17, Hurley-rd., s., u.t. 24 yrs., g.r. 6l., increasing to 8l., y.r. 51l. 10s. 350

By A. J. SHEFFIELD.

Millwall.—41 to 49 (odd), Tooke-st., u.t. 56 yrs., g.r. 12l. 10s., w.r. 130l. 1,035
32 and 34, Glengall-rd., u.t. 38 yrs., g.r. 5l. 12s., w.r. 40l. 8s. 300
Bow.—48, Tredegar-rd., u.t. 70 yrs., g.r. 5l. 5s., e.r. 45l. 425
Forest Gate.—41, Osborne-rd., u.t. 72 yrs., g.r. 3l. 8s., e.r. 40l. 420
Ilford, Essex.—40, Elgin-rd., u.t. 993 yrs., g.r. 7l. 14s., y.r. 32l. 300

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 15 6	per 1,000 alongside, in river.	
Rough Stocks and Grizzles	1 12 6	,, ,, ,,	
Facing Stocks	2 12 0	,, ,, ,,	
Shippers	2 5 0	,, ,, ,,	
Flettons	1 8 6	,, at railway depôt	
Best Wire Cuts ..	1 12 6	,, ,, ,,	
Best Fareham Red	3 12 0	,, ,, ,,	
Best Red Pressed Ruabon Facing	3 0 0	,, ,, ,,	
Best Blue Pressed Staffordshire ..	4 5 0	,, ,, ,,	
Do. Bullnose	4 11 0	,, ,, ,,	
Best Stourbridge Fire Bricks	4 8 0	,, ,, ,,	
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers.....	13 0 0	,, ,, ,,	
Headers	12 0 0	,, ,, ,,	
Quoins, Bullnose, and Flats.....	17 0 0	,, ,, ,,	
Double Stretchers	19 0 0	,, ,, ,,	
Double Headers..	16 0 0	,, ,, ,,	
One Side and two Ends.....	19 0 0	,, ,, ,,	
Two Sides and one End	20 0 0	,, ,, ,,	

PRICES CURRENT (*Continued*).

BRICKS, &c.

	£ s. d.		
Splays, Chamfered, Squints.....	20 0 0	per 1,000 at railway depot.	
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,, ,, ,,	
Quoins, Bullnose, and Flats.....	14 0 0	,, ,, ,,	
Double Stretchers	15 0 0	,, ,, ,,	
Double Headers..	14 0 0	,, ,, ,,	
One Side and two Ends.....	15 0 0	,, ,, ,,	
Two Sides and one End	15 0 0	,, ,, ,,	
Splays Chamfered, Squints.....	14 0 0	,, ,, ,,	
Second Quality Whiteand Dipped Salt Glazed	2 0 0	,, less than best.	

	s. d.	
Thames and Pit Sand	6 0	per yard, delivered.
Thames Ballast	6 0	,, ,,
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	20 6	,, ,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s cd. per yard, delivereh.
Stourbridge Fire-clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	,, ,,
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot. Nine Elms depot, or PimlicoWharf	2 1	,, ,,
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2 2½	,, ,,

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer in blocks	1 6	,, ,,
Grinshill ,, ...	1 10	,, ,,
Darley Dale in blocks..	2 4	,, ,,
Red Corsehill ,,	2 5	,, ,,
Closeburn Red Freestone	2 0	,, ,,
Red Mansfield ,,	2 4	,, ,,

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. ,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,, ,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,, ,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,, ,,
1½ in. to 2 in. ditto, ditto	0 6	,, ,,

BEST HARD YORK—

Scappled random blocks	3 0	per ft. cube ,,
6 in. sawn two sides, landings to sizes(under 40 ft. sup.)	2 8	per ft. super. ,,
6 in. Rubbed two sides Ditto	—	,, ,,
3 in. sawn two sides slabs (random sizes)	1 2	,, ,,
2 in. self-faced random flags.....	0 5	,, ,,

Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
,, ,, ,, 3 in. do.	1 2½	,, ,,

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry. dep.
20×12 ,, ,, ,, ..	13 17 6	,, ,,
20×10 best seconds ,,	12 15 0	,, ,,
20×12 ,, ,, ,,	13 10 0	,, ,,
16×8 best ,,	7 0 0	,, ,,
20×10 best blue Portmadoc	12 5 0	,, ,,
16×8 best blue Portmadoc	6 5 0	,, ,,
20×10 best Eureka unfading green....	15 2 6	,, ,,
20×12 ,, ,,	17 2 6	,, ,,
18×10 ,, ,,	12 10 0	,, ,,
16×8 ,, ,,	10 5 0	,, ,,
20×10 permanent green	11 0 0	,, ,,
18×10 ,, ,,	9 5 0	,, ,,
16×8 ,, ,,	6 10 0	,, ,,

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. ,, ,,
Best Broseley tiles	50 0	per 1,000 ,, ,,
Do. Ornamental Tiles 52	6	,, ,, ,,
Hip and valley tiles....	4 0	per doz. ,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 ,, ,,
Do. ornamental Do. 60	0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles.....	3 0	,, ,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 ,, ,,
Do. Ornamental Do. 54	6	,, ,, ,,
Hip tiles	4 1	per doz. ,, ,,
Valley tiles.....	3 8	,, ,, ,,
Best "Rosemary" brand plain tiles 48	0	per 1,000 ,, ,,
Do. Ornamental Do. 50	0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles	3 8	,, ,, ,,

PRICES CURRENT (*Continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 7 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	,, ,, ,,
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	,,

	At per load of 50 ft.	
Fir timber: Best middling Danzig or Memel (average specification	4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

	At per Standard.	
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
,, ,, 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0
,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small ,, ,, ...	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	- -

	Per square.	
Prepared Flooring— 1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered. £ s. d.	Railway Vans, per ton. £ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
,, ,, galvanised.....	16 0 0	- - -

(* And upwards, according to size and gauge.)

Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	- - -
,, ,, to 24 g.	10 15 0	- - -
,, ,, to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.....	14 5 0	- - -

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PRICES CURRENT (*Continued*).

METALS.

	Per ton, in London. £ s. d.	£ s. d.
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	. . .
,, ,, 22 g. and 24 g.	16 10 0	. . .
,, ,, 26 g.	18 0 0	. . .
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	. . .
,, ,, 22 g. and 24 g.	12 15 0	. . .
,, ,, 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 *in.* usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 5 0	. . .
Pipe in coils	14 15 0	. . .
Soil pipe	17 5 0	. . .
Compo Pipe	17 5 0	. . .
ZINC—Sheet—		
Vieille Montagne ton	26 5 0	. . .
Silesian	26 0 0	. . .
COPPER—		
Strong Sheet per lb.	0 0 10½	. . .
Thin ,,	0 0 11½	. . .
Copper nails ,,	0 0 12	. . .
BRASS—		
Strong Sheet ,,	0 0 10	. . .
Thin ,,	0 0 11	. . .
TIN—English Ingots ,,	0 1 4	. . .
SOLDER—Plumbers' ,,	0 0 6	. . .
Tinmen's ,,	0 0 8	. . .
Blowpipe ,,	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

	£ s. d.
15 oz. thirds	2½d. per ft. delivered.
,, fourths	1¾d. ,, ,,
21 oz. thirds	3¼d. ,, ,,
,, fourths	2¾d. ,, ,,
26 oz. thirds	4d. ,, ,,
,, fourths	3¼d. ,, ,,
32 oz. thirds	5d. ,, ,,
,, fourths	4¼d. ,, ,,
Fluted sheet, 15 oz.	3d. ,, ,,
,, 21 oz.	4d. ,, ,,
½ Hartley's Rolled Plate	1¾d. ,, ,,
⅝ ,, ,, ,,	2d. ,, ,,
¾ ,, ,, ,,	2¼d. ,, ,,

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels.. per gallon	0 1 11
,, ,, ,, in drums ,,	0 2 3
Boiled ,, ,, in pipes or barrels.. ,,	0 2 2
,, ,, ,, in drums ,,	0 2 6
Turpentine, in barrels ,,	0 3 2
,, in drums ,,	0 3 4
Genuine Ground English White Lead per ton	20 0 0
Red Lead, Dry ,,	20 0 0
Best Linseed Oil Putty per cwt.	0 8 0
Stockholm Tar per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

CHELSFIELD (Kent).—For erection of a private house. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

W. Owen	£917	T. Knight	£789
J. Smith	893	Stebbings & Pannett*	690
Somerford & Son	799		

CHELSFIELD (Kent).—For erection of a detached cottage at Green-street Green. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

B. J. White	£475	J. Smith	£365
W. Borer	369	W. Owen*	360

DOWNE (Kent).—For addition of a new choir vestry to parish church. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

W. Borer	£245	W. Owen	£238
J. Smith	240		

EAST HAM.—For the erection of a new police station at East Ham. Mr. J. Dixon Butler, Surveyor to the Metropolitan Police, architect. Quantities by Messrs. Thurgood, Son, & Chidney, Charing Cross-chambers, Adelphi, W.C.:—

Clarke & Bracey	£12,764	Leslie & Co.	£11,179
F. & H. F. Higgs	11,998	Lathey Bros.	11,153
H. J. Williams	11,913	D. W. Barker	10,950
Grover & Son	11,792	Lascelles & Co.	10,976
Killby & Gayford	11,499	J. Greenwood	10,288
Perry & Co.	11,488	H. Wells	9,935
Higgs & Hill	11,480	A. Hood	9,834
Holloway Bros.	11,447		

KEMSING (Kent).—For alterations to the Wheatsheaf p.-h. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

Geo. Saxby* £195 18 6

LONDON.—For additions and alterations to Ormesby, 120, Upper Tulse Hill, S.W. Mr. E. Harding Payne, architect, 11, John-street, Bedford-row, W.C.:—

‡Candler & Son	£630	Marsland & Son	£625
Sayer & Son	680	‡J. Stewart*	547
Selway & Son	635	Crabb & Son (with-drawn)	510
‡Arley & Son	634		

‡ *Additional estimates.*

LONDON.—For *underpinning and repairs to swimming-bath* at the Royal Normal College for the Blind, Upper Norwood, S.E. Mr. E. Harding Payne, hon. architect, 11, John-street, Bedford-row, W.C.:—

Poole & Son, Ltd.	£170	Sayer & Son	£148
J. & C. Bowyer	165	J. Stewart*	136

LONDON.—For the erection of additional buildings and structural alterations and repairs to shop and premises, No. 835, Old Kent-road, S.E., for Mr. Wm. C. Freeston. Mr. J. Halsted Waterworth, architect and surveyor, 281A, Queen's-road, New Cross Gate, S.E., and Welling, Kent:—

J. & A. Oldman	£349 0	W. Coates	£252 10
H. M. Dobson	327 0	F. Dawes	246 0
S. R. Best	304 14	Hooper & Wright, New Cross*	209 15
B. Gale	264 9		

LONDON.—For the erection of additional buildings and structural alterations and repairs to shop and premises, No. 729, Old Kent-road, S.E., for Mr. Wm. C. Freeston. Mr. J. Halsted Waterworth, architect and surveyor, 281A, Queen's-road, New Cross Gate, S.E., and Welling, Kent:—

W. Falkner	£347 0	S. R. Best	£219 15
W. J. Dixon	287 0	B. & A. Gale, Old Kent-road*	199 0
W. Coates	249 0		

LONDON.—For rebuilding back addition to No. 6 Clifton-road, Peckham, S.E., for Miss Haines. Mr. J. Halsted Waterworth, architect and surveyor, 281A, Queen's-road, New Cross Gate, S.E., and Welling, Kent:—

H. M. Dobson	£172 18	W. Falkner	£155 0
S. R. Best	169 10	J. Green	141 0

LONDON.—For the conversion into business premises of No. 262, Brockley-road, S.E., for Mrs. M. A. C. Beacock. Mr. J. Halsted Waterworth, architect and surveyor, 281A, Queen's-road, New Cross Gate, S.E., and Welling, Kent:—

S. R. Best, Brockley* £210

LONDON.—For sundry repairs and decorative work to property on Martin's Estate at New Cross and Greenwich. Mr. J. Halsted Waterworth, Surveyor to the Estate, 281A, Queen's-road, New Cross Gate, S.E., and Welling, Kent:—

S. R. Best	£179 10	W. Falkner, New Cross*	£147 0

LONDON.—For external painting and repairing works, &c., at the St. Luke's Workhouse, Shepherdess-walk, City-road, E.C., for the Guardians of the Poor of Holborn Union. Mr. Alfred Saxon Snell, architect:—

M. McCarthy	£2,665 0	T. G. Hawkins	£1,586 0
W. A. King	1,987 15	Proctor & Son	1,430 0
Pitcher & Son	1,974 8	Gavin Bros., Wilson-street, E.C.*	1,167 10
Wall & Co.	1,703 0		
W. Reason	1,593 0		

LONDON.—For the erection of four Blocks of dwellings, to be erected by the Bermondsey Borough Council upon the Fulford-street and Braddon-street site. Mr. A. F. Wrightson, quantity surveyor:—

	£	Additions. s.	d.	£	s.	d.	£	s.	d.
F. & T. Thorne	47 552	0	0	2,727	14	11	50,289	14	11
Balaam Bros.	45,437	0	0	2,961	0	0	48,398	0	0
B. E. Nightingale	44,298	0	0	3,736	0	0	48,034	0	0
Holloway Bros., Ltd.	43,450	0	0	4,467	0	0	47,917	0	0
White & Co.	42,977	0	0	3,495	0	0	46,472	0	0
C. Gray Hill	42,838	5	6	3,460	6	0	46,298	11	6
Perry & Co.	42,977	0	0	3,170	0	0	46,147	0	0
H. L. Holloway	42,580	0	0	2,660	0	0	45,240	0	0
Wall & Co.	41,863	10	10	3,212	12	8	45,076	3	6
G. Parker	41,790	0	0	3,052	16	7	44,842	16	7
Kirk & Randall	41,204	0	0	2,473	8	0	43,677	8	0
Holliday & Greenwood	39,877	0	0	2,687	0	0	42,564	0	0
Martin, Wells, & Co., Ltd.	39,906	2	2	2,427	5	9	42,333	7	11
Chessum & Sons	39,140	0	0	2,756	12	2	41,896	12	2
Killby & Gayford	38,600	0	0	3,048	0	0	41,648	0	0
Thomas & Edge	38,447	0	0	2,521	0	0	40,968	0	0
Lawrence & Son, Waltham Cross*	38,439	0	0	2,521	0	0	40,960	0	0

NEW BROMPTON (Kent).—For the erection of a shop, stores, &c., Byron-road, for the Co-operative Society. Messrs. J. W. Nash & Son, architects, 245, High-street, Rochester:—

E. West	£2,099	W. C. Snow	£1,629
H. Harris	2,052	West Bros.	1,599
J. Davidson	1,891	F. Luff	1,595
H. E. Phillips	1,850	G. Gates	1,590
E. Filley	1,717	G. E. Woollard, New Brompton*	1,589
J. L. Trueman	1,659		
J. Leonard	1,630		

ORPINGTON (Kent).—For erection of six cottages in Chapel-avenue. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

Somerford & Son	£1,377	T. Knight	£1,389
W. Owen	1,360	Stebbings & Pannett*	1,311

ORPINGTON (Kent).—For erection of five cottages in Chapel-avenue. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

Stebbings & Pannett* £1,140

ORPINGTON (Kent).—For alterations to the Maxwell Arms. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

Somerford & Son	£113	W. Owen*	£87

RADCLIFFE-ON-TRENT.—For rebuilding of the Cliffe Inn, Radcliffe-on-Trent, Nottinghamshire, for the Home Brewery Co., Ltd. Mr. F. C. Martin, architect, Nottingham:—

Williamson & Co.	£1,145	F. Messom	£1,015
Maule & Co.	1,030	T. H. Harper	947
Vickers, Ltd.	1,025	Hy. Parr, Radcliffe*	944

RICHMOND (Yorks).—For additions to hospital, for the Corporation. Mr. T. H. Hailstone, Borough Surveyor, Richmond, Yorks:—

Matthew Metcalfe, Frenchgate, Richmond	£553 13 *a*
Thresh & Co., 16, Great George-street, Westminster, S.W.	138 0 *b*

a All stones for walls (except heads, sills, &c.) have been got by Corporation from their own quarries, hence the cost of same not in above contract price.

b Disinfecting apparatus.

SOUTHALL.—For the erection and completion of Holy Trinity Parish Hall, Lady Margaret-road, for the Building Committee. Messrs. Scott & Hanson, architects, 10, Basinghall-street, E.C. Quantities by architects:—

Fassnidge & Son	£1,650	Plaistow	£1,540
Dorey & Co.	1,593	Lough	1,447
Larke & Sons	1,590	A. & B. Hanson	1,414
Kearley	1,579	Brown, Southall*	1,387

[Architects' estimate, £1,525.]

STRATFORD. — For repairs and decorations to Conference Hall, Stratford. Messrs. G. & R. Palmer Baines, architects, Clement's Inn, Strand, W.C.:—

Collingwood & Co.	£731 3	Fowler Bros., Stratford*	£499 0
G. J. Hosking	581 15		
J. Baxter	513 0		

SUTTON (Surrey).—For additions to a private house. Mr. G. St. Pierre Harris, architect and surveyor, 8, Ironmonger-lane, E.C., and Orpington:—

Dabbs & Son	£263 0	E. J. Burnand	£236 15
J. J. Shopland	250 0	J. B. Potter*	236 10

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following lists of tenders. Mr. T. J. Bailey is the Board's Architect:—

(*a*) "ASHBURNHAM" SCHOOL (Chelsea), and (*b*) CATOR-STREET-SCHOOL (Peckham). — For reconstructing boiler flues:—

(*a*) CHELSEA.—"Ashburnham" School.

J. R. Sims	£221	Rockhill Bros.	£158
Maxwell Bros., Ltd.	189	R. S. Ronald	154
General Builders, Ltd	187	Williams & Sons	148
Rice & Son	169	E. B. Tucker*	122

(*b*) EAST LAMBETH.—Cator-street School.

Rockhill Bros.	£132	Rice & Son	£91
Bulled & Co.	103	W. V. Goad	85
Maxwell Bros., Ltd.	99	Marsland & Sons*	44

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ACKMAR-ROAD GRADED SCHOOL (Fulham).—Drainage and sanitary works :—

G. Neal	£2,514 0 0	R. P. Beattie	£2,360 0 0
Lathey Bros..	2,399 0 0	J. Peattie	2,347 0 0
Durbin & Katesmark..	2,390 10 0	F. Bull	2,279 10 6

"BEN JONSON" SCHOOL (Stepney).—Additional heating :—

Adams & Son	£795 0	Duffield & Sons	£495 0
Wippell Bros. & Row	587 10	Wontner-Smith, Gray & Co.	470 0
Cannon & Sons	549 0	G. & E. Bradley*	447 0
Eason & Son	537 10		
F. Biggin	510 0		

BETHNAL GREEN (Turin-street boys' and girls' school.—Re-dividing classrooms, &c. :—

Johnson & Co.	Schedule, plus 20 per cent.	J. Stewart	£1,385
		F. Bull	1,333
		Grover & Son	1,292
Turnbull & Son	£1,615	McCormick & Sons..	1,246
F. & F. J. Wood	1,598	Belcher & Co.. Ltd.	1,100
Lawrance & Sons	1,555	Marchant & Hirst.*	990
Williams & Son	1,479		

BONNEVILLE-ROAD SITE (Clapham Park).—New graded school. The Board of Education have sanctioned the erection of a school to provide accommodation for 1,000 children on the Bonneville-road site, Clapham Park, upon which site three temporary iron buildings have been erected and are now in use. Finished plans of a school to provide accommodation for 960 children (viz., boys, 328, girls, 328, infants, 340), were passed by the Committee on March 9, and laid upon the table of the Board on March 19 last. The school consists of a two-story building for the boys and girls, the infants being accommodated in a separate one-story building on the site, and contains the following accommodation :—Halls : boys' school, 50 ft. by 28 ft. ; girls' school, 50 ft. by 28 ft. ; infants' school, 54 ft. by 26 ft. 6 in. Classrooms : boys' school, 56, 56, 48, 48, 40, 40, 40 ; girls' school, 56, 56, 48, 48, 40, 40, 40 ; infants' school, 50, 50, 48, 48, 48, 48 (calculated on the 9 sq. ft. basis). Special rooms : manual training centre for forty boys in an existing emporary iron building ; drawing classroom and science room in a second temporary iron building ; and, possibly, ookery and laundry centres in third iron building. Heating of boys' and girls' school by low-pressure hot-water apparatus ; infants' school, by open fires. Area of site, 1,145 sq. ft. Playgrounds, area per child : boys', 30 sq. ft. ; girls', 30 sq. ft. ; infants', 26 sq. ft., for the completed school. House in Shandon-road to be adapted for the accommodation of the schoolkeeper.

J. Carmichael	£21,517	Mitchell & Son	£20,483
Holliday & Greenwood, Ltd.	21,460	Wallis & Sons	20,478
Lathey Bros.	21,279	Lawrance & Sons : Treasure & Son	20,338
Marsland & Sons	21,233	Garrett & Son	20,325
Simpson & Co.	20,641	Appleby & Sons	20,310
F. & H. F. Higgs	20,637	Holloway Bros., Ltd.	20,273
J. & C. Bowyer	20,593	Martin, Wells, & Co., Ltd.	20,062
Smith & Sons, Ltd.	20,552	J. & M. Patrick*	19,665
W. Downs	20,535		19,411

The school is planned for future extension by 128 places (making a total of 1,124), and that the tenders for the portion now to be built include the provision of halls of sufficient size for the school when enlarged, and also cloakrooms, lavatories, staircases, &c., for the completed school.

DENMARK HILL SITE, CAMBERWELL.—Junior and senior mixed school of two stories, and infants' school of one story.

Plans of a junior and senior mixed school of two stories and an infants' school of one story, to accommodate 996 children, were passed by the committee on February 9, 1903, and laid upon the table of the board on February 19, 1903. The following is a description of the plans :—Accommodation : Junior mixed, 328 ; senior mixed, 328 ; infants, 340 ; total, 996. Halls : Junior mixed, 50 ft. by 28 ft. ; senior mixed, 50 ft. by 28 ft. ; infants', 54 ft. by 26 ft. 6 in. Classrooms : Junior mixed school, 56, 56, 48, 48, 40, 40, 40 ; senior mixed school, 56, 56, 48, 48, 40, 40, 40 ; infants', 50, 50, 48, 48, 48, 48, 48. (Infants' department calculated on the 9 sq. ft. basis.) Special rooms : Drawing classroom, 600 ft. area ; science room, 600 ft. area. Heating by low-pressure hot-water apparatus for senior and junior mixed schools, and open fires for infants' school. Area of site, 62,495 sq. ft. Playgrounds, area per child : Boys', 46 ft. ; girls' and infants', 36 ft. A house on the site will be retained and adapted as a housewifery centre (for which an expenditure of 200*l.* was sanctioned by the Board on November 20, 1902), and the remaining portion for accommodation for the schoolkeeper :—

Appleby & Sons	£22,695	Mitchell & Son	£21,397
Johnson & Co.	22,119	F. & H. F. Higgs	21,586
Smith & Sons, Ltd.	22,075	Martin, Wells, & Co., Ltd.	21,455
J. & C. Bowyer	21,978	William Downs	21,352
Lawrance & Sons	21,949	J. & M. Patrick	20,615
Garrett & Son	21,909	Marsland & Sons*	20,494
Holliday & Greenwood, Ltd.	21,791		

GIDEON-ROAD SCHOOL (Battersea).—For re-constructing boiler flue :—

W. Hammond	£239 0	R. S. Ronald	£145 0
Maxwell Bros., Ltd.	238 0	Williams & Sons	143 0
Lathey Bros.	222 0	Dowsett & Jenkins	136 0
E. Triggs	190 0	Garrett & Son	136 0
Rockhill Bros.	178 0	E. B. Tucker*	117 15

HARWOOD-ROAD SCHOOL (Fulham).—For partitions, &c. :—

W. Hammond	£979	Lathey Bros.	£629
Hooper & Son	699	H. Bouneau	576
H. Line	671	J. & M. Patrick*	509
Bulled & Co.	666		

HEARNVILLE-ROAD SITE (Balham).—Special school. The Board have purchased a site in Hearnville-road, Balham (sub-division A H of West Lambeth), upon which to erect a permanent school for 1,000 children. The Board and the Board of Education have also sanctioned the provision of a special school on this site, and the Committee propose that the erection of this special school should be proceeded with at once without waiting for the new permanent school. Plans of a mentally defective school, consisting of three rooms for twenty children each, were passed by the Committee on March 23, 1903, and laid upon the table of the Board on April 2 last, these plans also including the work of enclosing, draining, and tarpaving a portion of the site :—

G. Neal	£5,345	E. Triggs	£4,031
Stevens Bros.	4,535	General Builders, Ltd.	4,024
Bulled & Co.	4,419	Akers & Co.	3,963
Garrett & Son	4,299	W. Harris	3,952
Rice & Son	4,269	Martin, Wells, & Co., Ltd.*	3,769
Wall & Co.	4,207		
Marchant & Hirst	4,149		

MORDEN-TERRACE SCHOOL (Lewisham-road).—For sanitary and drainage works :—

G. Parker	£2,945 0	R. P. Beattie	£2,630 17
Falkner & Son	2,790 0	W. Downs	2,548 0
Johnson & Co.	2,650 0	J. & C. Bowyer	2,487 0
Lathey Bros.	2,635 0	A. Porter*	2,350 0

PRINCESS-ROAD SCHOOL (Regent's Park).—Refitting offices :—

J. Peattie	£677	G. Neal	£623
Marchant & Hirst	673	Stevens Bros.	612
T. Cruwys	668	F. Bull*	598
Williams & Son	642		

"SOUTHFIELD" SITE (Merton-road) New School.

The Board of Education have sanctioned the erection of a school on the "Southfield" site, Merton-road, to provide accommodation for 1,000 children. Plans of the proposed school to accommodate 980 children were passed by the Committee on February 23, 1903, and laid upon the table of the Board on March 5 last. The following is a description of the plans :—Accommodation : Senior mixed, 342 ; junior mixed, 298 ; infants, 340 ; total, 980. Senior mixed, junior mixed, and infants' school of one story. Halls : Senior mixed school, 57 ft. 7½ in. by 26 ft. 6 in. ; junior mixed school, 57 ft. by 25 ft. ; infants' school, 54 ft. by 26 ft. 6 in. Classrooms : Senior mixed school, 48, 48, 48, 48, 40, 40, 40, 30 ; junior mixed school, 56, 50, 48, 48, 48, 48. Infants' school, 50, 50, 48, 48, 48, 48, 48. Heating by low-pressure hot-water apparatus for senior and junior mixed schools and open fires for infants' school. Area of site for school buildings, 72,380 square feet. Playgrounds, area per child : Senior and junior boys', 33 square feet ; senior girls', 42 squre feet ; junior girls' and infants', 30 square feet :—

Smith & Son	£23,678	Hudson Bros.	£21,572
H. Holloway	22,497	W. Downs	21,558
Smith & Sons, Ltd.	22,122	J. & C. Bowyer	21,293
Martin Wells & Co. Ltd.	22,003	Garrett & Sons	21,191
J. Carmichael	21,928	Marsland & Sons	21,140
Lathey Bros.	21,857	Stimpson & Co., Ltd.	20,990
C. F. Kearley	21,659	Lawrance & Sons	20,975
F. & H. F. Higgs	21,599	Wallis & Sons	20,371
Holliday & Greenwood	21,596	J. & M. Patrick*	19,414

The school is planned for future extension by 146 places (making a total of 1,126) and that the tenders for the portion now to be built include the provision of halls of sufficient size for the school when enlarged, and also cloakrooms, lavatories, &c., for the complete school.

THE MILLBANK SCHOOL (Westminster).—For enlargement. The Board of Education have sanctioned the enlargement of this school by 150 places :—

Wall & Co.	£2,145 0	General Builders, Ltd.	£1,758 0
King & Son	2,134 0	E. Triggs	1,600 0
Holloway Bros. Ltd.	2,109 0	Stevens Bros.	1,036 0
Treasure & Son	2,088 5	Martin, Wells, & Co. Ltd.	1,563 0
Spencer, Santo & Co. Ltd.	2,067 10	Rice & Son	1,549 0
T. L. Green	1,884 0	C. F. Kearley	1,529 0
Simpson & Son	1,863 15	Dearing & Son*	1,473 0

TOWNMEAD-ROAD SITE, FULHAM.—New school in accordance with revised plans.

Accommodation : Senior mixed, 382 ; junior mixed, 354 ; infants, 388 ; total, 1,124. Halls : Senior mixed school, 57 ft. 7½ in. by 26 ft. 6 in. ; junior mixed school, 57 ft. by 25 ft. ; infants' school, 54 ft. by 26 ft. 6 in. Classrooms : Senior mixed school, 48, 48, 48, 48, 40, 40, 40, 40, 30 ; junior mixed school, 56, 56, 50, 48, 48, 48, 48 ; infants' school, 50, 50, 48, 48, 48, 48, 48, 48. (Accommodation calculated on 9 sq. ft. basis.) Special rooms : Drawing class and science rooms (separate one-story building), 600 ft. area each ; manual training centre for 20 boys (in temporary iron building). Heating by low-pressure hot-water apparatus for senior and junior mixed schools and open fires for infants' school. School-keeper's house. Area of site, 82,250 sq. ft. Playgrounds, area per child : Senior and junior boys, 37 sq. ft. ; senior girls, 36 sq. ft. ; junior girls and infants, 34 sq. ft. :—

King & Son	£28,817 0 0	Holloway Bros., Ltd.	£26,118 0 0
C. F. Kearley	28,225 0 0	Lathey Bros.	25,976 0 0
J. Carmichael	27,761 0 0	Leslie & Co.	25,339 0 5
Martin, Wells, & Co., Ltd.	27,352 0 0	Treasure & Son	25,246 0 0
Stimpson & Co.	27,287 0 0	Lawrance & Sons	24,714 0 0
Hudson Bros.	26,725 0 0	Dearing & Son	24,590 17 6
T. L. Green	26,510 0 0	Wallis & Sons*	14,148 0 0
Grover & Son	26,357 0 0		
Appleby & Sons	26,227 0 0		

UNION-STREET SCHOOL (Woolwich).—Drainage and sanitary work :—

W. Downs	£2,684	Mitchell & Son	£2,497
G. Parker	2,656	J. & C. Bowyer	2,415
Johnson & Co.	2,574	T. D. Leng	2,237
Ashby & Horner	2,569	Thomas & Edge*	1,900
Lathey Bros.	2,517		

UPPER HORNSEY-ROAD SCHOOL (Holloway).—For heating apparatus in new portion :—

Wippell Bros & Row	£425 0	G. & E. Bradley	£305 0
Wontner-Smith, Gray, & Co.	359 0	Bates & Sons	298 10
Duffield & Sons	321 0	The Brightside Foundry and Engineering Co., Ltd.*	287 0
Palowkar & Sons	319 0		

PARTITIONS.—For providing partitions, &c., at various schools.

(*a*) CHELSEA ("Victoria" School) :—

General Builders, Ltd.	£539	Willmott & Sons	£425
Chinchen & Co.	519	W. R. & A. Hide	365
W. Hammond	503	S. Polden*	351
Lathey Bros.	489		

(*b*) FINSBURY (Moreland-street) :—

Parrott & Isom	£664	Dearing & Son	£449
Williams & Son	552	Vigor & Son	446
Spencer & Co.	509	F. Bull	421
W. Martin	478	Barrett & Power	415
Johnson & Co.	465	Stevens Bros.	404
T. L. Green	459	A. Porter*	382

(*c*) GREENWICH (Hither Green) :—

A. Acworth	£510	J. & C. Bowyer	£429
Bulled & Co.	455	Smith & Sons, Ltd.	428
G. Kemp	450	Harry Groves*	335

(*d*) HACKNEY (Wilmot-street) :—

Johnson & Co. (Schedule + 20 per cent.)		F. & F. J. Wood	£1,647
		Williams & Son	1,588
Marchant & Hirst	£1,696	Willmott & Sons	1,170
London School Furniture Co.	1,678	Belcher & Co., Ltd.*	986

(*e*) EAST LAMBETH (Hollydale-road). — (Tenders include rebuilding flank wall of classroom and painting school, in addition to partition work) :—

	†(A)	(B)	(C)	Total.
Marsland & Sons	[Tender incomplete.]			
Lathey Bros.	£471	£349	£523	£1,343
Appleby & Sons	484	315	520	1,319
W. Downs	478	309	513	1,300
Bulled & Co.	480	295	520	1,295
J. & C. Bowyer	466	263	518	1,247
Coleman & Co.	—	—	—	1,660
J. F. Ford	356	184	458	998
T. D. Leng	298	172	504	974
Garrett & Sons	340	174	375	889
H. Groves*	319	186	300	865

†(A) For alterations to and division of Room D on ground floor (Infants).

(B) For taking down and re-building flank wall of Room E, ground floor, and underpinning front wall.

(C) For general repairs and painting, and distempering throughout the school.

(*f*) WEST LAMBETH ("Tooting Graveney").—Tenders also include interior painting) :—

	(*a*) Partitions, &c.	(*b*) Interior painting.	(*c*) Total.
Lathey Bros.	£553	£506	£1,059
E. B. Tucker	579	480	1,059
Appleby & Sons	544	441	985
J. & C. Bowyer	530	429	959
Bulled & Co.	527	426	953
Garrett & Sons	520	413	933
Coleman & Co.	—	—	932

(*g*) MARYLEBONE (Barrow Hill-road) :—

M. Pearson	£1,197 0	T. Cruwys	£838 0
Thompson & Beveridge	1,134 0	General Builders, Ltd.	827 0
London School Furniture Co.	1,096 13	Stevens Bros.	823 0
Chinchen & Co.	849 0	Marchant & Hirst	796 0
		G. Neal	693 0

(*h*) TOWER HAMLETS (Dempsey-street) :—

Dearing & Son	(Schedule, plus 25 per cent.)	Williams & Son	£455
		J. Stewart	427
		Belcher & Co., Ltd.	325
Johnson & Co.	(Schedule, plus 20 per cent.)	Turnbull & Son	308
		F. Bull	297
		F. & F. J. Wood	290
Parrot & Isom	£465	H. Bouneau*	274

RUNNING CONTRACT for the Supply of Dust-bins :—

	Large. each.	Small. each.
	£ s. d.	£ s. d.
Parker, Winder, & Achurch, Ltd.	8 11 6	7 10 6
Pryke & Palmer	6 17 6	5 17 6
H. C. Slingsby	4 15 0	3 3 0
Davis & Co., Ltd.	3 15 9	2 12 6
Pearson, Ltd.	3 12 6	2 9 6
Carter & Aynesley, Ltd.	3 7 6	2 9 6
Braby & Co., Ltd.	3 6 6	2 5 0
Young & Co.	3 5 0	2 10 0
Lysaght, Ltd.	3 5 3	2 4 0
Bird & Co.*	3 4 0	2 2 0

RUNNING CONTRACT for the supply of CORK CARPET for Teachers' Rooms :—

	s. d.
Catesby & Sons per sq. yd.	2 6
Wallis & Co., Ltd. ,,	2 3½
Atkinson & Co. ,,	2 3
Maple & Co., Ltd. ,,	2 3
Marshall & Snelgrove, Ltd. ,,	2 3
Treloar & Sons ,,	2 3
Shoolbred & Co.* ,,	2 1½

Cleaning and Painting.

The work at the following schools will be done during the summer holidays—July 25 to August 22, 1903. Where exterior as well as interior work has to be done, an additional week will be allowed for the former :—

ALBION-STREET.—Painting interior and exterior :—

Lathey Bros.	£816	H. J. Williams	£620
Johnson & Co.	638	Sayer & Son	607
Garrett & Son	629	W. Downs*	558

"ALL HALLOWS."—Painting interior :—

A. E. Symes	£135	Vigor & Co.*	£95
Gibb & Co.	£130		

[See also page 121.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
•Public Library, Brunswick-road, Bromley, E.	Metropolitan Borough of Poplar	75*l.* 1st premium; 25*l.* 2nd premium	Oct. 2
•Free Library, Town Hall Assembly Room	Borough of Rawtenstall	100*l.*, 50*l.*, 30*l.*	Oct. 12
Machinery for Lifting Boats	Austrian Government	100,000 Kronen, 75,000 Kronen, and 50,000 Kronen	Mar. 3, 1904

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Car Shed	Colchester Corporation	H. Goodyear, Civil Engineer, Town Hall, Colchester	July 28
Offices	Durham County Council	W. Crozier, Civil Engineer, Town Hall, Durham	do.
Road Works	Winchester Town Council	City Surveyor, Guildhall, Winchester	do.
Road Metal (1,050 tons)	Horsham U.D.C.	S. Mitchell, Council Offices, Horsham	do.
Weir, Fenny Bridge	Devon County Council	H. Micklemore, County Offices, Exeter	do.
Street Works, &c., Wakefield	.....	City Surveyor, Town Hall, Wakefield	do.
Street Works, Harte-street	West Hartlepool Corporation	J. W. Brown, Borough Engineer, West Hartlepool	do.
Cottage, &c., Riverside, Merthyr	.....	C. M. Davies, 112, High-street, Merthyr	July 29
Additions to Tenterhill New Mill, Huddersfield	E. H. Burtt, Esq., J.P.	F. W. Ridgway, Architect, Dewsbury	do.
Lodge, &c.	Cleethorpes U.D.C.	E. Rushon, Engineer, Poplar-road, Cleethorpes	do.
Granite Road Metal	Barnet U.D.C.	H. W. Poole, 40, High-street, Barnet	do.
Granite (1,500 tons)	Wanstead U.D.C.	W. Blewitt, Council Offices, Wanstead, N.E.	do.
Kerbing, &c., Union-street	Whitwood U.D.C.	A. Hartley, Surveyor, County Chambers, Castleford	do.
Sewers, &c., Midland-road	Thrapston Parish Council	T. Lloyd, Surveyor, Halford-street, Thrapston	do.
Road Works	Erdington U.D.C.	H. H. Humphries, Engineer, Public Hall, Erdington	do.
Park-keeper's Lodge, East Park	Hull Corporation	J. H. Hirst, City Architect, Town Hall, Hull	do.
Additions to Sanatorium, Eachend Hill, Lyminge	Elham R.D.C.	H. Ames, Surveyor, Elham	do.
Sewerage Works, &c., Kingseat Asylum	Aberdeen Lunacy Board	Jenkins & Marr, Civil Engineers, 16, Bridge-street, Aberdeen	do.
Drainage Works, &c., Oldmill	Aberdeen City Parish Council	Brown & Watt, Architects, 17, Union-terrace, Aberdeen	do.
Laying Water Mains, &c.	Ashton-under-Lyne Guardians	Eaton & Co., Architects, Ashton-under-Lyne	do.
Foundations, &c., Pine-grove	Bootle Corporation	J. H. Farmer, Town Hall, Bootle	do.
•Road Making, &c., Sedlescombe-road	Metropolitan Borough of Fulham	Borough Surveyor, Town Hall, Fulham, S.W.	July 30
Additions to Shop, &c., Abercanaid	.....	R. C. Jenkins, Architect, Cefn Coed	do.
Rebuilding 12, Duke-street, Whitehaven	.....	J. S. Moffat, Architect, 53, Church-street, Whitehaven	do.
Two Houses, Esholt	.....	Empsall & Clarkson, Architects, 7, Exchange, Bradford	do.
Restoration of Welsh Baptist Chapel, Ynysybwl	.....	J. Morgan, 68, Robert-street, Ynysybwl	do.
Chapel, &c., Glyncorrwg, Port Talbot	.....	W. B. Rees, Architect, 37, St. Mary-street, Cardiff	do.
House, Gordon, Berwickshire	The School Board	T. R. Atkinson, Architect, Earlston	do.
Additions to Workhouse	Driffield Guardians	J. Shepherdson, Architect, Driffield	do.
Stabling, &c., Tyne-road East	Gateshead Corporation	J. Bower, Borough Surveyor, Town Hall, Gateshead	do.
Broken Granite, &c. (1,300 tons)	St. Neots U.D.C.	J. Edey, Surveyor, South-street, St. Neots, Hunts	do.
•Making Up Castlebar Park-road	Borough of Ealing	Borough Engineer, Town Hall, Ealing, W.	do.
•New Coast Guard Buildings at Hayling Island	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue, W.C.	July 31
Cottage Hospital, Walton-on-Thames	.....	John Gough, Architect, 28, Craven-street, London, W.C.	do.
Two Houses and Shops, Whitehead	.....	F. W. Lockwood, Architect, 91, Victoria-street, Whitehead	do.
Walling, &c., Brighowgate	Grimsby Corporation	H. G. Whyatt, Architect, Town Hall-square, Grimsby	do.
Kerbing, &c., Salisbury-road, Chorlton-cum-Hardy	Withington U.D.C.	A. H. Mountain, Civil Engineer, Town Hall, West Didsbury	do.
House, Mount Pleasant, Stanley	Mr. W. Butler	P. Frater, Architect, Howden-le-Wear	do.
Warehouses, Maryport	Messrs. J. Thomlinson, Ltd.	C. Eaglesfield, Architect, Maryport	do.
Graving Dock	Belfast Harbour Commissioners	G. F. L. Giles, Engineer, Harbour Office, Belfast	do.
•Reconstruction of Old Hebarium, Kew Gardens	H.M. Office of Works	Secretary, H.M. Office of Works, Storey's Gate, Westminster, S.W.	do.
Bridge Works, Ushaw Moor	.....	J. E. Parker, Civil Engineer, Newcastle-on-Tyne	Aug. 1
Reservoir, &c.	Withington U.D.C.	A. H. Mountain, Civil Engineer, Withington	do.
Laundry, &c.	Abertillery Steam Laundry Co.	G. C. Hillard, Market Chambers, Abertillery	do.
Forty-one Houses, Ferndale	Bryngolen Building Club	W. A. Lloyd, 20, Elm-street, Ferndale	do.
Granite Road Metal	East Dereham U.D.C.	H. G. Hinson, Surveyor, Theatre-street, East Dereham	do.
Sewers, &c., Forest-road	Huddersfield Corporation	Borough Engineer, 1, Peel-street, Huddersfield	do.
Sulphate House, Foleshill Works	Coventry Corporation	F. W. Stevenson, Engineer, Gasworks, Coventry	do.
House, Hillsborough, Co. Down	G. Bell, Esq.	H. Hobart, Architect, Dromore, Co. Down	do.
•Builder's Works at Foleshill Works	Coventry Corporation Gas Commit.	Engineer and General Manager, Gas Works, Coventry	do.
•School in Ingram-road	Croydon School Board	Barron Rule, School Board Office, Katharine-street, Croydon	do.
Water Pipes, &c., Auchinleck and Saughs	Glasgow Corporation	J. Lindsay, City Chambers, Glasgow	Aug. 3
Drainage Works, Ringley-road	Radcliffe U.D.C.	S. Mills, Council Offices, Radcliffe	do.
Well Sinking, Wooden Mill	Kelso Town Council	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	Aug. 4
Sewerage Works, Talgarth, Herefordshire	Hay R.D.C.	R. E. W. Berrington, Civil Engineer, Wolverhampton	do.
Cast Iron Pipes, Haslemere	Hambledon (Hants) R.D.C.	Grantham & Son, 23, Northumberland-avenue, W.C.	do.
Additions to the Exchange Inn, Gilwern, Wales	Mrs. Edwards	B. J. Francis, Architect, Abergavenny	do.
Stabling, Navigation Inn, Gilwern	.....	do.	do.
Road Works, &c., Brownlow-road	Mansfield Corporation	R. F. Vallance, Engineer, Mansfield	do.
Sewers, &c.	Hale (Cheshire) U.D.C.	F. J. Lobley, Civil Engineer, Hale, Cheshire	do.
Rebuilding Causey House, Sheriff Head, Gateshead	Messrs. Emmerson & Son	L. H. Armour, 16, West-street, Gateshead	do.
•Repair of Hampton Pier	Herne Bay U.D.C.	Surveyor to the Council, Town Hall, Herne Bay	do.
•Wrought Iron Fencing, Recreation Ground, Queens-rd.	Hendon U.D.C.	Engineer to the Council, Council Offices, Hendon, N.W.	do.
Sewerage Works	Foleshill R.D.C.	C. N. Lailey, Engineer, 6, The Sanctuary, Westminster	Aug. 5
Sewers, &c.	West Bromwich Town Council	A. D. Greatorex, Civil Engineer, Town Hall, West Bromwich	do.
Sewers, &c.	Oakengates U.D.C.	R. E. W. Berrington, Engineer, Bank Buildings, Wolverhampton	do.
Rails, &c.	G.S. & W.R. (Ireland)	F. B. Ormsby, Kingsbridge Terminus, Dublin	do.
Pipe Laying, &c.	Tenbury R.D.C.	Wilcox & Raikes, Engineers, 63, Temple-row, Birmingham	do.
•Painting, &c., Chapel in St. Leonards-street Workhouse	Stepney Union	Master of the Workhouse, St. Leonards-street, Bromley-by-Bow, E.	Aug. 6
•New Lighthouse Dwellings at Portland Bill, Dorset	Trinity House Corporation	The Trinity House, London, E.C.	do.
•Painting Infirmary	St. Mary's Islington Guardians	W. Smith, Architect, 65, Chancery-lane	do.
•Repairs to Roofing	West London District Schools	Superintendent at the Schools, Ashford	Aug. 7
•Sorting Office, Thornton Heath	Commissioners of H.M. Works, &c.	Storey's Gate, London, S.W.	do.
•New Post Office at Crewe	H.M. Office of Works	The Secretary, H.M. Office of Works, Storey's Gate, S.W.	do.
•Police Station, Cottages, &c.	Kent County Council	County Surveyor, 86, Week-street, Maidstone	do.
•Supply and Erection of Iron Steelwork, Timber, &c.	Chatham Corporation	A. T. Walmisley, 9, Victoria-street, S.W.	do.
•New Coastguard Buildings at Cemaes	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue	do.
•1,000 tons of Granite Spalls	County Borough of Brighton	Borough Engineer and Surveyor, Town Hall, Brighton	do.
•Dressed Granite Kerb and Channel, &c.	do.	do.	do.
Kerbing, &c.	Brighton Town Council	F. J. C. May, Civil Engineer, Town Hall, Brighton	do.
•Wrought Iron and Oak Fencing, &c., at Muswell Hill	Hornsey U.D.C.	Engineer to the Council, 99, Southwood-lane, Highgate, N.	Aug. 10
Embankment Works	Kettering U.D.C.	T. R. Smith, Architect, Market-place, Kettering	do.
•Furnishing requisited at Mount Pleasant Sanatorium	Southall-Norwood U.D.C.	Clerk to the Council, Council Office, Southall	do.
•New Scullery at Sidney-road Workhouse, Homerton	Hackney Union	Clerk's Offices, Sidney-road, Homerton, N.E.	Aug. 12
•New Depot in Church-street	Epsom U.D.C.	Council's Surveyor, Council Offices, Bromley Hurst, Epsom	Aug. 15
Water Supply Works, Chilcompton, Somerset	Clutton R.D.C.	W. F. Bird, Civil Engineer, Midsomer Norton, near Bath	Aug. 25
Schools, Troedyrhiw	Merthyr Tydfil School Board	J. L. Smith, Architect, Aberdare	Aug. 26
Church, Blackburn-road, Darwen	....	J. B. Thornley, Architect, Market-street, Darwen	No date.
Warehouse, Dronfield	.....	Gibbs & Flockton, Architects, 15, St. James-row, Sheffield	do.
Brewery, Green-lane, Bury	Phœnix Brewery Co., Ltd.	W. E. Gill, Architect, Fleet-street, Bury	do.
Three Shops, &c., Working-street, Cardiff	Messrs. Jacob & Jacob	Habershon & Co., Architects, 14, Pearl-street, Cardiff	do.
Registry Offices, Cathays Park, Cardiff	University of Wales	Ivor James, Registrar, Brecon	do.
Schools, King's-road	Wombwell School Board	J. Robinson, Architect, Park Cottage, Wombwell	do.
Additions to House, Cartmel	The Misses Cowherd	J. Stalker, Architect, Kendal	do.
Two Houses, Croft's-terrace, York	Mr. Lanes	F. W. Brown, Architect, Clifford-street, York	do.
Bridge Works, Hay Mill	.....	J. Price, City Engineer, Council House, Birmingham	do.
•Block of Dwellings at Tollington Park	.....	A. Monks, Organ Works, 556, Holloway-road, N.	do.

[*See also next page*

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
Clerk of Works	Fulham Borough Council	3 Guineas per week	July 28

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, lv. *Contracts*, lv. vi. viii. x. & xxi. *Public Appointments*, xviii.

TENDERS (*Continued*):—

"ALMA" and "SOUTHWARK" P. T. SCHOOL.—Painting exterior:—

W. Downs	£232 0	J. C. Chalkley	£267 0
H. J. Williams	289 10	Johnson & Co.*	256 0
Sayer & Son	278 0	Belcher & Co., Ltd.	248 0

ARLINGTON-SQUARE.—Painting interior and exterior:—

C. & W. Hunnings	£301 0	H. Runham Brown	£210 0
G. Kirby	228 10	Dearing & Son	197 0
A. Porter	215 0	Stevens Bros.*	192 10

ARTHUR-STREET.—Painting interior:—

H. Line	£396 0	H. Groves	£289 0
W. Hooper	349 0	Maxwell Bros., Ltd.	289 0
E. Triggs	333 0	W. J. Howie*	259 0
Sayer & Son	305 10		

BALTIC-STREET.—Painting exterior:—

Parrott & Isom	£161 0 0	W. Chappell	£115 0 0
Johnson & Co.	149 0 0	F. & H. F. Higgs*	115 0 0
Gavin Bros.	134 5 0	G. Barker	108 10 0
John Greenwood, Ltd.	129 17 6		

BETTS-STREET.—Painting exterior:—

A. J. Sheffield	£180 0	Gibb & Co	£165 0
J. F. Holliday	176 15	G. Barker*	146 0
Vigor & Co.	166 0		

BLACKHEATH-ROAD (old and new portions).—Painting interior:—

W. Banks	£497 0	Proctor & Son	£370 0
G. Kemp	450 0	W. J. Howie	358 0
C. G. Jones	393 4	H. Groves*	325 0

BONNEVILLE-ROAD (iron buildings).—Painting exterior and cleaning interior:—

King & Son	£146 0	Coleman & Co.	£106 4
M. E. Allen	137 0	W. Read	104 0
R. S. Ronald	110 0	C. Gurling*	75 0

BURGHLEY-ROAD (J. M. and P. T. Centre).—Cleaning interior:—

Chinchen & Co.	£237	McCormick & Sons	£190
T. Cruwys	227	Stevens Bros	196
Viney & Stone	211	Marchant & Hirst*	189
Wall & Co.	208		

CABLE-STREET.—Painting interior and exterior:—

A. E. Symes	£495 0	Vigor & Co.	£348 15
Johnson & Co.	369 0	G. Barker	328 0
F. & H. F. Higgs	355 0	J. F. Holliday*	251 0

CALVERT-ROAD (old portion).—Painting interior:—

W. Banks	£229 17 6	Leney & Son	£196 0 0
W. J. Howie	225 0 0	Hayter & Son*	166 0 0

CARLTON-ROAD.—Painting exterior:—

Viney & Stone	£223 0	Balfour & Co.	£196 0
T. Cruwys	223 0	Graham & Graham	173 0
Wall & Co.	215 0	F. W. Harris	165 0
Marchant & Hirst	198 0	Chinchen & Co.*	139 10

CATHERINE-STREET.—Painting interior:—

H. Runham Brown	£608 0	Stevens Bros.	£414 0
McCormick & Sons	495 0	W. Hornett	381 0
Garrett & Power	485 0	Haydon & Sons*	329 10

CAVENDISH-ROAD.—Painting interior and exterior:—

Dowsett & Jenkins	£755 10	Garrett & Son	£446 0
Coleman & Co.	564 0	Johnson & Co., Ltd.	429 0
Leney Bros.	564 0	Rice & Son*	397 0
E. Triggs	480 0		

CAYLEY-STREET.—Painting exterior:—

T. Cruwys	£296 10	Vigor & Co.	£191 10
F. & H. F. Higgs	273 0	A. W. Derby	188 0
J. F. Holliday	249 0	Gibb & Co.*	185 0

CHARING CROSS-ROAD.—Painting exterior:—

T. Cruwys	£242	W. Chappell	£158
J. R. Sims	183	Chinchen & Co.*	149
Belcher & Co., Ltd.	177		

CLYDE-STREET (Boys', Girls', Infants and Pupil Teachers) and EDWARD-STREET.—Painting exterior and cleaning interior of Clyde-street and painting exterior of Edward-street:—

T. D. Leng	£733 0 0	John Greenwood, Ltd.	£532 17 6
H. Groves	651 0 0	Proctor & Son	530 0 0
W. J. Howe	629 0 0	M. E. Allen	528 6 6
Holliday & Greenwood, Ltd.	577 0 0	G. Kemp*	544 0 0
J. & C. Bowyer	555 0 0		

COOK'S GROUND (Chelsea).—Painting exterior:—

J. & M. Patrick	£369	E. Triggs	£282
F. B. Tucker	351	W. R. & A. Hide	270
Leney Bros.	343	C. F. Kearley	173
Bristow & Eatwell	297	W. Hammond*	163

"CUBITT TOWN."—Painting interior:—

Parrott & Isom	£285	Vigor & Co.	£242
A. J. Sheffield	266	Gibb & Co.	222
		Woollaston & Co.*	£188

CULLODEN-STREET.—Painting interior and exterior:—

J. F. Holliday £458 10

DANIEL-STREET.—Painting interior and exterior:

Johnson & Co.	£650 0	Silk & Son	£433 0
W. Hornett	526 0	Haydon & Sons	405 0
Stevens Bros.	494 10	Belcher & Co., Ltd.*	393 0
W. Chappell	475 0		
G. Barker	435 0		

DIVISIONAL OFFICES (8, Avonmore-road).—Painting exterior, cleaning and partly painting interior:—

Hudson Bros.	£135 15	Macey & Sons, Ltd.	£127 0
W. Hammond	129 0	F. Chidley*	91 6

DRURY-LANE INDUSTRIAL.—Painting exterior:—

Bargman, Son, & Co.	£288 0 0	W. Hornett	£179 10 0
Parrott & Isom	227 0 0	H. Runham Brown	169 0 0
Gavin Bros.	212 8 6	W. Chappell*	125 0 0

ELIZABETH-STREET.—Painting exterior:—

W. Harris	£150	Proctor & Son*	£92
Holliday & Greenwood Ltd.	119		

ELLERSLIE-ROAD.—Painting exterior:—

Hudson Bros.	£123 0	F. Chidley	£95 0
Bristow & Eatwell	113 0	Chinchen & Co.	87 10
W. Hornett	109 0	W. Hammond*	89 0
W. R. & A. Hide	95 10		

ENFIELD-ROAD.—Painting exterior of main and special schools:—

J. Stewart	£192	McCormick & Sons	£149 10
Barrett & Power	164	H. Runham Brown	142 0
Dearing & Son	150	Grover & Son	134 15
Woollaston & Co.	154	G. Wales*	134 10

ESSEX-STREET (Boys', Girls', Infants', and P.T.).—Painting exterior:—

A. J. Sheffield	£363 0	A. W. Derby	£273 0
J. F. Holliday	358 0	Vigor & Co.	244 10
Johnson & Co.	322 0	Haydon & Sons*	234 0
Corfield & Co.	310 10		

FORSTER.—Painting exterior:—

McCormick & Sons	£178	Stevens Bros.	£152
G. Kirby	176	F. W. Harris	119
Grover & Son	166	C. & W. Hunnings*	117
Bate Bros.	153		

GALLEYWALL-ROAD.—Painting parts of exterior of old portion not done with enlargement (Boys', Girls', and Infants') and painting interior and exterior of Special Schools:—

H. J. Williams	£249	J. Greenwood, Ltd.	£158
Sayer & Son	194	J. C. Chalkley	157
Rice & Son	170	W. Hooper*	127
Garrett & Son	165		

GAYHURST-ROAD.—Painting exterior:—

Willmott & Son	£203 10	H. Runham Brown	£137 0
J. Stewart	194 0	Silk & Son	127 10
A. Porter	156 0	F. Bull*	119 10
Shurmur & Sons, Ltd.	147 10		

HITHERFIELD-ROAD (iron buildings).—Painting exterior and cleaning interior:—

M. E. Allen	£146 10	R. S. Ronald	£110 0
Maxwell Bros., Ltd.	140 0	Dowsett & Jenkins*	88 10
J. & C. Bowyer	130 0		

HOMERTON-ROW.—Painting exterior:—

Chessum & Sons	£230 0	G. Wales	£209 0
Shurmus & Sons, Ltd.	227 0	Silk & Son	197 0
A. Porter	225 0	Grover & Son	196 0
Belcher & Co., Ltd.	213 10	Corfield & Co.*	153 0

HUGH MYDDELTON.—Painting interior:—

G. Kirby	£790 18	Marchant & Hirst	£657 0
G. Barker	753 0	Bristow & Eatwell	579 0
C. & W. Hunnings	720 10	Johnson & Co.*	553 0
Stevens Bros.	696 0		

HUGHES' FIELDS (old and new portions).—Painting interior:—

T. D. Leng	£452 0	Hayter & Son	£150 0
W. J. Howie	314 0	S. E. Musgrove*	224 5
Proctor & Son	304 0		

JOHN RUSKIN.—Painting interior and exterior:—

J. R. Sims	£734 0	Garrett & Son	£490 0
W. V. Goad	562 0	H. J. Williams	425 10
Sayer & Son	498 0	Maxwell Bros., Ltd.*	398 0

KENTISH TOWN-ROAD.—Painting exterior:—

T. Cruwys	£98 10	Wall & Co.	£59 0
Balfour & Co.	64 10	Marchant & Hirst	49 0
F. & H. F. Higgs	68 0	F. Chidley*	46 0

"LAVENDER HILL."—Painting interior of all buildings:—

General Builders, Ltd.	£1,079	Martin, Wells, & Co., Ltd.	£615
King & Son	845	R. A. Jewell	600
W. Chappell	685	E. Triggs	599
Holloway Bros. (London), Ltd.	668	Garrett & Son	589
		J. & M. Patrick*	586

MALMESBURY-ROAD (JM).—Painting interior and exterior:—

Gibb & Co.	£215 0	Woollaston & Co.	£126 10
A. E. Symes	165 0	Vigor & Co.	123 0
G. Barker	154 0	A. W. Derby*	121 0
J. F. Holliday	140 0		

MARLBOROUGH-ROAD (Old buildings).—Painting exterior:—

C. Gurling	£426	W. Hammond	£326
J. & M. Patrick	356	Macey & Sons*	249
C. F. Kearley	342		

MERTON-ROAD.—Painting interior:—

Dowsett & Jenkins	£483 17	Maxwell Bros., Ltd.	£235 0
R. S. Ronald	280 0	Rice & Son	227 10
J. & M. Patrick	260 0	R. A. Jewell*	181 0

MORNING-LANE.—Painting exterior:—

Shurmur & Sons, Ltd.	£253 0	Silk & Son	£238 0
G. Wales	256 0	F. Bull	199 10
Barrett & Power	250 0	Chessum & Sons	199 7
J. Stewart	245 0	Woollaston Bros.*	176 0

NECKINGER-ROAD.—Painting exterior:—

F. & H. F. Higgs	£236 0	J. Greenwood, Ltd.	£197 15
Johnson & Co.	222 0	Sayer & Son	188 0
Garrett & Son	219 0	H. J. Williams*	172 0

No. 10, MAIDA-HILL, W.—Painting interior and exterior:—

T. Cruwys	£169 0 0	Marchant & Hirst	£105 0 0
W. T. & A. Hede	154 15 0	Balfour & Co.	97 15 6
Chinchen & Co.	119 0 0	W. Chappell*	82 10 0
Wall & Co.	116 10 0		

OBAN-STREET.—Painting interior:—

Parrott & Isom	£589 0	Gibb & Co.	£415 0
G. Wales	479 0	Vigor & Co.	360 10
A. E. Symes	468 0	G. Barker	340 0
A. W. Derby	434 0	A. J. Sheffield*	333 0

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Martin, Wells, & Co., Ltd.	175	Garrett & Son*	153

"OLIVER GOLDSMITH" and the DIVISIONAL OFFICES.—Painting interior and exterior:—

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Martin, Wells, & Co., Ltd.	376	W. Chappell	298
		Leney & Son*	235

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A. Porter	205 10	Haydon & Sons	152 0
H. Runham Brown	173 0	McCormick & Sons	140 0
Belcher & Co., Ltd.	159 4	Dearing & Son*	114 0

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"PULTENEY."—Painting exterior:—

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J. R. Sims	359 0	T. Cruwys*	242 0
G. Foxley	327 0	W. Chappell	235 0
Lathey Bros.	289 0		

PURRETT-ROAD.—Painting exterior:—

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W. Hooper	111 12 6		

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Johnson & Co.	198 5	Sayer & Son	146 0
W. Read	197 0	W. Hooper*	93 0

ROYAL HILL.—Painting exterior and interior:—

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H. Groves	245 0 0	C. G. Jones*	208 12 6
W. Banks	236 17 6		

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SOUTH LAMBETH-ROAD (J. M.).—Cleaning interior:—

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W. Read	139 0	Sayer & Son	84 10
G. Brittain	113 0	R. S. Ronald*	80 0
Maxwell Bros., Ltd.	113 0		

SMITH-STREET.—Painting interior and exterior:—

G. Barker	£470 0	J. F. Holliday	£383 0
Barrett & Power	456 0	G. Wales	377 0
Vigor & Co.	409 10	Woollaston Bros.	364 0

STANLEY-STREET (old portion).—Painting interior:—

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W. J. Howie	410 0 0	S. E. Musgrove	306 4 6
Proctor & Son	390 0 0	Hayter & Son*	296 0 0
H. Groves	385 0 0		

SUMMERFORD-STREET—Cleaning interior and painting interior:—

Willmott & Son	£1,163 10 7	G. Barker	£660 0 0
G. Wales	950 0 0	A. Porter	631 0 0
Barrett & Power	692 0 0	H. Runham Brown*	620 0 0

"THE FOX"—Painting exterior:—

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C. F. Kearley	90 0	G. M. Sealy	82 0
Brown & Sons	86 0	Chinchen & Co.*	73 0

THE SNOWSFIELDS.—Cleaning interior of old portion and painting interior of enlargement, painting exterior of all buildings:—

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H. J. Williams	444 0 0		

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Garrett & Son	59 0 0	W. Banks*	51 17 6
Proctor & Son	59 0 0	Hayter & Son	45 0 0

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G. Barker	132 10		

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J. R. Sims	£199 0	Johnson & Co.	£156 0
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Rice & Sons	173 0	H. J. Williams	148 0
G. Brittain	167 0	J. F. Ford*	139 0

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G. Kirby	528	Stevens Bros.*	474

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Bate Bros.	271 0		

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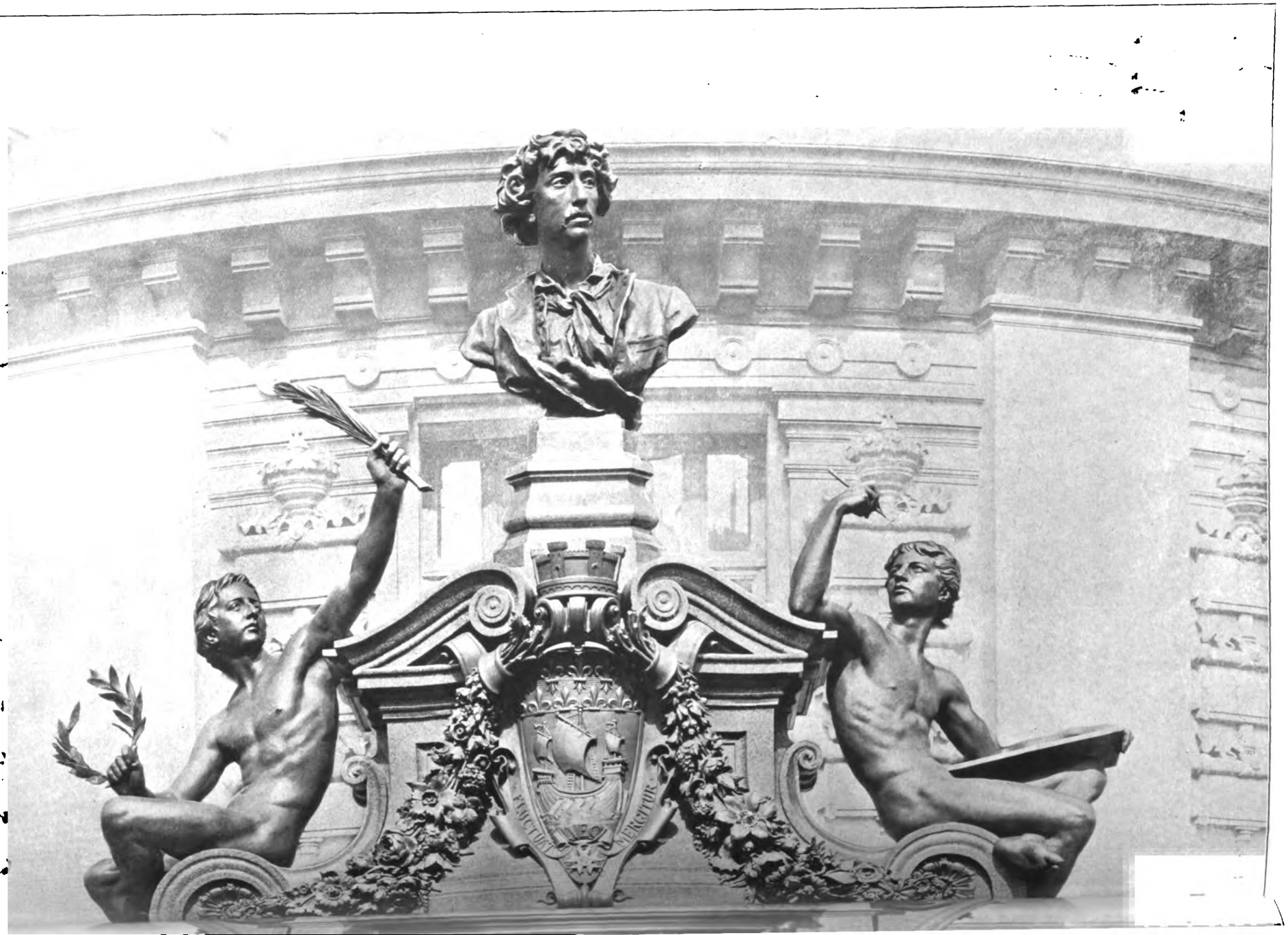

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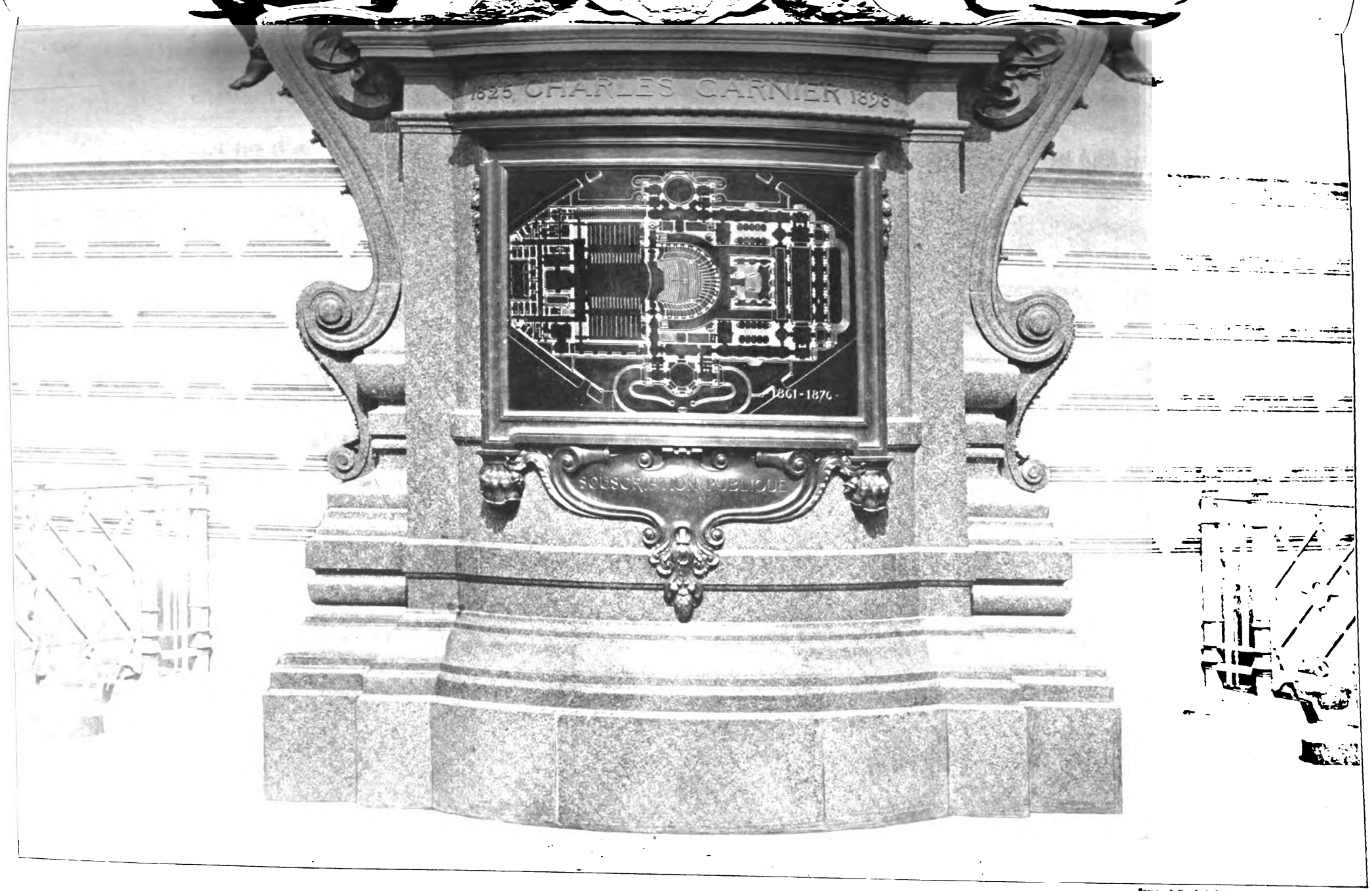

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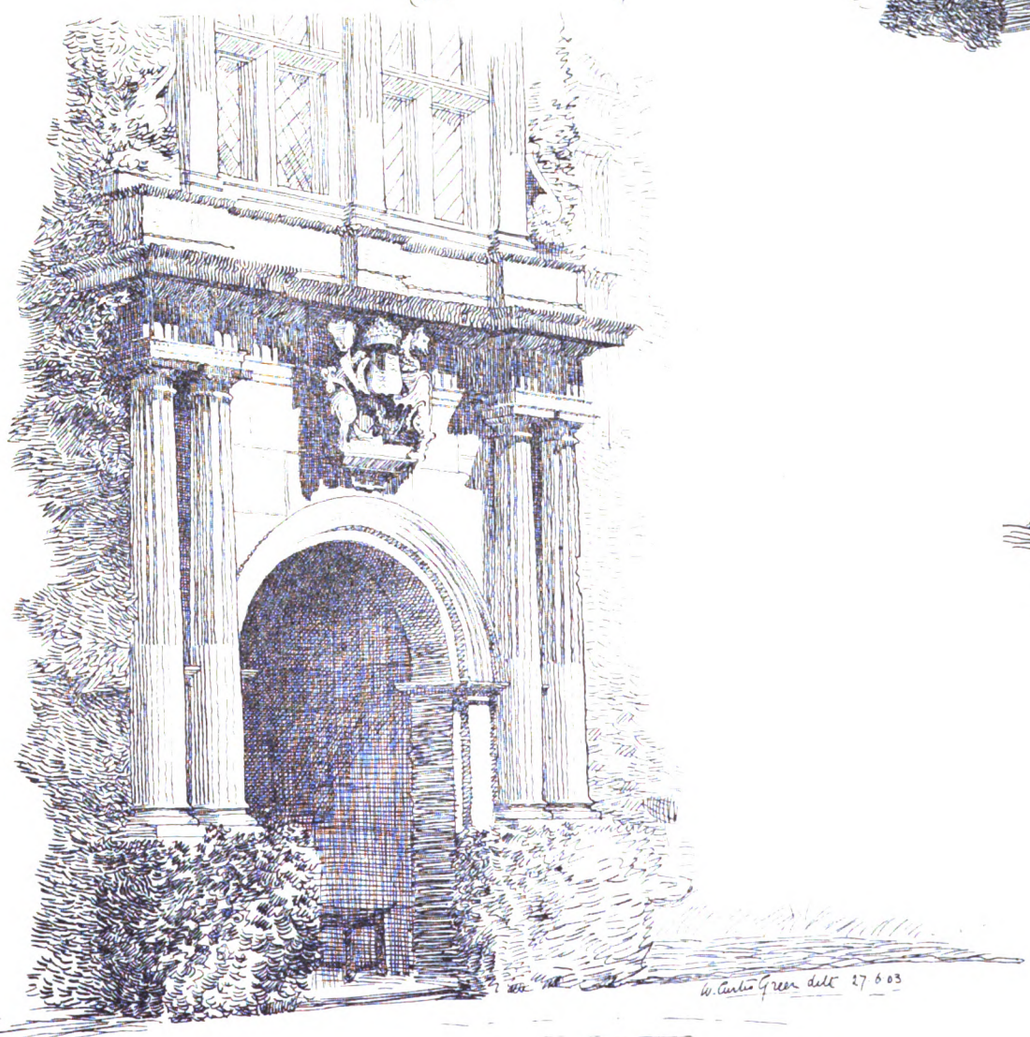

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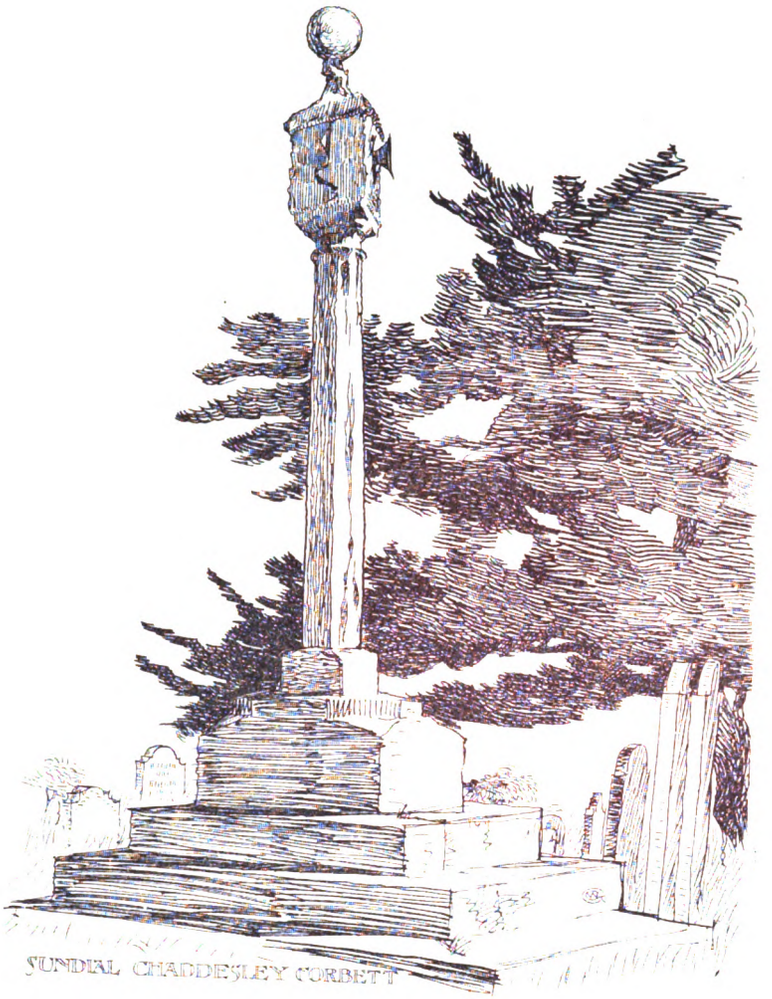

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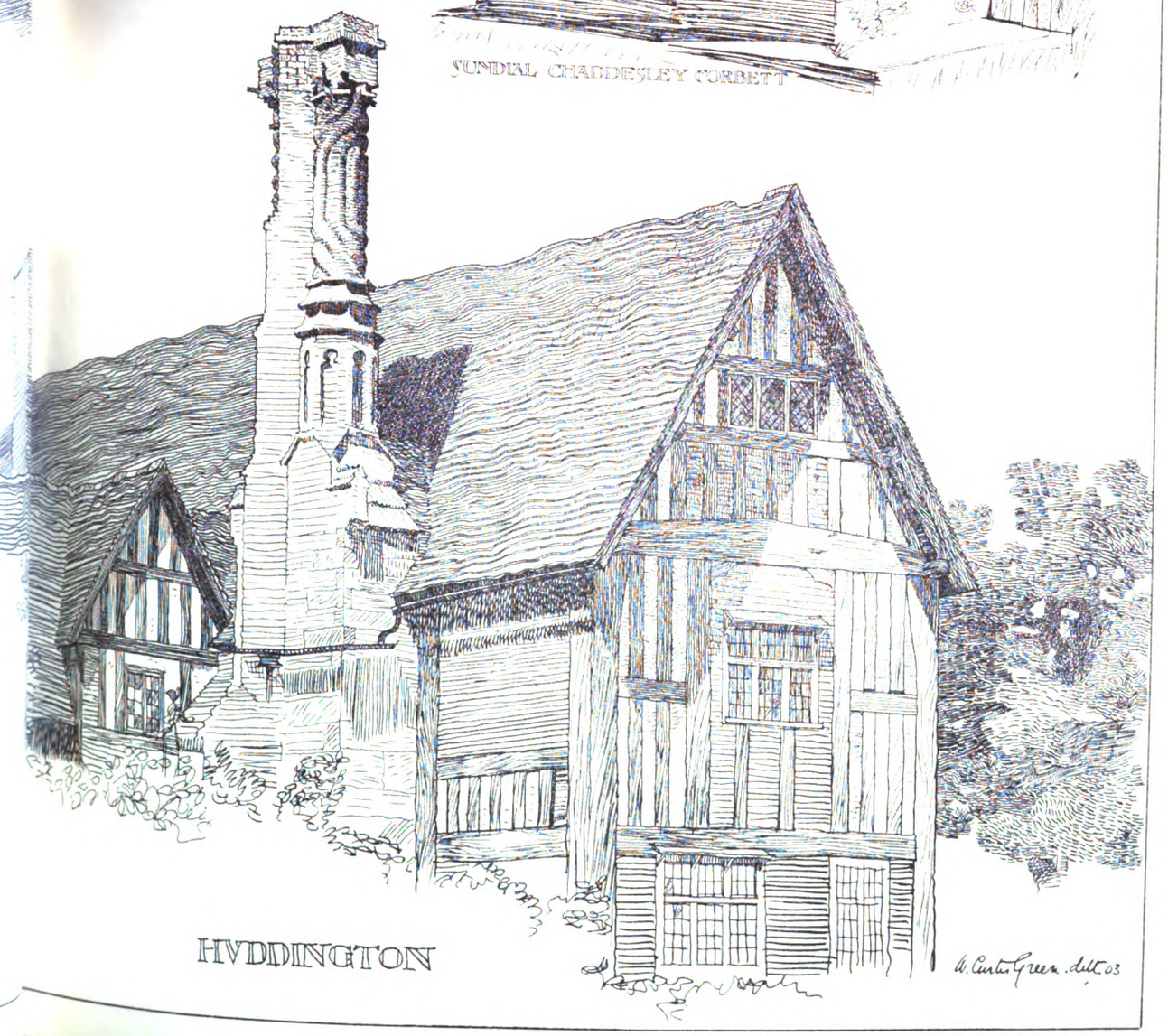

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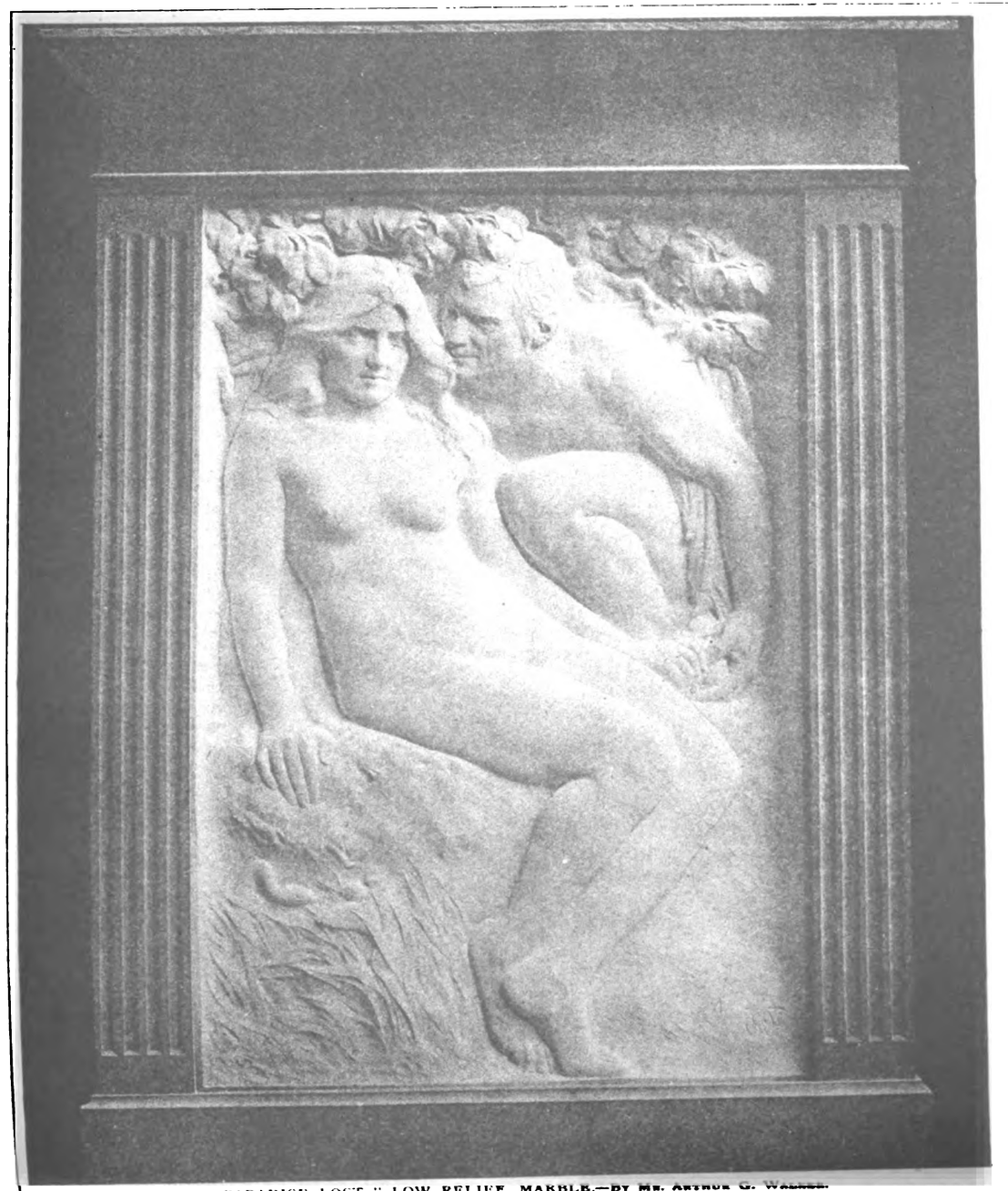

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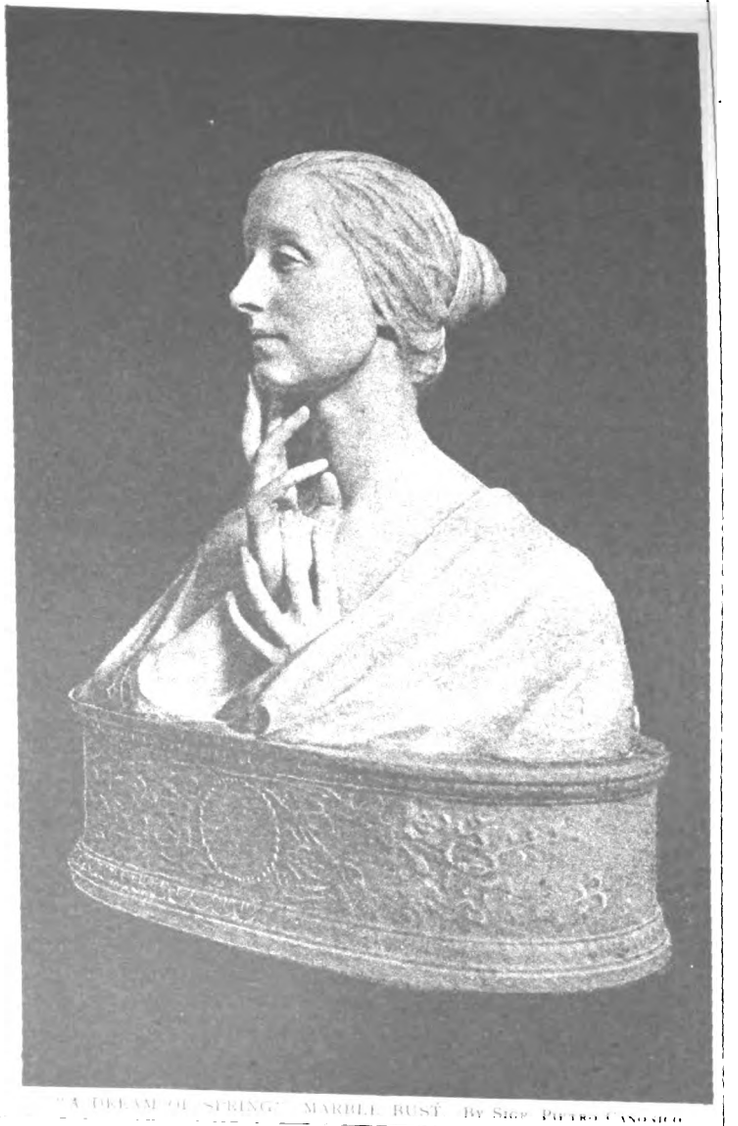

"A DREAM OF SPRING": MARBLE BUST. BY SIGR. PIETRO CANONICA.

SCULPTURE AT THE ROYAL ACADEMY

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SKETCHES IN WORCESTERSHIRE: ARCHITECTURAL ASSOCIATION EXCURSION

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The Builder.

VOL. LXXXV.—No. 3156. AUGUST 1, 1903.

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Notes in Constantinople.

In a way, few places are more disappointing to the expectations of the average educated visitor than Constantinople, as the famous city becomes visible from the ever-calm lake-like waters of the Sea of Marmora. Its beauties as a maritime city may perhaps have appeared more evident in former ages; at the present day the mouth of the Bosphorus is usually wreathed over with clouds of smoke from the innumerable steamers which fill the harbour and the Golden Horn—strange misnomer for a particularly leaden-looking sheet of filthy water—and from the factory chimneys of the squalid industrial quarters.

A near approach to Constantinople completely dispels any illusions which may have been derived from reading old-world books describing the splendid capital of the Eastern Empire and of the Caliphs. Turkish towns all resemble each other in a remarkable degree, and the principal capital of the Mohammedan world is very little more imposing or superior in style to half a hundred provincial centres. The same narrow, dirty unpaved streets lined with roughly built houses of not the smallest architectural pretensions meet the eye everywhere. Here and there, relieving the all prevailing modern ugliness, a mosque with its numerous domes and semi-domes rises in huge wen-like growth from amongst the crowded tenements of humanity; but there is nothing beautiful in the exterior of a Turkish mosque, and very little that is even attractive in its usual accompaniments of fountains or garden gateways.

Constantinople in its Turkish aspect belongs to a period when the Renaissance of Europe was spreading eastwards and the misunderstood details of architecture and ornament belonging to Western civilisation were being adopted (often with most remarkable results) by the Levantine races. At the same time such details could only be used in a very restricted sense in consequence of religious prejudices, and such restrictions eliminated the great mainspring of all true art—the study of the human figure. So-called Turkish art is probably one of the poorest varieties in the world. It lacks the inventiveness and ingenuity of its nearest racial relative, the Chinese style, whilst it has none of the colour-sense and constructive ability of the Arab and Persian. To the student of art Turkish Constantinople presents little, if anything, for study, and its clumsy stone carvings, intended as imitations of French or Italian art of the past three centuries, are merely grotesquely absurd when not actually repulsive. Even mere floral and leafage decorations are so badly executed that the best of Turkish designs would be bad anywhere else. This kind of design in architecture (*i.e.*, constructed ornament) and decoration is, in fact, more of an object-lesson in what to avoid as utterly wrong in principle than of anything to be admired. In it the architectural forms adopted have no reference to the construction, and almost every detail is misplaced.

On visiting Constantinople the student of historic monuments must be impressed by one very remarkable fact. The city has always been one of the most important, if not of the wealthiest in the world, and yet few great centres of population have so very few vestiges of antique greatness about them. With the exception of St. Sophia, the monumental remains of the long period intervening between the days of Constantine the Great and Constantine XIII., a period of eleven and a half centuries, are hardly represented by any surviving work of art. The two or three fragments of prehistoric or monolithic character still standing erect in the Hippodrome and elsewhere have no local connexion with the city, being mere loot from Egypt or Greece.

The question presents itself: What can have become of all the monuments of Classic or Mediæval times which must once have existed to allow of the city's designation as New Rome? Such a complete clearance of an ancient site, even by so alien a race as the Turkish is very rare—indeed unique.

The innumerable sieges to which the city was subjected during the Middle Ages would account for a very great destruction of the ancient Roman remains, but the final siege and occupation by the Turks is of a period so comparatively recent that the disappearance of mediæval Constantinople becomes exceedingly remarkable. Perhaps the patient investigation of the enormous blocks of half-ruinous building which constitute the palaces of Pashas and officials in the older portion of the city, by some resident student, would reveal the existence of mediæval fragments; such an investigation would, however, require considerable time and enthusiasm. To the superficial observer there is nothing to be seen which would encourage such labours; the uniform pall of an uninteresting drab-coloured plaster covers everything, its frayed and broken edges affording a glimpse of a particularly mean and deplorable construction in wood and bad stone or brickwork underneath.

Constantinople is, and always has been, proverbial for its fires. Conflagrations at times sweep whole districts away many times over within the same area, and within comparatively short periods. Mounds of immense height now cover the mediæval city in all directions, and probably beneath them are buried the remains of the period before the Turks. Even around St. Sophia, where there has always been probably a certain amount of open space preserved, the earth has risen to a height of many feet, and this would be due to the usual cause—the ruin of ancient buildings.

The famous triple wall of the city is still wonderfully intact, but it has no architectural character, and, built of small stones and bricks, its appearance is anything but imposing. The same may be said for the old walls within the city dividing off certain wards or quarters. Nowhere are such imposing structures and gateways to be seen as are common enough in Cairo.

There remains, however, the one great feature of Constantinople which will always and for all time attract the attentive study of the architect and art-student—a monument of art unequalled, in some respects, in the world, and certainly the grandest creation of its epoch. Although St. Sophia is remarkably insignificant and uninteresting to look at from the outside, its mean, un-

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dignified exterior serves to heighten the magnificent impression created by the first glimpse of its interior. The church or mosque—neither the exterior nor the interior suggest the idea of either use to our modern eyes—is a superb hall glowing with the colour of old age, and the always impressive glitter of gold mosaic. It is a building expressive of a completed and organically perfect type of architecture. The Byzantine style as known to Europeans through the imperfect examples of Venice or Ravenna, or represented to some extent by the contemporary Romanesque of Western Europe, is associated with the more or less second-hand use of classical details robbed from more ancient buildings, and adapted in a barbarous manner. To judge of the Byzantine style, it is evidently necessary to visit St. Sophia and study its harmony of proportion, its elegance of detail, and its wealth of colour, although this latter detail perhaps but reproduces the original mosaic design after a fashion. Much of the beauty and impressiveness of its interior may be due to a survival of the scale and general proportions of Classic buildings such as the Roman Pantheon or the temples of Baalbek. Many of the details in its carvings, the dolphins, tridents, &c., are Classical in treatment if not in execution; its mosaic decorative treatment is perhaps its most distinctive feature, and that in which it differs from older monuments. These mosaics in their present state are evidently very far from reproducing the Christian mosaics which once covered the immense vaulted areas of the ancient church. The "restoration" of the interior during the past half-century has removed all traces of the defaced figure mosaics without heads or deprived of their noses and eyes, and in a generally ruinous condition wherever not covered over with inevitable whitewash, so often referred to by writers of fifty years ago. Evidently the whole interior has been completely restored, and the mosaic work has been renewed throughout, only the four great cherubims enveloped in wings on the pendentives of the great dome remain as evidence of the original Byzantine style of the decorations. Everywhere else the figure designs have completely disappeared. The extensive spaces which must once have been filled with these figure designs are now covered with a plain gold filling-in of mosaic cubes, which has a flat and monotonous effect—an effect which is not much mitigated by the introduction of feeble oriental designs forming pateras and panels on the soffits of arches and elsewhere.

But however much the mosaic work of the interior of St. Sophia may be unlike the original decorations, there is no doubt that the actual architectural details of column and cornice are just as Anthemius of Tralles designed them. The magnificently solid proportions, the ponderous mass of walls, and the remarkably constructed dome remain apparently untouched by the wear and tear of thirteen centuries, and the singular survival of the raised platform on which once stood the Christian altar is a sufficient proof of the trifling structural change which occurred on the advent of the Mohammedan religion. The general effect of majestic and colossal construction is quite worthy of ancient Roman work such as the Pantheon or the Colosseum, and in addition there is a certain lightness of the upper parts which seems surprising in a building of such great antiquity.* Externally the building has been much repaired and restored since its conversion into a mosque, but the inevitable drab plaster spreads its monotone influence over every part.

St. Sophia must at one time have possessed many of the usual picturesque additions of the mediæval period, which have almost entirely disappeared. As has been pointed out, Constantinople is remarkable for its lost monuments, and St. Sophia seems to possess only one doorway which belongs to the Middle Ages, perhaps the thirteenth century. As a curiosity on that account we reproduce it, although it is of no architectural or artistic interest. It is a simple, deeply arched porch, evidently made up of ancient columns, of which the two outermost have ancient capitals. The whole reminds one of the similar design in St. Mark's, Venice, and it probably would be intended to have a similar mosaic decoration.

Mediæval Porch, St. Sophia.

A BOOK OF COUNTRY HOUSES.

MR. ERNEST NEWTON'S new book of designs and plans of country houses† is superior to his first one. These represent houses carried out during the last ten years; that at least is the general statement in the introduction; though there is one drawing that we think we remember at an earlier date than that would imply. We remember thinking that in the earlier set, however picturesque the exteriors, the construction was rather light and the walls of the extreme tenuity that was decently possible. This economy of material is less apparent in the present plans; though, as regards the exterior walls, their solidity is still far below that of old country houses of about the same scale. Fourteen-inch exterior walls seem to be the extreme of indulgence, even in the case of the comparatively large house No. XI., which has a frontage of 90 ft. There is a solid bit of 2 ft. 6 in. on each side of the door, but that is rather a pier than a wall. In No. IV., indeed, we have the unwonted extravagance of 18-in. walls all round, but this is a stone house on a moor. We should have liked to have seen the other houses encompassed by 18-in. external walls, and this one 2 ft. 6 in; perhaps Mr. Newton would also, and it is a question merely of expenditure. In old stone- or brick-built country houses the idea seems to have been to have at least a good thick external wall to make the interior thoroughly weather-proof; that secured, the interior partitions might be as slight as you pleased. Now the exterior walls are made no thicker than is absolutely necessary, but the interior ones are kept up to a standard of solidity and soundproof quality. This is more reasonable in a sense; but yet there is an element of architectural satisfaction in the thick exterior walls of the old houses, giving an impression of solidity and of liberality in the use of material. The modern contract system reduces them to 14 in.; with properly selected materials it is practically sufficient, but it has a meagre and skimped appearance by comparison with the old thick walls and deep interior reveals and window-seats; and it may be suggested that an architect with the tastes and perceptions of Mr. Newton, who desires to revive in modern country houses something of the unpretentious simplicity of the old country house, might do a good work by gently leading round his clients to the contemplation of thickness and solidity of walling as one element in country house architecture; and that even some interior decorative finish—and we gather that there is plenty of that in the externally plain houses shown in this book—might be sacrificed to obtain this quality of solidity of structure, more particularly in the cases where a house is built to be inherited as a family possession.

Most of the exterior views in this book are drawings, which in the main we prefer to photographs; there is more certainty in showing exactly what you want to show; the effect of a photograph is a good deal at the mercy of accidental conditions of light, and also, frequently, the impossibility of finding a thoroughly suitable standpoint. The author is careful to say that these designs are not put forward as a book of "specimens," nor the houses as "examples" to be copied; "they are given for what they are worth as the fruit of some experience." People who tried to imitate one of these houses from the drawings and plans would find, in fact, when it was done, that they had missed the particular quality of detail which gives them their special character; and the book was certainly not put out with any such object. Yet the author says that, from the rapid sale of the first book, he concluded that it must have been of some use "to house builders, professional and amateur." To other architects, especially the younger ones, this usefulness would consist, we suppose, in suggestions in planning, and in the cultivation of their own taste in regard to the architectural treatment of a country house. Without supposing any copying, a set of illustrations of this kind must have a certain effect on the mind of those who turn them over—especially those who are intending to build houses for themselves—in suggesting an ideal.

The ideal suggested is that of what the author calls "a natural architecture," which he defines as "a rational healthy builder's art expressing itself soberly through the medium of masonry and carpentry." This ideal is in opposition to the new ideals in

* The dome of St. Sophia does not, however, suggest that perfection of colossal stability of the Pantheon. It certainly is not of so marvellously perfect a construction, and will probably not survive the more ancient monument.

† "A Book of Country Houses." By Ernest Newton. London; B. T. Batsford; 1903.

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architecture, especially in house architecture, which imply a kind of research after the picturesque; a research which results in the tendency to eccentricity of design and treatment which Mr. Newton happily describes as "Freak architecture." In his objection to this we are quite in sympathy with him. A country house should be reposeful in its appearance and expression; freaks of building are the reverse of reposeful, and after their novelty has worn off (or even before) they become an irritation. There are no freaks in Mr. Newton's house architecture, at all events as here illustrated. There is nothing in the whole set of designs to which the most fastidious critic could object as being in bad taste; nothing that has the least suspicion of vulgarity; and this is a great thing to be able to say. The question which might be raised is whether the architectural virtues of Mr. Newton's ideal are not a little negative.

"A healthy builder's art:" that is to say (is it not?), a return to just the putting together of walls and roofs and the placing of windows and doors, in the most obvious direct and simple manner, with little attempt at any special symmetry or any contrived effect in design. It is building houses as they were built in country neighbourhoods two or three hundred years ago. Mr. Newton does not altogether ignore the changed conditions. As he says, it would be affectation to insist nowadays on the use of local materials only, when the means of transport are so much greater. On the other hand (and we quite agree) it is legitimate to take the district into consideration. "Materials foreign to the country-side are often imported for no better reason than that the architect has a habit of design, and an inelastic mind." Where the concern is with houses of a simple and unpretending character, we are disposed rather to lay stress on the use of local materials so long as they are structurally satisfactory. Foreign materials are seldom really necessary except when there is the wish to do something more than what Mr. Newton calls "natural architecture."

Turning over the designs in this book, however, which are all pleasant to look at, it seems to us that a question may be asked, or two questions. First, is this really natural architecture from the point of view of the present day? It seems to us that it is really not so much building as it is natural to build to-day but as it was natural to build in a past generation. The old simply-built houses of the XVIIth or XVIIIth century have a charm of old world repose about them; but can we really revive that by building like them? At present there is what may be called a taste for old buildings of this description, and those built somewhat on the same lines are pleasant to that taste; but there is a good deal of sham-antique about this; and after a time we fear that these modern houses of "natural architecture" will be seen to have been rather unnatural—not belonging really to the age in which they were built. Why, to mention one point only, keep up this fiction of the necessity of high-pitched roofs and their inevitable production of useless internal spaces, when it is known that we can make low-pitched roofs quite as weatherproof? It is only for that reason that the old ones were made high pitched; it was not with any idea of their being more beautiful on that account.

And secondly, is "natural architecture," as defined by the author, all that we need ask for in a country house? We admit that all these houses are pleasing, because there is nothing in them in bad taste; but, as observed, it is rather a negative virtue. A dwelling, after all, is an artificial thing; and we cannot but think (as Mr. Solness in "The Master Builder" thought), that even a country house of moderate size is capable of being made the expression of an architectural thought, symmetrically treated and finished in detail, and that this is a higher effort that merely putting in doors and windows in what may be called a natural, but might perhaps rather be called a naïve way; and naïvété is not a proper characteristic of art; it is a characteristic of want of art. Then is there nothing to be done in the way of improving on some of these old-fashioned details; the method of roof-finishing for instance—the wooden quasi-classical cornice (a regular piece of constructed decoration) and the barge-board. In short, however one may gloss it, these irregular high-gabled houses with their windows just in a "natural" manner (and sometimes a good deal smaller than is desirable) belong really to what one may call the "hut" form of dwelling house—the hut a little developed and extended. And modern architecture ought to be able to do something more than this.

There are, however, many pleasant little fancies in these pictures of houses. The colonetted porch in No. 1; the playful finish of squares of brick and stone at top of the porch turret in No. 2; the treatment of the centre bay in the garden part of No. 8; the staircase in the same house, with the simple but effective decoration of inlay; the arrangement of balustered terraces in No. 9, suggested by the varying levels of the site; the semi-circular columned porch and the treatment of the chimneys in No. 11; the projecting semi-circular bays in No. 12, supported, as it were (æsthetically), by the strongly-marked horizontal lines of contrasted brick and stone beneath them; the introduction of ornamental cast lead facings on the fronts of the bays, between the upper and lower windows, in one or two cases; the bits of what may be called symbolical ornament occasionally occurring on the walls — lozenges, shields &c., one does not know exactly why, but which suggest some kind of meaning and give a little point of interest for the eye: all these are pleasant diversifications which appeal to our sense of the picturesque or our sense of humour—for there is such a thing as humour in building. It is all pleasant to turn over; only it is a little too like turning over a book of illustrations of old houses, not of new ones. That perhaps the author will think is the best compliment we could pay him; but we are not quite sure on that point.

Mr. Newton, of course, attaches due importance to planning; the plans show a great deal of variety in the arrangement of the sitting-rooms, and the author sets a good example in adding a compass to each plan, and tells us on what sides the garden lies in regard to the house. But we do not think the question of aspect is sufficiently considered. In some cases the similar aspect of drawing-room and dining-room is explained by the conditions of prospect; but we do not like dining-rooms facing south. A morning-room should face east, for it is just in the early morning that the sun is welcome without being inconvenient. A kitchen should face north or east; few of these do; some are due south; and in a majority of cases the kitchen window is on the wrong (which is the right) side of the fireplace, when it might easily have been avoided by a different position of the fireplace. In other respects the plans are a useful study for young architects.

NOTES.

The Value of Irrigation.

VALUABLE as recent irrigation works in Egypt may be to the people of that country, they have served another useful purpose in directing public attention to irrigation generally. In arid, and semi-arid, lands the utmost efforts of the cultivator are of little or no avail without the helping hand of the irrigation engineer. The benefits received by Egypt from the systematic regulation of water supplies are undoubtedly great, but are small as compared with those similarly bestowed on the people of India. The area of irrigated land in the Indian Empire is of far greater extent than in any other country in the world—a fact that is insufficiently recognised by people at home. Considering the vast areas in the British Colonies where the conditions are unfavourable for proper utilisation of the land by agriculture, it seems desirable that attention should be devoted to the remedy that is ready to hand. Capital is undoubtedly necessary for extensive engineering works, but the fact that the produce of four acres can be secured from one acre of land should be a sufficient justification for enterprise.

London County Council Training College.

THE proposal of the Technical Education Board of the County Council to place the new Training College in Southampton-row, adjoining the County Council Central School of Arts and Crafts is a reasonable one. There can be no doubt that, as far as possible, such buildings should be in a central position. It is a great drawback to the University of London that it should be located in South Kensington, and the London County Council is wise to select a central site. The cost of the site will be 30,200*l.*, the payment for which will be refunded to the Technical Education Board in sixty annual payments. Unquestionably, a central training college is an urgent necessity. The mere fact that the present training proceeds partly in rooms in Clement's Inn and partly in premises lent by the London School of Economics shows how far we are behind Germany and the United States in such matters. If our manufacturers, instead of complaining that we are hampered by adverse tariffs, would do more for technical education, they would play a more truly patriotic part than by sighing for hostile tariffs against foreign nations.

Pipes and London Streets.

PEOPLE who suffer from the frequent upheaval of certain busy thoroughfares may derive comfort from the consideration that efforts are being made to legislate for mitigation of the nuisance. Last year the City of London Corporation promoted a Bill to regulate and control the breaking up of streets in the City. The London County Council are arranging that paving or opening operations in streets and bridges under their control shall be carried on continuously day and night, and there is now serious talk of con-

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stituting a controlling authority to regulate work throughout the metropolis, so that the minimum amount of inconvenience may be suffered by the public. Owing to the extensive use of wood-paving, street surfaces have to be broken up and relaid at more frequent intervals than was necessary in the days of granite setts, but the unfortunate thing is that the various companies still licensed to open streets at their own sweet will always seem to choose the wrong time for attending to pipes and other conduits. Ordinary business firms would gladly avail themselves of opportunities of economy by doing such work when streets were already up, but gas, water, and electric light companies appear to be as oblivious to pecuniary advantage as they are to the general convenience of those using the public streets.

Right to Light Over "Open Spaces."

THE case of Boyce *v.* Paddington Borough Council, on which we commented a little while ago, has now reached the Court of Appeal, and the judgment below has been reversed. It will be remembered that the claim was one made by the owner of a large block of flats which overlooked a disused burial ground against the defendants for erecting a hoarding in front of his windows, preventing the access of light to the same, with the object of preventing him from obtaining a prescriptive right to the light. The plaintiff alleged that as a member of the public he was entitled to insist on the space being kept open, and, secondly, that the defendants were by the statutes which relate to open spaces and disused burial grounds prohibited from erecting any building, and that this hoarding was a building. The learned Judge in the Court of first instance decided against the plaintiff's right, and held that the hoarding was not a building, and that there was nothing contained in the statutes in question which would prevent the defendants erecting such a structure to preserve rights being obtained over the space of land. The Court of Appeal have reversed this decision on the ground that the erection of this screen was inconsistent with the duty imposed on the defendants by the statutes to hold and administer the ground as an open space with a view to its enjoyment by the public. Two of the Lords Justices, moreover, appeared to think that the word "building" would embrace this hoarding, but their decision did not turn upon that point, but on the fact that the action of the Borough Council was *ultra vires*, and did not decide what rights, if any, were vested in the plaintiffs. The effect of the judgment, however, is to give the owners of buildings overlooking such spaces the right to light and air, unless some means can be adopted to prevent them acquiring such an easement.

Antiquities in Cyprus.

WE are glad to hear that Mr. George Jeffery has been appointed to what appears to be a semi-honorary position of Curator of Ancient Monuments in Cyprus. He proposes, while he occupies this position, to endeavour to arouse a more general interest in the remains of the little mediæval principality, and also in the grand ruins marking the time of the Venetian occupation. There are also in the island splendid fragments of Byzantine work, such as the mosaic at Kiti, which a peasant priest is now selling piecemeal to that class of visitors who like to carry away such spoils. Indeed, the artistic treasures of Cyprus are vanishing with alarming rapidity. During the last seven or eight years a great deal has disappeared. In Nicosia—the capital—two or three most interesting mediæval houses with richly decorated windows of the fourteenth and fifteenth centuries have been removed. A great part of Famagusta has been transported over to Port Said; at the present time, indeed, there is little of the ancient place left except the old mediæval churches (to some extent) and the fortified enceinte of Genoese and Venetian times. The new harbour works will soon have destroyed all traces of the curious mediæval harbour and its chain gate.

St. George's Hall, Liverpool.

MR. STIRLING LEE, whose fine series of bas-reliefs in the panels of St. George's Hall is now complete, has received a further commission to produce statues to be placed on the pedestals above, in the spaces between the square columns. These are to be winged figures symbolising the Spirits which should build up the greatness of a city—the Spirit of Wisdom, the Spirit of Counsel, the Spirit of Might—and so on. This is a fine and suitable idea; but we feel a little doubtful about the wings. Figures of severe vertical lines will be required to harmonise with the architectural lines, and anything like a display of wings will be apt to have a disturbing effect. We hope they will be kept subordinate, at all events.

A Notable Bridge.

NOW approaching completion at Pittsburg is a bridge which is worthy of attention as including the longest truss span hitherto built in the United States, and the third longest of the same class in the entire world. The bridge crosses the Monongahela River, near its confluence with the Alleghany, and is designed to carry the double track of the Pittsburg, Carnegie, and Western Railroad. It is proportioned for very heavy loads, and the construction is of massive yet simple character. The type chosen is that of a through pin-connected cantilever bridge, with vertical trusses and suspended centre span, the length of the cantilever structure being 1,504 ft., made up of a centre span, 812 ft. long between the pier centres, and two outer spans of 346 ft. each. Simplicity of arrangement and detail are noticeable throughout, and the structure is built entirely of standard materials, and with members adapted to the general practice observed in American bridge shops. All the members have been completed at the maker's yard, so that they could be assembled with the usual tackle provided for heavy bridge work. There is much to be said for this mode of procedure, which avoids the heavy preliminary outlay necessitated when the members are of such design that they must be laboriously built on the site. For instance, in the case of the Forth Bridge, with two cantilever spans of 1,710 ft., the principal members were of tubular section, built up piecemeal in position by the aid of an elaborate plant established at the southern shore of the firth. Again, the Lansdowne Bridge in India, with a channel span of 820 ft., has members of special design varying widely in character and dimensions. Some of them were shipped in sections to the site, and built up on false work with much labour; others were assembled whole, and erected by the aid of an elaboration of systems and appliances which involved heavy expenditure and very considerable adjustment and alteration from time to time. In addition to the unholy desire for details which preclude the adoption of standard materials and practice, English bridge engineers usually prefer field-riveting to pin-connexion, and thereby materially increase the labour and time necessary for erection.

Engine Foundations.

A METHOD, largely adopted on the Continent, of making foundations for engines and boilers is based on the use of steel-cored brick caissons, the bricks being made with two rows of four or more perforations, through which iron or steel rods are passed and grouted with cement mortar. An interesting example of this system was to be found in the foundation provided at the last Paris Exhibition for the 1,000 h.-p. Cockerill gas-engine, the operation of which caused a shock of 250 tons at every revolution. This foundation consisted of a series of caissons carried down to the depth required by the holding-down bolts, and the bolt tubes themselves were formed of armoured cement tied to the steel cores of the brickwork. A somewhat similar foundation, now in course of construction in St. James's Park, for boilers to be used in connexion with a pumping-station, is composed of caissons about 1 ft. deep with covers of armoured cement tied to the caissons. It is claimed for the system in question that it will withstand any required pressure from above, however soft the soil may be, and that engine foundations so made distribute the load to such an extent that very little vibration is transmitted. One further point in connexion with engine foundations is worthy of mention. Vibration is almost invariably debited either to the account of the foundation or to the unbalanced condition of the engine. In the case of a steam-engine it is quite as likely that the source of offence may be found in badly-designed piping, and a great deal of unnecessary trouble and expense may frequently be saved by looking in this direction when complaint arises.

Electric Power Transmission.

THE arrangement and control of long-distance transmission lines for electric power is a problem which is now engrossing the attention of electricians, and hence the paper by Messrs. Cowan and Andrews, which has recently been published in the *Journal* of the Institution of Electrical Engineers, is a timely one. Twenty miles appears to be the practical limit to the length of underground cables for transmission purposes, owing to the enormous-capacity currents required for greater lengths. The authors, therefore, discuss the possibility of overhead transmission in this country. The poles used abroad are generally about 40 ft. long, and there are about fifty of them to the mile. Steel towers for supporting the wires are, however, coming into use. In the case of a 60,000-volt installation in Mexico these towers are placed at distances of 440 ft. apart, and the total cost was practically the same as if poles were used. The objections to the use of overhead wires are danger and unsightliness. It has been

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pointed out that kite flying on a damp day near a high voltage line would be exceedingly dangerous, and balloons or air-ships would be destroyed if they came in contact with it. So far as appearance goes, these power transmission lines need not be as unsightly as many existing telephone or telegraph lines, but still their appearance in most cases will be objectionable. For very high pressures the insulators need to be over one foot in diameter, and the wires need to be at least 10 ft. apart from one another, as otherwise there is a risk of arcing across, and the power lost in air leakage is appreciable. With modern lightning arresters no danger need be anticipated during thunderstorms. In some transmission lines in South Africa the arresters are seen flaming across three or four times per minute, and yet no damage is done. The Board of Trade have intimated that they are prepared to consider overhead schemes of power transmission; but it is to be hoped that the greatest caution will be exercised in granting permission for their use.

Ventilation in Workshops.

DR. KING WARRY, in his Report for 1902 on the Sanitary Condition of the Hackney District, makes some exceedingly practical remarks in regard to certain difficulties in the administration of the Factory and Workshops Acts in respect to the ventilation of workshops, owing to the divided authority in regard to ventilation and temperature. Dr. Warry says:—

"The enforcing of the law with regard to ventilation in workshops is the duty of the Local Authority; that with respect to the maintenance of a certain temperature in workshops is the duty of the Home Office through their inspectors. Now, ventilation and temperature are so closely connected, that the present division of supervision is anything but satisfactory. If, for instance, a bad form of heating arrangement is approved of by the factory inspector, by its vitiation of the atmosphere of the workshop, an alteration of the methods of ventilation may be necessary to meet this; or, again, suppose a small workshop is allowed to be heated by means of gas burners, here the ventilation must be altered to meet the circumstances. Now, ventilation and heating are so closely connected that I am of opinion they ought to be under the supervision of one authority, it matters not which, except to the occupier, who would probably be relieved of much anxiety if both these matters were settled by one inspection at the one time."

Milton's Cottage, Chalfont St. Giles.

STEPS are about to be taken for a restoration, at an estimated cost of some 300*l.*, of Milton's cottage at Chalfont St. Giles. Having been purchased in the name of trustees in 1887, the long-neglected premises were put into repair and converted into a kind of museum, Mr. J. Oldrid Scott acting as advisory architect to the trustees. The six-roomed half-timbered cottage forms one of two back-to-back tenements which had belonged to the Fleetwood family, of The Vache, near Chalfont. The part in which Milton lived faces towards the road called the Dene-way. On the front, above the doorway, are the coat-arms of Fleetwood. The trust-deeds relating to the property during longer than two centuries past have been recovered, and show that it had always been subdivided, as at present, into two separate tenements, and for some time in the interval, 1709-1737, was known by the name or sign of the "Three Compasses," a designation that survived until one hundred years ago. A deed dated April 27, 1683, rehearses its sale to one Thomas Cock, carpenter, for 63*l.*, by David Fleetwood. A wooden porch, added to the garden front since Milton's day, became decayed and has been removed, so, whilst one or two rooms are occupied, we can still see, and almost in its pristine condition, the only existing house in which it is certainly known that Milton lived.

National Competition of Schools of Art.

THIS year's National Competition of Schools of Art shows no individual work of higher merit than usual; in some of the sections a high standard is attained, others do not reach the same level as in previous years. On the whole the characteristic of the present exhibition is the greater number of designs executed and shown in the material state as well as the working drawings, which in previous years was all that was shown. This class of work covers a large field, no two pieces being comparable one to the other. There is, however, a noticeable lack of conviction about the work. Take, for instance, modelling design; the architectural setting would have been better ignored altogether than shown as it is in many instances. Miss V. E. Brunton, of Liverpool, shows admirable modelled figures, with an Alfred Stevens strength and vigour suited to architecture, but the architecture shown is bad beyond description. Very beautiful designs are shown for lace; those for damasks and wall-papers seem to us of less interest than usual. A more beautiful design for printed muslin than that by Miss S. C. V. Jarvis, of Battersea, it would be hard to find among student's work. Furniture is well represented by a finished piece of work in the form of a writing table made by Mr. Herbert Martin, of Camberwell. The architectural work is rather more deplorable than usual; and this is due not so much to the students as to the lack of instruction during the preparation of measured drawings or designs. Mr. John H. Gibbons, of Manchester, shows a design for an oak reredos and baldacchino of some originality, though the character of it is hardly a wooden one. Useful work is done by students of mechanical drawings. Several good drawings are shown from West Bromwich. It is a pity that this class of work is not more taken up, as it is a useful education for many of the more exact crafts and for most industries.

Liverpool Town Hall.

WE read with something like indignation, in a correspondence in the *Liverpool Journal of Commerce* of the 25th ult., a proposal, in connexion with the removal of the Liverpool Cotton Exchange from its present "Flags," that the Cotton Exchange should purchase the Town Hall and pull it down, and that "by this means Water-street might be widened and brought into a line with Dale-street." Among the constantly-recurring instances of the rage for architectural destruction in the present day, we do not know that we have ever seen anything more barefaced than this. Liverpool Town Hall is a historic building, which is the most important work of one of the most eminent architects of his day, and contains one of the best staircase halls and one of the finest suites of reception-rooms to be found in any town hall in England; rooms, moreover, which are designed in a refined style, far superior to that found in most of the later public buildings of the nineteenth century; and on the pretext that this building projects a few feet beyond the line of the streets above and below it, it is proposed to destroy it to widen the street, as if it were a warehouse. The proposal is disgraceful.

Supposed Portraits of the Stone Age.

A CONSIDERABLE number of persons were drawn to a room at the Langham Hotel on Wednesday, at the invitation of Mr. Auberon Herbert, to see a number of examples of what were described in the invitation as "the men of the Stone Age, sketched by themselves"; a sufficiently interesting announcement, the practical outcome of which must, we fear, have disappointed some of the guests. What we were invited to look at were a number of stones which presented rude likenesses to human heads, or in a few instances to animals. The theory is that these were selected by the men of the Stone Age as presenting natural approximation to the likeness of the human head, and chipped into a closer likeness, with holes or depressions artificially sunk for the eyes, slits chipped for the mouth, &c. This branch of archæological research has already for some time been pursued in France by M. Thieullen and one or two other students. It would be rather presumptuous to offer a decisive opinion as to the truth of the theory without a more careful and lengthened study of the examples produced; but our impression was that a good many of the resemblances were accidental. The reply to this is that the abrasions on the stones are not in the most exposed or projecting portions, as would be the case with natural wear, but in the recessed portions, and are therefore artificial. Some of the examples seemed to bear out this theory. But if human beings at some time or other amused themselves with assisting Nature in making grotesque resemblances out of oddly-shaped stones, is there enough of it to make a scientific theory of, or to fix it on the men of the Stone Age? And can we have much faith in stones picked here and there out of a gravel-pit, from among a number of others which present no peculiarity? If there had been any find of a number of these apparent grotesques all in one place, it would be a different thing. However, the question is certainly an interesting one, and we may thank Mr. Auberon Herbert for drawing attention to it and illustrating it by his own specimens from the New Forest.

LETTER FROM PARIS.

THE Paris Municipal Council has under consideration two schemes for increasing the supply of drinking water for Paris, one submitted by the Prefecture of the Seine, the other put forward by one of the members of the Council. The former scheme provides for bringing the daily supply per inhabitant to 50 gallons, not comprising river water for general purposes; and estimating the population of Paris in 1930 to be four millions, the required daily supply to be provided within the next few years will have to be 200 million gallons. Nearly half of this quantity, it is estimated, may be procured from the subterranean waters of the Val d'Orléans, in the basin of the Loire, and a fifth aqueduct, over 60 miles long, will have to be constructed. A preliminary portion of the remaining quantity required will be obtained from new supplies brought through the existing aqueduct of the Avre. The estimated cost of the work is 130,000,000 fr. The second scheme, brought

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forward by Dr. Navarre, is much more economical, but would afford a very inadequate supply; this is to take off the springs at Fontaine-sous-Jouy and Cailly, near Evreux, and lead the supply to Paris through the existing aqueducts of the Avre.

The French Parliament has passed the new law concerning the interdiction of the employment of white lead in painting work in buildings. The delay of one year after which the law was to come into force has, in order to meet the interests of certain manufacturers of this material, been increased to two years. By the terms of the new law, after a delay of two years from the date of the law, the use of white lead or litharge, and oil, will be forbidden for all work of preparation, fillings, &c., for painting, and after three years the interdiction will extend to all painting work of whatever kind executed in the interior of buildings.

The City of Paris has been authorised to borrow the sum of 170 million francs for the construction of the new lines of metropolitan railways in Paris.

The Académie des Beaux-Arts has awarded the Prix Bailly, of a value of 60*l.* and destined to recompense an architect for interesting work executed and completed during the past six years, to M. Boeswillwald for his work in restoring the monuments of Carcassonne. The Prix Houlevigne, of a value of 200*l.* has been awarded to M. Toudouze for his designs for the tapestry to be executed by the Gobelins Manufactory for the decoration of the New Sorbonne. This prize was founded to recompense the author of the most remarkable work of architecture, painting, sculpture, or engraving produced during the past five years.

The "Vieux Paris" Committee approved at its last meeting the scheme submitted by M. Bouvard for the laying out of the vacant ground of the Champ de Mars, mentioned in the last "Letter from Paris." The Committee considers that the Eiffel Tower and the Galerie des Machines offer proportions much too heavy and gigantic to in any way suit the scale of the proposed embellishments, and puts forward the opinion that these two buildings should be demolished at the latest in 1910, when the present agreement between the town and the owners of the Eiffel Tower shall have expired. The Committee desires the definite widening of the Pont d'Iena in place of the temporary work which was carried out for the purposes of the 1900 Exhibition, the arrangement of the interior of the Champ de Mars in symmetrical parks and gardens, and the artistic setting out of the quays and banks of the Seine in sloping grass swards and flower gardens. The Esplanade des Invalides should, in the opinion of the Committee, be set out in the form of non-symmetrical pleasure gardens.

The archway of the new tunnel for the Metropolitan Railway of the north of Paris is showing serious signs of fissures caused by settlement in the portion next the station of the Place Pigalle. The engineers of the railway are examining into the cause and the remedy, and in the meantime heavy loads are not allowed to circulate over this portion of the line. The stations above ground of the new line on the left bank of the Seine will be of entirely different design to those erected for the existing lines; the "modern style" design for these stations is found to be too insipid and of a disappointing effect, and will be abandoned in the future stations.

M. Tournaire, the architect of the Palais de Justice at Paris, is preparing his plans and designs for the completion of the Palais de Justice, for which a large sum has been voted. The new wing will occupy the ground at present covered by an agglomeration of very old houses comprised between the Quai des Orfèvres and the Rue Sainte Chapelle. M. Tournaire has thought it well to consult the various judges on the details of the plans he is now preparing.

It has been decided to settle the much-discussed question of passing the new north-to-south line of metropolitan railway under the buildings of the Institute, by entirely changing the line of route. The line will now follow the rues Bailard and Halles and the Place du Chatelet, and will cross the river above the Pont au Change. It will then pass under the Prefecture de Police and follow the Rue Danton as far as the Rue de Rennes, when the original programme will be followed. Owing to the greatly increased depth of the various new lines, it has been decided to construct large public lifts in the station of the Place de l'Etoile and in that of the Place de l'Opéra. The depth of the line at the Etoile is about 56 ft., and at the Place de l'Opéra nearly 70 ft.

The "Vieux Paris" Committee produced a report at its last meeting, tending to destroy the long-founded belief that the Menilmontant stream passed under the Opéra and the Place de l'Opéra. During the building of the Opéra House, M. Garnier had to overcome the difficulties presented by the existence of over 18 ft. of water situated at the depth of the foundations, and it was concluded that this water came from the subterranean stream which was known to flow from the higher portions of Paris, near Menilmontant. The present excavations for the Metropolitan Railway on the Place de l'Opéra have shown that very little water now exists, and that the large quantity discovered by M. Garnier came in all probability from surface infiltrations, now prevented by the wood paving of the square, allowing little water to pass. It was announced during the meeting that the heirs of the late Sir Richard Wallace were offering to sell the domaine of Bagatelle and the historical château of that name situated close to Paris, for the sum of eight million francs. As the domaine is a very important one, and the château, built in the eighteenth century by Boulanger for the Comte d'Artois, is, according to M. Charles Normand, the most pure specimen of architecture he knows of next to the Parthenon, the Commission passed a vote to the effect that in the case of the purchase of the domaine by a private person the town should use its right to exact one opening only in the whole of the extent of the property.

M. Nenot, the architect to the Panthéon, has decided to replace the two Gobelins tapestries which now occupy the central panels of the two transepts by paintings. These two tapestries, which were executed in 1875, are completely out of keeping with the frescoes of M. Ferdinand Humbert and the compositions by M. Maillot. The work of completing the decoration of the remaining panels will fall to M. Humbert, whose compositions entitled "Patrie" fill the panels of the transept.

The work of constructing the two important new wings of the Bourse at Paris is advancing fast, the masonry work being nearly terminated. During the recent work of demolishing the old foundations of the convent of St. Thomas Aquinas, on the site of which the Bourse was built in 1808-1827, a metal box was discovered containing a statuette of the Virgin Mary and some remnants of old cloth, with an inscription relating to the ceremony of the laying of the foundation-stone of the Convent of St. Thomas in 1663. These objects have been deposited in the Carnavalet Museum.

The 8th Arrondissement of Paris, one of the richest quarters of the city, possessing a Mairie far from worthy of the quarter, after having for some time considered the advisability of forming a new Mairie in the magnificent Hotel de Paiva, situated in the Avenue des Champs Elysées, is now considering the question of demolishing the "Chapelle Expiatoire," situated in the Square Louis XVI. on the Boulevard Haussmann, and constructing a Mairie on the site. The "Vieux Paris" Committee is urgently protesting against this scheme, which would result in the destruction of a monument interesting in both a historical and an architectural point of view. This fine chapel was built by Louis XVIII. in consecration of the mortal remains of Louis XVI. and Queen Marie Antoinette, which were deposited in this burial-place, once portion of the cemetery of the Madeleine, until 1815, when the remains were transferred to the Royal burying-place of St. Denis. The building is interesting as being one of the very few public monuments erected during the reigns of Louis XVIII. and Charles X., and although very cold and classical in style, is an excellent example of the work of Percier, of a sad and imposing simplicity and grandeur quite in keeping with the object and sentiment in which it was built. It is to be hoped that the protests of the Committee will avail to save it.

The old building of the Caserne du Petit Musc at Paris has been given over to the demolishers. The "Vieux Paris" Committee has requested the Municipal Council to give orders for the preservation of all objects of historical or architectural interest likely to be found in this ancient building. A number of interesting stone consoles of the Renaissance style will be taken to the Carnavalet Museum, and the Committee requests that the fine wrought-iron staircase, dating from the seventeenth century, should be carefully preserved and re-erected in one of the Municipal buildings.

The operations of the jury formed to decide the annual competition called "Concours des façades," will begin very shortly. A hundred and five houses, constructed in 1902 at Paris, have been entered for competition.

The well-known iron foot-bridge called the Pont des Arts, which crosses the Seine between the Louvre and the Institute, is at present under repairs. This bridge is interesting in the fact that it was the first bridge with iron arches constructed at Paris; next year will be the centenary of its existence. It was constructed by a company that for a number of years took toll from those who crossed the bridge, and it took its name from the present Louvre, which was at that time called "Palais des Arts."

The Académie des Beaux-Arts has awarded the Grand Prix de Rome to M. Etienne Joussely, pupil of MM. Daumet and Esquié. The subject given for the competition was—"A public place with a long avenue bordering a river, and with three important buildings: a bourse, a military club, and an art club." The young architect who has gained the prize has made a fine scheme out of this very suggestive and interesting programme. The principal second prize was awarded to M. Jean Wielhorski, pupil of M. Laloux, for a design which is very successful in a rather academic way; and the second second prize (so to put it) has been awarded to M. Henri Joulie, a pupil of M. Pascal, whose design, well studied as a whole, is rather spoiled by a principal building which looks too suggestive of a railway station.

According to precedent, the National Fête (July 14) has been made the occasion for conferring honours on various artists. M. Boeswillwald, the Inspecteur Général of "Monuments Historiques," has been created Officier of the Legion of Honour. Among the new Chevaliers of the Legion of Honour are M. Guifard, the decorative painter who assisted Ballu in the decoration of the Hôtel de Ville, and M. Daumet, the architect for the restoration of and additions to Chantilly—an honour bestowed rather late in the day. Other Chevaliers are M. Jeannin the flower painter, M. Cordier the animal sculptor, M. Vernier (engraver), and M. Morin Goustiaux, architect of the fine "New York Hotel" in the Boulevard des Italiens.

M. Saglio, who has been an admirable curator of the Cluny Museum, has retired, and his place has been taken by M. Harancourt, hitherto Director of the Museum of Sculpture of the Trocadéro; but the appointment has been a good deal criticised, the new curator not being credited with the archæological learning which was so conspicuous in his predecessors, du Sommerard, Darcel, and Saglio. M. Enlart replaces M. Harancourt at the Trocadéro.

Before separating for the recess, the Paris Council has passed a vote for 60,000 fr. for the decoration of the principal cupola of the Petit Palais, to be carried out by M. Albert Besnard, who is to paint in the cupola four large compositions, symmetrically arranged, symbolising the industrial, scientific, literary, and artistic glories of Paris. In connexion with this building we may add that M. Georges Cain, Curator of the Musée Carnavalet, is also to be Curator of the Petit Palais, with M. Henri Lapauze, the art critic, as assistant curator.

M. Ernest Barrias, the sculptor, has completed his fine design for a clock and its surroundings for the new buildings of the Bibliothèque Nationale at the angle of Rue Colbert and Rue Vivienne. A head of Minerva surmounts the clock face, which will be in white marble with bronze hands. Above is an owl, modelled by M. Gardet, as the symbol of the hours of night, on the right of the clock is a figure representing Day, on the left a heavily-draped one with a torch, representing Night. Above the whole is the figure of a young girl turning over a book, representing "Study." On the ground floor is a pediment with a figure of a cock, signifying Dawn, also (like the owl) modelled by M. Gardet.

The new Japanese museum, a legacy of M. Adolphe d'Ennery, is shortly to be opened. It has been arranged by M. Emile Deshayes, at No. 59 Avenue des Bois de Boulogne. On the ground floor is a large room intended for lectures; on the first floor five large rooms contain the collection, amounting to about six thousand objects divided into three classes:

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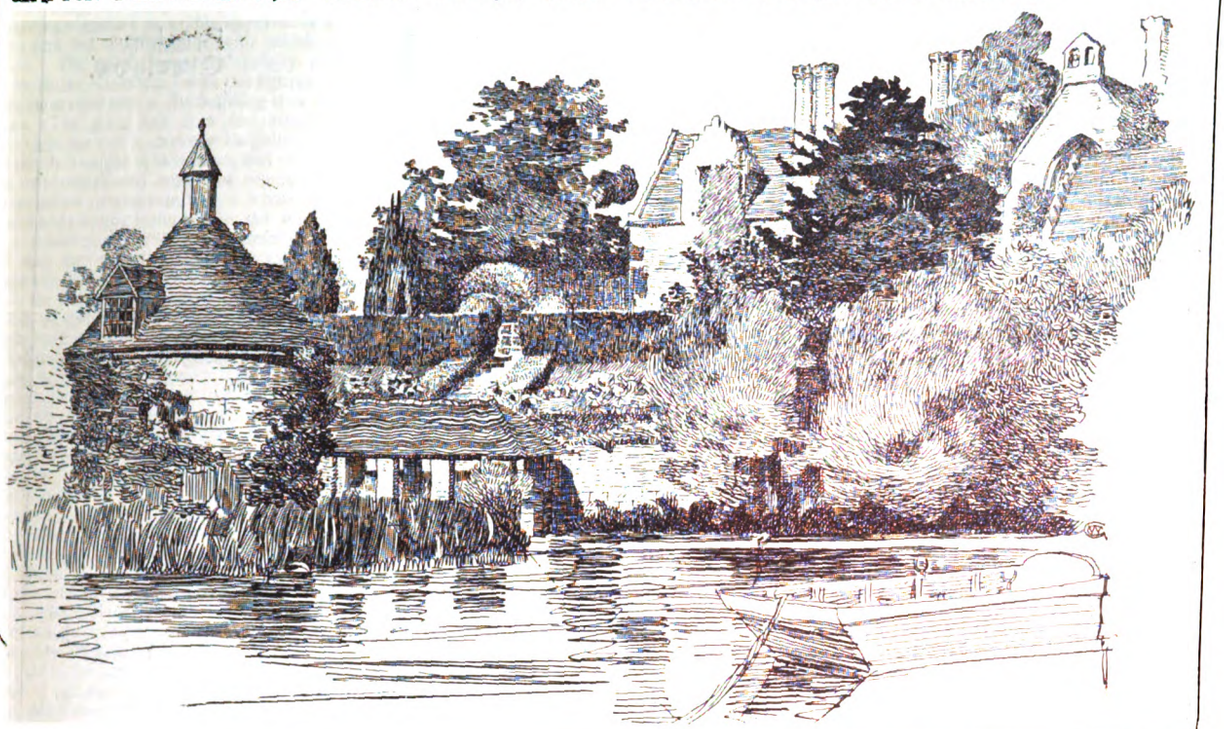
GRAFTON MANOR HOUSE PIGEON HOUSE AND CHAPEL FROM THE WATER



(1) Furniture; (2) Wood carvings of animals; (3) Ceramic work, vases, and netsukos. M. Deshayes, who has carried out the arrangement admirably, is also curator of the Guimet museum.

The Sèvres manufactory, though in the main a very conservative institution, has been experimenting in some modern applications of ceramic work. Among these is a monument to be erected at Chaville, to the late Colonel Guillon, who died in the Madagascar campaign. The monument, modelled by M. Boverie, the sculptor, has been executed entirely in polychromatic stoneware. The firing has been quite successful, and the cost of the work very moderate.

Following a suggestion of the Prefect of the Seine, the Department of Public Works is considering what means can be taken to keep in check the disfigurement of the Parisian suburbs by advertisement posters. It seems to be considered an easy matter to deal with, especially as the railway companies, which are anxious to satisfy their customers, are believed to be quite ready to abandon the display of advertisements if called on to do so. It is hoped that this movement in the Department of the Seine will spread to the whole of France, where at present the country neighbourhoods are greatly disfigured by advertising placards.

The Paris newspapers have been talking of a proposed retirement of M. Bouvard, the Directeur des Travaux d'Architecture, before his actual time of superannuation, and of his making over his place to M. Formigé; but we do not believe that M. Bouvard, who has held the post ever since the death of Alphand, has any serious intention of the kind.

The death is announced, at the age of fifty, of M. Paul Joseph Janin, the painter, a former pupil of Jules Lefebvre and Bouguereau. He had made a special study of pre-historic subjects, to the treatment of which he brought archæological learning as well as artistic ability. He had exhibited this year, at the Old Salon, a picture entitled, "A Decorative Painter of the Stone Age." He had obtained medals at various exhibitions.

THE SANITARY INSTITUTE.—At an examination in practical sanitary science, held in Liverpool, on July 24 and 25, 1903, four candidates presented themselves. The following three candidates were awarded certificates:—J. Hatton; J. W Davison; J. J. Quirk.

GEOLOGICAL MUSEUM, JERMYN-STREET.—The museum will be closed during the repainting of the interior from August 1, 1903. The business of the geological survey will be carried on as usual, and all visitors coming to the museum for special information may obtain admission.

THE ARCHITECTURAL ASSOCIATION ANNUAL EXCURSION.*

ON Wednesday morning the weather was very wet and uninviting, but a start was made from Worcester by train to Droitwich, which was reached about 9 o'clock. Here carriages were in waiting to convey the members to Hampton Lovett, about a quarter of an hour's drive, the rain still coming down most persistently. On arrival, however, the church was quite worth any discomfort endured in getting there. It consists of a nave, chancel, and chapel on the north side opening into the chancel and nave by one arch in each, and the pier between the arches has been pierced in recent times to allow of another sight into the chancel. The building has some Decorated windows, but is chiefly of the Perpendicular style. The tower is on the south side and forms the porch. There are some interesting monuments in the church to Sir John Packington, who is considered to have been the Sir Roger de Coverley of Addison. A window on the north side of the chapel contains some beautiful glass dated 1561. In the churchyard is an old cross restored by Hardwick in 1849. Grouped round the top are statuettes of the four Evangelists under canopies with their symbols. During the visit here the weather fortunately cleared up, which made the drive to the next place on the programme a very enjoyable one. Harvington Hall (see lithograph in last week's issue) is a most picturesque moated house, consisting of many brick gables grouped together in an unusual way, varying in height from three to four stories. There is very little here, however, of architectural interest, the inside being generally in a ruinous state, of bare walls without chimney pieces or panelling of any sort, with the exception of one or two rooms, and these are hardly of sufficient merit to note. There is, too, a massive oak staircase of good width and height, the details being somewhat coarse, but very suggestive for treatment in a better way.

The village of Chaddesley Corbett with its church was the next visit on the programme. It contains many interesting old buildings in the half-timbered style of the neighbourhood. The Talbot inn (see lithograph), facing the church, is a quaint building, with its two projecting porches having some six steps leading into them to reach the ground floor, which is raised some height above the ground. The church has a nave, chancel, aisles, and north chapel, the latter being divided from the chancel by two arches.

* Concluded from page 102.

Some portions of the church are Norman work, of which the font is a good specimen. The church is in the Decorated style, the windows here being of an elegant design—the large east window loses a good deal internally by having very poor stained glass. There is also a good sedilia.

In the North chapel are two recumbent figures of a Crusader and an ecclesiastic, and at the east end of the nave is a slab of fifteenth century work, with brass figures of Thomas Forest, keeper of Dunclent Park, his wife, and eleven children. A horn and feathered arrows are added to show his calling.

Leaving here about four o'clock, a rather long drive brought the party to Grafton Manor House, which for several years was the residence of the Talbots before Alton Towers was erected. This house is picturesquely situated, and the grounds surrounding it are interesting. The garden front is architecturally the best, and, with its prominent chimneys and high dormers with stepped gables, makes a most pleasing composition. A sketch of the house as seen from the river is appended, and other sketches from Grafton Manor will be found in our last week's plates. The members spent a very pleasant hour here, and tea was provided on the front lawn—a form of hospitality always appreciated, coming as it does at a time when the hard work of the day is accomplished.

On leaving here the brakes took the party to Droitwich Station, whence the train conveyed them back to head-quarters.

On the following morning a train journey, of some twenty minutes' duration, to Aschurch station, where carriages were in waiting, commenced the proceedings for the day, the first place visited being Bredon, where the church, barn, manor house, and almshouses occupied the attention of all during the stay of one hour.

The church consists of a nave, chancel, north aisle, and chapel in the south side of nave, with a central tower between the latter and the chancel. Externally it is a building of a very picturesque nature, owing to the happy grouping of its various parts. We append a plan and an exterior view of the church, supplied to us by Mr. R. W. Paul. In the chapel, which is Early English in style, there is a beautiful monument of Elizabethan character, the whole being well designed and carried out with the most refined details. It has two recumbent figures, male and female, with groups of kneeling figures on either side, consisting of four sons on the one and two sons and two daughters on the other. There is a tomb of similar design to this one in Cirencester Church, which was visited by the members of the A. A. excursion some two years ago. A sketch of the porch is given on the lithograph plate.

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The barn which is near the church is a very fine one, with its enormous roof raking down to within about 8 ft. of the ground, and its two boldly projecting gables standing out some 12 ft. from the main building. It is a splendid example of the simple and proper use of materials without fuss or effort of any kind, the result being entirely satisfactory. At the side of one gable is a quaint stone chimney, octagonal in plan, with small arched openings at the top having small gablets over each, the whole terminating with a stone pyramidal cap. Internally the roof supports are massive and well constructed, the timbers being of large scantlings. The principals are 12 ft. apart, the main posts supporting them being 13 in.

TILES IN BREDON CHURCH

by 13 in. at the base, tapering to about 10 in by 10 in. at the top. The subjoined sketch of the barn is by Mr. R. W. Paul.

The manor house and almshouses were interesting in themselves, but the barn and the church occupied the greater attention of the members during the somewhat short stay allowed here.

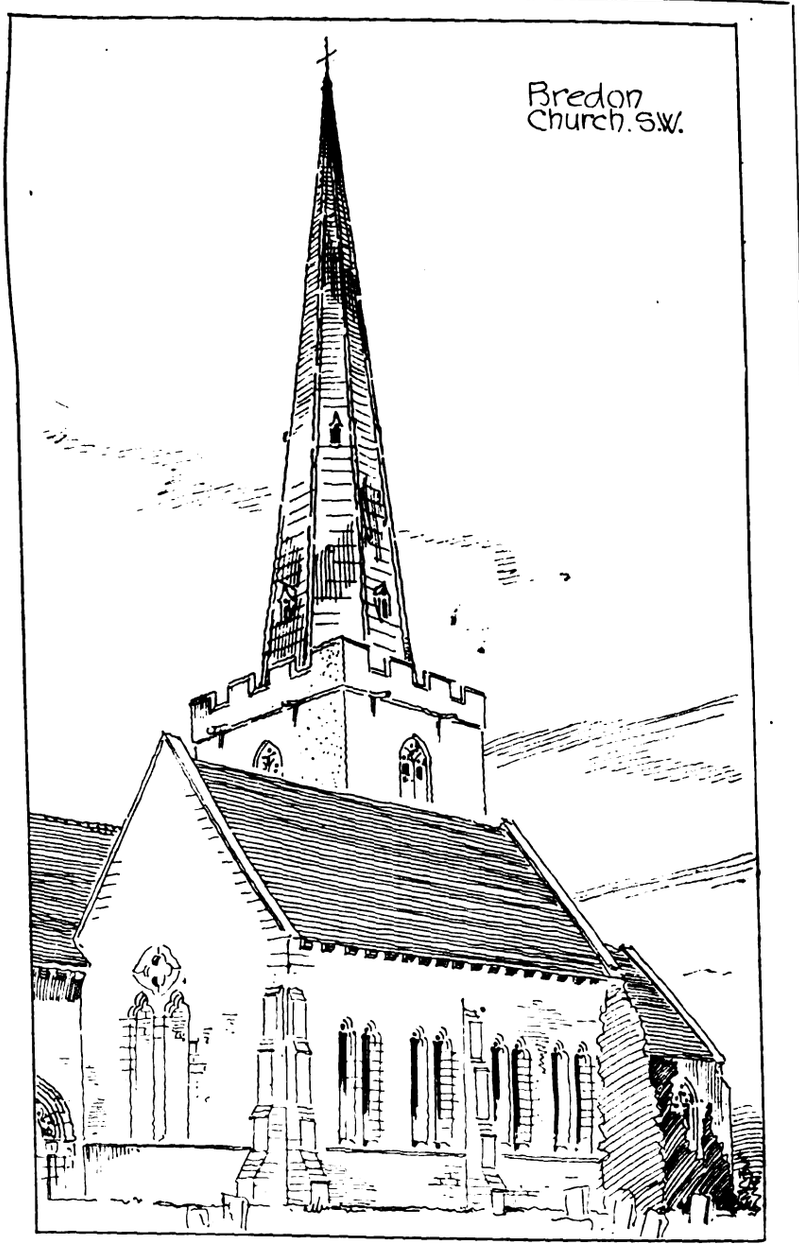
The next place visited was Overbury, which was rich in interesting buildings. Mr. Norman Shaw has been at work here for some years, and the new buildings by him and the careful restoration of the old ones were equally delightful. After visiting so many old buildings, it is very satisfactory to come across modern work like this which compares so favourably with it.

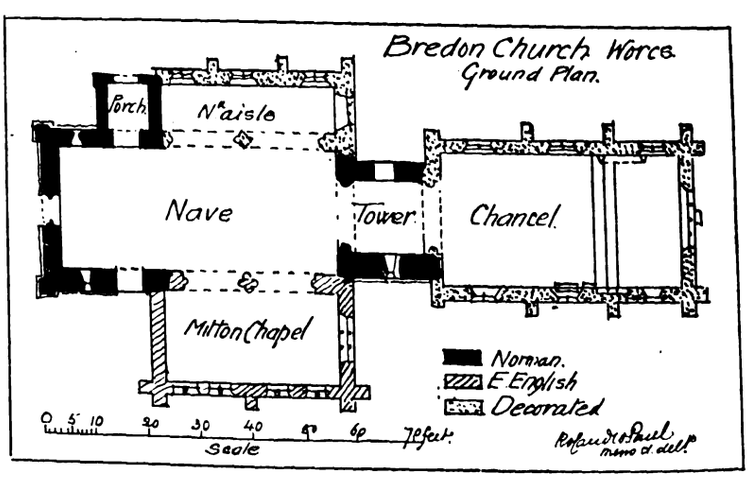
The greater part of the time here was spent in wandering about the village, which is so

IN BREDON CHURCH

prettily situated, and looking at the various buildings, which included the schools, built in local stone, and on which the bell-turret is so prominent and happy a feature, a shop with half-timbered projecting upper story, and a very quaint well with seats on either side. The village hall, higher up the hill in another street, is a much later example of Mr. Shaw's work, and is admirably suited to its purpose in every way.

The church consists of a fine first pointed chapel, Early Norman nave, with low Norman arcade and middle pointed aisles and tower. The bowl of the font is Norman. The tower externally is simple and well proportioned, and





the whole building strikes one as being a typical example of a simple church.

After luncheon, which was partaken of in a field under the welcome shade of some large trees, a visit was made to the Court, the residence of Mr. Robert Martin. The estate was purchased in 1723 by John Martin, Esq., a banker of Lombard-street, who erected a new mansion, which, in 1735, being burnt down, the present house was constructed on its site. This again has been added to in recent years by Mr. Shaw, who has made a new entrance and gallery right through into the garden—dining-room, billiard-room, with kitchen and servants' offices. It is needless to say that the new work is quite up to Mr. Shaw's great reputation, and thoroughly upholds the position of English domestic architecture.

It is an unwritten rule with members of the Architectural Association Excursion that the work of contemporary architects is not to be measured up, so that, although there was so much to note, the members refrained from adding to their already well-filled books.

From here a long drive through charming country to Wollas Hall (see lithograph, where, however, our artist has incorrectly written it "Woollas") the last visit on the programme for the day. Ths house is delightfully situated on an eminence, and commands

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extensive views. The brakes had to be left about a quarter of a mile down the hill, the roads being too steep for the horses. The building presents a venerable appearance from the dark but durable stone with which it is built. The porch bears the family motto, "Memorare Novissima," with the figures 1611, but the greater part of the building is of older date. The great hall is a fine apartment, having at one end a screen with gallery over. It rises to a height of two floors, and is lighted by well-proportioned mullioned windows. A large recess on one side, with a window, is a useful and pleasing feature. On the top floor is a curious chapel with a segmental ceiling. An arch over the altar rails in plaster, with some well-modelled enrichments, is interesting.

In the bedrooms are several fine chimney-pieces of more or less elaborate design, and some good panelling, all in oak.

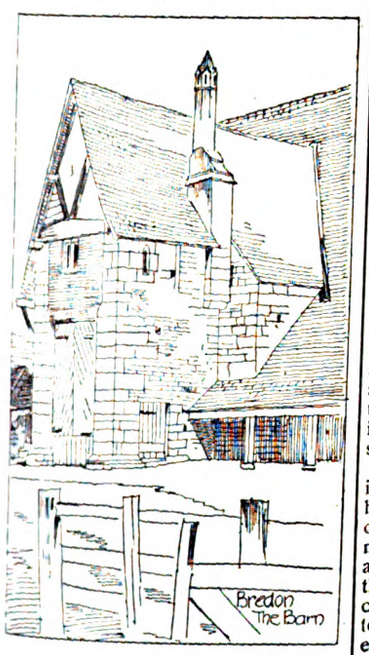
Externally it is a picturesque many-gabled house, with a projecting porch having an oriel window above it. The lead rain-water heads and down pipes were worthy of note, and the whole place was characteristic of a type of house of the period in which it was erected.

A drive to Defford Station, and thence by train to Worcester, ended a pleasant day spent among much very interesting and varied work.

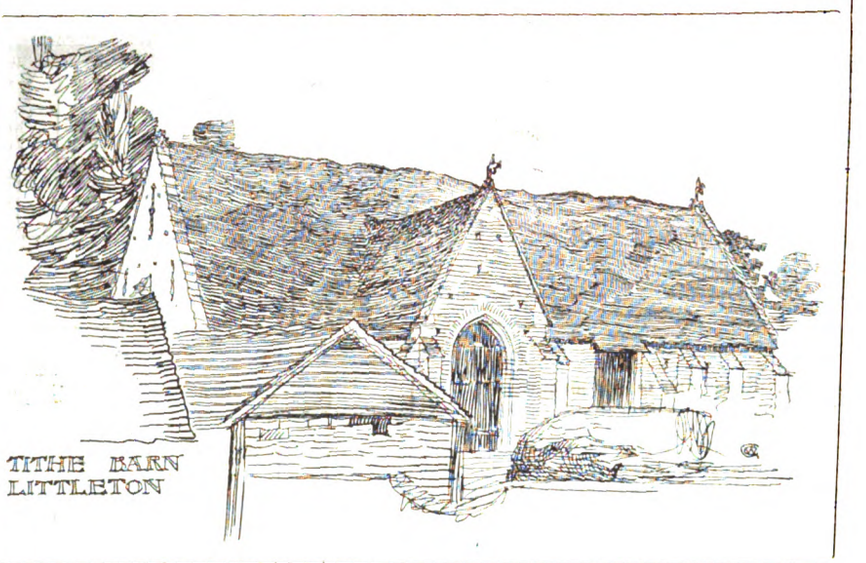
On Friday morning the railway was again made use of, the members leaving the Shrub Hill Station at 9.10 for Evesham, where the carriages picked them up for conveyance to Smith Littleton Manor House.

This is a charming house, built in 1721, and a very fine example of its style. It has not been lived in for over 100 years, with the exception of the kitchen and one or two back rooms, which are inhabited by an old villager and his wife. The windows have mostly been plastered or boarded up, and the house inside generally stripped, but enough remains to show that the whole is the work of a mind that thoroughly understood the importance of simplicity in the small details as well as in the larger.

On the right-hand room in entering at the principal entrance is a plaster ceiling very beautifully modelled, which received a good deal of attention both from the pencil and the camera. The staircase, too, is good, and the design and proportion of the balusters quite satisfactory. In fact, it struck one that this was a very complete house, every detail seeming to be of about the right weight, whether it was the doorway with its projecting hood—the main cornice—dormer window, or the crowning turret on the roof. The house and grounds were completely taken possession of by the members of the excursion, and even those who had no doubt been working all the week in making mental notes seemed compelled at last to take out a note-book and two-foot rule and follow the lead of their more energetic



companions, so that at the allotted time of the duration of the visit to this old-world house, with the mystery of its emptiness, had been pretty completely measured up and it was regretfully left.



Opposite was the church, which had been restored some time since. It has a pleasing and simple oak porch, and the churchyard contains some tombstones dated 1804-1818 of very refined design.

After leaving here, a visit was paid to Middle Littleton Manor House, now a farmhouse (see sketch). The plan of this is in the form of the letter H, the hall forming the centre connecting the two wings. The stone paving in the hall is interesting, a pattern being formed by the arrangement of the stones in different shapes and sizes, which is very effective.

Adjoining the house is a large barn (see sketch), built in masonry of very small courses with a single large roof covering the whole. It is 150 ft. long and has lofty archways for the doors. It is somewhat similar to the one at Bredon, but not so fine. The church consists of nave, chancel, north transept, south aisle, with a tower at the west end. It contains little of interest, and has been restored in a manner that leaves much to be desired.

The afternoon was spent at Evesham, which is well known on account of its ancient history. The town contains many buildings of interest, and in walking round one sees many things to admire. It was early chosen as the site for a monkish establishment; to that the town owes its existence; and the most conspicuous object remaining is the stately tower of the abbey, which was founded in the eighth century by a Saxon saint Egwin, who, a victim to false charges, was sent to Rome a prisoner in fetters, when lo! a salmon caught in the Tiber was found to contain in its stomach the key of his fetters, which he had cast into a pool in the Avon before setting out! This miracle was regarded by the Pope as a sufficient refutation of the accusations, and the saint was sent home to found his abbey in peace. Evesham became a mitred abbey, and, when in prosperity, it was one of the largest in the kingdom. It continued to enjoy splendour and wealth until the Dissolution, but then was so entirely swept away that Leland, in 1540, describes the abbey as "gone, a mere heap of rubbish."

The chief relic of the abbey is the tall bell tower, built in 1533. It is an elegant and well-preserved Perpendicular structure, covered with rich panelling in good condition. It is 22 ft. square at the base, and rises to a height of 117 ft., with buttresses at the angles, and is adorned with battlements and pinnacles and possesses the character of great magnificence.

Within the churchyard stand two churches, both founded by the monks as parochial chapels. St. Laurence, chiefly of the sixteenth century, has been restored, together with its elegant Perpendicular south chantry, with rich fan tracery roof and panelled walls. The east end is a good composition, with a double row of panelling externally and delicate angle buttresses. All Saints, restored in 1876, has a richly decorated mortuary chapel of Abbot Clement Lichfield, with handsome fan vaulting.

Beyond the churchyard are some interesting houses, one in particular having some very fine wrought-iron gate railings.

In the road leading to the station is a prominent house of the Queen Anne period, and permission was given for the members to go over it. It had a fine wide staircase, of good design, and some rooms of considerable interest, and in the garden there was a very fine sundial of most elegant design.

Worcester was reached soon after six o'clock.

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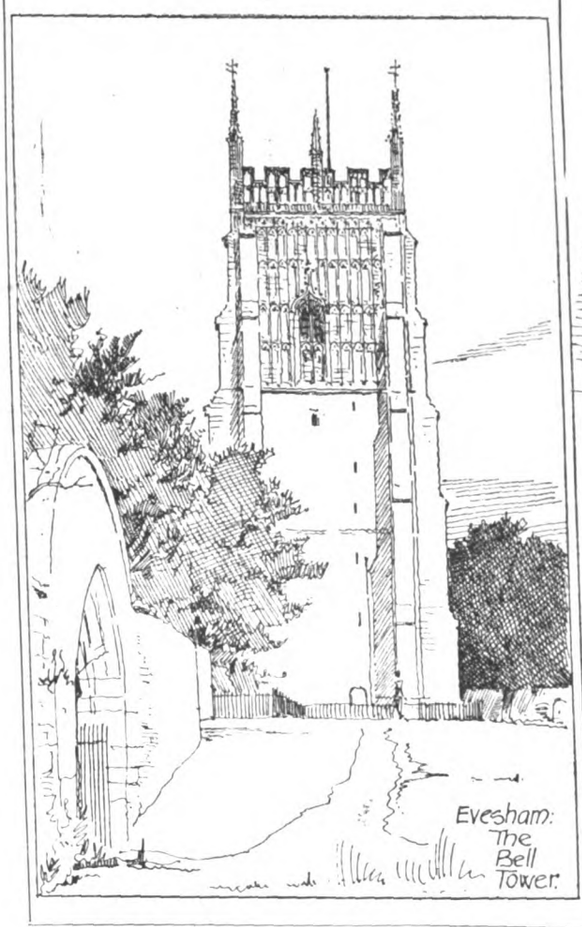
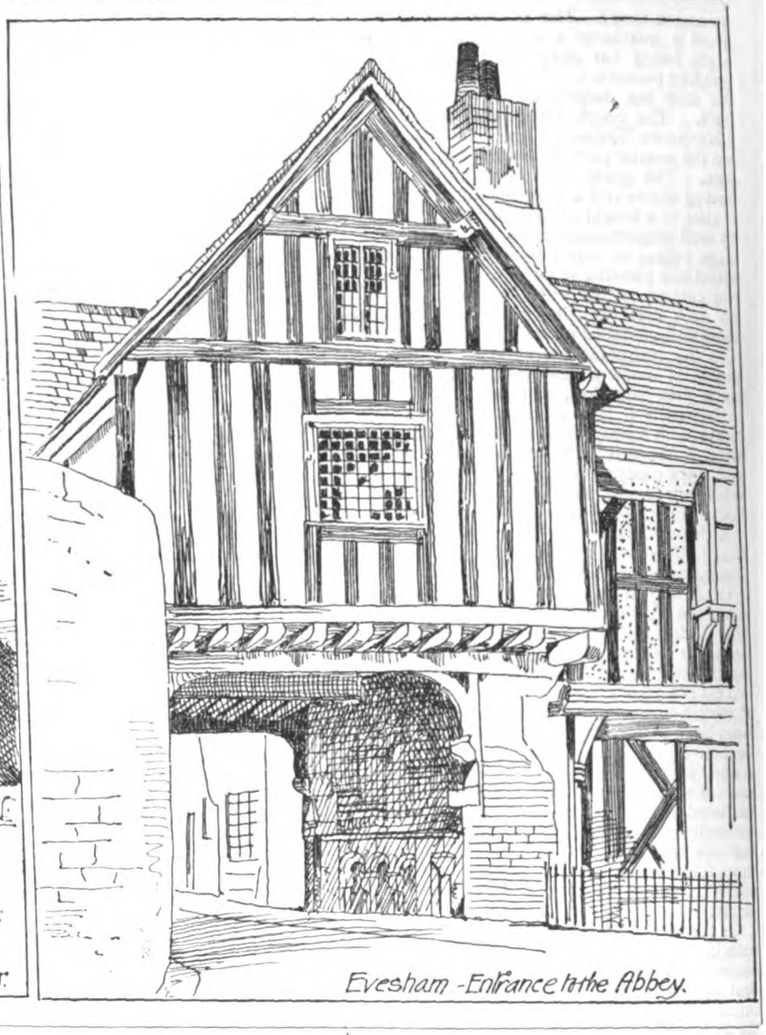




After dinner one of the members gave an exhibition of photographs on a large sheet in the smoking-room which was very much appreciated, the buildings illustrated being interesting from an architectural as well as an archæological point of view. This was followed by an impromptu concert, which brought out considerable latent talent, and a thoroughly varied entertainment continued, which lasted well into the night. While this was in progress members had an opportunity of seeing each others' work during the week, the sketch books and drawings being laid on the table. This is always very instructive, and gives younger members an opportunity of seeing the quality, as well as the mere quantity, of useful notes, and how to measure up the main lines of a building in the simplest and least confusing way.

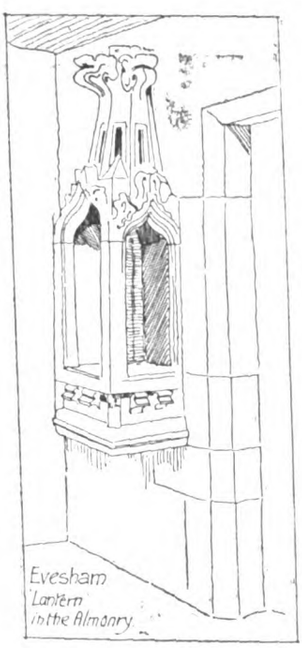
Saturday was given up to visiting the most interesting buildings in Worcester city, the chief among which is, of course, the cathedral, where the members assembled at eleven o'clock. Time, however, allowed of only a hurried look round, the building being too vast to see properly in detail during so short a visit.

The Guildhall, finished in 1723, is a handsome example of Queen Anne architecture, built of red bricks, and having stone dressing to the windows and doors. These, however, being painted, absolutely spoil what would otherwise be a most charming front, with its recessed centre and projecting wings. Why do people think it necessary to smarten up these old places? It has the effect of so marring them, that it is not to be wondered at if they are passed unheeded.

Opposite to the Guildhall is a very refined little front, of somewhat Grecian feeling, forming the entrance to the Museum. It was erected during the earlier part of the nineteenth century.

The Commandery adjoining Sedbury on the eastern side of the canal is a historical old building, although only the Commander's house and great hall remain. Of the latter, the roof, minstrel's gallery, covered canopy over the dais, Oriel window, and Solar room, are interesting portions.

A few members met at lunch, but the majority had already left at different times during the morning.



The week's outing was quite successful in every way, taking the rough with the smooth, and with the exception of two half days of unsettled weather, there was nothing to be desired. The thanks of every member is due to the honorary secretaries, Mr. Talbot Brown and Mr. A. W. Hennings, who worked so hard and unselfishly to give them an enjoyable and instructive week's entertainment.

CHURCH, SKELMERSDALE.—The foundation stone has just been laid of the new parish church, Skelmersdale. Messrs. Austin & Paley, of Lancaster, are the architects, and Messrs. J. Thomas & Sons, of Lancaster, the general contractors. The total cost is estimated at 9,000*l*.

THE ROYAL ARCHÆOLOGICAL INSTITUTE AT YORK.

AFTER an interval of nearly sixty years, the Royal Archæological Institute has again selected York as the place of its annual meeting. The proceedings commenced at noon on Tuesday, the 21st ult., when the members to the number of over 100 were received in the ancient Guildhall by the Lord Mayor, Alderman Edwin Gray, who in a brief address welcomed the Institute to York, and referred to the various changes that had taken place since its former visit. At the close of the Lord Mayor's remarks, which were formally replied to by the President of the Institute, Sir Henry H. Howorth, an adjournment was made to the more modern Council Chamber, where the President of the meeting, Sir George Armytage, Bart., delivered his opening address. In this the President referred to the various places of interest to be visited during the meeting, and to the excellent work of the Yorkshire Archæological Society and other kindred societies. After luncheon the party reassembled in the Minster, where Mr. J. T. Micklethwaite first explained the architectural history of the church, and then conducted the visitors round the building and into the crypt, where some remains of the original seventh century church were pointed out. A short communication from Mr. N. H. J. Westlake was also read, on a panel of stained glass in the north clearstory of the nave, that had once formed part of a twelfth-century Jesse window. The various treasures preserved in the vestry were explained by the Dean.

A visit was next paid, on the invitation of Sir Edward Green, to the Treasurer's house, an interesting Elizabethan structure near the east end of the Minster, where Mr. Frank Green has accumulated a large number of pictures and examples of old furniture. A visit was also made to the ancient college of St. William, the buildings of which, of the fifteenth century with seventeenth century alterations, have been lately bought as a church house for the laymen of the Convocation of York.

At the evening meeting, in the museum of the Yorkshire Philosophical Society, a paper

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was read by Mr. T. M. Fallow on "Yorkshire Goldsmiths and their work," with special reference to the local marking of plate at York, Hull, and Leeds. A number of interesting pieces were exhibited in illustration of the paper.

On Wednesday, the 22nd, the party proceeded by rail to Howden, where the magnificent church was first inspected. The choir is now in ruins, owing to its having formed the church of a college of secular canons suppressed at the Reformation. The nave and transepts and the grand central tower had escaped a similar fate through their having formed the parish church of Howden. The architectural history was lucidly explained by Mr. John Bilson, who pointed out that the now ruined choir had replaced an earlier one of the same date as the transepts, but without aisles, built about the middle of the thirteenth century. The reconstruction of the church had afterwards been continued westwards, and the existing nave and aisles were fully developed work of the last quarter of the thirteenth century. The completion of the church westwards was followed by the building of a new choir with aisles, the existing ruins of which showed that its eastern gable must have been a composition of exceptional beauty. The only later additions were the lantern of the central tower, the work of Bishop Skirlaw, and the lovely little octagonal chapter house, now reduced to a sad wreck, on the south side of the choir. Mr. Bilson also called attention to the interesting series of monuments, including a cross-legged effigy of a lady on a tomb in the south transept. After a perambulation of the outside of the church, a brief visit was paid, also under Mr. Bilson's guidance, to the adjoining remains of the manor house of the Bishop of Durham, which include the hall and porch of Bishop Skirlaw and a gateway built by Bishop Langley.

After luncheon carriages were in readiness to convey the party to Wressle Castle, an interesting late fourteenth century example of the transition from the purely military stronghold to a fortified house, in the form of ranges of chambers arranged round an open court, with towers at the angles. Only one side of the square now remains, but Mr. Bilson showed by the aid of a plan what had been the original arrangement, and by quotations from letters and other documents, what had been the fate of the building owing to its share on behalf of the King during the Great Rebellion.

From Wressle, the party returned by train to Selby, where Mr. J. T. Micklethwaite called attention to the chief features of the abbey church, which is well-known for its noble fourteenth century choir, and a nave which seems to have been the result of repeated experiments on the part of its twelfth century builders. The monastic buildings have unfortunately been entirely destroyed.

At the evening meeting Mr. F. Haverfield read a paper on Roman Yorkshire, with special reference to the traces of a purely military occupation, as shown by the various forts of which remains exist, and to the evidences of merely civil settlements to be found at York, Aldbrough, and elsewhere.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

WALTHAM ABBEY AND NEIGHBOURHOOD.

ALTHOUGH the annual excursion was in progress at the same time, the fourth of the present series of Saturday afternoon visits, on July 25, attracted thirty-five members to Waltham Abbey and district.

Essex is here rapidly losing its quiet rural character and giving place to that cheap newness, now so typical of the outskirts of all large towns. Although not a stone producing county, brick, timber and plaster have for centuries been used in a combination that has become traditional and it is satisfactory to find a fair number of pre-nineteenth-century domestic buildings still in occupation in the town of Waltham Abbey. Stepping from the modernised main street into a small open square, curiously named Romeland, with scarcely a modern note in it, one is forcibly reminded of the contrast in social conditions of the Georgian and Victorian eras. But popular attention is naturally directed to the Abbey. The visitors were here met by Mr. J. A. Reeve, who, having made careful drawings and a minute study of the fabric some years ago, gave a dissertation upon its archæological history, together with certain theories based upon what he found and measured. It is but human for the antiquary to assign the earliest date possible to the object of his investigation, and Mr. Reeve was emphatic in concluding that the five western bays of the church were built by Harold about 1060 A.D., and the two eastern bays by Henry I.; this is somewhat speculative, although the evidences point to the fact that two distinct building operations took place in Norman times.* Any detailed account of this well-known abbey is perhaps unnecessary; suffice it to say, briefly, that only a Norman nave, a western tower and a unique lady chapel, both of Perpendicular date, remain. The church is said to have had its choir walled off from the nave, thus limiting the use of the former part to the priests, so that it became necessary to build the lady chapel in its present position on the south side of the nave; all traces of this choir have vanished. A very remarkable feature of this grand Norman interior is the east end — built by the late Wm. Burges in 1860; a coarse, discordant erection in the style of the bastard Early French Gothic so much affected at that period; it is, at the same time, a good example of unrestrained liberty and a courageous effort to perpetuate an individuality. The stonework of the tower is rapidly decaying, probably from its being wrongly bedded; temporary covered ways have therefore been placed round this part of the churchyard for the protection of pedestrians from falling material. In the lady-chapel the graceful stonework is no less deserving of admiration than the solid massiveness of the Norman builders; the fenestration has a particular character, of which the double tracery of the large west window is somewhat unusual, although delightful. The peculiarity of this lady-chapel, however, is its floor level, which is some 7 ft. above the nave floor line, and below which is an interesting vaulted crypt, now used as a coal cellar. The shooting and drawing of fuel is causing serious and unnecessary damage; it is to be hoped, therefore, that this practice will soon be discontinued and a careful restoration applied to what should prove a worthy acquisition.

A drive of about three miles in the direction of Epping brought the members to Warlies, where a small modern church was visited. It is somewhat unusual to find the design of a new village church based on the tradition of the ecclesiastic edifices of the county, but here the spirit of the timber and plaster structures of Essex has given the key to the charming character which this small fabric possesses. Dedicated to St Thomas, it has been built by Sir Fowell Buxton as a gift to Lady Victoria Buxton, and intended to provide for services hitherto held in the school. The plan consists of a nave 60 ft. by 18 ft., a north aisle 9 ft. wide, a spacious chancel and a timber bell tower, the construction of which is carried through to the nave floor and made visible from the interior of the church. The walls are built of brick plastered inside and out; the dressings to the buttresses, doors and windows, are in Chilmark stone; the fine broad roof is covered with tiles and the spire with oak shingle. A very effective feature is the oak arcade between the nave and aisle, with which are framed the open timber roofs; English oak of large baulk is used, in which the wooden detail shows considerable study. There is no imitation of any particular period of old work, but an individual treatment has been introduced, while the feeling of fifteenth-century religious craftsmanship is revived. Messrs. Freeman & Ogilvy, the architects, are to be congratulated in making a thoughtful and restrained use of an opportunity in which the prevalent element of minimum cost was not the chief factor; and the result of their labours is such that this little church at Warlies worthily takes its place amongst the best ecclesiastical work in Essex. The more decorative parts—the carvings and the modelled plaster ceiling of the chancel, by Mr. Lawrence Turner, and the metal work by Mr. W. P. Reynolds are sympathetic yet individual in treatment; other fittings are equally satisfactory.

After partaking of Sir Fowell Buxton's hospitality the party drove to Copped Hall, two miles away, where the owner, Mr. E. J. Wythes, kindly received the visitors, and conducted them to the various parts of the gardens and to one or two rooms in the house. Standing on a hill (as the name suggests) this site has considerable archæological interest, having first accommodated a monastic settlement, then a splendid Elizabethan mansion, and, subsequently, a large Adam house; it is with the latter that we are now concerned. The sixteenth-century work was pulled down and the old material used in the existing house erected in 1750, some fifty yards from the old site, by Sir Reginald Newdigate. Robert Adam's design was severely simple in its interior; but in recent years it has assumed an ornate appearance, a treatment such as many other houses by this architect have received during the last fifty years; here, as elsewhere, if the original yellow brick elevations suffered from extreme plainness, the application of embellishments is certainly no gain from the point of view of architecture. With the exception of the roof and chimneys on the house, most of the work now seen is the design of Mr. C. E. Kempe, who is well known for his beautiful stained glass. To the simple features of the eighteenth century house have been applied architraves, cornices, balustrades, and large scale carvings. Additions are visible in a large block at the north end, and in the stone arcade terraces to the west front, whilst a large Italian garden (recalling Montacute) with stone balustrades, flights of steps, and two small pavilions, has been laid out on the west, together with a large winter garden and enclosed Dutch garden on the south. Time prevented a detailed inspection of the place, but first impressions certainly produced not a very favourable opinion upon the result of some most extensive labours.

This concluded an incomplete afternoon's work, for it was felt that rather too much had been attempted in the short time that remained after making a late start from town.

* Our opinion on this point, with the reasons for it, is summed up in a "Note" in the *Builder* of June 25, 1898 (page 606). Our conclusion was that the evidence of the building itself is against the Saxon theory, and that it was all built by the Normans, though with a slight break in the work, between the five western and the two eastern bays. This interruption in the work can only have been for a comparatively short period.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

THE members of the British Association of Waterworks Engineers held their annual conference in Bolton during last week. The Conference was opened on the 21st ult. in the Council Chamber of the Town Hall, when the Mayor of Bolton (Mr. Alderman Miles) gave the delegates a hearty official welcome. The President for the year is Mr. R. H. Swindlehurst, the Engineer of the Bolton waterworks.

Mr. Swindlehurst, in his presidential address, spoke of the growth of the Association, which now contains 286 members, or twenty-four more than in the previous year. The great value of the Association lay in the opportunity it gave, through the reading and discussion of papers, of the interchange of knowledge and ideas on points of practice. The duties of the waterworks engineer, if carried out aright, had a most important bearing upon the improvement of the health and prosperity of the people. Statistics showed clearly that the expenditure on the improvement of the water supply in the larger towns had resulted in a saving to the community, and no one could fully estimate the benefits conferred on our crowded centres of population by the introduction of a pure and abundant water supply. In spite of this, the difficulties and opposition met with when such schemes were mooted were often very serious, and the public needed to be shown that money expended on the improvement of the water supply was a good investment, and that it was to their own interest that the works should be of the best and most perfect description. Going on to deal with questions affecting variations of the rainfall in different districts, and methods of filtration, he said that of course the purity of a water supply was a matter of the highest importance. Although it was true that waterworks engineers succeeded in making good and effective filter beds long before they knew anything at all about microbes, it must be admitted that recent researches in the domain of the bacteriologist had helped the engineer to a better and more thorough knowledge of what he was about, and had emphasised in a remarkable manner the necessity of filtration being carried out in an intelligent, systematic, and scientific manner.

Mr. Swindlehurst was thanked for his address.

Afterwards Professor S. Delépine, of Owens College, read a paper on "Protection of

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Gathering Grounds and Filtration Compared." He reviewed in detail the evidence in support of both methods, and arrived at the following conclusions:—That filtration of unpolluted water is unnecessary as a protection against disease, and in the case of polluted water is not always an absolute safeguard. To make filtration efficient, both constant skilled supervision and considerable expenditure are necessary. Protection against pollution is a sufficient safeguard against disease, and the initial expenditure is not usually very large. The supervision of depopulated gathering grounds requires no special skill or large permanent expenditure. "When expense is not a matter for consideration, the best results are obtained by a combination of protection with well-conducted filtration; but whenever expenditure makes it a matter of necessity to choose between filtration and protection, I have no hesitation in saying that protection is better than filtration, which is really equivalent to saying that prevention is better than cure."

In the discussion which followed, several members argued in favour of filtration as against the acquisition and protection of watersheds.

On the 23rd ult., in a paper on "The Internal Combustion Engine as a Pumping Medium," Mr. D. Hastings Irwin stated that the combined efficiency of the steam-engine and boiler could only under the most favourable conditions be put at 14 per cent., whereas the internal combust on engine could boast of 30 per cent. That was a saving which would be a leading factor in estimating the expense of a projected water supply.

Mr. C. C. Smith (Wakefield) described a new scraping machine, the invention of a German named Nowotry. Mr. Smith had experimented with the machine on a main 5 in. in diameter, the effective diameter of which had been reduced to 3 in. by incrustation. The cost of scraping the main, including labour and materials, amounted to 10d. per lineal yard, exclusive of the royalty on the scraper and the wages of the man working it. The cost of labour and materials was high, but there was no doubt that, with the experience already gained, the cost of those two items could be reduced to 6d. per lineal yard.

A vote of thanks was accorded the Mayor and Corporation of Bolton on the motion of Mr. Watts (Sheffield), seconded by Mr. Millhouse (Scarborough).

In the afternoon the members visited the Bolton waterworks.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend Camberwell Borough Council 1,050*l.* for purchase of land, 10,000*l.* for paving works, and 6 88 0*l.* for furnishing new infirmary; Poplar Borough Council, 3,345*l.* for electric lighting; Battersea Borough Council, 15,000*l.* for the erection of working-class dwellings; Stepney Borough Council, 7,000*l.* for dwellings; Shoreditch Borough Council, 1,292*l.* for various purposes and 480*l.* for dust destructor; School Board for London, 200,000*l.* for new schools, &c.; and Wandsworth Borough Council, 10,642*l.* for street improvements. Sanction was also given to the following loans:—Hampstead Borough Council, 1,273*l.* for street lighting; and Camberwell Borough Council, 14 500*l.* for purchase of land for wharf.

Chief Officer of the Fire Brigade.—After a long discussion, Captain J. de Courcy Hamilton, R.N., was appointed Chief Officer of the Fire Brigade.

Quantity Surveyors.—The following recommendations of the General Purposes Committee were agreed to:—

"(*a*) That the following be substituted for the first paragraph of standing order No. 216, relating to bills of quantities for architectural works:—

A quantity surveyor is to be employed by the Council to prepare bills of quantities for complicated or large works, the surveyor employed being responsible in all cases for the accuracy of the quantities, *bona fide* clerical errors excepted. Provided that the Committee concerned may in any particular case order the quantities to be prepared by the Architect's staff instead of by an outside quantity surveyor.

(*b*) That the Solicitor be instructed to obtain the execution of agreements as now settled with the following firms of quantity surveyors for architectural works, viz.:—

Mr. C. W. Brooks, Moorgate Station Buildings, 63, Finsbury-pavement, E.C.
Messrs. Franklin & Andrews, 25, Ludgate-hill, E.C.
Messrs. J. R. Hunt & Co., Bridge House, 181, Queen Victoria-street, E.C.
Messrs. J. Leaning & Sons, 28, John-street, Bedford-row, W.C.
Messrs. C. John Mann & Son, 29, Great George-street, S.W.
Messrs. Northcroft, Son, & Nicholson, 9, Regent-street, S.W.

And that the seal of the Council be affixed to such agreements when ready.

(*c*) That so much of the resolution of the Council of April 3, 1900, as relates to the appointment of Mr. W. H. Strudwick be rescinded.

(*d*) That the name of Messrs. Tucker & Huntley, of 22, Buckingham-street, Strand, W.C., be added to the list of quantity surveyors to be employed for architectural works.

That the following be added to the list of quantity surveyors employed in connexion with engineering works:—

Messrs. J. Rider Hunt & Co., Bridge House, 181, Queen Victoria-street, E.C.
Mr. C. E. Bruges, 1, Victoria-street West, S.W."

Investigations of Subjects of General Importance.—They also recommended as follows, the recommendation being agreed to:—

"That the resolution of the Council of June 23, 1903, with regard to scientific investigations relating to the public health be not acted upon, but that applications be made in the next session of Parliament to amend Section 12 of the London County Council (General Powers) Act, 1893, so as to enable the Council to expend 2,000*l.* instead of 1,000*l.* a year in investigating subjects of general importance to the inhabitants of the county."

Trees in Public Streets.—It was agreed to make application in the next session of Parliament for power to enable Metropolitan Borough Councils to plant and maintain trees in the public streets.

Additional Land, Barking Outfall.—The following recommendation of the Main Drainage Committee was agreed to:—"That the estimate of 35,000*l.* submitted by the Finance Committee in respect of the cost of acquiring additional land adjacent to the Barking Outfall be approved."

Rebuilding of Lambeth Bridge.—The Bridges Committee recommended that Parliamentary powers be sought in the next session of Parliament to enable the Council to rebuild Lambeth Bridge at a cost of 872,000*l.*

Lord Welby, on behalf of the Finance Committee, moved as an amendment, "That, having regard to the present commitments of the Council on capital account, the consideration of the question of seeking powers to rebuild Lambeth Bridge be postponed."

After discussion, Mr. McKinnon Wood moved the adjournment of the debate, and this was carried.

Rotherhithe Tunnel Construction.—The same Committee recommended that the estimate of £1,340,000 submitted by the Finance Committee for the construction of Rotherhithe Tunnel be approved, but a motion to adjourn the consideration of the matter was carried.

Housing.—The Housing of the Working Classes Committee reported as follows:—

"On October 22, 1901, the Council entrusted to Messrs. C. B. Roberts & Co. the work of building 276 cottages on Section A of the Totterdown Fields Estate, Tooting. During the building of these cottages it has been necessary to omit from Messrs. Roberts's contract three rows of cottages—one in consequence of permission having been granted to Messrs. Roberts to provide workshops and mills for the manufacture of joinery on the estate, one in consequence of delay in obtaining the extinction of a right of way which crosses the site thereof, and one in order to provide a site for the erection of administrative buildings on the estate. In lieu of these three rows of cottages we propose that Messrs. Roberts should build two rows of first-class cottages in Lessingham-avenue on Section B of the estate. The two rows in question comprise twenty first-class cottages, each containing living-room, parlour, scullery, and three bedrooms. We have ascertained that Messrs. Roberts are willing to accept the substitution of these cottages at the schedule of prices contained in their contract, with an adjustment for any prices not contained therein. This method of dealing with the matter appears to us to be at once fair to Messrs. Roberts and advantageous to the Council, since it will enable the development of section B of the estate to be begun at once, and will, therefore, minimise the inconvenience caused by the omission of the three rows from section A. The Architect's estimate of the cost of the cottages amounts to 7,803*l.*, made up as follows:—Cost of building, 7,608*l.* 10s.; provision for articles purchased direct, 45*l.*; architect's expenses, supervision, quantity surveyors' and other fees and incidentals, 149*l.* 10s."

The Committee recommended accordingly and it was agreed. They also reported as follows:—

"On June 30, 1903, the Council referred to us the following tenders for the erection of 146 cottages on section A of the Norbury estate:—

Haslemere Builders, Ltd	£37,000
Messrs. Martin, Wells, & Co., Ltd.	38,338
Mr. B. E. Nightingale	39,835
Messrs. F. & H. F. Higgs	40,074
" Holloway Bros.	40,432
" C. B. Roberts & Co.	40,487
" Leslie & Co., Ltd.	41,402
Mr. H. L. Holloway	41,480
Messrs. F. & T. Thorne	43,058
Mr. Ingleton, Herne Bay	45,280

The Architect's estimate comparable with these tenders amounted to 41,200*l.*

We now submit working drawings, specification bills of quantities, and estimate of 39,550*l.* in respect of the erection of these cottages. The following table gives the class and type of cottage proposed, and the amount of accommodation to be provided therein:—

Number, class, and type of cottages.	Number of persons provided for.	Size of Parlour.	Living room.	First bedroom.	Second bedroom.	Third bedroom.	Scullery.	Bathroom.
		sq. ft.	sq. ft.	sq. ft.	sq. ft	sq. ft.	sq. ft.	sq. ft.
6 1st class, type A ...	60	101	144	116	96	96	27	22
6 " " B ...	48	114	144	123	96	—	32	29
6 " " C ...	48	96	144	116	96	—	32	29
3 " " D ...	30	96	144	116	100	96	18	—
3 " " E ...	24	96	144	116	96	—	18	—
18 2nd class, type A ...	180	96	144	100	108	96	30	—
10 " " B ...	80	—	144	96	96	96	64	—
10 " " C ...	60	—	144	96	96	—	64	—
27 " " D ...	216	—	144	96	104	96	30	—
27 " " E ...	216	—	144	104	100	96	30	—
6 3rd class, type A ...	36	—	144	96	96	—	30	—
24 " " B ...	144	—	144	96	96	—	30	—
146	1,142							

. . . . We recommend—That the tender of the Haslemere Builders, Limited, amounting to 37,000*l.* for the erection of the cottages on Section A of the Norbury estate be accepted. . . ."

This was agreed to. Approval was also given to the expenditure of 40,100*l.* in connexion with the formation of roads and sewers on the Norbury estate.

In another Report the Committee announced a gift of 10,000*l.* from Sir Samuel Montagu for the purpose of cottages at Wood Green. The Committee recommended and it was agreed,

"That the generous offer of Sir Samuel Montagu, Bart., to give to the Council a sum of 10,000*l.* to be used for the purpose of facilitating the provision on a portion of the White Hart-lane estate, Wood Green, of cottages for persons of the working class, primarily for residents of three years' standing in the Whitechapel Division of the Tower Hamlets, in accordance with the scheme now submitted in that behalf, be accepted with thanks."

The following recommendations were also passed:—

"That the estimate of 2,000*l.*, submitted by the Finance Committee, be approved; that expenditure up to the amount of the estimate be sanctioned in connexion with the erection and equipment of laundry and the erection of a store at Mill-lane

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House, Deptford; and that the Housing of the Working Classes Committee be authorised to make the necessary arrangements for the works to be proceeded with at once.

That the estimate of 14,982*l.* submitted by the Finance Committee, be approved; that expenditure up to the amount of the estimate be sanctioned in connexion with the erection of Brightlingsea-buildings, Ropemaker's Fields site, Wapping, for the accommodation of persons to be displaced by the construction of the Rotherhithe Tunnel; that the work of erecting the buildings be carried out by the Council without the intervention of a contractor; and that the working drawings, specification, bills of quantities, and architect's estimate of 13,892*l.* in respect of the buildings be referred to the Works Committee for that purpose."

The Committee's Report contained the following paragraphs:—

"On July 14, 1903, the Council referred to us the following tenders for the erection of Drake, Raleigh, and Benbow Buildings, Hughes Fields, Deptford:—

	£
Messrs. Martin, Wells, & Co., Ltd.	23,333
Messrs. Leslie & Co., Ltd..	24,631
Messrs. H. Wall & Co.	24,635
Mr. H. L. Holloway	24,730
Messrs. Holloway Bros. (London), Ltd.	24,925
Messrs. Fred & T. Thorne	25,250
The Haslemere Builders, Ltd.	25,588
Messrs. Stimpson & Co.....	25,760
Mr. B. E. Nightingale.....	26,148
Messrs. W. Smith & Son	26,630
Mr. H. F. Lovatt.....	28,300

The Architect's estimate comparable with these tenders amounts to 25,300*l.*

We now submit working drawings, specification, bills of quantities, and estimate in respect of the dwellings. . . . The blocks of dwellings now in question are to be erected on three of the four plots of surplus land acquired under the Hughes Fields scheme, Deptford, and will provide accommodation for 660 persons in eight tenements of four rooms, seventy-four tenements of three rooms, and thirty-eight tenements of two rooms. Drake-buildings will provide accommodation for 220 persons, and these buildings will be built on land which, on February 10, 1903, was appropriated by the Council for the provision of accommodation for the 214 persons to be displaced by the erection of the Greenwich electricity generating-station. Raleigh and Benbow buildings will be built on the remainder of the three plots of surplus land, and must be erected under the powers of Part III. of the Housing of the Working Classes Act, 1890. . . . . We recommend . . . . that the estimate of 24,579*l.* submitted by the Finance Committee be approved; that expenditure up to the amount of the estimate be sanctioned in connexion with the erection of Drake, Raleigh, and Benbow buildings, Hughes Fields, Deptford: and that, subject to the consent of the Local Government Board, the sites of Raleigh and Benbow buildings be appropriated for the purposes of Part III. of the Housing of the Working Classes Act, 1890.

That the reduced tender of Messrs. Martin, Wells, & Co., Ltd., amounting to 23,119*l.*, for the erection of Drake, Raleigh, and Benbow buildings be accepted. . . . ."

The recommendations were passed.

"The Council has before it a recommendation that the work of erecting twenty first-class cottages in Lessingham-avenue, on Section B of the Totterdown-fields estate should be entrusted to Messrs. C. B. Roberts & Co. [see above.] We have now had prepared plans of the remaining 414 cottages to be erected on Section B, and in the preparation of these plans we have taken advantage of the resolution of the Council of June 30, 1903, permitting us to design cottages with rooms of such a size and so arranged as to best suit the convenience and comfort of prospective tenants. We are giving careful consideration to the question of the number of persons for whom these cottages should be held to provide accommodation and will report thereon in due course. The cottages will consist of three classes, of which the following table gives particulars:—

Number, class, and type of cottages.	Parlour.	Living room.	First bedroom.	Second bedroom.	Third bedroom.	Scullery.	Bath-room.	Kitchen.
	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.
22 1st class, type A ...	107	150	140	100	97	33	—	—
28 " " B ...	98	150	130	100	97	33	—	—
24 " " C ...	—	155	113	106	97	53	37	102
48 2nd class, types A, B, and C	—	140	121	97	46	89		—
48 2nd class, types D & G	*91 & 75†	136	*131 & 115†	93	—	35	—	—
13 " type E ...	78	145	123	137	—	37	—	—
48 " " F ...	*91 & 75†	130	*131 & 115†	93	94	35	—	—
120 3rd class, types A, B, and D	—	136	97	96	—	40	—	—
73 3rd class, types C, E, F, and G	—	137	110	96	—	40	—	—

* With bay. † Without bay.

The cottages will be distributed on the estate as follows:

Derinton-road—97 second-class types, D, E, F and G.

Lessingham-avenue—64 first-class types, A, B, and C.

Coteford-street (north side)—48 second-class types, A, B, and C.

Coteford-street (south side)—58 third-class types, E, F, and G.

Cowick road—116 third-class types, A, B, and D.

Franciscan-road (west side)—2 first-class type, C; 12 second-class types, D, F, and G; 17 third-class types, C, E, and G.

We have received an offer from Messrs. C. B. Roberts & Co. to build the whole of these cottages at an all-round reduction of 1½ per cent. on the prices contained in the schedule to their contract for the erection of the cottages on section A. This offer holds good till August 29, 1903, and is made partly in consideration of Messrs. Roberts being allowed to retain their workshops and mills on the estate so as to admit of the joinery being made thereat. The Architect's estimate of the cost of the cottages based on this offer amounts to 120,317*l.*, made up as follows:—Cost of building, 115,857*l.*; provision for articles to be bought direct, 1,105*l.*; architect's expenses, quantity surveyor's, and other charges and incidentals, 3,355*l.* . . . We therefore recommend:— . . . That the estimate of 120,317*l.*, submitted by the Finance Committee, be approved; and that expenditure up to the amount of the estimate be sanctioned in connexion with the erection of 414 cottages on section B of the Totterdown Fields estate. That the offer of Messrs. C. B. Roberts & Co. to build the 414 cottages at a reduction of 1½ per cent. on the prices contained in their contract for the erection of cottages on section A of the estate, be accepted . . ."

The recommendations were agreed to.

Widening of Piccadilly and Sloane-street.—It was recommended by the Improvements Committee that the estimate of 209,500*l.* submitted by the Finance Committee be approved, and that, subject to the Westminster City Council agreeing to contribute one-fifth of the cost, or a sum not exceeding 40,000*l.*, and subject to the P. and R. Syndicate undertaking to give up free of cost to the Council any interests which they may have in the land proposed to be added to the public way, the Improvements Committee be authorised to take all necessary steps to secure the widening of Piccadilly to a minimum width of 80 ft. between Sackville-street and Piccadilly-circus.

Mr. Spokes moved, and Mr. Hardy seconded, the postponement of the Report. This was negatived, and the recommendation was carried on a division by 55 votes to 36.

It was agreed to expend 60,000*l.* in the widening of Sloane-street between Basil-street and Brompton-road, subject to the Chelsea Borough Council contributing 20,000*l.*

Other Improvements.—It was also agreed to expend 6,320*l.* in respect of the widening of the portion of Queen's-road, Peckham, within the Borough of Camberwell, authorised by the London County Council (Tramways and Improvements) Act, 1902, in connexion with the reconstruction of the existing tramway in the thoroughfare.

The following recommendations were agreed to:—

"That, subject to the Councils of the Metropolitan Boroughs of Bethnal Green and Hackney giving any consents necessary under Section 12 of the London County Council (Tramways and Improvements) Act, 1901 to the doubling of the tramway between Whitechapel-road and Clapton-road, and agreeing to contribute between them one-third of the net cost of the necessary street widenings, and subject to one-third of the net cost of the street widenings being charged to the account of the improvement, the remaining third being charged to the tramways account which will also be charged with the whole cost of reconstructing the tramway, application be made to Parliament in the Session of 1904 for powers to widen portions of Cambridge-road, Mare-street and Upper Clapton-road, in general accordance with the plan presented to the Improvements Committee, on July 8, 1903.

That exemption from the operation of the 92nd Section of the Lands Clauses Consolidation Act, 1845, be sought to enable the Council to acquire, where necessary, portions of enclosed gardens and private pavements and strips of open land instead of the Council being compelled to purchase the houses as well, the properties in question being as follows: Private pavement fronting Nos. 29, 31 and 33, Cambridge-road; part of 51a, Mare-street; part of forecourts of Nos. 51, 53, 55, 57, and 59, Mare-street; forecourt and part of No. 61, Mare-street; part of St. John's churchyard (adjoining the old Town Hall); part of road entrance to St. John's rectory; part of forecourt of No. 7, Upper Clapton-road; part of forecourt and buildings, Brooke House private lunatic asylum; private pavement fronting Nos. 33 and 35, Upper Clapton-road; part of nursery ground, No. 35a, Upper Clapton-road; and part of forecourts of Nos. 37, 39, 41, 43, 47, 49, 51, and 53, Upper Clapton-road."

By-laws Relating to Plans of Drains.—The Public Health Committee reported as follows, the recommendations being agreed to:—

"On July 21* the Council made by-laws under Section 2 of the Metropolis Management Acts Amendment (By-laws) Act, 1899, relating to plans of drains. In accordance with the statute, it is necessary that the by-laws should be submitted to, and confirmed at, a subsequent meeting of the Council. We accordingly submit them, and recommend—

(*a*) That the by-laws made by the Council on July 21, 1903, under Section 2 of the Metropolis Management Acts Amendment (By-laws) Act, 1899, in relation to plans of drains, be confirmed; and that copies of the by-laws, as confirmed, be sealed and submitted for the approval of the Local Government Board.

(*b*) That the Clerk of the Council be instructed to take the steps prescribed by the Metropolis Management Act with regard to the printing and publication of the by-laws, and that a sufficient number of copies of the by-laws, when approved by the Local Government Board, be sealed, to enable the Council of each metropolitan borough to have a sealed copy for production in cases of legal proceedings."

Theatres, &c.—The following applications were agreed to:—

Improvement of the Canterbury Music-hall, Westminster Bridge-road (Messrs. Wylson & Long).

Certain alterations at the Criterion Restaurant, Piccadilly (Mr. F. T. Verity for Messrs. Spiers & Pond).

Certain alterations and additions to the Dulwich Constitutional Hall, East Dulwich-grove (Mr. E. J. Wallis for the Club).

Extension of lavatory accommodation at Grosvenor Hall, Buckingham Palace-road (Messrs. Woodrow & Helsdon).

Abolition of the Royal box and institution of seats at the Empress Theatre, London Exhibitions (Mr. A. O. Collard).

Setting back the stage front at the Tivoli Music-hall, Strand (Mr. W. Emden).

Rates of Wages and Hours of Labour.—The following recommendations of the Works Committee were agreed to:—

"That the Council's list of rates of wages and hours of labour be amended, and that the hours of labour for wheelwrights, inserted in the list, be fifty-four a week.

That the Council's list of rates of wages and hours of labour be amended, and that the rate of pay for carmen, inserted in the list, be as follows:—

Employed by the Council—One horse, 28s. a week; two horses, 31s. a week; overtime, 3d. per half hour after 6.30 p.m.

Employed by contractors—One horse, 26s. a week; two horses, 28s. a week."

District Surveyor, North Chelsea.—The following recommendation of the Building Act Committee was agreed to:—

"That the districts of North and South Chelsea be united as from and including August 1, 1903, and the district so formed be designated Chelsea; and that Mr. T. E. Mundy, the District Surveyor of the present district of South Chelsea, be appointed district surveyor for the district of Chelsea as from and including August 1, 1903, subject to the standing conditions of the Council as to the appointment of District Surveyors, with the exception that he be allowed to retain his appointment as assessor and surveyor to the Westminster Fire Office, and that '68' be substituted for '65' in condition (*f*) as the age at which he may be required to retire."

Letting of Property by Public Auction.—The following recommendations were agreed to—

"(*a*) That the resolution of the Council of July 14, 1903, recommending that the Clarence-street, Rotherhithe, and Tower Bridge re-housing sites be put up for sale by auction, be rescinded, and that in lieu thereof the land be offered upon lease for 999

* See our issue for July 25, p. 109.

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years, and that the officers be instructed to amend the conditions so as to give effect to the resolution.

(*b*) That the commercial land, lots 4, 5, 6, and 7, Holborn to Strand; lot 8, Southampton-row; lots 1-15, Mare-street, Hackney; lots 1, 2, and 3, Long-lane, Borough; and lots 14, 15, 16, and 21, Tower Bridge southern approach, be offered by public auction upon lease for eighty years and otherwise in accordance with conditions approved by the Council, adapted in detail as circumstances necessitate."

Fire Station, Isle of Dogs.—The following recommendation was agreed to:—

"That the estimate of 13,267*l.* submitted by the Finance Committee in respect of the erection of a new fire-station at the Isle of Dogs on the site of the existing station and adjoining ground be approved, and that the Fire Brigade Committee be authorised to have the quantities taken out, and to make the other necessary preliminary arrangements for the erection of the station."

Tramway Subway and Paving Works, Holborn to Strand and Southampton-row.—The following recommendation of the Improvements Committee was agreed to:—

"That, in the event of the Works Committee being prepared to undertake, at the amount of the Engineer's estimate, the construction of the tramway subway and the subway for pipes and wires, and also the execution of the paving, &c., works between Great Queen-street and Holborn, and between Eagle-street and Vernon-place, such works be carried out by the Council without the intervention of a contractor, and that the working drawings, specification, bills of quantities, and estimate be referred to the Works Committee for that purpose; but that in the event of the Works Committee not being prepared to accept the work at the amount of the Engineer's estimate, tenders be invited by advertisement."

Flodded Buildings.—Mr. Squires called attention to the flooding of the houses between Fleet-street and the Embankment, and asked if some discretion could not be left to the officers in charge of the fire stations to assist in pumping out basements.

Mr. E. Smith, Chairman of the Fire Brigade Committee, replied that the Committee would try as far as they could to be neighbourly in the matter, but in the case of such a flood as that which took place on Sunday morning such pumping would have been useless.

The Tramways Manager.—Replying to Mr. Burns, Mr. Benn (Chairman of the Highways Committee) stated that Mr. Alfred Baker, the Tramways Manager, had resigned his position to take over the management of the Birmingham Corporation Tramways. There need be no apprehension as to the successful continuance of the tramways of the Council.

The Council adjourned shortly before nine o'clock till October 6.

Illustrations.

SCULPTURE: "HARMONIES."

THIS sculpture in relief, life size, by M. Raphael C. Peyre, was one of the finest works of sculpture exhibited at the Paris Salon this year, where it occupied a prominent position which showed what was the opinion of the Committee on its merits.

It might be taken as a classical rendering of the sentiment of the lovers in the "Merchant of Venice":

"Look how the floor of Heaven
Is thick inlaid with patines of bright gold;
There's not the smallest orb which thou behold'st,
But in his motion like an angel sings,
Still quiring to the young-eyed cherubim;
Such Harmony is in immortal souls."

The upward gaze of the man evidently suggests some such dual meaning to the title "Harmonies."

SKETCHES IN WORCESTERSHIRE.

THESE sketches, like those given last week, illustrate places visited by the members of the Architectural Association on their annual excursion last week, the concluded report of which will be found on another page.

They are made specially for the occasion by Mr. W. Curtis Green.

HOUSE AT SHEPHERD'S GREEN, CHISLEHURST.

SINCE making these drawings, certain alterations have been made affecting the plan internally, but not the exterior.

The object of breaking the house across the centre was to vary the aspect of the different rooms, and to get as little exposure to the north as possible; this arrangement created convenient positions for the entrance and main staircase. The house is built of stock brick, covered with cement rough cast, and roofed with sand-faced roofing tiles. The window casements are of iron with leaded glazing, and not of wood as shown on the drawing.

Messrs. Podger & Sons, of Bromley, are the builders.

HOUSE AT GREAT SHELFORD, NEAR CAMBRIDGE.

THE motive governing the plan of this house was the 3-sided verandah forming part of the house on the southerly side, but not overlooked by any of the sitting rooms. The house is in an exposed position and is kept low for that reason.

It is being built of Fletton bricks covered with rough cast and a red tile roof.

Mr. F. Johnson, of Chelmsford, is the builder, and Mr. W. Curtis Green and Mr. Arch. C. Dickie are the architects for this and the Chislehurst house described above.

THE INSTITUTE OF SANITARY ENGINEERS.

WE mentioned in our last issue that the Institute of Sanitary Engineers held a three days' provincial summer meeting at Wolverhampton recently. The proceedings opened on the 14th ult., when Mr. W. J. Dibdin, of London, delivered a Presidential address, which was briefly summarised in our last issue. On the following day Mr. G. Green, A.M.Inst.C.E., Borough Engineer, Wolverhampton, read a paper on "Cold Storage," and on the 16th ult. the following paper by Dr. J. C. Thresh and Mr. Martin Priest was read on

The Distribution of Sewage on Bacteria Beds.

"It is now generally admitted that in the processes of sewage purification bacterial action is the most important factor with which we have to deal, and that the condition and quality of a sewage effluent will vary according to the different bacterial influences to which the sewage has been subjected. We may, from the point of view of sewage purification, consider bacteria as divided into two classes, viz., anaërobes and aërobes. the anaërobes producing, of course, putrefactive fermentation, while the aërobes produce the true purification, and it is these latter, namely, the aërobic bacteria, that we must chiefly endeavour to cultivate and employ in our sewage schemes; for while the advantage, and even the advisability, of a preliminary anaërobic action on the sewage is becoming a matter of doubt, we find the necessity of the most perfect aërobic action is becoming more and more strenuously insisted upon by those who are making independent investigations into the practice of modern sewage disposal and treatment.

In sewage we find a heterogeneous collection of bacteria and of other micro-organisms. These vary from the bacilli of typhoid fever, cholera, and tuberculosis to the harmless saphrophyte, and from the amœba to the higher types of infusoria and rotifers.

The problem which confronts the sewage expert is how to utilise such a living admixture so as to produce a result which shall be satisfactory, reliable, and easily controlled. It is just as if a farmer were given a quantity of mixed seed, cereals, vegetables, grasses, flowers, weeds, and so on, and told to produce a profitable crop from the mixture.

In the bacterial process of sewage purification we achieve the desired results by a process of selective growths, that is to say, we cause the sewage to pass through the beds under conditions which shall be suitable only for the growth of the particular type of bacteria that will give us the results we desire. But we must take care that the processes producing these conditions are sufficiently under our control to be reliable, otherwise we may find that the results are very different from those which we expect. Now, if bacterial treatment is the main factor in sewage purification, the proper utilisation of the bacteria beds is the crux of the whole problem, and we propose, therefore, to proceed at once to the discussion of the best means for the distribution of sewage on bacteria beds. Of these we may say there are three methods now in use:—

First, the so-called contact beds, in which the beds are filled with sewage, allowed to stand a certain time, then run off and the bed allowed to aërate. Secondly, distribution by means of alternating siphons, with or without arrangements for distributing the sewage over the whole surface of the beds; and thirdly, the continuous or sprinkler system.

It is not necessary for us to dwell on the question of the preliminary treatment of the sewage previous to filtration beyond saying that while in the case of contact beds the use of large depositing tanks may be advantageous, they seem to be unnecessary with the continuous filtration beds, as shown by the successful employment of merely finely-strained sewage at Leeds, and of sewage after simply passing through a small catch-pit at the trial installations at Redhill and Reigate.

The avoidance of preliminary treatment in large tanks is undoubtedly an advantage, not only on the score of economy, but also because strong sewage, after undergoing anaërobic tank treatment, is liable to produce putrefactive and evil-smelling gases, which, if the tanks are closed, may become dangerously explosive, as has recently happened at Walton-on-the-Naze and Sheringham. All that seems absolutely necessary in any process, but more especially in preliminary treatment with sprinklers or continuous filtration beds, is to prevent the larger and grosser solids passing on to the beds, these solids comprising rags, offal, large fæcal matter, pieces of fat, paper wood, and such like; also grit and insoluble mineral matters that become washed into the sewers in time of storms. These substances may be removed by straining or by a comparatively short deposition in detritus tanks, or by a combination of both.

During the last few years we have seen many installations on the contact system which for some reason have not given, and are not giving, very satisfactory results. Some of these have been well-planned, and are carefully tended. Some have secondary contact beds; nevertheless, the ultimate effluent contains much free ammonia and little free oxygen—in other words, nitrification is far from complete. From certain works we have examined samples weekly, or at definite intervals, and have had the samples taken so as to represent as accurately as possible the whole days' flow, so that our experience is based on hundreds of analyses, and observations on works in many parts of the country. We have also examined effluents from works where the sewage is distributed on the beds at regular and frequent intervals by means of automatic siphons, and the results have not nearly answered our expectations. On the other hand, we have examined many samples from beds on which the sewage is distributed at regular and very frequent intervals by means of various forms of sprinklers or sprays, in some cases fixed, in others stationary, and we are compelled to acknowledge that the effluents from beds so used were uniformly of a much higher degree of purity and better oxygenated than effluents from contact beds. We also know that other competent observers are conducting experiments which show the same results.

The mode of applying the sewage is, as we have intimated before, the main factor in relation to the quality of the effluent. The beds may be the same, yet if the sewage is applied in one way the effluent will be far less pure than if applied in another, equal quantities of sewage being treated in twenty-four hours.

It will be interesting to consider what are the main differences between the operations of a sprinkler bed and a contact bed, and to what causes the superior results which we have obtained with the sprinkler beds are due. In our opinion the secret lies in the greater suitability of the sprinkler bed process in fostering the selected growth of bacteria and the superior aëration which the sewage undergoes. The settled sewage which is to be treated is aërated by the sprinkling and comes in contact with the top of the bed, where the aëration is probably greatest. At a distance of, say, 1 ft. down the sewage is in a different chemical condition than when it flowed on to the top of the bed, oxidisation having commenced and sedimentary matter having been arrested. At a depth of 2 ft. in its passage through the bed the sewage has still further advanced in its progress towards purification, and so on. It is only the top of the bed that ever receives unchanged sewage, and the middle and lower parts of the bed never receive wholly unchanged sewage,

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and the amount of filtration and oxidation that the sewage has undergone by the time it reaches any particular layer in the bed, being constant, the maximum amount of selective growths for dealing with the sewage at those particular points is obtained. For instance, at the top of the bed which receives the settled sewage we found at Redhill large numbers of little worms and the larvæ of flies. These were undoubtedly feeding on the small particles of solid matter in the sewage, but at the bottom of the bed we found none of those, but plenty of nitrifying bacteria, together with infusoria, &c.

Now with a contact bed it may be that these selective growths or cultivations are not obtained in so perfect a manner, because the unfiltered settled sewage comes more in contact with the whole of the body of the bed, the bottom as well as the top, and the purification has to take place through the whole of the bed as best it can, and then, after a rest for aëration, the bed is again flooded with sewage.

Again, as regards aëration we think the contact bed compares very unfavourably with the sprinkler bed, because while the contact bed is alternately filled and emptied, that is to say, first favouring anaërobic, and then aërobic organisms, the continuous or sprinkler bed works under constant aërobic conditions, with always an ample supply of oxygen—oxygen dissolved in the sewage and oxygen in the air carried down by the sewage as it passes through the bed.

We do not think it desirable or even necessary for the purpose of raising a discussion to give long series of analyses, but we give three following typical analyses :—

No. 1.—Best Results Obtained from a Septic Tank and Single Contact Bed Installation, which has been working about one year.

Suspended matter removed	85 per cent.
Free ammonia removed	72 ,,
Organic matter removed—	
Measured by organic ammonia	75 ,,
Measured by oxygen absorbed	70 ,,
Nitrification	Slight.

No. 2.—Best results obtained with a detritus tank, or open septic tank, and primary and secondary contact beds, at work over six months :—

Suspended matter removed	95·5 per cent.
Free ammonia removed	75 ,,
Organic matter removed—	
Measured by organic ammonia	95 ,,
Measured by oxygen absorbed	90 ,,
Nitrification	Fairly good.

No. 3.—Average Results Obtained with Primary and Secondary Coke Beds fed by Sprinklers.

Suspended matter removed	95 per cent.
Free ammonia removed	99·5 ,,
Organic matter removed—	
Measured by organic ammonia	95 ,,
Measured by oxygen absorbed	91 ,,
Nitrification	Practically complete.

Impurities Removed per Cent.

	No. 1.	No. 2.	No. 3.
Suspended matter	85	95·5	95
Free ammonia	72	75	99 5
Organic ammonia	72·5	93	93
Nitrification	Slight	Marked	Practically complete.

It will be seen that No. 3 has given much better results than we have ever obtained from Nos. 1 and 2. The subject is one of such great importance to everyone interested in the disposal of sewage that no excuse is necessary for presenting this brief paper for the purpose of introducing a discussion. We may, however, be permitted to make a further remark with reference to sewage purification, and which has reference to a subject which must sooner or later come prominently forward, namely, the fact that the bacterial system of purification merely improves the sewage from the chemical point of view, leaving it nearly as impure as before from the bacteriological point of view, and possibly, therefore, quite as dangerous, so far as disseminating the germs of typhoid fever, cholera, and other water-borne diseases is concerned.

Some method is, or will be, required for removing these bacteria. This may possibly be done by a final filtration through beds of sand, but we doubt whether this will prove practicable on a large scale. On the other hand, it may be done by aid of heat, and possibly the heat evolved from the combustion of house refuse may be utilised for this purpose At any rate, it may interest this meeting to know that one of us is experimenting in this direction, and thinks he has succeeded in solving the problem. In any case, such sterilisation is greatly to be desired where the sewage effluent is to be discharged into any stream from which at points lower down water is abstracted for use for domestic purposes, or where the effluent is discharged into tidal water near layings from which shellfish are taken. Possibly some member of the Congress may have given this subject attention, and may have information to impart which will be of interest to the members."

COMPETITIONS.

CARNEGIE FREE LIBRARY, TAUNTON.—There were eighty-one designs submitted in this competition, and these will be on view on Saturday and during next week from twelve till seven, at the Municipal Hall. The assessor, Mr. J. S. Gibson, London, has awarded the premiums as follows :—No. 51, Mr. A. Colbourne Little, 9, Gray's Inn-square, London ; No. 29, Mr. J. Lindsay Grant, 2, St. Peter's-square, Manchester ; No. 42, Mr. Henry A. Crouch, 12, Gray's Inn-square, London.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses :—

Lines of Frontage and Projections.

Brixton.—Blocks of buildings with bay windows and balconies on a site on the north-west side of Coldharbour-lane, Brixton, abutting also upon Lilford-road and Denmark-street (Mr. E. E. Bird for Messrs. L. Whitehead & Co., Ltd.).—Consent.

Strand.—A projecting clock at No. 134, Regent-street (Messrs. J. J. Stockall & Sons, Ltd., for Mr. J. W. Glenny).—Consent.

Hoxton.—An iron and glass shelter in front of the Britannia Theatre, Hoxton-street (Mr. B. Crewe for Mr. T. Barrasford).—Consent.

Hackney, South.†—An addition to the bakehouse at the rear of No. 71, Chatsworth-road, Clapton, to abut upon Blurton-road (Mr. H. Dearsly for Mr. H. Lunken).—Consent.

Islington, East.—Retention of a one-story building on the north side of Northampton Park, Islington, eastward of "Pulbro' Lodge" (Mr. G. H. Lovegrove).—Consent.

Lewisham.—A projecting clock in front of No. 1A, Burnt Ash-road, Lee (Mr. W. F. Young, for Mr. R. Fielding).—Consent.

Bethnal Green, North-East.—A modification of the conditions consenting to the re-erection of buildings on the site of the Arabian Arms public-house, Nos. 222 to 232 (even numbers only), Cambridge-road, and Nos. 2, 4, 6, and 8, Bishop's-road, Bethnal Green, so far as relates to an extension of the time within which No. 2, Bishop's-road was required to be re-erected.—Agreed.

Hackney, Central.—Eight houses on the south side of Richmond-road, Mare-street, Hackney, westward of No. 269, Mare-street (Messrs. Hodson & Whitehead, for Messrs. Hodson & Co.).—Consent.

Hammersmith.—An iron and glass shelter at the entrance in Rockwood-place to the Shepherd's Bush Empire, Shepherd's Bush Green, Hammersmith (Mr. F. Matcham, for the Hackney and Shepherd's Bush Empires, Limited).—Consent.

Hammersmith.†—Buildings on the site of Nos. 91 and 93, Goldhawk-road, Hammersmith, to abut also upon the Grove (Mr. W. G. Hunt for Dr. F. H. Alderson).—Consent.

Fulham.—A projecting clock in front of No. 9, The Broadway, Walham Green, Fulham (Mr. J. Boot for Messrs. Boots, Limited).—Consent.

Kensington, South.—The retention of oriel windows, with projecting pilasters in front of a block of residential flats known as Cecil Court, Hollywood-road, Fulham (Mr. C. J. C. Pawley).—Refused.

Hampstead.—Buildings on a site abutting upon the north side of Abbey-road and east side of West End-lane, Hampstead (Messrs. Goodwyn & Sons for Mr. A. Bretzfelder).—Refused.

Lewisham.—Houses, with bay windows, on the west side of Brockley Rise, Lewisham, southward of Stondon Park (Mr. A. H. Kersey for Mr. R. Kersey).—Refused.

Hampstead.—A one-story stable building at the rear of Belle Vue, Shoot-up-hill, Hampstead, to abut upon Mill-lane (Mr. F. S. Hammond for Mr. De Meza).—Refused.

Islington, South.—One-story shops upon part of the forecourts of Nos. 236, 237, and 238, Upper-street, Islington (Messrs. Drivers, Jonas, & Co., for Mr. C. E. Merson, Mr. R. J. Hayward, and others). Refused.

St. Pancras, West.—The retention of a projecting roof in front of the Mohawk Works, Harmood-street, Chalk Farm, St. Pancras (Mr. F. R. Squire)—Refused.

Width of Way.

Southwark, West.—Offices on the site of No 54, Lant-street, Borough (Messrs. A. C. Potter & Co.)—Consent.

Woolwich.—The erection on the site of Nos. 18, 19, 20, 21, and a portion of the site of No. 22, Lower Market-street, Woolwich, of an extension to the Woolwich Polytechnic Institute (Mr. H. P. Monckton for Lieut. R. L. A. Ogilby, and the governors of the Woolwich Polytechnic Institute).—Consent.

City.—Dwelling-houses and workshops on a site abutting upon the north side of Little Somerset-street and east side of Harrow-alley, Aldgate (Mr. J. R. Moore-Smith for Mr. L. Ceraskin)—Refused.

Width of Way and Line of Frontage.

Hoxton.—A warehouse building on the site of Nos. 2, 4, and 6, East-road, City-road, Hoxton, to abut upon City-road, Brunswick-place, and Catherine-street (Mr. A. Keen for Mr. J. Kent).—Consent.

Fulham.—The rebuilding of the Live and Let Live beerhouse, No. 37, North End-road, Fulham, at less than the prescribed distance from the centre of the roadway of Portland-street (Mr. W. Steward for Messrs. Mann, Crossman, & Paulin, Ltd.).—Consent.

Marylebone, West.—The rebuilding of Nos. 376 to 384 (even numbers) inclusive, Oxford-street (Messrs. A. E. Hughes & Son for Mr. D. C. Appetly).—Refused.

Formation of Streets.

Islington, West.—That an order be issued to Messrs. Boehmer & Gibbs sanctioning the formation or laying out of a new street for carriage traffic, to lead out of the east side of Caledonian-road, Islington, to the north-eastern side of Stock Orchard-crescent (for Mrs. E. J. Cave).—Agreed.

Hackney, North.—That an order be issued to Messrs. Boehmer & Gibbs sanctioning the formation or laying out of new streets for carriage traffic to lead out of the west side of Stamford Hill and south side of Dunsmure-road, Hackney (for Mrs. F. A. Cave).—Agreed.

Cubical Extent.

Deptford.—That the Council do make no order on the application of Mr. J. W. Stevens on behalf of Messrs. Farquharson Brothers & Co., for consent to the covering over of an open space between two buildings at Messrs. Farquharson Brothers & Co.'s works at Rollins-street, Canterbury-road, Deptford.—Agreed.

Width of Way and Cubical Extent.

Woolwich.—The erection at the works of the Western Electric Co., Henley-road, Woolwich, of an addition to a building, with the boundary of the space between such building and addition, and the public way at less than the prescribed distance from the centre of the roadway of Henley-road, and such building and addition exceeding in extent 250,000, but not 450,000, cubic feet, and to be used only in connexion with the manufacture of telephone cables (Messrs. Ardron & Dawson for the Western Electric Co.).—Consent.

Means of Escape at Top of High Buildings.

Kensington, South.—Means of escape in case of fire, proposed to be provided on the sixth floors of blocks Nos. 1, 2, and 3, and on the sixth and seventh floors of block No. 6, Oakwood-court, Addison-road, Kensington, for the persons dwelling or employed therein (Messrs. Rolfe & Matthews for Messrs. Jones Bros.).—Consent.

Kensington, South.—Means of escape in case of fire, proposed to be provided on the sixth and seventh stories of Nos. 63 to 83, Oakwood-court, Addison-road, Kensington (Messrs. Rolfe & Matthews for Messrs. Jones Bros.).—Consent.

*** *The recommendations marked † are contrary to the views of the Local Authorities.*

COURT OF COMMON COUNCIL.

THE usual fortnightly Court of Common Council was held on Thursday last week at the Guildhall.

The Streets' Committee submitted a Report, in the course of which they stated they had further considered the proposed regulations in regard to the demolition of buildings in the City, together with the suggestions of the Royal Institute of British Architects, the Surveyors' Institution, and the Institute of Builders. The Committee submitted a set of by-laws prepared in accordance with Section 5 of the City of London (Public Health) Act, 1902, and recommended that the same be approved of, and be submitted to the Local Government Board for confirmation.

The Report was adopted.

The same Report recommended that at the expiration at Michaelmas next of the contract for the reparation and construction of sewers, the tender of Mr. Alfred Woodhouse be accepted for one year at 10 per cent. above schedule prices ; that creosoted wood blocks be substituted next year for the existing carriageway pavements of Cloak-lane and College

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Hill at an estimated cost of 370*l.*; that creosoted deal blocks on a foundation of Portland cement concrete be laid in the upper portion of Laurence Pountney Hill and Suffolk-lane, next year, at an estimated cost of 350*l.*; that the carriageway of Bouverie-street be paved next year, as far as practicable, with hard wood blocks, at an estimated cost of 700*l.*; that the sewer in Eldon-street be reconstructed at a cost of about 2,800*l.*, and that tender for the work be advertised for; that permission be granted for the fixing of an earth plate to the lightning-conductor of St. Stephen's, Walbrook, on the application of Mr. H. Percy Monckton on behalf of the churchwardens; that, subject to the usual conditions the construction of two vaults and the fixing of three pavement lights at No. 1, Cross-lane, Bush-lane, be allowed on the application of Mr. Howell J. Williams; and that permission be given for the construction of a vault at No. 67, Farringdon-street on the application of Mr. T. Walter Mass for Mr. L. Heywood. The recommendations were all agreed to.

METROPOLITAN ASYLUMS BOARD.

THE usual fortnightly meeting of the Metropolitan Asylums Board was held on Saturday last week at the Board's offices, Victoria Embankment, Sir R. Hensley in the chair.

Correspondence was received from the Local Government Board in respect of the following matters:—The proposal to provide twenty-two cottages for married attendants at Leavesden Asylum, returning the amended plan and requesting the Managers to consider certain points with regard to the system of drainage; the proposal to erect a building for housing a steam fire-pump at Caterham Asylum, and stating that the Board had already approved of a plan for the same; and the alterations and additions which are proposed to be carried out at Southfield House, Joyce Green, promising an order authorising the expenditure of a sum not exceeding 485*l* on such work. The matters were referred to Committee. On the recommendation of the Finance Committee, it was agreed to make application to the Local Government Board for orders authorising the expenditure of the following sums:—8,680*l.* for the erection of additional buildings at Joyce Green Hospital; 2,773*l.* for the erection of new workshops at Darenth Asylum; 797*l.* (additional) for alterations and additions at the Northern Hospital; and 1,070*l.* for the erection of engineers' cottages at the Brook and Grove Hospitals—Brook Hospital, 530*l*, and Grove Hospital, 540*l.* The Works Committee reported that they had sanctioned an expenditure of 205*l.* 8s. 4d. on granite paving at Banstead-road school. This was an extra on Mr. J. B. Potter's contract of 11,099*l.* The same Committee recommended and it was agreed to apply to the Local Government Board for sanction to the expenditure of an additional sum of 105*l.* in respect of the completion of the boundary wall at the Grove Hospital. With reference to the cottages for married attendants at Leavesden, and the letter received from the Local Government Board, the Committee recommended and it was agreed, that the plan, when amended, be forwarded to the Local Government Board with an estimate of the probable cost. The Works Committee further reported that they had sanctioned various extra works at the Southern Hospital, the value of which amounted to 805*l.* In regard to the same hospital the architect had reported that the sum of 2,400*l.* provided in the contract for extra foundations would probably not be required at all. The offer of the County of Surrey Electrical Power Distribution Co. to supply alternating current at 200 volts to the Southern Hospital at a reduced rate of 2¼d. per unit was accepted. Messrs. Treadwell & Martin, the architects to the Southern Hospital, were appointed to prepare plans and to supervise the work of forming roads and paths at the hospital. The Hospitals' Committee reported that the Sutton Water Co. had offered to supply water to the Southern Hospital at the rate of 10d. per 1,000 gals., provided that the Board agreed to take from the company all the water to be used within the hospital or its grounds. The Committee's recommendation that the offer be accepted was agreed to.

HOUSE-BUILDING IN FROSTY WEATHER.

IN winter time one hears much about the want of employment for bricklayers and others in the United Kingdom on account of frosty weather, yet any one residing in Stockholm during the winter months can see bricklaying carried on in hard frost as an everyday occurrence. Mr. Stewart MacGregor, the present British Consul in Stockholm, was so struck by this circumstance that he made special inquiries as to how the contrast was brought about, in the hope that any information he might obtain on the subject would be useful in England. In the course of his investigations he met Mr. P. Graham, a native of Scotland, long resident in Sweden, who was able to supply him with a detailed explanation which the Consul has now communicated to the British Foreign Office, with the preliminary remark that "the art of building stands very high in Stockholm, much of the work done being both ornamental and of excellent quality."

The substance of Mr. Graham's valuable information on the subject is to the following effect, viz., that a few years ago a series of experiments were carried out in Stockholm with a view to deciding the lowest temperature at which bricklaying might safely be carried on. Three different temperatures were decided on, viz.:—

	Celsius. deg.	Equivalent (about) in Fahr. deg.
First	— 5	23
Second	—10	14
Third	—15	6

The bricks and mortar were, as to quality and conditions, such as are commonly used in Stockholm. The walls thus erected during winter were allowed to stand till the following autumn, when they were torn down and the following results noted: Nos. 1 and 2 were perfectly satisfactory; the mortar was quite hard and sound and had to be scraped from the bricks. No. 3 proved to be unsatisfactory; the mortar did not adhere at all to the bricks, which lay loosely embedded in it. These results, Mr. Graham points out, tend to prove that, without any special precaution as to material or labour, bricklaying can be carried on in Stockholm at a temperature as low as 14 deg. Fahr. For lower temperatures it is necessary to heat the sand and water used in making the mortar, and for this purpose very simple apparatus are employed:—First, for the boiling of the water, all kinds of contrivances are to be seen in use, including primitive as well as modern boilers; second, for heating the sand the common arrangement consists of a circular iron tube 18 in. to 24 in. in diameter, and 6 ft. to 8 ft. long, closed at one end with bricks or an iron plate; on the top at this end there is a chimney 8 ft. to 10 ft. high, and 5 in. to 6 in. in diameter. The fuel, which is generally refuse wood from the building under erection, is fed in at the open or partly open end of the cylinder. This cylinder is often formed of an old boiler tube or a piece of an old iron chimney, &c. For burning coal, special grate and chimney arrangements would be necessary, but in no case need they be elaborate or expensive. After placing the cylinder on the ground the sand is heaped on and around it to a depth of 18 in. to 24 in., and allowed to remain until it gets hot, when it is taken away from where it is hottest and replaced by fresh sand. The mortar should be made in a room where the temperature is kept well above freezing; this temperature should naturally be regulated according to the frost that has to be counteracted. Generally the builders in Stockholm make a room of the kind described by roughly boarding in a part of the scaffolding, simplicity and cheapness being the prominent characteristics of all the arrangements. When building in frosty weather the following precautions should be observed:—(1) In laying the bricks care should be taken to avoid shifting them after they have once been set in the mortar. (2) Never use old or stale mortar, but arrange supply to correspond with demand. (3) It should be understood that the brick used in Stockholm is of a light or porous character, which readily absorbs the moisture from the mortar; hard-pressed or calcined bricks and stonework generally are not suitable for building during frosty weather, but edgings or ornaments, &c., of such material can easily be dealt with by slightly warming them before bringing them into position; this can be done by keeping them a few days in a wooden shed heated by an open coke-stove; in some cases it is found advisable to cover in with rough boarding the part of the wall where such stonework is extensive; in such cases a very small coke fire is found sufficient to keep the temperature high enough to prevent any damage to the mortar. (4) Although brick-building can thus be carried on safely under any of the temperatures already named, this does not apply to plaster or cement work, which should not be done at or below freezing point, unless proper heating arrangements are made. Whereas in Stockholm, fifteen or twenty years ago, almost all building was broken off during four to five months every winter, it is now the exception that such operations are hindered by frost more than a few days, or, at most, a few weeks, annually, and this though there is much more stone and ornamental work in the buildings now being erected than in those of an earlier period. What twenty years ago was considered practically impossible has now become every-day practice. To sum up shortly, the bricks should be porous and perfectly dry, that they may readily absorb the moisture in the water; and, in the second place, the water, sand, and bricks must all be heated.

TOWN'S OFFICES, SHIPLEY, YORKS. — At the monthly meeting of the Shipley District Council, on the 21st ult., the proposed outlay in connexion with the erection of new town's offices was under discussion. Mr. J. W. Moody, Chairman of the Public Offices Committee, proposed the adoption of the minutes of that Committee, from which it appeared that Mr. W. H. Beevers, architect, had submitted plans of baths and workshops at an estimated cost of 4,000*l.*, making a total estimated expenditure for public offices of 24,000*l.* These plans were submitted for confirmation. Mr. R. Lindley seconded the motion, which was agreed to after discussion.

NATIONAL FEDERATION OF BUILDING TRADE EMPLOYERS.

THE annual meetings of the National Federation of Building Trade Employers of Great Britain and Ireland were opened at Cardiff on the 21st ult. The Mayor (Alderman E. Thomas), who wore his official robes, welcomed the members to the town at the library of the South Wales Institute of Engineers, Park-place, where the meetings were held. The President of the Federation (Mr. C. W. Green, of Liverpool) was introduced to his worship by Mr. James Allan, President of the Cardiff Builders' Association, and among those present were Alderman W. H. Jessop (Huddersfield), Mr. Wm. Shepherd (London), Vice-Presidents of the Federation; County Alderman J. Bowen, of Birmingham; Mr. T. F. Rider, London; Alderman W. Holdsworth, Bradford; Messrs. Wm. Sapcote, Birmingham; A. Krauss, Bristol; B. I. Greenwood, London; W. Nicholson, Leeds (Treasurer); G. Macfarlane, Manchester; S. Smelhurst, Oldham, members of the Federation; Aldermen David Jones, J. Ramsdale, and P. W. Carey, and Councillors F. J. Veall, J Robinson, F. J. Nicholls, A. Sessions, S. O. Williams, and Illtyd Thomas, Cardiff. Mr. Lanchester, representing the architects, and Mr. P. S. King, of King & Son, contractors for the new town hall and law courts, were also present, and were introduced.

The Mayor said he could assure them it was a great pleasure to welcome them in his official capacity to the town of Cardiff. Cardiff was an advancing town, and in bricks and mortar it was making great strides. The number of houses and shops built in the town from 1881 to 1902 was 20,149. There were at present many public works on hand, notably the new town hall and law courts in Cathays Park, the new asylum at Whitchurch, and other large works for private persons and companies. In Cathays Park, too, sites were being given to the University College, the University of Wales, the Central Welsh Board, and other public bodies and institutions.

The President of the Federation (Mr. Green) thanked the Mayor for having received the Federation.

In the afternoon the members were the guests of Mr. James Allan, President of the Cardiff Builders' Association.

The Mayor proposed the health of Mr. Green, and referred to the useful work done in the technical schools in Cardiff. Contracts representing half a million of money were now let in Cardiff.

Mr. Green suitably replied.

Speeches were also delivered by Alderman Ramsdale, Alderman David Jones, and others. Alderman Ramsdale said he believed the tendency of the times was in favour of public bodies letting their work by contract, rather than doing it themselves, but, so far as Cardiff was concerned, he was certain that the ratepayers got value for their money.

In the evening a banquet, presided over by Mr. C. W. Green, was held at the Royal Hotel.

The loyal toasts were submitted from the chair and duly honoured, after which Mr. H. B. Greenwood submitted the toast of "The Imperial and Reserve Forces," to which Mr. J. R. Kempson, Cardiff, responded.

The Mayor of Cardiff next submitted the toast of "The National Federation, and the various Centres and Local Associations." The building trade, he said, was one of the largest industries in the kingdom, which they would easily discern when they came to count all those engaged in it and the capital it involved.

Mr. W. F. King, of the firm of King & Son, responded. He said the Federation had consistently advocated a conciliation board for the settlement of labour disputes, and they had seen the fruits of that policy in the few troubles they had experienced during the last few years.

Mr. W. Sapcope proposed "The South Wales Federation and the Cardiff Master Builders' Association," and said that he was very much struck with the splendid wide streets of the town and the excellent train service they had, and he ventured to say that Cardiff could almost hold its own with many of the principal towns in the United Kingdom.

Messrs. J. Allan, W. Blackburn, and J. Turner responded, the latter stating that since 1802, when they had a prolonged dispute in the town in the building trade, everything had gone on smoothly by reason of an amicable understanding having been come to between the different societies.

Alderman David Jones proposed the health of the Chairman, to which Mr. C. W. Green suitably replied, and after the healths of the Vice-Presidents had been drunk, on the proposition of Mr. J. W. Courtis, and responded to by Alderman Jessop, the proceedings terminated.

The following day, the Council, which met on the previous day, recommended that a reserve fund should be inaugurated by levies or otherwise. An amendment was, however, moved that a reserve fund be formed by donations or otherwise. Eventually it was decided that before any definite decision was arrived at, a committee of the Federation should report on the matter to the emergency committee, and that the question be finally dealt with at the next annual meeting in London.

A resolution moved by Mr. G. Macfarlane, Manchester, to reduce the subscription of members by

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1d. on the "100l. in the wages paid" was lost after a rather prolonged discussion.

An important discussion took place upon the relations of builders and plasterers with the National Association of Operative Plasterers. Much friction has existed for some time with regard to the working of an agreement come to in 1899, which the builders and master plasterers claim has been repeatedly broken by the men's union. The payment of local rates of wages by contractors, whose chief offices are situated in other towns, has also apparently reached a stage when something definite in the way of a satisfactory arrangement with the men and employers will have to be arrived at, for the meeting appointed a committee composed of four master builders and four master plasterers (with the President of the National Federation as chairman) to deal with the questions immediately.

A special sub-committee appointed to confer with the Royal Institute of British Architects on the question of the new form of contract, reported that they had succeeded in settling satisfactorily an official form of contract with the Committee of the Royal Institute of British Architects, subject to the approval of the respective councils of the organisations interested. Instead of providing one document to be adopted, either for contracts in which the bills of quantities are excluded, or for contracts in which the bills of quantities are included, they had agreed that a separate and distinct document should be issued in each case, and in the form of contract in which the bills of quantities were included they had obtained the insertion of a new clause, which they considered would effectually secure the contractor against any loss in consequence of any errors which might appear in the bills of quantities. The new clause was as follows:—"Should any error appear in the bills of quantities other than in the contractors' prices and calculations, it shall be rectified, and such rectification shall constitute a variation of contract, and shall be dealt with as hereinafter provided."

The half-yearly Report referred to the Royal Commission appointed to consider the question of municipal trading, and urged upon the different federations to take the matter in hand, with a view of sending up witnesses to oppose the action of municipalities.

In accordance with arrangements kindly made by Mr. J. Hurman, the members in the afternoon visited the docks. They subsequently visited the Dowlais Works.

In the evening the Mayor and Mayoress of Cardiff (Alderman and Mrs. Edward Thomas) invited the members attending the conference to a reception in the Town Hall. The function was well attended. A large party visited Ilfracombe on the following day.

[The above has been taken from the report in the *Western Mail*.]

Correspondence.

SEWAGE DISPOSAL.

SIR,—Your remark on my patent for sewage disposal, shown at the Building Trades' Exhibition recently, that I "put the aerobic filter before the anaerobic" seems to require explanation on my part. I regret the model was covered when your visit was paid.

The process which I have patented I believe to be according to Nature. I have combined the dry-earth and water-carriage systems as most suited to country houses.

The rain falling on the face of the ground and passing through the foul matter therein, which is changed, or should be, by being buried in cultivated soil, filters downward into the pervious strata beneath charged with oxygen and micro-organisms, till it is stopped by an impervious bed, when it runs often long distances, and to a considerable depth. When further checked it rises by force of the head that feeds it through the overlying pervious strata, and being tapped by deep wells, yields generally a pure and never-failing supply. The solids having been finally disposed of by some bacillus in the foul air beneath, and clarified in the close upper strata through which it has been forced, we have both quality and quantity. This process, of course, can only be carried out in a limited way above ground, but the principle can be followed whereby a pure effluent is obtained, and by repeating the anaerobic filter would give water pure enough for supplying cattle.

I claim by this simple and natural process: (1) that the whole manurial value is preserved; (2) that without chemicals or mechanism, and with a minimum of hand labour—about half-an-hour once a week is sufficient for removing solids—it is continuous and inodorous in working; (3) that I obtain a pure effluent. I may mention that at two large houses where it has been adopted—before it was fully perfected as in the patent—I have obtained most satisfactory results.

ALFRED S. GOODRIDGE.

*** Mr. Goodridge admits the accuracy of our description of his apparatus. With reference to his letter we may say that reasoning from analogy may be misleading, and we should be better able to judge of the merit of his invention if the results of extensive chemical and bacterial analyses had been given.—ED.

The Student's Column.

CONCRETE-STEEL.—V.

THE PHYSICAL PROPERTIES OF STEEL.

FROM the report of the Steel Committee, 1868-70, it is clear that within the yield point of steel the amount of lengthening from tension, or of shortening from compression, produced by equal forces per unit of area, is nearly the same, and further that the stress at which the material yields or breaks down is practically the same for tension and compression. The tests conducted by the Committee were upon bars 1½ in. diameter and 10 ft. in length between the measuring points, and owing to this unusual length the results obtained were particularly accurate. One noteworthy point is the uniformity of behaviour within the elastic limit of all the bars, irrespective of differences in manufacture. Some average values taken from the report of this Committee are recorded for reference in Table XII.

Table XII.—Tension and Compression of Steel Bars.

Type and Mark of Steel.		Tension. Ultimate Stress in lbs. per sq. in.	Tension. Yielding Stress in lbs. per sq. in.	Compression. Yielding Stress in lbs. per sq. in.
Bessemer	"SLW"...	33,685	17,500	16,000
	"H" ...	34,193	20,000	21,166
	"K" ...	35,403	19,500	18,000
Cast	"31" ...	33,050	26,750	27,000
	"H" ...	41,850	27,000	26,000
	"46" ...	43,480	26,000	25,500
Crucible Cast	"KB"...	34,440	20,500	24,000
	"NB"...	51,013	25,500	26,166
	"SC"...	52,760	26,000	23,333

The tensile strength and elastic limit in tension and compression of low carbon or mild steel, and of high carbon or hard steel, are shownin Table XIII., which is calculated from the results of tests made by Professor Bauschinger at the Termuz Steel Works.

Table XIII.—Tensile Strength and Elastic Limit of Steel in Tension and in Compression.

Percentage of Carbon.	Ultimate Tensile Strength.	Elastic Limit in Tension.	Elastic Limit in Compression.
	Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.
0·14	62,944	41,055	30,536
0·19	68,000	47,084	43,008
0·40	75,712	49,050	48,944
0·51	79,744	48,428	46,233
0·54	79,072	49,616	48,944
0·55	80,416	46,095	49,772
0·57	79,744	47,084	48,943
0·66	89,600	53,244	53,648
0·78	92,064	53,312	53,648
0·80	102,816	57,008	63,168
0·87	104,608	61,017	56,000
0·96	118,048	69,216	71,120

For tension tests, the plates used measured 24 in. long by 2·8 in. wide by 0·48 in. thick, and for compression tests, the specimens measured 3·6 in. long by 1·2 in. square. The percentage of carbon in steel for various purposes is stated below as an index to the percentages of carbon slated in Table XIII. and other tables:—

	Per cent.
Boiler plate	From 0·10 to 0·33
Wire ropes (ordinary)	„ 0·15 to 0·30
„ (hard)	„ 0·45 to 0·75
Structural sections	„ 0·20 to 0·25
Rails	„ 0·30 to 0·60
Tool steel	„ 0·70 to 1·40

The resistance of steel to shearing stress varies somewhat, according to the direction in which force is exerted with respect to the structure developed in rolling the plate or bar. As a general rule, however, it may be taken that the ultimate shearing stress of steel is from 70 to 75 per cent. of the ultimate tensile stress. For mild steel the value is about 50,000 lb., per sq. in., and for hard steel about 80,000 lb. per sq. in.

With regard to the modulus of direct elasticity, it should be noted that, as in the case of concrete, values are calculated by some investigators from the total deformation, and by others from the elastic deformation only.

In Table XIV. are given the values of the modulus according to the two modes of measurement as ascertained by the tests of the Steel Committee. Here, E is the ordinary coefficient, and E_1 is the coefficient calculated after deducting permanent set.

Table XIV.—Modulus of Elasticity of Steel in Tension and Compression at Different Loads.

Stress in lbs. per square inch.	Values of E in 1,000,000-lbs. units.	
Tension.	E per sq. in.	E_1 per sq. in.
15,232	28·7	28·7
17,785	28·6	28·6
20,316	28·6	29·0
22,870	28·9	27·4
25,401	28·6	29·1
27,955	28·5	29·4
30,486	28·2	29·3
38,102	20·6	30·0
Compression.		
23,251	29·7	30·1
31,001	29·5	30·3
34,227	29·2	30·8
36,176	28·9	30·6
38,774	28·0	30·5
41,350	24·0	30·1

Table XV.—Modulus of Elasticity of Steel of Different Kinds.

(Values of E in 1,000,000-lbs. units).

Type of Steel.	E per sq. in.	Percentage of Carbon.	Authority.
Soft cast	30·3	—	Kupffer
Hard file	30·1	—	
Hammered Bessemer	30·3	1·15	Knut Styffe
Rolled cast	31·2	1·22	
Krupp cast	31·3	0·61	
Rolled puddled	29·9	0·56	
Siemens-Martin	29·9	—	Bauschinger
Bessemer	32·4	0·19 to 0·96	

Table XV. shows the value of the modulus E for different qualities of steel, and Table XVI. indicates the variation of E, with the percentage of the carbon in the steel, and according to the nature of the test. The latter table is compiled from a series of records given by Professor Bauschinger.

Table XVI.—Modulus of Elasticity of Steel with Different Percentages of Carbon Under Different Tests.

Percentage of Carbon.	Values of E in 1,000,000-lbs. units per square inch. Tension.	Compression.	Bending.	Mean.
0·19	30·8	37·0	29·1	32·9
0·46	32·0	32·7	29·3	31·8
0·54	30·6	36·1	28·8	32·4
0·57	30·7	32·0	29·2	31·0
0·66	32·4	35·7	32·1	33·0
0·78	33·5	32·4	30·1	32·4
0·80	30·5	32·3	32·9	31·7
0·87	31·0	31·5	30·4	31·1
0·96	30·9	32·7	29·2	31·2

From the foregoing tables it will be seen that the mechanical and elastic strength of steel is fairly uniform for the various qualities manufactured, and that the modulus of elasticity is practically constant within the elastic limit. From a consideration of the figures the following average values may be established both for tension and compression:—

	lbs. per sq. in.
Ultimate strength, mild steel	65,000
„ „ medium steel	78,000
„ „ hard steel	100,000
Elastic limit, mild steel	40,000
„ „ medium steel	48,000
„ „ hard steel	58,000
Modulus of elasticity	30,000,000

An important matter in connection with steel incorporated in buildings is the effect of temperature on its strength and ductility. The risk of fire has always to be considered, and it is very necessary for the designer to be able to estimate the probable influence of heat upon

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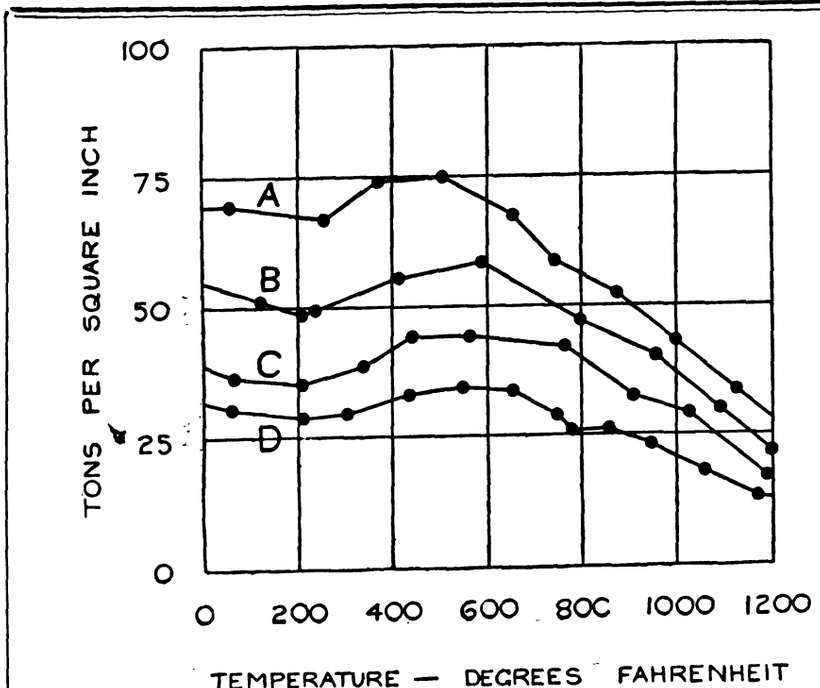

Illustration to Student's Column.

metal however employed. Sir William Fairbairn's tests* upon iron plates and rivet iron showed that the strength of the former was not materially decreased until temperatures of over 1,200 deg. Fahr. were approached, and that the strength of the latter increased from 62,720 lbs. per square inch at 60 deg. to 86,016 lbs. at 435 deg. Fahr., while at 1,290 deg. the strength decreased to 35,840 lbs. per square inch. More precise experiments by Knut Styffe indicate that at temperatures between 212 deg. and 392 deg. Fahr. the strength of steel is practically the same as at normal temperatures. According to the results obtained by Mr. C. Huston† in testing steel at temperatures ranging up to 932 deg. Fahr. there is gain of strength and loss of ductility with increase of temperature. From a table calculated by Roelker‡ we take the following figures relative to Bessemer steel :—

Temperature in Degs. Fahr.

0 100 300 500 700 1,000 1,500 2,000

Percentage of Original Strength.

100 100 100 98·5 68 31 12 5

Some of the most important tests of this nature are those made for the Admiralty by Mr. Barnaby. Table XVII. embodies some of the results quoted by Professor Unwin,§ the tensile strength being reduced to pounds per square inch. The bars were partly heated in oil and partly in sand, temperature being judged by the colour of the metal.

Table XVII.—The Influence of Temperature on the Tensile Strength and Elongation of Steel. (Elongation in a Length of 8 in.)

Type of Steel.	Temperature.	Tensile Strength.	Elongation.
	Degs. Fahr.	lbs. per sq. in.	Per centage.
Bessemer	60	58,396	27·34
,,	450	90,720	14·06
,,	520	86,688	17·18
,,	880	53,804	25·56
Bessemer	60	63,817	21·87
,,	430	86,016	18·75
,,	550	74,099	17·18
,,	580	41,574	25·00
Siemens-Martin	60	65,184	25·78
,,	430	74,928	14·06
,,	490	77,280	18·75
,,	610	62,720	18·70
,,	630	69,059	18·74

Other recent tests made by Mr. J. E. Howard at Watertown Arsenal, U.S.A., showed that tensile strength diminished as temperature was increased from 0 deg. to about 250 deg. Fahr. From the latter point upwards strength increased with the rise of temperature until the maximum was reached between 500 deg. and 600 deg. Fahr. At higher temperatures strength again diminished. Curves are given in Fig. 6, for four bars containing the following percentages of carbon : A, 0.20 ; B, 0.37 ; C, 0.57 ; D, 0.97. Mr. Howard's investigation further showed that the coefficient of elasticity decreased as temperature increased, the decrease depending upon the percentage of carbon in the steel, as indicated in Table XVIII.

Table XVIII.—The Influence of Temperature on the Modulus of Elasticity of Steel. (Values of E, in 1,000,000-lbs. Units.)

Percent. of Carbon.	Temp. Deg. Fahr.	E. per sq. in.	Temp. Deg. Fah.	E, per sq. in.
0·20	74	29·2	470	26·6
0·37	68	29·7	475	27·5
0·57	80	30·0	465	28·1
0·97	80	29·1	455	27·7

An elaborate report by Professor Martens,* on the influence of heat upon the strength of iron and steel contains a great deal of useful information on this point, but it is only necessary to mention the following facts : Commencing at 4 deg. Fahr., the tensile strength of mild steel diminished with increase of temperature to about 150 deg. Fahr. It then increased with the rise of temperature to about 480 deg., afterwards falling rapidly to about 13,440 lbs. per sq. in. at the temperature of 1,100 deg. Fahr. The yield point was found to fall regularly with the rise of temperature.

The safety of steel structures may sometimes be influenced by the peculiar behaviour observed by Professor Martens in steel at 570 deg. Fahr. At that temperature it appears that the strength of the material is greater, but its ductility is less than when in a cold state. Professor Martens says that fracture then occurs suddenly and without previous contraction, the metal exhibiting decided indications of brittleness. It may be doubted, therefore, whether steel at a temperature of 570 deg. Fahr. is capable of resisting repeated shocks or vibrations.

With regard to the endurance of steel subjected to repetitions of stress, a considerable quantity of data are available. Wohler's well-known endurance tests included experiments upon steel subjected to torsion, tension, and bending. Similar tests made by Sir Benjamin Baker included experiments on the endurance of bars subjected to repeated bending, and a large number of experiments have also been made by Professor Bauschinger. From the records thus made available we give in Table XIX. a few of the lowest and highest results. From this table it is clear that the variation of stress—which in the experiments quoted ranged either from — to +, or from zero upwards—is of more importance than its actual intensity. A singular point is that a bar of steel subjected to so many repetitions of loading as to be on the verge of failure, gives no indication in the testing machine that its strength or its ductility has been altered.

Table XIX.—Endurance Tests of Steel Subjected to Repetitions of Stress.

Character of Stress.	Maximum Stress.	Range of Stress, lbs. per sq. in.	Number of Repetitions.
Torsion[1] ...	48,160	48,160	373,800
,, ...	40,544	40,544	23,850,000[2]
Torsion[2] ...	25,760	51,520	859,700
,, ...	23,520	47,040	19,100,000[3]
Tension ...	85,568	85,568	18,741
,, ...	53,468	53,468	473,766
,, ...	51,340	51,340	13,600,000[3]
,, ..	58,688	58,688	40,000
,, ...	35,840	35,840	11,030,000[3]
Bending ...	74,838	74,838	104,300
,, ...	48,160	48,160	43,000,000[3]
,, ...	44,128	88,256	12,240
,, ..	34,496	34,496	3,145,020[3]

[1] In one direction. [2] In opposite directions alternately. [3] Not broken.

Nevertheless, the material actually breaks as if it were perfectly brittle. Taking this fact in conjunction with the ascertained increase of the elastic limit during repetition tests, it appears that the ductility of steel must be prejudicially affected by long continued vibration, although testing-machine observations seem to suggest that the alteration may be confined to planes of weakness. The practical lesson to be learnt by the concrete-steel designer is that the metal incorporated should not be exposed to repetitions of stress beyond safe limits of stress intensity.

The coefficient of expansion of steel is variously stated between 0·0000056 and 0·00000695. It is now usually taken at 0·0000066 for mild steel, and 0·0000069 for hard steel unit.

BOOKS RECEIVED.

Utility Fowlhouses and Appliances : No. 4 of Rural Handbooks. By H. Francklin. (Dawbarn & Ward. 6d.)

The Business Encyclopædia and Legal Adviser. Vol. iv. By W. S. M. Knight. (Caxton Publishing Co.)

Practical Building Construction. By J. Parnell Allen. Fourth Edition. (Crosby Lockwood & Son.

GENERAL BUILDING NEWS.

Rebuilding of Wednesfield Church.—Some eighteen months ago the Parish Church of St. Thomas, Wednesfield, was destroyed by fire, and immediately afterwards a committee was appointed to carry out the work of rebuilding. Drawings were prepared by Mr. Fred T. Beck, architect and diocesan surveyor, of Wolverhampton, and the contract was placed in the hands of Messrs. H. Willcock, of Wolverhampton. The whole of the edifice has been rebuilt, except the main walls of the nave and the tower at the west end, which have been repaired and pointed, and new balustraded parapets have been erected. The opportunity has also been taken for the enlargement of the church by the addition of a chancel sufficiently spacious to accommodate the choir and clergy, seats for whom were formerly in the nave. The organ-chamber has also been enlarged, vestries for the choir and clergy have been provided, and a semi-circular apse, forming the sanctuary, has also been added at the east end. The building is constructed of brick, with stone dressings, and the roofs covered with slates, the windows being glazed with new glass throughout, except those in the sanctuary, where the old stained glass which was saved from the fire has been utilised. The clock, which was entirely destroyed, has been replaced by a new one, and the bell has been re-cast. Internally the church has been remodelled in many respects, although the gallery system has been retained. The ceiling, which was formerly flat, is now arched in three spans. The galleries and roof are supported on rolled-steel stanchions. An oak balustrading forms the gallery front, which terminates at the eastern end of the nave with curved returns. The choir and clergy stalls and pulpit are executed in fumed oak, and the seating throughout the remainder of the church in pitch-pine. A font, executed in Hollington stone, has been placed near

* Report of the British Association, 1857.
† Proc. Inst. C.E., Vol. liii., p. 304.
‡ Proc. Inst. C.E., Vol. lxvii., p. 437.
§ "The Testing of Materials of Construction," by W. C. Unwin, p. 300.

* Mittheilungen aus den Koeniglichen technischen Versuchsanstalten. Berlin, 1890, p. 159.

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the west end. The total cost of the whole of the works is about 5,000*l.*

WESLEYAN CHAPEL, GREAT BARFORD, BEDFORDSHIRE.—The foundation stones of the new Wesleyan chapel were laid at Great Barford recently. The church is being erected by Messrs. G. Wycroft & Sons, of St. Neots, from plans by Mr. T. Cockrill, architect and surveyor, of Biggleswade.

RESTORATION OF CORSTORPHINE PARISH CHURCH.—A movement is on foot for the restoration of the parish church of Corstorphine in the neighbourhood of Edinburgh. The work is estimated to cost about 4,000*l.*, and it is understood that it will be almost immediately commenced, from plans by Messrs. Hay & Henderson. Externally the church will not be interfered with.

WESLEYAN SCHOOLS, OLD HILL, STOURBRIDGE.—Designs for a Wesleyan chapel and schools have been prepared by Mr. W. F. Edwards, of Birmingham, and the scheme is estimated to cost 4,500*l.* The chapel and schools are designed to accommodate 500 persons each, and are being erected by Messrs. Pugh & Sons.

UNITARIAN CHAPEL, MERTHYR. — The new Unitarian Chapel in Thomas-street, Merthyr, was opened recently. The chapel provides accommodation for 150 worshippers, and there is a schoolroom beneath. The building is Gothic in style, and is faced outside and inside with red pressed brick with Bath stone dressings, and has an open red tile roof. There are two entrances to the chapel, which is seated by open pews, and two also to the schoolroom, these being surmounted by an embattled parapet. Mr. E. A. Johnson was the architect. The contract was originally let to Mr. Edward Lumley, but the work was carried on to its completion by a committee after the death of the builder.

CHURCH, BURTON AGNES, YORKSHIRE.—It is proposed to carry out some necessary works of restoration to the church at Burton Agnes, near Driffield. A provisional scheme for repairing the church, at a cost of 1,000*l.*, has been adopted. Mr. John Bilson, F.S.A., is the architect.

RESTORATION OF BOSHAM PARISH CHURCH, SUSSEX.—A commencement has been made with the restoration of the village church at Bosham—a work which it is estimated will cost something like 2,600*l.* The work is to be confined practically to the tower, and the expenditure will not exceed 1,000*l.*, until more money has been subscribed or promised. Included in the work now to be carried out is the reshingling of the tower, the renovation of the oak work inside, a new bell frame, the recasting of one of the bells, the strengthening of the foundations, and the opening of an old Saxon window which is at present partly covered up. Messrs. Colson, Farrow, & Nisbett, of Winchester and London, are the architects.

RESTORATION OF FRIDAYTHORPE CHURCH, YORKSHIRE.—The ancient church of the Wold village of Fridaythorpe has been restored under the direction of Mr. C. Hodgson Fowler, F.S.A. Before the restoration, the church consisted of nave, chancel, and western tower, and for years had been in a very serious state of dilapidation, and the nave roof was supported by beams from the floor. After the work was begun and the plaster taken off the south wall of the nave, it was found to be in such a dangerous condition that two-thirds of it had to be taken down. All the facing stones were laid out in rows in the churchyard and rebuilt in their old position. The arcade on the north side of the nave had been built up, and it now opens to the aisle. When the arches were taken down, and the excavations being made for the present aisle, traces of another wall were found, which were apparently the foundations of the north wall of the Norman nave. The principal features of the old church, the nave of which was originally Norman, were the south doorway and the chancel arch, both of which have been kept without alteration. The doorway is a very elaborate specimen of late Norman, but shows traces of having been at some period, probably the thirteenth century, rebuilt, as many of the mouldings are out of place, and some seem to have been brought from another work. The chancel arch also was probably partially altered in the same century. The chancel appears to have been slightly altered in the same century, and the lower part of the tower is of the same date, whilst the upper part of the tower belongs to the middle of the eighteenth century. The recent additions consist of the north aisle, with a sacristy at its east end, both designed in the style of the fifteenth century, so as to show clearly that they are additions to the original church. All the roofs have been renewed in oak, with moulded beams and carved bosses. The whole of the fittings are in oak, the aisle being separated from the nave by an oak screen, which is carried across the west end, and some of the panels just inside the south door are filled so as to protect the worshippers from the draught. Under the chancel arch is another oak screen in the same position as the old one occupied. On the south-west of the nave a new porch has been erected. At the east end, which has no east window, is a carved oak triptych, designed by Mr. C. Hodgson Fowler. The carving has been done by Mr. Bridgeman, of Lichfield. The work of restoration has been carried out by Messrs. Thompson & Son, of Peterborough, Mr. Mills being foreman of the work.—*Yorkshire Herald.*

THE BIRMINGHAM CREMATORIUM. — The new crematorium for Birmingham, at Sheldon Coppice, near Rocky-lane, on the Birmingham and Walsall road, at Percy Barr, is, according to the *Birmingham Post*, rapidly approaching completion from the designs of Mr. Frank B. Osborn, architect. The chapel and crematorium stand in the centre of the land, and are approached through an entrance gateway and drive from the main road, at which there is an ornamental lodge. At the entrance to the chapel there is a large porch or vestibule. The size of the chapel itself is 50 ft. long by 25 ft. wide, and about 40 ft. high to the ridge, with an open-timbered roof, the total length of the building being about 107 ft. On one side there is a vestry and registry office with a separate entrance, and on the other side a small mortuary chamber. The chapel is principally lighted by lofty clearstory windows, and underneath these on both sides are recesses for the reception of urns containing the ashes of the dead. If relatives prefer, these urns may be placed in cloisters of ornamental design, which they will be at liberty to erect in the grounds. The chapel, which is in brick and red stone, with tiled roof, will be provided with chairs and furnished with a reading-desk. The catafalque will be against the end wall opposite the entrance, and is to stand on a stone platform approached by two steps. Immediately behind the catafalque, and concealed by curtains, is an iron door leading to an intermediary chamber. On the north-west side is an ornamental tower, 80 ft. in height, containing the stack.

CONVALESCENT HOME, SWANSEA.—The opening of the new convalescent home in connexion with Swansea Hospital took place recently. Having a south-west aspect, the building will be approached from Terrace-road. The home consists of three blocks. The centre one is the administrative block, and on either side, approached by open corridors, are two ward blocks—one ward for men and one for women. On the ground floor of the administrative block is the entrance-hall, with waiting and staff rooms, dining-hall (for use of all patients), with kitchens and offices in close proximity, and a loggia in front running the whole length of the room. On the first floor are arranged bedrooms for the staff and nurses, with bathroom, lavatories, &c. The accommodation provided in each ward block is a large dayroom, a ward for ten beds, bathrooms, and lavatories, with verandahs running the whole length of the buildings. This accommodates twenty patients. The work generally is of local stone, with brick quoins and rough cast; the top floor of the administrative block has the walls covered with red Broseley tiles, and all the roofs are covered with terra-cotta slates. The contract has been carried out by Mr. Griffith Davies, Mr. Daniel Evans was clerk of works, and the whole of the work has been designed and carried out under the supervision of Mr. Glendinning Moxham, architect, Swansea.

CHURCH SCHOOLS, GREENGATES, YORKSHIRE.—Church Sunday schools have been erected at Greengates from plans prepared by Messrs. T. and H. Healey, of Bradford, the architects. The edifice is situate on the summit of the hill on Carbottom-road, and has cost about 3,500*l.* The building is of stone, and in addition to a central hall, there is a smaller hall. There are also a number of classrooms.

JEWISH HOSPITAL, MANCHESTER.—On the 23rd ult. the foundation-stone of the Manchester Jewish Victoria Memorial Hospital was laid. The site is in Elizabeth-street, and it is estimated that the cost of the scheme, when completed, will be between 10,000*l.* and 12,000*l.*, but the work now embarked upon will involve an outlay of between 3,500*l.* and 4,000*l.*, and this will enable provision to be made for ten patients. The administration block will occupy the front of the site facing Elizabeth-street, and will afford accommodation for the resident medical officer, matron, nurses, and servants. The out-patients' department will be at the corner of Elizabeth-street and Sherbourne-street, and the in-patients' portion will face Sherbourne-street, with the ward windows overlooking the adjoining park. In this block, which will be entirely detached from the administration block, except for a subway in connexion with the kitchen, it is proposed to make provision in the complete scheme for forty patients, twenty of each sex. The architect is Mr. W. Cecil Hardisty, of Manchester.

NEW ROYAL VICTORIA HOSPITAL, BELFAST.—This building, which has just been opened by the King, is situated in Grosvenor-street. The new hospital has 300 beds, and has been designed by Messrs. Henman & Cooper, of Birmingham. Illustrations and a long description of the building appeared in our issue for December 21, 1901. The main corridor, 460 ft. long, extends from east and west, and from it seventeen side corridors open south, each leading to a complete "unit," consisting of a large ward with fourteen beds, one or two small wards with two beds each, kitchen, bathroom, &c., and either a clinical lecture-room or an operating theatre. The large wards lie side by side, only a dividing wall between two, and are lit by lantern lights in the roof, and a large French window at the south end of each opening on to a balcony and looking into the garden. The air is admitted by three openings on each side of each ward, 7 ft. from the ground, and escapes by a number of smaller openings at the level of the floor. The seventeen units are distributed two each, a male and female, to the four senior surgeons and four senior physicians, and one to the gynæcologist. The ophthalmic unit is on the north side of the main corridor, and contains two wards with six beds each, and an operating theatre with western light. There are, besides, detached buildings for septic and infectious cases, and a pathological building. Opening off the main corridor on the north are the administration block, including a wing for the resident medical staff and one for the nursing staff, and the extern department. The latter consists of a central hall, lighted from the roof like the wards, and surrounded by about eighteen smaller rooms, including medical (male and female), surgical (male and female), gynæcological, ophthalmic, emergency, recovery, &c. The two large wings of the central administrative block are the only parts of the entire building rising above one story. The ventilating system is arranged to give an entire change of air seven times an hour in winter, and ten times in summer. The cost of the hospital works out at between 300*l.* and 350*l.* per bed.

CAMBERWELL INFIRMARY, BRUNSWICK-SQUARE.—The infirmary previously existing in Havil-street consisted of one H-shaped building erected in 1873, with basement rooms, and one circular pavilion erected in 1889. These are now being altered and modernised to form part of the larger institution, which consists of twenty-one buildings standing on a site of several acres, practically surrounded by roads, and all buildings are connected by glass-covered ways and subways. It accommodates 800 patients, has a resident staff of five doctors, while the other officials, nurses, and servants number about 160. It is built of fire-resisting material, and special provision is made for escape. It contains a fully-equipped operating theatre with recovery-room attached, an electric treatment room with all modern appliances. It is electrically lighted, has electric lifts of special labour-saving type, laundry motors, electric ventilation, and a heating scheme on a system only existing in one other institution in London, erected under the same architect a year or two ago. The new pavilions are axially north and south; each consists of three main stories and a fourth one over part of the area. It has at the home end a wide staircase, with walls of glazed brick from bottom to top. At the other end it has a secondary or escape staircase, extending from the flat roof to the road, in what is practically a separate tower. There are three exits from the building. On each floor there is a ward of twenty-four beds, with windows on three sides, and other wards of six four, and two beds respectively, affording opportunity for classification. There is a ward kitchen. This and the corridors have also all their walls of glazed brick. There are other necessary offices and two sanitary towers—one for baths, one for closets, &c. These are placed near the centre of each block, so that patients from the smaller wards may not have so far to go as if the towers were at the extreme end. In some of the pavilions there are separate bathrooms and closets attached to the six-bed wards used for special diseases. The twenty-four, two, and four bed wards are open to supervision from the ward kitchen and from each other. All are well lighted, and every window opens. There is only one fireplace of faïence at the end of each ward, for cheerfulness, the heating proper being by hot water. The walls of all parts are painted in soft colours. All wards have polished teak floors, the kitchens terrazzo floors. On every floor a balcony the whole length of the large ward faces west, and is sheltered from all cold and flanking winds. The large ward on the top has been specially designed for consumptive patients. Practically the whole of the enclosures on three sides consist of opening windows, for open-air treatment, and above is a flat roof, on which patients may spend all the day. Three of the pavilions are so designed. All pavilions have electric lifts capable of taking beds of full length. These are so designed that no special attendant is necessary. By pressing a button the lift comes to the required floor, and inside, of course, it can be made to stop when required by pressing another button. The children's pavilion is four-storied, and contains wards of one, two, four, and eight beds, providing accommodation for eighty-eight patients, with eight bathrooms and sanitary appliances for boys and girls respectively, in towers at the two ends. There are two main staircases and a bed-lift; a kitchen, linen-room, &c., on each floor. The children's wards have wide balconies on each floor, capable of taking beds if desired. There are four exits from this building. The ventilation—*i.e.*, the continued circulation of air—is ensured by an extraction flue from each room, connected to main trunk shafts or conduits over the central corridor, at the end of each being an electrically driven fan. The trunk conduit is equal in area to all the subsidiary flues, and by an adjustable shutter in each of the latter the velocity of the up-current can be regulated. All sanitary apparatus—baths, closets, and lavatories—is concentrated at the end of the corridors. The heating is a special feature. Instead of the system of conveying live steam to calorifiers placed under every building, or the practice of placing a furnace in each, the system here consists in placing

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only three calorifiers under the immediate eye of the engineer. These are heated by exhaust steam from engines, &c., and from them water is pumped all over the institution for heating and domestic hot-water supplies. The pipes are in subways high enough to walk in, all lighted by electricity, and cross-ventilated at frequent intervals. The advantages of one heating station are obvious. The boilers are four in number, and are mounted with duplicate steam ranges. The laundries are both arranged so that linen received soiled at one end passes through, and out clean at the other. The machinery is driven by a 45-h.p. motor. Electric fans remove all steam and polluted air. The drying is by hot blast. By the system of drying-horses and the hot blast, each horse can be loaded in rotation. By the time the attendant has loaded the last one, the goods at the other end are dry and ready for removal, when the horse can be again loaded, and so on. The general contractors for the works have been Messrs. Holliday & Greenwood, of Brixton. The sub-contractors have been:—For boilers, Messrs. Fraser & Fraser; steam pipes, Messrs. Taylor & Son; electric engines, motors, and pipes, Messrs. Crompton & Co.; electric mains and wires, Messrs. Wells & Co.; electric treatment appliances, Mr. Leslie Miller; heating apparatus and hot-water supplies, Messrs. Dargue, Griffiths, & Co.; laundry machinery, Messrs. D. & G. Tullis; kitchen apparatus, Messrs. Moorwood, Sons, & Co.; electric lifts, Messrs. Waygood & Co.; fire hydrants, &c., Messrs. Merryweather; weighbridge, Messrs. Avery; entrance gates and railings, Messrs. Imison & Ottoway; disinfector and incinerator, Messrs Manlove, Elliott, & Co. The clerks of works were Mr. Durston and Mr. Rayner; the general foreman, Mr. Price. The architect's consulting and inspecting engineers were Mr. Edward G. Hiller, of Manchester, and Messrs. Dolby & Williamson, of Westminster. The whole has been carried out from the designs and under the superintendence of the architect, Mr. Edwin T. Hall.

EUSTON HALL, SUFFOLK.—This house, the seat of the Duke of Grafton, which was almost entirely destroyed by fire in the spring of last year, is being rebuilt. Externally the general lines and character of the old building are to be maintained, but internally the arrangements have been remodelled to meet present-day requirements. The works are being carried out by Mr. Thomas Heath, of London and Towcester, under the directions of Mr. W. H. Atkin Berry, of the firm of Kidner & Berry, architects, London.

SCHOOLS, PORTSLADE-ON-SEA.—New schools in this suburb of Brighton were opened on the 22nd ult. The walls are of brick, plastered internally throughout with painted cement dados. The roofs are covered with tiles, the floors of school and classrooms with wood blocks, and the corridors, cap-rooms, and lavatories with granolithic paving. The warming is by open fireplaces and the ventilation by Boyle's system. The architect is Mr. E. Lingen Barker.

CAPITAL AND COUNTIES BANK, BRIGHTON.—This new building at the Western corner of the principal approach to the Royal Pavilion is now completed. The architects were Messrs. Clayton & Black, Brighton.

HOSPITAL, ROCHESTER AND CHATHAM.—Mr. R. Deane Sweeting, M.B., one of the Inspectors to the Local Government Board, recently held an inquiry as to the application of the Joint Hospital Board for Rochester and Chatham for sanction to borrow 2,400*l.* for further enlarging and improving St. William's Hospital for Infectious Diseases. The loan now being asked for is 1,700*l.* to meet the cost of additional works and improvements to complete the new buildings, plans for which were approved by the Local Government Board in 1901, when a loan of 9,000*l.* was sanctioned. The remaining 700*l.* is needed for furnishing the new blocks. Mr. Bond, the architect, explained in detail the alterations and additions to the observation ward block, the administration block, the convalescent block, the isolation block, the discharge block, porter's lodge, kitchen, doctor's room, and a separate contract (185*l.*) for a stable and coach-house. He explained that a very heavy item of expenditure beyond the original estimate was caused by 4½ in. more brickwork having to be put round the whole of the buildings—making the walls two and a-half bricks thick—to comply with the by-laws of the city of Rochester.

MISCELLANEOUS.

CEMENT IN BULGARIA.—In the Report on the trade of Bulgaria for the year 1902, by the British Consular officers, the following passage occurs:—"Portland cement is well known and liked, but conditions are too inelastic and prices too high. It is believed that a great part of the success of our Continental competitors results from their making barrels of any size desired, and it might be sold by weight."

LIBRARY, BRENTFORD.—The Countess of Jersey laid the foundation stone on the 27th ult. of the new free library in Clifden House grounds. Mr. Nowell Parr is the architect. Situated near by the municipal buildings the library will be entered by a porch leading to the main hall. On the left and right respectively are the reference library and newspaper room, and at the rear the lending department. From the hall a teak staircase will lead to the lecture-room and museum. The lending department is 39 ft. long by 27 ft. wide, with bookshelves to accommodate 20,000 volumes. The reference department is a room 30 ft. 6 in. by 20 ft., and will accommodate about thirty readers at one time.

TIMBER TRADE OF SWEDEN.—According to an official Report just to hand, the export of deals, battens, and boards (planed and unplaned) from the whole of Sweden, in St. Petersburg standards, was last year 1,004,606, as compared with 903,787 in the previous year, 1,009,448 in 1900, 1,026,692 in 1899, and 1,015,835 in 1898. The shipments to the United Kingdom in 1902 comprised 449,198 standards as compared with 399,376 in 1901, 450,887 in 1900, 480,076 in 1899, and 468,782 in 1898. From this return it appears that the total export of these kinds of wood during 1902 amounted to about 11 per cent. more than in 1901, but, with the exception of the latter year, one must go as far back as 1893 to find such low figures. There was an increase of about 50,000 standards to the United Kingdom as compared with 1901, which itself was the poorest year since 1896.—Mr. Carrick, British Vice-Consul at Gefle, in a recent communication to the Foreign Office, remarks that "the tendency observable in the timber trade of Sweden of late years to amalgamate the large sawmill companies, and thereby to obtain control of large areas of standing wood, to the exclusion of competition, made great progress in 1902. These combinations are not only rendering it increasingly difficult for the small millowner and shipper to exist, but are likewise rapidly absorbing the estates of the peasant proprietors. Whether the transformation of the latter from a comparatively independent position to that of mere dependants on the large sawmill companies is advantageous for the country at large may well be doubted."

HOUSING SCHEME, BLACKLEY, MANCHESTER.—Colonel A. G. Durnford, on behalf of the Local Government Board, held an inquiry in the Lord Mayor's Parlour, at the Manchester Town Hall, on the 21st ult., into the application of the Manchester Corporation for sanction to borrow 10,000*l.* for the purposes of their schemes for the provision of dwellings at Blackley. Mr. Hudson, the Deputy Town Clerk, who represented the Corporation at the inquiry, explained that 60,000*l.* had already been borrowed by the Corporation for the housing schemes at Blackley. The schemes had been undertaken to fulfil certain obligations incurred by the Corporation by the demolition of property for street improvements. The City Council had agreed to construct eighty houses to meet their obligations in Rochdale-road, fifty houses in respect to property demolished in Ardwick, twenty houses with respect to Millgate, and fifty-three houses were to be built under the powers granted to the Corporation under the Housing of the Working Classes Act. The estimates for the work showed that it would cost 62,707*l.* To that had to be added the cost of making certain side roads, which were needed in order to erect the cottages, and that amounted to 7,203*l.* Included in that sum was the cost of forming the roads, making them up in a sufficiently substantial manner, and of sewering the roads. The 7,203*l.*, together with the balance of 2,707*l.* on the 62,707*l.*, made up the sum for which the borrowing sanction was asked. Evidence as to the details of the work having been given by Mr. T. de Courcy Meade, the City Surveyor, and Mr. H. Price, the City Architect, the inquiry was closed.

HOUSING, BIRMINGHAM.—The Housing Committee of the Birmingham City Council report to the City Council that they have been in negotiation with the owners of properties in the various parts of the city for the removal of obstructive buildings at the entrances to courts, for the purpose of admitting more light and air to the houses in the courts. In this connexion they have been in negotiation with the representatives of the freeholders, and with the lessees of a block of property fronting to William-street and Bishopsgate-street, shown on a plan accompanying the report. The plan is in duplicate, Print A showing the present arrangements of the buildings, and Print B showing the alterations proposed by the committee. It is suggested that the following buildings be removed:—No. 99, William-street, and Nos. 5 and 6 at rear, also the shopping at rear of No. 100. No. 102, William-street, and No. 6 at the end of the court. No. 103, William-street, and the shopping at rear. No. 106, William-street. The front of No. 28 Court. The stable, &c., to be demolished and the site paved. No. 6 Court, Bishopsgate-street—one house on the right at the end of the court. No. 7 Court, Bishopsgate-street—one house at the end of the court. No. 9, Bishopsgate-street—one house at the end of the court. No. 31, Bishopsgate-street, and the house at the end of the court at the rear thereof. Arrangements are being made between the freeholders and the leaseholders for the surrender of the present leases, the outstanding terms of which are fairly short, and the granting of new leases. The conditions of the renewal of the leases will include the thorough repair and rearrangement of the houses and out-houses; congested courts will be cleared of obstructive buildings and opened up to the street, thus admitting an increased supply of light and air to the houses that remain in the courts. All pan closets will be converted to water-closets. In addition to the above buildings, the committee have also been in negotiation with the owners of the undermentioned obstructive properties for their removal, viz.:—No. 52, Dartmouth-street; No. 7 and No. 18 at rear, Bishopsgate-street; No. 29, and No. 2 at rear, Lower Tower-street; No. 19, and No. 6 at rear, Brearley-street; House in No. 19 court, New John-street; House in No. 4 court, Manchester-street. No. 25, Manchester-street. House in No. 14 court, Great Barr-street. The committee have carefully gone into each case, and now recommend that they be instructed to proceed with the completion of the negotiations. The amount of compensation which will have to be paid to the various owners of all the obstructive buildings now referred to is estimated at 1,000*l.* It should be stated that this amount is intended to include the pulling down of the buildings and the paving of the sites, which will be kept permanently open. The small cost to the Corporation of these improvements will, in the opinion of the committee, be justified by a reduction in the death-rate, and the improvement in the health of those living in the neighbourhood that must ensue from the increased supply of light and air, and the substitution of modern sanitary conveniences. The committee submit the following figures showing the details of the work dealt with by them to June 30 last:—Represented by Medical Officer of Health to date, 650 houses; closing orders obtained, 114; houses rendered habitable, 157; houses demolished, 35; houses undergoing repairs, 143; legal notices unexpired, 247; negotiations pending, 74. This does not include all the houses that have been repaired and rendered habitable, as in many instances where two or three houses have been represented in a court, the committee have been able by negotiation to obtain the proper repair of the whole of the houses in the court. The committee ask for the appointment of another inspector experienced in the building trade, at wages of 35s. per week.—*Birmingham Post.*

WHITE MASTIC TUCK POINTING.—A correspondent asks us for a recipe for white mastic tuck pointing. We may say that a mastic which will be very nearly white can be made by mixing two parts of white lead, three parts of fine silver sand, and three parts of lime, with linseed oil; but whether this is the composition intended we cannot say, as the term "white mastic" is very indefinite. In America a putty composed of lime, plaster of Paris, and white lead is sometimes used for pointing. If the description occurs in a specification, the best course will be to ask the writer of the specification for a recipe.

BRIDLINGTON PARADE EXTENSION.—At the Town Hall, Bridlington, recently, Mr. W. O. E Meade-King, M.Inst. C.E., conducted a public inquiry relating to various sums of money to be borrowed for purposes of constructing the Victoria Sea Defences, a new footpath, an extension of the Prince's Parade, &c. The Town Clerk (Mr. A. E. Matthewman, B.A., LL.B.), the Borough Surveyor (Mr. E. R. Matthews, C.E.), Mr. C. Palmer (Parade Manager), and Mr. W. H. Littlewood (representing the firm of Messrs. Magnall & Littlewood, architects), were present.

HUMAN REMAINS IN LIVERPOOL-STREET.—In excavating the roadway at the western end of Liverpool-street, E.C., for the construction of an underground lavatory the workmen have found a large amount of human remains—so large, indeed, that it is deemed advisable to suspend operations for the present, and to obtain authority for their proper reinterment elsewhere. In one portion of the sinking the skulls and bones were massed together as though the burials had been made hastily in a pit, but in another portion they are mingled with coffin-handles and other indications of more orderly burial. The terminus in Liverpool-street stands on the site of the first Bethlehem Hospital, originally founded as a priory of canons, with brethren and sisters, in 1240, and dedicated to St. Mary of Bethlehem, by Symon FitzMary, sheriff for that year. In 1806 the Great Eastern Railway Co. paid to the hospital governors a sum of 61,000*l.* for the site of their terminus. Before the building of the adjoining North London Railway terminus, opposite the end of Broad-street, the recipients of the Pitt dole of sixty loaves used to attend on each Whitsun-day in a private garden which had been a burial-ground appertaining to the hospital. Stow records that in the year 1569 Sir Thomas Roe, Mayor, "caused to be enclosed with a wall of brick about one acre of ground being part of the hospital of Bethlehem. . . . This he did for burial and ease of such parishes in London as wanted ground convenient within other parishes." It seems very likely, then, that a part of the old graveyard is now disturbed, its existence having become forgotten. Within one hundred years after its establishment the priory is named as a hospital (1330); in 1346 it passed under the protection of the City, and in 1546 the Corporation bought the patronage, property, and buildings, with a bequest, *ad hoc*, of Stephen Gennings, citizen. The hospital was known as an asylum for lunatics in the early years of the fifteenth century, when, as Stow says, "a King of England not liking such a kind of people to remain so near his palace," had caused certain lunatics to be removed from Charing Cross to Bethlehem in Bishopsgate Without. After

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the Dissolution, Henry VIII. having confirmed the purchase by the Corporation, Bethlehem became the "Bedlam," which it has been ever since, and continued on that site until the building, in 1675-6, by Robert Hooke, the celebrated mathematician, as City Surveyor, of the hospital in Moorfields, against the northern side of the London Wall. The registers of St. Botolph, Bishopsgate, contain an entry: "1608, April 9. Buried, Lady Mary Bohun, *alias* Stafford, bd. out of Bethlehem House, aged 140."

SEWERS.—The following local sewers are to be constructed:—Camberwell: 615 ft. of 9-in. pipe and concrete sewer in proposed new road between Forest Hill-road and Underhill-road to be called "Ryedale." Fulham: 750 ft. of 12-in. pipe and concrete sewer in Micklethwaite-road from Halford-road to Farm-lane. Lambeth: 1,175 ft. of 15-in. pipe and concrete sewer in an extension of Sudbourne-road to Brixton Hill.

MIDDLEWICH CHURCH.—There has been recently placed in the north aisle of St. Michael and All Angels, the parish church of Middlewich, Cheshire, a large four-light window of stained glass, the subjects chosen being "Christ Preaching," "Christ, the Good Shepherd," "Christ Knocking at the Door," and "Christ Healing the Sick." There are also four adoring angels in the tracery. The work has been carried out by Messrs. Pepper & Co., of London, from the designs of Mr. R. Wylie, architect, &c., Liverpool.

ROYAL INSTITUTE OF PUBLIC HEALTH: LIVERPOOL CONGRESS.—At an adjourned meeting of the Preventive Medicine and Vital Statistics Section, held on Tuesday, July 21, it was proposed by Dr. Vacher, County Medical Officer of Health for Cheshire, seconded by Dr. H. Scurfield, Medical Officer of Health, Sunderland, and unanimously resolved: "That this 1903 Congress of the Royal Institute of Public Health, held at Liverpool, approves of the efforts made by the Worshipful Company of Plumbers in promoting the Plumbing Registration Bill, believing that such a measure will be for the safeguarding of the public health and beneficial to all classes of the community, and appeals to the Government to give facilities and support to the measure."

ST. BARTHOLOMEW'S HOSPITAL.—It will be recollected that as a result of the criticisms of the appeal for the enlargement of St. Bartholomew's Hospital, a committee was appointed at a Mansion House meeting last January to report on the matter. The committee have now reported. They have come to the conclusion that the value of the site of St. Bartholomew's Hospital has been much exaggerated, and that there would be very little, if any, ultimate money profit to the hospital in removing the building from its present situation to any other locality. The committee next carefully considered the present buildings of the hospital, and the necessary additions demanded by the medical and surgical staff. They are satisfied that important additions to and a considerable rearrangement and improvement of the existing buildings are necessary, and they consider that, with the additional land purchased from Christ's Hospital, there will be ample room for the provision of a hospital with every modern appliance. The committee, having carefully examined the several plans placed before them, consider that a thoroughly efficient hospital can be provided by a gradual building scheme under which the improvements and alterations contemplated can be secured so soon as funds are obtained. The committee are assured of the great value of the medical school to the hospital and the public. For the continued efficiency of the treatment of the patients, the teaching in the school and the advancement of medical science, greater facilities for research and teaching are absolutely necessary, and call for additional accommodation. The committee recommend that the rebuilding of such parts of the hospital as are most urgently needed be proceeded with so soon as sufficient funds are collected.

LEGAL.

NUISANCE CASE IN SLOANE-STREET, W.

THE hearing of the case of Ash and another *v.* The Great Northern Piccadilly and Brompton Railway Co. concluded last week before Mr. Justice Kekewich in the Chancery Division.

The action was brought by the plaintiffs, tenants of residential flats at No. 7, Sloane-street, London, for an injunction to restrain the defendants from causing a nuisance in the construction of certain works on and under a piece of land adjacent to the plaintiffs' premises, near the site of the Sloane-street station on the section of their Tube Railway between South Kensington and Piccadilly-circus.

The facts were these:—In March, 1902, defendants, before acquiring Parliamentary powers, by agreement with the landowner, entered upon the piece of land and sunk a shaft within about 25 yards of the plaintiffs' premises in order to clear away the soil taken from this section of the tunnel and to connect the station with the tunnel by a subway. Defendants continued this work night and day, and plaintiffs' case was that the noise caused by the carting of earth, hammering timber, and using a steam crane, &c., during the night caused an intolerable nuisance to themselves and the tenants in the flats, and that the value of the flats was thereby being greatly diminished.

Defendants relied on the statutory powers they subsequently obtained, and contended that they had acted reasonably in the construction of their work.

In the result, Mr. Justice Kekewich, after hearing the evidence, in giving judgment, said that by the Act of 1902, which received the Royal assent in November of that year, the Company had power to enter upon, take, and use the piece of land in question. In the previous March, however, the defendants entered into possession by private agreement with the landowner for a long lease for the purposes only of building a station. In doing that the Company anticipated their Parliamentary powers at their own risk, and had no power to use the land for the general purposes of their undertaking. It was not until November, 1902, that their possession became lawful for the purposes of the Act. Upon the construction of the Act his lordship held that the Railway Company were authorised to use the piece of land in question for the general purposes of their undertaking, and that the Act could not fairly be construed otherwise. It followed that from November, 1902, they could use this land for the general construction of their railway. His lordship held that there had been a common law nuisance by the defendants, but that the Railway Company had acted reasonably in carrying out the work, and had promised to do what they could to reduce the noise, &c. On general grounds he was, therefore, in favour of the defendants, but as Mr. Ash, one of the plaintiffs, had given uncontradicted evidence that from March to November, 1902, when the defendants had no exemption by statutory powers, he and his family had suffered from the nuisance caused by a traction-engine upon the works, the Railway Company must pay him 20*l.* damages. Apart from this, the plaintiffs' action failed, as from November, 1902, the defendants had acted reasonably in the exercise of their statutory powers.

Mr. Warrington, K.C., and Mr. Cozens Hardy appeared for the plaintiffs, and Mr. Roskill, K.C., and Mr. Clauson for the defendants.

ACTION ON A COVENANT.

THE case of Moore *v.* Todd came before the Court of Appeal, composed of Lords Justices Vaughan Williams, Romer, and Stirling, on the 24th ult., on the defendant's appeal from a decision of Mr. Justice Bigham in the King's Bench Division.

It appeared that the defendant, the Rev. J. W. Todd, of Forest Hill, Kent, wishing to develop some land fronting the road at Bromley, for building purposes, widened the roadway running by his land and constructed a road and metalled and made up the surface. The plaintiff, being the owner of property on the opposite side of the road, agreed to contribute 250*l.* towards defendant's expenses in improving the road and in the deed entered into between the parties was a covenant by the defendant that the plaintiff, his heirs, or assigns, or his or their tenants should not be under any liability to contribute to the maintenance or repair of the roadway and sewer and main drain, or any works connected therewith; but, on the contrary, that the same and every part thereof should be wholly maintained by the defendant and his heirs, executors, &c., until the same should be taken to by the Local Authority. In 1901 the Beckenham Local Authority served the frontagers with notice to make up the road, and, in default, executed the work themselves, and charged the frontagers with the cost, under Section 150 of the Public Health Act, 1875. The plaintiff's share of the costs under this amounted to 108*l.*, and he brought the present action to recover that sum from the defendant, under the terms of the before-mentioned covenant. Mr. Justice Bigham held that the object of the covenant was to protect the plaintiff from this kind of liability, and gave judgment for the plaintiff for the amount claimed. Hence the present appeal of the defendant.

At the conclusion of the arguments, Lord Justice Vaughan Williams, in giving judgment, said that the object of the covenant was to protect the plaintiff from any kind of liability which he became subject to by reason of the statutory notices served by the Local Authority. It was clear from the covenant that the road was to be wholly and solely maintained by the defendant until it was taken over by the Local Authority; but the question was whether the defendant was liable to indemnify the plaintiff against the sums which the plaintiff was called upon to pay by the Local Authority by reason of the excercise by the Local Authority of their rights and powers to sewer, pave, &c., under the Public Health Act, 1875. He thought, however, that the word "contribute" in the covenant might properly be limited to contributions for maintenance and repairs which from time to time became necessary for the roadway which had been made by the defendant and to the expenses which the plaintiff had contributed. As his lordship entertained that view very strongly, he thought the appeal should be allowed with costs.

Lords Justices Romer and Stirling concurred, and the appeal was accordingly allowed with costs.

Mr. C. A. Russell, K.C., and Mr. C. C. Scott appeared for the appellant; and Mr. J. Eldon Bankes, K.C., and Mr. R. V. Colam for the respondent.

TARPAULIN SHELTERS ON SCAFFOLDS.

QUESTION AS TO SUB-CONTRACTOR'S NEGLIGENCE.

AT the Marylebone County-court, on Tuesday, before Deputy-Judge Fitzroy Cowper, Miss Frances Spatman, a machinist, Bow Common-lane, E., brought an action against Mr. H. G. Barrett, builder (trading as H. G. Barrett & Co.), 59, Fernhead-road, Paddington, W., also against Mr. William H. Voyce, a bricklayer, 18, Felixstowe-road, Kensal Rise, N.W. The plaintiff claimed 25*l.* damages in respect of personal injuries, said to have been sustained owing to negligence on the part of the defendants or their servants.

Mr. E. Overhead, counsel, appeared for the plaintiff, and Mr. A. H. D. Nonweiler, solicitor, for the two defendants.

Plaintiff's counsel stated that on May 7 last his client was walking along Middlesex-street, E., and as she was about to pass a scaffold, erected for building operations which were being carried on by Messrs. Barrett & Co., a wooden beam fell from a window above upon plaintiff's shoulder with a dreadful crash. By the blow the young woman was struck to the ground, where she remained for a time unconscious. Owing to the injuries the plaintiff was prevented from returning to business for eight weeks. In a letter written to plaintiff's solicitors, Mr. Barrett said, "Mr. W. Voyce, bricklayer, of 18, Felixstowe-road, Kensal Rise, is liable for whatever has happened. He has taken the work piecework from me."

After the accident Voyce called upon the plaintiff, explaining that he had taken the "pointing" work at the job from Mr. Barrett, and then offered her 10*s.*

The plaintiff bore out counsel's opening statement.

In cross-examination, plaintiff denied that it was windy at the time of the accident, and added that after the accident Voyce said it was owing to the negligence of some one that the board fell.

Miss May Spatman, the plaintiff's sister, gave evidence relating to the accident; and a medical man described the plaintiff's injuries.

Mr. Nonweiler submitted that there was no evidence of negligence against Mr. Barrett.

His Honour agreed and held accordingly, granting a nonsuit in respect of Mr. Barrett, with costs.

The defendant Voyce was then called. He stated that he had taken the pointing work at the job in question, and in consequence of the wet weather he was obliged to fix up a large piece of tarpaulin for the men to work under. The piece of timber in question was used to support the tarpaulin. Suddenly a gust of wind came and the board was blown to the ground.

The Judge: I think on this defendant's own showing there is evidence of negligence on his part. It was a careless thing to do, I think, to put up this tarpaulin in such a way on a windy day. It was evidently risky putting up such a shelter, but if it was put up precautions should have been taken to see that it was perfectly secure. I find for the plaintiff against Voyce for 12*l.* 15*s.*, with costs.

POINT UNDER THE LONDON BUILDING ACT, 1894.

IN the Court of Appeal, composed of the Master of the Rolls and Lord Justice Mathew, on the 28th ult., the case of *in re* an arbitration between Wm. Stone and Arthur H. Hastie came on for hearing on the appeal of A. H. Hastie from an order of Mr. Justice Walton in chambers.

Mr. Hansell appeared in support of the appeal, and Mr. Clavell Salter for the respondent Stone.

Mr. Hansell, in opening the case, said the appeal was from an order of Mr. Justice Walton in chambers by which the learned Judge partially reversed the order of the Master. The application before the Master was under Section 12 of the Arbitration Act for leave to enforce an award made under the provisions of the London Building Act, 1894, the Master giving leave to enforce the award. The award contained three heads of claim, as to two of which there was no dispute. Mr. Stone objected to the third head of claim, and he appealed from the order of the Master to the Judge, and he reversed the order of the Master and refused leave to enforce the award under the one head in dispnte. The case involved a question of general importance on the construction of the London Building Act. The facts were these:—The appellant was the lessee of No. 17, Queen-street, Mayfair. He took the lease from trustees from June 24, 1807, for twenty-one years at a rent of 300*l.* per annum. Before the lease was granted by the trustees, the lessors had to partially rebuild the party-wall between No. 16 and No. 17, and they paid the expenses, whatever they were, of the rebuilding. Mr. Stone, the respondent, in 1901 or the beginning of 1902, acquired the long lease of No. 16, Queen-street, and on January 18, 1902, gave a notice under the London Building Act, as building owner, to Mr. Hastie as adjoining owner of the work he (Mr. Stone) intended doing. This included the cutting into and making an extended use of the party-wall in question. At the bottom of the notice there was added these words:—"I hereby appoint

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Messrs. Rolfe & Matthews to act as my surveyors." Mr. Hastie, not assenting to the proposed work, appointed a Mr. Willoughby as his surveyor in the dispute which had arisen. The two surveyors between them appointed Mr. Douglass Mathews the umpire. Mr. Hastie claimed 18*l.* for the damage done during the building operations, and there was no dispute about that part of the claim. He also claimed compensation in regard to the extra use which was being made by Mr. Stone of the party wall. The two surveyors and the umpire met and the points were raised, and on April 25, 1903, they issued the award. They awarded (1) 18*l.* for the damage done, which was agreed to, and (2) that the sum of 38*l.* 10s. 6d. be paid by the building owner in payment of the extra use of the party-wall in excess of the portion previously used as the party-wall of the old building formerly occupying the site of No. 16, Queen-street. Mr. Hastie took up the award on May 22, and then a summons was issued for leave to enforce the award under the Arbitration Act. The learned counsel said that under the provisions of the London Building Act an award could only be questioned by an appeal to the County Court within fourteen days after it had been taken up. That was the first point to be considered.

The Master of the Rolls: What was the date of the taking up of the award?

Mr. Hansell replied he thought it was May 22. There was no dispute that the fortnight had elapsed before any proceeding was taken. On June 17 Mr. Hastie took out a summons to enforce the award as a judgment of the High Court, and the Master gave leave to enforce the award. The matter then came before the Judge, and on July 10 he gave his decision. He enforced the award as to the payment of the 18*l.* to Mr. Hastie, and directed that the latter should pay the costs of the award. He, however, refused to enforce the award as to the amount for the extended use of the party-wall. The learned counsel contended, first, that it was not open to the respondent to question the award except by the process pointed out by the London Building Act; secondly, that as the matter had been discussed and considered by the respondents' own arbitrator, who had signed the award, he could not now go behind it by an application of this sort; and thirdly, that Mr. Hastie was the person to whom the 38*l.* 10s. 6d. should be paid, and not to the lessors, the trustees. Mr. Stones's contention was that Mr. Hastie had no right to have contribution for expenses which he did not pay out of his own pocket. He (Mr. Hansell), however, submitted that he had, and that the learned Judge was wrong on the matter, and that the Master's order should be restored.

Mr. Clavell Salter submitted that the view taken by Mr. Justice Walton was right. In the first place, the trustees, being the owners of No. 17, improved and enlarged that house, and in doing so raised the party wall between Nos. 16 and 17. That was a thing done a good many years ago, and before Mr. Hastie had any connexion with the matter. That was done under the London Building Act, and no doubt all proper notices were served. That being so, the trustees of No. 17 were the building owners. The building owners, the trustees, had to pay the whole of the expenses of raising the party wall since it was for their sole benefit they did it. No further advantage having been taken of the raising of the party wall, Mr. Stone became the lessee of No. 16, and after that Mr. Hastie acquired the lease of No. 17. Then the next thing that happened was that Mr. Stone was minded to improve No. 16, and part of the important works he contemplated involved a raising of his house, and the use of the party wall which the trustees had raised.

Lord Justice Matthew: Supposing there was no statute, to whom would Mr. Stone be responsible for interfering with the party wall? Surely the man in possession of it—Hastie.

Mr. Salter: At common law I think he would have the right of using the party wall without any payment.

Lord Justice Mathew: But if he encroached on his neighbour's rights an action would lie.

Mr. Salter continuing, said that the next material fact was that when Mr. Stone contemplated his improvements he served upon Mr. Hastie, who had become the adjoining owner, the necessary notice. The position was reversed, and in consquence of that reversal of position the surveyors had had some confusion. The effect of giving it was that unless Mr. Hastie within a given time served a notice of acquiescence then, under Section 90 Sub-Section 7 of the Act, "a difference was to be deemed to have arisen." The effect was to constitute a technical Court under the Act consisting of surveyors for the purpose of adjusting the differences between the parties. He (counsel) submitted, however, that there was nothing in the Act which gave the tribunal power to order Mr. Stone to pay a sum of money which he was under no liability to pay. Mr. Stone was perfectly willing to pay Mr. Hastie the claim for the damage and inconvenience caused him by the work next door. The trustees had also put forward a claim for compensation for the user of the party-wall. It was clear that Mr. Stone had to pay something for the user of the party-wall. It might be that he had to pay Mr. Hastie all, or the trustees all, or he might have to pay part to the trustees and part to Mr. Hastie. It might also well be that there could be a series of persons who could all claim compensation from Mr. Stone. None of those persons were parties to the arbitration except Mr. Stone and Mr. Hastie.

Lord Justice Mathew said it seemed impossible to say that Mr. Hastie was not the adjoining owner. He seemed to have been treated by everybody as such.

Mr. Salter contended that Mr. Hastie, as the tenant, was not entitled to have any compensation under the disputed head of claim. He had spent nothing, and was therefore entitled to nothing. He submitted that Mr. Stone ought to pay the trustees, and there was nothing in the Act which enabled the trustees to get any share out of Mr. Hastie.

At the conclusion of the arguments of counsel, the Master of the Rolls said that having regard to the importance of the question raised, the Court would deliver judgment the following morning.

In giving judgment on the 29th ult., the Master of the Rolls, having gone *in extenso* through the material sections bearing on the question in the London Building Act, 1894, said it seemed to him that the tenant, Mr. Hastie, had no property in the sum to be paid by Mr. Stone for the user of the party wall. The provisions in the Act aimed at the recoupment of the person at whose expense the party wall was built. Mr. Hastie had not become tenant until after the expense had been incurred by the lessors. He thought that the learned Judge had come to a proper decision on the matter, and that the arbitrators had no jurisdiction to deal with this part of the claim. He thought, therefore, that the appeal failed, and must be dismissed with costs.

Lord Justice Mathew concurred.

POINT UNDER THE METROPOLIS LOCAL SPACES ACT.

THE case of Boyce *v.* The Mayor, Aldermen, and Councillors of the Metropolitan Borough of Paddington came before the Court of Appeal, composed of Lords Justices Vaughan Williams, Romer, and Cozens-Hardy, on the 25th ult., on the appeal of the plaintiff from an order of Mr. Justice Buckley in the Chancery Division.

Mr. Astbury, K.C., and Mr. Mark Romer appeared for the appellant, and Mr. H. Terrell, K.C., and Mr. Nash for the respondents.

Mr. Mark Romer in opening the case stated that it had been opened in that Court before, but had stood over with the view to an arrangement being come to. He said the writ had been amended by adding the Attorney-General as a co-plaintiff in the interest of the public, and the only question to be determined was whether the Borough Council were entitled to erect upon the disused burial ground of St. Mary, Paddington, now under their management as an open space, a hoarding, so as to block out the view from the windows of flats built by the plaintiff overlooking the garden. The Metropolis Local Spaces Act of 1881 provided that it should not be lawful to build upon a disused burial ground so preserved except for the purpose of enlarging the church, and for that reason the course which the Council were taking could not be justified. The plaintiff disclaimed the right to any easement of light or air over the open space.

Mr. H. Terrell, for the defendants, desired to say that he was mistaken when he stated at the previous hearing that they had offered not to erect the screen if the plaintiff would contribute to the maintenance of the gardens. A proposal was made by the managing committee of the gardens that he should contribute 100*l.* a year to that object, but that was not approved by the Council. The only purpose that the Council had in view was to compel the plaintiff to carry out his original agreement to provide in the middle of the flats he was erecting a passage 30 ft. wide, giving the public greater facilities of access to the gardens.

Mr. M. Barlow represented the Vicar.

The Lords Justices dismissed the action as against the Vicar, and did not interfere with the order of the Court below as to his costs, but they did not think he ought to have any costs of the appeal. In their judgment, what the Borough Council were threatening to do was inconsistent with their duties under the statutes. The plaintiff succeeded in the action, and was entitled to an injunction restraining them specifically from erecting the screen so as to prevent the access of light coming over the ground to the plaintiff's windows. The plaintiff would have the costs of the appeal, but there would be no costs in the Court below.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

14,871 of 1902.—A. G. CONSIDERE: *Construction of Buildings, Bridges, Arches, and the Like in Strengthened Concrete or Similar Material.*

In the construction of stiffened concrete the formation of the beams in which the core of concrete or the like is surrounded by metallic hooping, either external or embedded, provided of independent consecutive closed circular bands or of helicoidal spirals.

15,447 of 1902.—J. LYONS: *Devices for Securely Fastening Sashes of Windows and the Like.*

A fastener for the sashes of windows and the like, the said fastener having a horizontal portion upturned at one end and downturned at the other end, and an intermediate upstanding part through which and the upturned end is passed a screw provided at one end with a milled head or other terminal and at the other end with a revolvable cup containing the rubber or other pad.

19,376 of 1902.—J. BARKER: *Bolts applicable for Warehouse and other Doors.*

Bolts applicable for warehouse and other swinging or folding doors or windows constructed with a rotable disc or lever connected to the ends of the bolts or bolt-bars by links pivotted thereto, and a stop piece against which the links rest when the bolts are shot to their full extent.

19,460 of 1902.—W. BIRCH: *Construction of Domestic Fire-grates or Ranges.*

A domestic fire-grate and range, with or without a boiler, having an extra air-chamber supplying air to the fire through a perforated face, and the combination therewith of diaphragms and openings for conducting, after heating, any desired proportion of air into the flue, where it shall meet and mix with the products of combustion.

347 of 1903.—J. W. CROFTS: *Shop-window Casings.*

A shop-window casing constructed and arranged in such a manner as to permit of it being moved so that its inner side, which is fitted with shelves or other supports for goods to be displayed, may face the interior of the shop.

4,876 of 1903.—W. OATES: *Composition for Forming Joints for Earthenware, Fireclay, Stoneware, and other Glazed Goods.*

A composition for forming joints for earthenware, fireclay, stoneware, and other glazed goods consisting of ground fireclay, sulphur, and red lead mixed together.

7,495 of 1903.—J. HARSEN and the CROWN SEAT CO.: *Closet Seats.*

In a closet-seat composed of a plurality of sections fitted together, openings in the ends of said sections adapted to register with each other when said sections are fitted together and terminating in recesses in the lower face of each section, bolts passing through said openings into said recesses, and nuts in said recesses adapted to receive the ends of said bolts, and engage the wall of each of said recesses nearest the end of the section to draw adjacent sections together.

9,122 of 1903.—R. SCHLEGELMILCH and the ACTIEN MASCHINENFABRIK "KYFFHAUSERHUTTE" vormals P. REUSS: *Chimney-tops and Cowls.*

A chimney-top with rotatable cowl, in which a bow-shaped support is inserted into the chimney and provided with a socket covered by a cowl and closed at its lower end, said socket enclosing a spindle acting partly as a step pivot and partly as a spindle, and in its latter capacity in contact with the inner wall of said socket by means of a ring or collar, so that the space remaining free between the spindle and socket can be filled with lubricant.

11,040 of 1903.—C. NUNAN: *Grates for Fireplaces.*

The combination, with a supporting frame open at the front, of a cross strip loosely mounted in the open front portion of the said frame, a grate section connected to said cross strip, and having lugs loosely engaging the back of the frame and provided with grate-bars, a grate body supported upon the frame, and movable longitudinally thereon, and having a series of grate-bars therein, arranged above the spaces between the bars of the grate section, connected to the cross strip, and brackets on the latter section engaging the bars of the grate body.

12,309 of 1903.—H. JOHNSON: *Manufacture of Tiles and the Like.*

The combination, with a tile-die of a plate loosely attached thereto, and shaped so that it forms an undercut recess in the tile, which is automatically disengaged from the plate when the tile is lifted from the die.

14,937 of 1902.—SUTCLIFFE, SPEAKMAN, & Co, Ltd., and E. R. SUTCLIFFE: *Method of Making Bricks or Blocks, of Concrete, Clay, and the Like, by Pressing in Moulds.*

A method of producing bricks or blocks of sand, lime, and the like by pressing in moulds, characterised by the material being subjected to a preliminary pressure by means of a wedge-shaped plunger, and afterwards to a final pressure whereby it is claimed a sharp-edged brick is produced of great density on both of its faces.

16,193 of 1902.—J. HAILWOOD: *Apparatus for Heating, Softening and Purifying Water.*

In apparatus for purifying water by mixing it with a precipitating reagent, the arrangement for controlling the admission of water and reagent to the purifier by means of a float which directly operates valves in the water and reagent supply pipes.

17,378 of 1902.—P. COTTANCIN and A. VYE-PARMINTER: *Strengthened Concrete and other Buildings and Structures.*

In building constructions, plates, slabs, or frames connected together by chains, bars, tubes, or wires,

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

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the space between said plates, slabs, or frames being filled with some suitable material such as concrete.

17,579 of 1902.—B. J. B. MILLS (Siegle): *Artificial Building Materials.*

A process of manufacturing silicious agglomerates, hardened by steam, and having metallic carcases, characterised by the fact that the said metallic carcases are submitted to an oxidation of their surface, as regular as possible, before being introduced into the plastic mass.

18,333 of 1902.—W. T. SUGG: *Lanterns for Public Incandescent Gas Lighting.*

In gas lamps or lanterns the combination of a cast metal socket, a solid lamp bottom, a cradle provided with an inlet for a torch in the solid bottom and a ball valve.

18,882 of 1902.—F. H. SHAW: *Clamps or Clips for Retort Stands.*

An adjustable clamp or clip for retort stands, consisting of a pair of gripping jaws, which are adjusted towards or away from one another along a bed plate or rest by means of a traversing screw mounted in bearings on the said plate or rest, and having right and left hand threaded parts respectively passing through correspondingly wormed holes in the shanks of the jaws, which are prevented from turning around the axis of the screw and from twisting about their major axes by arranging the said shanks or extensions of same to work within guide channels, grooves or their equivalent on the base plate or rest, whereby a parallel gripping action is obtained.

10,862 of 1902.—T. FISHER: *A Contrivance for the Ventilation of Works, Mills, and Manufactories.*

A contrivance for the ventilation of works, mills, and manufactories, characterised by a main steam pipe having branches which are provided with a multiplicity of jets or nozzles discharging into the chimneys of tin houses and other unhealthy departments of works and places, for increasing the current of air, in combination with valves for regulating the same and the means for removing the condensed water.

24,094 of 1902.—W. PERRY: *A Cement.*

A cement composition consisting of fifty to ninety parts of powdered iron, eight to thirty-five parts of plaster of Paris, two to fifteen parts of dextrine, five to twenty-five parts of ground glass, and half to five parts of a salt of sodium or potassium.

12,387 of 1903.—EMIL VON BUHLER and T. FRANKE: *Concrete Ceilings.*

In ceilings constructed of concrete slabs, or blocks an embedded iron bearer having three sides, the middle one of which serves as a base, and is of greater breadth or thickness, or both, than the other two converging sides.

12,388 of 1903.—EMIL VON BUHLER and T. FRANKE: *Combined Concrete and Iron Ceilings.*

A concrete and iron ceiling, in which the iron bearers enclosed therein consist of two webs meeting at an acute angle, one of said webs being horizontal for the purpose of preventing the separation of the concrete from the iron.

12,427 of 1903.—P. BRANDNER and C. MILLER: *Building Blocks.*

A building block provided with dovetail tongues and undercut grooves, and with correspondingly shaped and proportioned body partitions and perforations arranged in alignment with the tongues and grooves respectively.

12,510 of 1903.—O. W. MIRACLE and W. S. DOW: *Building Walls and Concrete Blocks for the Same.*

A building wall consisting of concrete blocks having a plurality of rows of vertical air cavities, the cavities of one row being opposite to and longer than the intervals between those of the other row, whereby they lap by the ends of the consecutive cavities of the other row, such blocks being assembled in the wall with their cavities registering one above the other in vertical succession to form continuous vertical cavities in the wall.

APPLICATION OPPOSED.

13,005 of 1902.—W. CALWAY: *Manufacture of Portable Buildings.*

This application, which covers an invention relating to the production of portable buildings by the use of tiles mounted within vertical frame members, was opposed by T. B. Provis on the ground of the prior patent granted to him (26,053 of 1901) in respect to the same invention. The hearing of the opposition took place on the 27th inst. before the Comptroller-General of Patents, when Mr. Edward Evans appeared on behalf of the opponent, and, after argument, the Comptroller-General gave judgment for the opponent, and refused the grant of the patent on the application of Calway, as he found that the invention was substantially the same as that in respect of which a patent had already been granted to T. B. Provis.

MEETINGS.

WEDNESDAY, AUGUST 5.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting of the members. 8. p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

July 14.—By SIMMONS & SONS (on the estate).

Silchester Common, Hants.—New-rd., &c., fourteen freehold building sites, 10a. 0r. 38p. (in lots) £1,037

July 15.—By BIDDELL & BLENCOWE (at Bury St. Edmunds).

Stradishall, Suffolk.—Seabrook's and Three Ashes Farms, 291a. 0r. 15p., f. 2,300
Mark's Farm, 65a. 3r. 9p., f. 500
Shop, house, malting land, &c., area 8a. 0r. 6p., f. 700
A small holding and lands, 24a. 0r. 13p., f. .. 310
Wickhambrook, Suffolk.—Peacock's and Brett's Farms, 182a. 0r. 23p., f. and c. 1,400
Attleton Green Farm, 117a. 3r. 11p., f. and c. 1,100
A small holding, 12a. 2r. 4p., f. and c. 340
Two freehold fields, 6a. 1r. 33p. 175
Hawkedon, &c., Suffolk.—The Windolfe's Farm, 142a. 0r. 21p., f. 1,100

By NOCK & JOSELAND (at Wolverhampton).

Codsall, Staffs.—Wheatstone Park Estate, 21a. 1r. 2p., f. 3,550
Wheatstone Cottage, and 10a. 3r. 38p., f. 1,200

By H. F. RUSSELL & Son (at Hereford).

Burghill, Hereford.—The Brick Kiln Farm, 309a. 0r. 17p., f. 8,500
Two enclosures, 10a. 3r. 18p., f. 440

July 16.—By GERMAN & GERMAN, with HAMPTON & SONS (at Derby).

Ilsley Walton, &c., Leicester.—The Ilsley Walton and Breedon estates of Baron Donington, 978 acres, f. (in numerous lots) 39,104

By BALLARD & MARSH (at Hampton).

Hampton Hill, Middx.—3 to 7, Wellington-gdns., u.t. 83¾ yrs., g.r. 15*l.*, w.r. 149*l.* 10s. 1,010

By WINCH & SONS (at Maidstone).

Brenchley, Kent.—Chill Mill Farm and Bowling Alley Woods, 82a. 3r. 16p., f. 2,000
Burrs Hill Fields, 10a. 1r. 38p., f. 155
Brick Oast Field, 4a. 0r. 5p., f. 160
Two cottages and 0a. 0r. 20p., f. 275
Brattles Farm, 114a. 1r. 14p., f. 1,420
Curtis Farm, 112a. 3r. 31p., f. 1,450
Four enclosures, 14a. 1r. 5p., f. 300

July 17.—By WALTON & LEE (at Barnstaple).

Lynton, Devon.—Lower Ilkerton Farm, 50a. 1r. 19p., f. 1,650
Enclosures of land, 69a. 2r. 23p., f. 1,400

July 18.—By FENN & Co. (at Colchester).

Great Bromley, Essex.—Walnut Tree Farm, 7a. 3r. 32p., f. 430
Freehold house and 1a., y.r. 15*l.* 10s. 270

July 20.—By H. J. BROMLEY.

Forest Hill.—62, London-rd., f., p. 1,000
121 and 123, Sunderland-rd., u.t. 56 yrs. g.r. 18*l.*, p. 645
144 and 146, Stanstead-rd., u.t. 73 yrs., g.r. 12*l.*, p. 675
Sydenham.—70, Wells-rd., s., u.t. 71 yrs., g.r. 5*l.* 10s., q.r. 30*l.* 300

By T. H. CURRIE.

Notting Hill.—14 and 16, Farmer-st., u.t. 46 yrs., g.r. 10*l.*, w.r. 92*l.* 6s. 660

By FURBERS'.

Hammersmith.—42, 44, and 46, Upper Mall, u.t. 76 yrs., g.r. 30*l.*, y.r. 135*l.* 1,260
South Kensington.—4, Cathcart-rd., u.t. 45¼ yrs., g.r. 10*l.*, y.r. 70*l.* 490
16 and 18, Cathcart-rd., u.t. 45¼ yrs., g.r. 20*l.*, y.r. 130*l.* 1,030
3, Coleherne-rd., u.t. 60½ yrs., g.r. 12*l.* 10s., y.r. 70*l.* 490
22, Finborough-rd., u.t. 59½ yrs., g.r. 10*l.*, y.r. 55*l.* 380
Surbiton, Surrey.—5, St. James's-rd., u.t. 57½ yrs., g.r. 10*l.*, y.r. 60*l.* 410
19, St. Philip's-rd., u.t. 64 yrs., g.r. 12*l.*, e.r. 6*l.* 370

By KEMSLEYS.

Buckhurst Hill, Essex.—High-rd., Ivy Cottage, f., y.r. 31*l.* 4s. 815

By J. C. PLATT.

Hammersmith.—110, 112, 112A, and 114, King-st., area 9,000 ft., c., y.r. 170*l.* 5,550
Brentford, Middx.—96, High-st., s., f., y.r. 40*l.* . 600

By J. H. BETHELL (at Forest Gate)

West Ham.—Ladysmith-rd., &c., 39 plots of freehold building land (in lots) 1,376

July 21.—By DAVID BURNETT & Co

Whitechapel.—8, Little Alie-st., u.t. 74 yrs., g.r. 16*l.* 10s., y.r. 100*l.* 1,300

By DEBENHAM, TEWSON, & Co.

Pall Mall.—No. 63 (New Oxford and Cambridge Club), area 3,800 ft., u.t. 49 yrs., g.r. 555*l.*, y.r. 2,000*l.* 20,000
Aldgate.—Mansell-st., The George p.-h., f.g.r. 100*l.*, reversion in 68½ yrs. 2,000

By FERRIS & PUCKRIDGE.

Southall, Middx.—Dormer's Well-lane, two freehold building sites, 0a. 2r. 20p. 505
Uxbridge-rd., a corner building site, 0a. 1r. 22p., f. 350
Havelock-rd., a freehold field, 1a. 2r. 31p. .. 500

By J. HAXELL.

City of London.—118 and 119, Cheapside, s, u.t. 18½ yrs., g.r. 250*l.*, y.r. 950*l.* 5,500

By ALFRED RICHARDS.

Palmer's Green.—11, Palmer's Green-villas, f., p. 800

By COBBS (at Rochester).

New Brompton, Kent.—Wyles-st., the Bricklayers' Arms b.-h., f., p. 3,150
Cliffe, Kent.—Various enclosures, 11a. 3r. 35p., f. 340
Market garden ground, 6a. 2r. 27p., f. 230

By WALTER VINCENT (at Kilburn).

St. John's Wood.—1 to 7, Beckett's-pl., u.t. 14 yrs., g.r. 21*l.*, w.r. 217*l.* 2s. 570
Kensal Rise.—12, Ravensworth-rd., u.t. 75¼ yrs., g.r. 5*l.* 10s., w.r. 30*l.* 285

By JOSEPH STOWER (at Waltham Cross).

Cheshunt, Herts.—76 and 78, Cheshunt-st. and cottage in rear, area 1a. 0r. 38p., f., y.r. 45*l.* 1,100

July 22.—By COCKETT & HENDERSON.

Stratford.—24 to 30 (even), Blenheim-rd., f., w.r. 88*l.* 8s. 685

By E. HORNE.

Orpington, Kent.—Station-rd., freehold building land, area 4a. 1r. 20p. 1,475

By CURTIS & HENSON.

Esher, Surrey.—Milbourne-lane, Milburn and 47a. 0r. 30p., part f., and part u.t. 36 yrs., g.r. 315*l.* £24,800

By HUMBERT & FLINT.

Hockliffe, &c., Beds.—Hockliffe Grounds Estate, 201a. 3r. 8p., f. 5,000

By F. JOLLY & Co.

Stoke Newington.—47, Norcott-rd., u.t. 76 yrs., g.r. 7*l.*, y.r. 33*l.* 405
Hackney.—4, Navarino-rd., u.t. 42 yrs., g.r. nil, e.r. 55*l.* 710

By RUSHWORTH & STEVENS.

Knightsbridge.—24 and 24a, Hill-st., u.t. 30½ yrs., g.r. 9*l.* 9s., y.r. 93*l.* 940
Tooting.—92 and 94, Longley-rd., f., y.r. 50*l.* 740

By F. VARLEY & SON.

Holloway.—56, Huddleston-rd., u.t. 64 yrs., g.r. 7*l.*, e.r. 60*l.* 590
Stoke Newington.—24, 27, 28, and 29, Mildmay-st., u.t. 48 yrs., g.r. 16*l.* 16s., y.r. 126*l.* 1,215

By DOUGLAS YOUNG & Co.

Camberwell.—Coldharbour-la., Herbert House, f., p. 1,750
Galleywood End, Essex.—Moretons and 17a. 2r. 9p., f., y r. 60*l.* 950
Balham.—75, Fernlea-rd., u.t. 70 yrs., g.r. 6*l.* 6s. e.r. 38*l.* 300
Bromley-by-Bow.—Epsom-st., f.g.r.'s 47*l.* 5s., reversion in 36 and 38 yrs. 1,210
Marner-st., f.g.r.'s 80*l.*, reversion in 39 and 40 yrs. 2,000
St. Leonard's-st., f.g.r. 8*l.*, reversion in 39 yrs.. 200
Wandsworth.—Earlsfield-rd., f.g.r.'s 50*l.*, reversion in 81 and 82 yrs. 1,400

By MADDISON, MILES, & MADDISON. (at Yarmouth).

Caister, Norfolk.—The White House, f., p. 840
Various enclosures, 55a. 2r. 12p., f. 1,810
Two freehold marshes, 10a. 3r. 15p. 400
Beach-road farm, 21a., f. 830
A small occupation, 0a. 2r. 15p., f. 200
A small holding, 1a., f. 275
Two enclosures, 4a. 1r. 3p., f. 510
Four freehold cottages 275

July 23.—By H. J. BLISS & SONS.

Bethnal Green.—39, 41, and 43, Vivian-rd., u.t. 60 yrs., g.r. 10*l.* 10s., w.r. 101*l.* 8s. 930
36, and 37, Pollard-st., f., y.r. 78*l.* 12s. 1,015

By J. H. BULMER.

Bermondsey.—53 and 74, Abbey-st., s., f., y.r. 68*l.* 10s. 1,240
385, Southwark Park-rd., u.t. 43¾ yrs., g.r. 5*l.* 5s., y.r. 32*l.* 310

By DEBENHAM, TEWSON, & Co.

Commercial-rd. East.—Nos. 510 and 512, f.g.r. 35*l.*, reversion in 68 yrs. 800
New Cross.—New Cross-rd., f.g.r. 45*l.*, reversion in 64 yrs. 1,400
Clapham.—Park-pl., f.g.r. 10*l.*, reversion in 40 yrs. 280
Norwood.—Weaver's cottages, f.g.r. 14*l.* 18s., reversion in 13 yrs. 425
Holborn.—3, Kirby-st., f., y.r. 50*l.* 1,255
Gray's Inn-rd.—35, Sidmouth-st., s., f., y.r. 54*l.* 12s. 500
Shoreditch.—55 and 56, Charlot.e-st., and 16, 17, and 18, Mills-court, f., w.r. 105*l.* 6s. 1,510
Spitalfields.—20, Buxton-st., f., w.r. 32*l.* 10s. 385
Wapping.—5, Little Hermitage-st., (s), and 4, Bushell-st., f., y.r. 45*l.* 655
New Cross.—5 and 7, Lewisham High-rd. (s), f., y r. 72*l.* 1,035
Merton.—High-st, a plot of building land, f. 600
Peckham.—2, 4, and 6, Peckham-gr., u.t. 28 yrs., g.r. 10*l.*, q.r. 56*l.* 600
22, 24, and 20a, Gloucester-rd., u.t. 23 yrs., g.r. 8*l.*, w.r. 93*l.* 12s. 450
49 and 51, Coleman-rd., u.t. 28 yrs., g.r. 7*l.*, w.r. 78*l.* 460
Hampstead.—1, 2, and 3, Elm-rd. cottages, u.t. 36 yrs., g.r. 3*l.*, w.r. 62*l.* 8s. 330

By HARRODS'.

Weybridge, Surrey.—Portmore-pk.-rd., Rosebank and ¾ of an acre, f., p. 2,000

By MARGETTS & TOWNLEY.

Pinner, Middx.—Main-rd., the Dingle and 8a. 3r. 13p., f., p. 3,750

By NEWBON, EDWARDS, & SHEPHARD.

Holloway.—188 and 188a, Seven Sisters-rd. (s), f., y.r. 150*l.* 2,540
Stoke Newington.—89, Green-lanes (s), u.t. 78 yrs., g.r. 15*l.*, e.r. 50*l.* 300
Stamford Hill.—82, Darenth-rd., u.t. 78¼ yrs., g.r. 20*l.*, e.r. 81*l.* 950
Holloway.—53, Hilldrop-crescent, u.t. 47 yrs., g.r. 9*l.*, e.r. 65*l.* 650

By F. SWAIN.

Edgware-rd.—No. 148, s., u.t. 7 yrs., g.r. 10*l.*, y.r. 200*l.* 1,040
Notting Hill,—Ladbroke-ter., peppercorn g.r., reversion in 19 yrs. 780

By STIMSON & SONS.

Stockwell.—Burnley-rd., f.g. rents, 45*l.* 10s., reversion in 59 yrs. 1,275
Camberwell.—28, Crown-st., u.t. 62 yrs., g.r. 5*l.*, e.r. 35*l.* 220
Peckham.—43, Reedham-st., s., u.t. 73½ yrs., g.r. 7*l.* 10s., y.r. 40*l.* 250
Old Kent-rd.—16, 18, 20, and 22, Haymerle-rd., u.t. 65 yrs., g.r. 25*l.* 4s., w.r. 156*l.* 830
Kennington.—18, Gilbert-rd., u.t. 24 yrs., g.r. 4*l.*, increasing to 6*l.*; y.r. 28*l.* 250
Homerton.—10, Isabella-rd., u.t. 48¾ yrs., g.r. 3*l.* 10s., w.r. 33*l.* 12s. 295
Holloway.—4, Hertslet-rd, u.t. 57½ yrs., g.r. 6*l.*, y.r. 32*l.* 310
Finchley.—Alexander-grove, six freehold residences (named), y.r. 237*l.* 10s. 3,680

By J. A. & W. THARP.

Leytonstone.—33, Ferndale-rd., f., y.r. 31*l.* 4s. .. 330

By FAREBROTHER, ELLIS & Co.

Hornsey Rise.—Upper Hornsey Rise, a building site, 0a. 3r. 28p., f. 2,000
Upper Hornsey Rise, The Lodge, and the mews area 0a. 1r. 20p., f., y.r. 101*l.*; also f.g.r. 10*l.*, reversion in 63 yrs. 2,250

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Hornsey Rise.—Shaftesbury-rd., f.g.r.'s 23*l.* 7*s.*, reversion in 73 yrs. £580
Hampstead.—5 and 6, New End-sq., area 3,000 ft., f., y.r. 28*l.* 850
Kensington.—98 to 104 (even), 108, 110, and 112, Holland-rd., f., y.r. 575*l.* 8,810
Soho.—10, Greek-st., s., area 760 ft., f., y.r. 80*l.* 2,150
Holborn.—Nos. 126 and 127, f.g.r. 245*l.*, reversion in 75 yrs. 8,100
City of London.—22, Farringdon-st. (Wheatsheaf Coffee Rooms), f., y.r. 150*l.* 3,900
Farringdon-st., f.g.r. 30*l.*, reversion in 27 yrs... 1,380
Cranford, Middlesex.—Bath-rd., a copyhold holding, 4 a. 1 r. 18 p., y.r. 10*l.* 500

By Browett & Taylor.

July 24.—Acton.—24, Rosemont-rd., u.t. 74 yrs., g.r. 14*l.* 14*s.*, y.r. 55*l.* 580

By C. Rawlev Cross & Co.

Shepherd's Bush.—6 and 8, Old Oak-rd., u.t. 78½ yrs., g.r. 15*l.*, y.r. 90*l.* 900
Ealing.—41, Coldershaw-rd., u.t. 988 yrs., g.r. 3*l.* 5*s.*, y.r. 30*l.* 320
Kensington.—25, St. Mark's-rd., u.t. 62 yrs., g.r. 9*l.*, e.r. 55*l.* 375
Shepherd's Bush.—147, Uxbridge-rd., u.t. 62 yrs., g.r. 7*l.*, e.r. 62*l.* 550

By Dolman & Pearce.

Regent's Pk.—31, Gloucester-rd., u.t. 41 yrs., g.r. 12*l.*, p. 895

By Moss & Jameson.

Lewisham.—1, Beacon-rd., f., p., and 207, Hither-green-lane, f., y.r. 40*l.* 1,900
Brompton.—101, Lillie-rd., s., f., e.r. 45*l.* 530
Fulham.—12 and 12A, Kingwood-ter., u.t. 95 yrs., g.r. 8*l.*, y.r. 75*l.* 8*s.* 525

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 15 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 12 6	" " "
Facing Stocks....	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 8 6	" at railway depôt
Red Wire Cuts ..	1 12 6	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6	0 per yard, delivered.
Thames Ballast	6	0 " "
Best Portland Cement	30	0 per ton, delivered.
Best Ground Blue Lias Lime..	20	6 " "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11*s.* 0*d.* per yard, delivereh.
Stourbridge Fire-clay in sacks 27*s.* 6*d.* per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1	6½ per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1	8½ " "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2	1 " "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2	2½ " "

PRICES CURRENT (*Continued*).

STONE.

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1¼ in. to 2 in. ditto, ditto	0 6	" "
BEST HARD YORK—		
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.).....	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "

Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	deld. rly. depôt. per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry. dep.
20×12 " " " ..	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green....	15 2 6	" "
20×12 " "	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles 52	6	" " "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do. 60	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do. 54	6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles 48	0	per 1,000 " "
Do. Ornamental Do. 50	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.	
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0	
Deals: best 3 by 9.....	14 10 0	15 10 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0	
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.	
Deals: seconds	1 0 0	less than best	
Battens: seconds	0 10 0	" " "	
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0	
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0	
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.	
¾ in.	1 0 0	"	

	At per load of 50 ft.	
Fir timber: Best middling Danzig or Memel (average specification	4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

	At per Standard.	
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 9 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0

PRICES CURRENT (*Continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	. . .
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch.....	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	. .

Prepared Flooring—	Per square. £ s. d.	£ s. d.
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6*d.* to 9*d.* per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
" " galvanised.....	16 0 0	. . .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	. . .
" " to 24 g.	10 15 0	. . .
" " to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:— Ordinary sizes to 20 g.....	16 0 0	. . .
" " 22 g. and 24 g.	16 10 0	. . .
" " 26 g.....	18 0 0	. . .
Galvanised Corrugated Sheets:— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	. . .
" " 22 g. and 24 g.	12 15 0	. . .
" " 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0

(Under 3 in. usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 5 0	. . .
Pipe in coils	14 15 0	. . .
Soil pipe	17 5 0	. . .
Compo Pipe	17 5 0	. . .
ZINC—Sheet—		
Vieille Montagne ..... ton	26 5 0	. . .
Silesian	26 0 0	. . .
COPPER—		
Strong Sheet ..... per lb.	0 0 10½	. . .
Thin ..... "	0 0 11½	. . .
Copper nails ..... "	0 0 11	. . .
BRASS—		
Strong Sheet..... "	0 0 10	. . .
Thin " ..... "	0 0 11	. . .
TIN—English Ingots ..... "	0 1 4	. . .
SOLDER—Plumbers' ..... "	0 0 6	. . .
Tinmen's ..... "	0 0 8	
Blowpipe ..... "	0 0 9	

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PRICES CURRENT (*Continued*).

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
„ fourths	2¾d. „ „
21 oz. thirds	3¾d. „ „
„ fourths	4¼d. „ „
26 oz. thirds	4d. „ „
„ fourths	5¼d. „ „
32 oz. thirds	5d. „ „
„ fourths	6¼d. „ „
Fluted sheet, 15 oz.	3d. „ „
„ 21 oz.	4d. „ „
Hartley's Rolled Plate	1¾d. „ „
½ „ „ „	2d. „ „
¾ „ „ „	2½d. „ „

OILS, &c.		£	s.	d.
Raw Linseed Oil in pipes or barrels	per gallon	0	1	11
„ „ „ in drums	„	0	2	3
Boiled „ „ in pipes or barrels	„	0	2	2
„ „ „ in drums	„	0	2	6
Turpentine, in barrels	„	0	3	2
„ in drums	„	0	3	4
Genuine Ground English White Lead	per ton	30	0	0
Red Lead, Dry	„	20	0	0
Best Linseed Oil Putty	per cwt.	0	8	0
Stockholm Tar	per barrel	1	12	0

VARNISHES, &c.

	Per gall on £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for Seats of Churches	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal	0	18	0
Extra Pale French Oil	1	1	0
Kegshall Flatting Varnish	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
Wrench and Brush Polish	0	10	0

TO CORRESPONDENTS.

J. S. M. (Amounts should have been stated).

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100l., unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BEESTON.—For alterations and re-seating Baptist Chapel, Beeston. Messrs. A. R. Calvert & William R. Gleave, architects, Nottingham :—

W. Crane, Ltd.*	£154 18

BRIGHTON.—For the erection of eight artisans' dwellings, Elm-grove, for the Town Council. Mr. F. J. C. May, C.E., Town Hall, Brighton :—

William Taylor	£3,900	J. & W. Simmonds, Brighton*	£2,552
H. A. Carton Jay	3,600		
Sattin & Evershed	3,592	Thomas Whittier ‡	2,246

‡ Withdrawn.

CADOXTON.—For the erection of a new branch reading-room at the Common-road, Cadoxton, for the Barry Urban District Council. Messrs. Speir & Beavan, architects and quantity surveyors :—

H. S. Randell	£1,075 0	Gibby & Cleak	£1,025 0
Henry Fisher	1,068 0	John Evans‡	945 4

‡ Recommended for acceptance.

CATERHAM.—For the supply and fixing of hot-water and heating services at Caterham Asylum, for the Metropolitan Asylums Board :—

Tamplin & Makovski, Ltd.	£368 12 6
Samuel Mason, Ltd.	360 19 6
Simpson & Co., Ltd.	335 0 0
Brightside Foundry and Engineering Co., Ltd.	328 0 0
Wenham & Waters	275 0 0
W. J. Millington	268 0 0
Werner, Pfleider, & Perkins, Ltd.	257 0 0
Joel & Co. and Potter & Sons United, Ltd.	248 0 0
Thos. Cole	245 0 0
Beaven & Sons	239 10 0
J. & F. May	228 0 0
Rosser & Russell, Ltd.*	221 0 0
Lancashire Heating Co.	180 0 0

(Engineer's estimate, £300.]

HEMEL HEMPSTEAD.—For repairs to the Lawn, Hemel Hempstead, Herts. Mr. Arthur F. Briggs, architect, 9, Queen Victoria-street, E.C. :—

Miskin & Sons	£925 0 0	J. Darvill	£580 0 0
Mansfield & Son	580 6 6	J. Hales	397 0 0

LEAVESDEN ASYLUM.—For the supply and fixing of hot-water and gas services at the Leavesden Asylum, for the Metropolitan Asylums Board :—

Tamplin & Makovski, Ltd.	£1,194 2 6
Simpson & Co., Ltd.	1,065 0 0
Samuel Mason, Ltd.	1,045 9 4
Wenham & Waters, Ltd.	898 0 0
W. J. Millington	893 0 0
Brightside Foundry and Engineering Co., Ltd.	813 0 0
Joel & Co. & Potter & Sons United, Ltd.	755 0 0
Beaven & Sons	701 5 0
Davey & Roberts	699 0 0
Lancashire Heating Co.	640 0 0
Rosser & Russell, Ltd.	665 0 0
Werner, Pfleider, & Perkins, Ltd.	618 0 0
J. & F. May, Lincoln's Inn Fields, W.C.*	610 0 0
Wood & Sons (withdrawn)	580 0 0

[Engineer's estimate, £720.]

LONDON.—For additions and alterations to No. 26, London-road, Forest Hill, S.E. Mr. J. Randall Vining, architect and surveyor, 89, Chancery-lane, W.C. :—

Black & Son	£1,700	A. W. Coombs	£1,569
Turtle & Appleton	1,653	Smith & Sons	1,535
J. & C. Bowyer	1,637	Roberts & Co.*	1,510
A. Sykes	1,578		

LONDON.—For three additional stories to warehouse, Kingsland, N. Mr. J. Randall Vining, architect and surveyor, 89, Chancery-lane, W.C. :—

Marsland & Sons	£2,938	Cormick & Sons	£2,819
Perry & Co.	2,900	C. Wall	2,671
Clark & Monnooch	2,837	Black & Son	2,637
J. & C. Bowyer	2,825	Turtle & Appleton*	2,497

LONDON.—For new staircase and alterations to No. 98, Fenchurch-street, E.C. Mr. Arthur F. Briggs, architect, 9, Queen Victoria-street, E.C. :—

Patman & Fotheringham	£1,400	Mansfield & Son	£1,315
Turnbull & Son	1,350	Greenwood & Co.	1,141
		Ashby & Horner*	1,047

LONDON.—For paving, with Australian hardwood, the carriageway of Tudor-street (Temple-avenue to New Bridge-street), for the Corporation of the City of London :—

Improved Wood Paving Co.*	£1,707 19 2

LONDON.—For the work of excavating and levelling the site of the New Cross car-shed, for the L.C.C. :—

A. Hopkins‡	£13,775 0 0
M. Dinnie	8,678 2 0
Pethick Bros.	8,659 19 3
Martin, Wells, & Co., Ltd.	8,208 0 0
J. & M. Patrick, London*	6,541 0 0

‡ Less credit allowance of £50 10s. for trees removed.

LONDON.—For the construction of a pier, river-wall, and water-condensing pipes, in connexion with the electricity generating-station to be established by the County Council at Greenwich for the electrical working of some sections of its tramways :—

Fasey & Son	£52,939 18 1
Cochrane & Sons, London*	55,558 19 9
Squire & Co.	57,340 1 3
Pethick Bros.	63,165 8 0
Alfred Thorne	£4,341 8 11
The Sir Hiram Maxim Electrical and Engineering Co., Ltd.	65,100 14 10
Pedrette & Co.	89,355 16 3

[Messrs. John Cochrane & Sons to sublet the following portions of the work in connexion with the construction of the pier and other works to the undermentioned firms (or to such other firms as may be approved by the Engineer under the contract), namely (1) to Messrs. Joseph Westwood & Co., the manufacture of the wrought iron and steel work; and (2) to Messrs. Cochrane & Co., the manufacture of the cast-iron cylinders and pipes]

LONDON.—For the supply, delivery, and erection of the steelwork for the first portion of the Greenwich electricity generating-station, for the L.C.C. :—

The Fulham Steel Works Co., Ltd.	£45,297 0 0 37,000 0 0‡
The Horseley Co., Ltd.	41,517 6 5
Dorman, Long, & Co., Ltd.	39,831 7 4
Westwood & Co., Ltd., Millwall*	36,808 14 6

‡ Alternative tender not to specification.

[The contract to be given to Messrs. Dorman, Long, & Co. if satisfactory terms and conditions cannot be arranged with Messrs. Westwood & Co]

LONDON. — For hydrant indicator-tablets, for the L.C.C. :—

Pontifex & Co., for the supply and fixing of not more than 1,000 hydrant indicator-tablets. Estimated expenditure £120

LONDON.—For electric light and electric bell installations at the Rotherhithe-street fire-station, for the L.C.C. :—

Alliance Electrical Co., Ltd.	£233 8 6
Glover & Co., Ltd.	221 5 0
Leo Sunderland & Co.	221 0 0
A. H. Marshall	220 0 0
Coleby & Co.	220 0 0
Oliver Clark & Co.*	211 0 0

LONDON.—For hot-water apparatus, Whitechapel fire-station, for the L.C.C. :—

Kinnell & Co., Ltd.	£290 0 0
John Jeffreys	248 0 0
F. & H. F. Higgs	230 0 0
F. & F. J. Wood	219 0 0
G. & E. Bradley	207 0 0
Werner, Pfleiderer, & Perkins, Ltd.*	178 12 6

LONDON.—For repaving the carriageway of Albert Bridge for the London County Council :—

Martin, Wells & Co., Ltd.	£1,855 0 0	Acme Wood Flooring Co., Ltd.	£998 3 4
Mowlem & Co., Ltd.	1,245 0 0	Griffiths & Co., Ltd.*	936 6 8
Improved Wood Pavement Co., Ltd.	1,086 10 0		

LONDON.—Running contracts for the supply of various articles of furniture (for the School Board for London) :—

	Cupboards. No. 2. each.	Cupboards. No. 5. each.	Tables. (3 ft. 6 in. by 2 ft. 6 in.) each.	Adjustable Drawing Desks. each.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
H. Bouneau	6 18 6	8 19 0	†1 12 6	1 17 0
Brake & Co.	—	10 18 6	—	—
J. Cox	—	†6 10 0	—	—
T. Cruwys	†6 5 0	9 10 0	—	2 9 0
A. Duncan	6 7 0	—	1 15 0	—
Educational Supply Association, Ltd.	7 10 8	9 9 0	1 15 6	†1 12 0
Galbraith Bros.	—	8 3 4	—	—
Garvie & Sons	—	11 8 6	—	—
General Builders, Ltd.	10 17 6	—	—	—
Golding & Ansell	9 10 0	—	—	—
Goodall, Lamb, & Heighway, Ltd.	6 15 0	—	2 2 0	—
Hammer & Co., Ltd.	7 15 0	9 0 0	1 15 0	1 17 0
Harrod's, Ltd.	12 10 0	12 0 0	—	—
Lascelles & Co.	9 15 6	—	2 2 0	—
London School Furniture Co.	7 10 0	7 0 0	—	1 16 5
Marchant & Hirst	7 5 0	—	2 0 0	—
Mason & Sons	8 3 6	—	—	—
North of England School Furnishing Co., Ltd.	7 17 10	9 14 4	—	1 14 4
Parkstone Steam Joinery Co.	10 0 0	—	—	—
T. R. Roberts, Ltd.	16 4 4	17 16 9	—	—
Shoolbred & Co.	12 12 0	—	3 15 0	—
Spence & Sons	8 8 0	—	—	—
Spencer & Co.	13 0 0	—	—	—
Wallis & Co., Ltd.	6 19 0	—	2 1 0	—
Waring & Sons, Ltd.	6 17 6	—	1 18 6	—
Wrinch & Sons	10 19 0	10 10 0	—	—

[*See also page 149.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Gates and Fencing, Rothwell, Haigh	Hunslet (near Leeds) Guardians	Not stated	Aug. 5
Offices, Seltonand Dixon-streets	Blackpool Corporation	Not stated	Aug. 31
Sewerage Works	Howden (Yorks) R.D.C.	15*l.*	Sep. 12
*Library Building	Borough of Heywood	30*l.*, 20*l.*, and 10*l.*	Sep. 14
Machinery for Lifting Boats	Austrian Government	100,000 Kronen, 75,000 Kronen, and 50,000 Kronen	Mar. 3, 1904
*Plans for a New School	Gillingham U.D.C. Education Com.	Not stated	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Cast Iron Water Piping	Glasgow Corporation	J. Lindsay, City Chambers, Glasgow	Aug. 3
Additions to Dyon School, Distington	The Managers	H. Hill, Dyon Side, Distington	do.
Cemetery Works	East Kilbride Parish Council	J. Cowan, Civil Engineer, 179, West George-street, Glasgow	do.
Additions to Police Station Buildings, Ludgershall	Wilts County Council	C. S. Adye, County Surveyor, County Offices, Trowbridge	do.
Building Works at Asylum, Murthly, Perth	.....	S. Smart, Architect, Perth	do.
Mission Hall, Northwich	.....	E. T. Ward, Winnington-street, Northwich	Aug. 4
Alterations to No. 29, The Parade	.....	G. Thomas, Architect, Queen's Chambers, Cardiff	do.
Well Sinking, Wooden Mill	Kelso Town Council	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	do.
Warehouse, Page Stair-lane, King's Lynn	Mr. H. J. Finch	H. Tilson, Architect, Railway-road, Lynn	do.
Business Premises, Bishop-street, Londonderry	Mr. Ed. McGunnis	J. P. M'Grath, Architect, Foyle-street, Londonderry	do.
Gas Mains (3½ miles) Contract 3	Cudworth U.D.C.	W. [illegible]son, Civil Engineer, Pontefract-road, Barnsley	do.
Paving Works	Salford Corporation	Borough Engineer, Town Hall, Salford	do.
Widening Bridge, Lower Cambridge-street	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
*Wrought Iron Fencing, Recreation Ground, Queens-rd.	Hendon U.D.C.	Engineer to the Council, Council Offices, Hendon, N.W.	do.
Station Buildings, Penshaw	N. E. R. Company	W. Bell, Architect, Central Station, Newcastle-on-Tyne	Aug.
Three Cottages, Sleights (Yorks)	do.	W. Bell, Architect, N. E. R. Co.'s. Offices, York	do.
Foundations, &c., at Electricity Works	Warrington Corporation	Borough Engineer, Town Hall, Warrington	do.
Sewers, &c., Brickhouse-lane and other roads	West Bromwich Town Council	A. D. Greatorex, Civil Engineer, Town Hall, West Bromwich	do.
Street Works, Chestergate	Macclesfield Corporation	Borough Engineer, Town Hall, Macclesfield	do.
Reservoir, Kirkella	Hull Corporation	F. J. Bancroft, Engineer, Town Hall, Hull	do.
Boundary Walls, Forge-lane, Bradford	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
House, Bowness-in-Windermere	Miss Sinkinson	J. F. Curwen, Architect, 26, Highgate, Kendal	do.
*Painting, &c., Dining Halls at Renfrew-rd. Workhouse	Parish of Lambeth	Clerk to Guardians, Board Room & Offices, Brook-st., Kennington	do.
Schools, Rhostyllen	Bersham U.D. School Board	T. Morris, Architect, 7, Argyle-street, Wrexham	Aug. 6
Additions to House and Offices, St. Agnes	.....	S. Hill, Architect, Green-lane, Redruth	do.
Road Works, Couchmore Estate, Thames Ditton	.....	C. & F. Rutley, Surveyors, 11, Dowgate-hill, E.C.	do.
Alterations, &c., at Asylum, Armagh	The Committee of Management	R. H. Dorman, County Surveyor, Armagh	do.
Vestry, &c., Ballee Church, Downpatrick	The Wardens	The Rector, The Rectory, Ballee, Downpatrick	do.
Road Works, Station-road	Wealdstone U.D.C.	H. Walker, Civil Engineer, Council Offices, Wealdstone	do.
Chapel, Ynysybwl	The Wesleyans	A. O. Evans, Architect, Pontypridd	do.
Broken Granite Road Metal (2,000 tons)	Portland U.D.C.	R. S. Henshaw, Engineer, New-road, Portland	do.
Road Works, Gladstone-place, Aberdeen	The Land Association, Ltd.	Walker Duncan, Civil Engineer, Aberdeen	do.
House, Bargate, Grimsby	.....	H. C. Scaping, Architect, Court Chambers, Grimsby	Aug. 7
Timber Jetty	Burntisland (N.B.) Harbour Comrs.	R. Henderson, Civil Engineer, High-street, Burntisland	do.
Chapel, Embleton	The Wesleyans	—. Allinson, Esq., Bassenthwaite Lake Station, Embleton	do.
Police Station, &c.	Faversham Town Council	County Surveyor, 86, Week-street, Maidstone	do.
Road Works at Hospital, Chickenley Wood	Dewsbury Hospital Board	Holtom & Fox, Architect, Dewsbury	do.
Additions &c., to Works, Scotswood, near Benwell	Messrs. Gibson & Co.	W. P. Pattison, Surveyor, Council Offices, Benwell	do.
Reservoir	Cromer (Norfolk) U.D.C.	J. C. Melliss, Civil Engineer, Town Hall, Cromer	do.
*Police Station, Cottages, &c.	Kent County Council	County Surveyor, 86, Week-street, Maidstone	do.
*New Coastguard Buildings at Cemaes	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue	do.
House, Fermoy, Ireland	.....	W. H. Hill & Sons, Architects, 28, South Mall, Cork	Aug. 8
Additions, &c. to Cottage Hospital	.....	J. W. Grundy & Son, Architects, Brogden-street, Ulverston	do.
Paving Works, Great Meadow	Dillisham Parish Council	J. Hellyer, Council Offices, Dittisham	do.
Water Supply Works	Boyle (Ireland) No 1 R.D.C.	J. H. M. Swiney, Civil Engineer, Avenue Chambers, Belfast	do.
Cold Air Store at Town Hall	Accrington Corporation	A. H. Aitken, Town Hall, Accrington	do.
Street Improvement Works, Jersey-road, Blaengwynlli	Glyncorrwg U.D.C.	W. P. Jones, Architect, Cymmer, Port Talbot	do.
Farm Buildings, Gwinear	Mr. J. S. Spry	S. Hill, Architect, Green-lane, Redruth	Aug. 9
Vicarage, Tyne Dock, Sunderland	Rev. L. P. Williams	J. Potts & Sons, Architects, 57, John-street, Sunderland	Aug. 10
Rebuilding Bridge, New-in-Pendle, Preston	Lancs County Council	W. C. Hall, County Offices, Preston	do.
Forty Houses, Pontnewynydd	Grove Estate Building Club	Fisher & Sons, Architects, Club Chambers, Pontypool	do.
Bridge Works, Waterleat	Ashburton U.D.C.	R. E. Tucker, Council Offices, Ashburton	do.
Granite Road Metal (1,800 tons)	Hitchin U.D.C.	Surveyor, Council Offices, Hitchin	do.
School Buildings, Lanehead-lane	Bacup Corporation	Smith & Cross, Architects, Town Hall Chambers, Rochdale	Aug. 13
*New Depot, &c. in Church-street	U.D.C. of Epsom	Surveyor, Council Offices, Bromley Hurst, Epsom	Aug. 15
*2½ miles Sewers, &c.	Wilton R.D.C.	Lemon & Blizzard, 38, Silver-street, Salisbury	Aug. 17
Bacteria Beds	Birmingham Corporation	J. D. Watson, Engineer, Tyburn, near Birmingham	do.
Sewage Disposal Works, Lyndhurst	New Forest R.D.C.	Bennett, Son & Berry, Engineers, Midland Bank Chmbrs, Southmptn.	Aug. 18
*New Post Office at Ilford	H.M. Works	The Secretary, H.M. Office of Works, Storey's Gate, S.W.	do.
*Foundations of 10th County Lunatic Asylum (Epsom)	L.C.C. Asylums Committee	Clerk to the Committee, 6, Waterloo-place, S.W.	Aug. 20
*Enlargement of Post Office, Leicester	H.M. Office of Works	Secretary, H.M. Office of Works, Storey's Gate, S.W.	Aug. 26
Graving Dock, Belfast	Harbour Commissioners	C. F. L. Giles, Engineer, Harbour Offices, Belfast	Aug. 31
Business Premises, Beighton	Handswrth Woodhouse. Indus. Soc.	G. Platts, Central Stores, Woodhouse	No date.
Rebuilding the Elephant and Castle Hotel, Westgate	.....	J. Jackson, Architect, Barry-street, Bradford	do.
Infirmary Buildings	Bridgend Guardians	P. J. Thomas, Architect, Bridgend	do.
Engine House, Ravenscliffe Mill, Calverly	.....	Kendall & Bakes, Architects, Victoria-square, Leeds	do.
Wrought-iron Pipes, Risca Colliery, Monmouthshire	.....	Secretary, United National Collieries, Ltd., 20, Exchange, Cardiff	do.
Five Houses and Shops, Harehills-lane, Leeds	Mr. Fred Terry	W. M. Coggill, Architect, Stourton, Hunslet	do.
School Buildings, Sneinton, Boulevard	Nottingham School Board	F. B. Lewis, Architect, Guildhall, Nottingham	do.
Fifteen Houses, Hemsworth, near Wakefield	.....	Jas. Simmons, Hague-lane, Henusworth	do.
*New School, Seedley, Salford	Salford Education Committee	Town Clerk, Town Hall, Salford	do.
*Detached Residence at St. Osyth	Mrs. F. J. Flower	George Gardiner, 11, Marine-parade, Clacton-on-Sea	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Lecturer	South-Eastern Agricultural College	100*l.* per annum	Aug. 20
*Draughtsman	Capetown Corporation	300*l.* per annum	No date.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. & xx. *Public Appointments*, xviii.

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TENDERS (*Continued*):—

LONDON.—Running contracts for the supply of various articles of furniture, &c. (for the School Board for London):—

—	Boards (interior notice).	Boards (not blacked). 48in. by 36in.	Boards (not blacked). 42in. by 30in.	Boards (not blacked). 36in. by 30in.	Boards (not blacked). 60in. by 42in.	Art easels.	Stools. Modelling.	Stools. Laundry.	Moveable Screens. For Flat Floors.	Moveable Screens. For Stepped Floors.	Portable Science Table Tops.
	Each. s. d.	Per 100. £ s. d.	Per 100. £ s. d.	Per 100. £ s. d.	Per doz. £ s. d.	each s. d.	per doz. £ s. d.	per doz. £ s. d.	per ft. run. £ s. d.	per ft. run. £ s. d.	each. £ s. d.
Barnard & Son	—	—	—	—	—	—	—	—	—	—	—
H. Bouneen	6 8	52 0 0	41 0 0	35 0 0	9 19 6	†3 11	6 10 0	6 12 0	0 11 0	0 12 3	—
Brake & Co.	11 6	49 10 0	38 10 0	35 15 0	—	—	—	—	—	—	1 10 0
T. Cruwys	—	—	—	—	—	9 6	6 0 0	9 0 0	†0 9 6	†0 10 6	—
Educational Supply Association, Ltd.	8 0	†40 0 0	†30 0 0	†26 10 0	—	8 0	6 8 0	8 0 0	0 11 6	0 12 6	—
Galbraith Bros.	—	—	—	—	—	—	—	—	—	—	1 16 0
Garvie & Sons	—	—	—	—	—	—	—	—	—	—	—
General Builders, Ltd.	—	—	—	—	—	14 11	9 18 0	8 14 11	—	—	2 9 6
Gloucester Joinery Co., Ltd.	—	—	—	—	—	—	—	—	—	—	—
Golding & Ansell	6 6	50 0 0	37 10 0	31 5 0	8 14 0	—	—	—	15s. per ft. run not less than 7 ft.	—	—
Gothill, Lamb, & Heighway, Ltd.	*5 4	57 10 0	40 0 0	37 10 0	8 14 0	—	—	—	—	—	†1 1 6
Hammer & Co., Ltd.	7 6	43 10 0	33 0 0	29 0 0	—	4 10	5 3 0	10 10 0	0 10 8	0 12 0	—
Harrod's, Ltd.	11 0	93 15 0	82 10 0	67 18 4	13 16 0	—	—	—	—	—	—
H. Keil	—	—	—	—	—	—	—	—	—	—	—
Lascelles & Co.	7 0	53 10 0	39 0 0	34 0 0	—	—	5 5 0	9 15 0	—	—	—
London School Furniture Co.	—	—	—	—	—	5 0	†4 13 0	†6 6 0	—	—	1 6 6
Lonnie & Co.	—	—	—	—	—	—	—	—	—	—	—
Marchant & Hirst	8 6	54 0 0	45 0 0	35 0 0	9 12 0	—	—	—	—	—	1 6 0
W. Martin	15 6	67 10 0	45 0 0	40 0 0	—	—	—	—	—	—	—
Mason & Sons	9 0	65 0 0	55 0 0	52 10 0	11 0 0	—	—	—	—	—	—
North of England School Furnishing Co.	12 2	57 4 6	47 13 6	37 4 6	9 17 6	—	—	—	0 14 0	—	—
Parkstone Steam Joinery Co.	11 6	50 0 0	36 0 0	31 0 0	8 14 0	—	—	—	—	—	1 10 0 (Price does not include fixing.)
Pearson & Brown	—	—	—	—	—	—	—	—	—	—	—
T. R. Roberts, Ltd.	—	—	—	—	—	—	—	—	—	—	—
Setten & Durward	—	—	—	—	—	—	—	—	—	—	—
Shoolbred & Co.	—	—	—	—	—	—	—	—	1 0 0	1 5 0	—
R. Smith	—	—	—	—	—	—	—	—	—	—	—
Spencer & Co.	10 6	68 17 6	53 16 6	47 10 0	12 7 0	—	—	—	—	—	1 11 10
J. E. Tuckett	—	—	—	—	—	—	—	—	—	—	—
Wallis & Co., Ltd.	7 2	43 15 0	34 11 8	31 5 0	†7 12 0	—	—	—	1 0 3	1 1 3	—
Waring & Sons, Ltd.	18 0	68 15 0	60 0 0	55 0 0	9 18 0	—	—	—	7 16 0 (complete)	—	—
Wrinch & Sons	—	—	—	—	—	—	—	—	—	—	—

LONDON.—For supply of ground-glass tablets (for the School Board for London):—

—	London School Furniture Co.	S. J. Waring & Sons.	G. M. Hammer & Co., Ltd.	T. Wallis & Co., Ltd.	E. Spencer & Co.	Galbraith Bros.	N.E. School Furnishing Co., Ltd.	General Builders, Ltd.	Educational Supply Association, Ltd.	H. Bouneen.	T. Cruwys.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Ground glass tablets, and fixing complete, exclusive of tapering blocks, per ft. run	4 9	11 6	6 0	10 9	8 7	5 6	9 9	3 9	8 0	6 6	4 8
Tapering blocks 3 ft. 3 in. by 1½ in. by 1½ in. fixing complete each	0 4½	1 8	0 8	0 10½	1 0	1 6	2 3	2 6	..	0 6	0 6
Tapering blocks 3 ft. 3 in. by 3 in. by 1½ in. fixing complete each	0 6	1 11	1 0	1 1½	1 1	1 6	3 0	3 0	..	0 8	0 7
Tapering blocks 3 ft. 3 in. by 4½ in. by 1½ in. fixing complete each	0 8	2 3	1 1	1 4	1 2	1 8	3 4	3 3	..	0 9	0 9
Tapering blocks 3 ft. 3 in. by 6 in. by 1½ in. fixing complete each	0 10	2 6	1 2	2 1½	1 4	2 0	3 8	3 6	..	0 11	0 10
Tapering blocks 3 ft. 3 in. by 9 in. by 1½ in. fixing complete each	1 0	3 0	1 8	2 8	1 6	2 4	4 5	3 9	..	1 2	1 0
Tapering blocks 3 ft. 3 in. by 12 in. by 1½ in. fixing complete each	1 3	3 7	2 0	3 5½	1 9	2 8	5 1	4 0	..	1 6	1 2

LONDON.—Running Contracts for the supply of furniture for teachers' rooms (for the School Board for London):—

—	Cushions. each.	Hearthrugs. each.	Hassocks. each.	Looking Glasses. each.	Folding Chairs. each.	Hammock Chairs. each.	Arm Chairs. each.	Wicker Chairs. each.	Table Covers, 70 in. wide. per yard.	Table Covers, 54 in. wide. per yard.	Turkey Red Twill for Window Curtains. per yard.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Shoolbred & Co.	†3 4	†10 9	1 1½	4 5	5 1	3 11	7 6	5 6	1 8½ 72 in. wide.	1 3½	0 7½ 34 in. wide.
Marshall & Snelgrove, Ltd.	3 4	12 1	1 0½	—	—	—	—	—	1 8½	1 4	0 8½ 36 in. wide.
Maple & Co., Ltd.	4 7	—	1 4½	3 1	4 11	3 10	6 3	4 9	2 11	2 3	0 6½
Atkinson & Co.	5 5	13 6	1 3	4 3	5 11	3 3½	6 10½	4 7½	†1 6½	†1 2½	0 6½ 35 in. wide.
Tarn & Co.	4 9	12 0	1 9	4 10	5 11	3 4	5 11	3 6	1 10½ 72 in. wide.	1 4½	†0 5½ 32 in. and 36 in. wide.
Harrod's, Ltd.	3 6	12 6	†1 0	4 6	5 0	3 11	†5 7	4 6	2 0½	1 5	0 8½
Oetzmann & Co.	3 7½	14 3	1 9	†3 1	4 11	3 4½	7 3	3 9	1 8	1 3 52 in. wide.	0 8½ 36 in. wide.
Lawes & Co.	—	—	—	—	6 7	3 7	7 0	4 6	—	—	—
T. Griffin	—	—	—	—	6 6	—	—	—	—	—	—
T. R. Roberts, Ltd.	4 4	14 8½	1 0½ and 2 1½	3 6	†4 9	†3 2	†6 4	†3 6 and ‡3 9	1 7½	1 2½	0 7
Wallis & Co., Ltd.	3 8	11 6	2 8	3 4	5 9½	3 2	6 8 and ‡5 9½	3 6 and ‡3 9	1 8½	1 3½ 52 in. wide.	0 6½ 34½ in. wide.

‡ Not Board's samples.

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence, is now ready.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under ..... 6s. 0d.
Each additional line ..... 1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

FOUR lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

LONDON.—For repainting of the Ironwork of the Blackwall Tunnel, for the L.C.C.:—
Proctor & Son ..... £590 | A. H. Inns* £426

LONDON.—For the supply of teak rails, sleepers, and plates for use in connexion with the construction of seats for use at the County Council's parks and open spaces:—

	Rails per set. s. d.	Sleepers per set. s. d.	Plates per set. s. d.
Williams & Son	20 0	4 6	1 6
Horton & Son	18 6	2 3	0 8
W. H. Jay	15 0	1 10	0 7
Marter & Co.*	12 9	1 6	0 8

LONDON.—For connexion of surface water outlet Graveney Brook, for the L.C.C.:—
Teill & Sons ..... £346 15 0 | A. C. Soan* £250 4 6
Kavanagh & Co. 276 14 0

[*See also next page.*

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LONDON.—For the erection of a new junior school, for the Royal Masonic Institution for Girls at Clapham Junction. Mr. Henry A. Hunt, hon. architect and surveyor, 45, Parliament-street, Westminster, S.W. :—

Turtle & Appleton	£15,643	Patman & Fotheringham	£14,793
Longley & Co.	15,489	Godson & Son	14,767
Lawrence & Co.	15,283	Allen & Sons, Ltd.	14,750
Smith & Sons, Ltd.	15,203	Higgs & Hill*	14,664
Holloway Bros.	15,000		
B. E. Nightingale	14,999		

NOTTINGHAM.—For alterations and additions to house, Park-road, Nottingham. Messrs. A. R. Calvert and William R. Gleave, architects, Nottingham :—

G. A. Pillatt* £285

[Lowest of four tenders.]

NOTTINGHAM.—For additions to offices, Exchange-walk, Nottingham. Messrs. A. R. Calvert and William R. Gleave, architects, Nottingham :—

G. A. Pillatt* £375

[Lowest of four tenders.]

NOTTINGHAM.—For alterations to Savings Bank, Nottingham. Messrs. A. R. Calvert and William R. Gleave, architects, Nottingham :—

W. Woodsend* £1,432 17

NOTTINGHAM.—For erection of house and stables, Mapperley Plains. Messrs. A. R. Calvert & William R. Gleave, architects, Nottingham :—

Cooper & Son	£1,590	J. Musson	£1,466
F. Messom	1,560	Fish & Son	1,466
Maule & Co.	1,510	G. A. Pillatt	1,463
W. Appleby	1,467	T. Barlow*	1,424

[All of Nottingham.]

POYNINGS (Sussex).—For new roof, &c., to south transept of parish church. Mr. E. H. Lingen Barker, architect :—

W. Whiteman	£221 0 0	J. G. Pickard	£179 17 6
Saltin & Evershed	203 0 0	S. Hopkins	170 0 0
Longley & Co.	198 0 0	G. H. Eastwood	159 0 0
G. Gillam	180 0 0	G. S. C. Cattress, Poynings*	155 10 0

PUDSEY (Yorks.).—For the erection of a warehouse, &c., Priestley Mill. Mr. C. S. Nelson, architect, 15, Park-row, Leeds :—

Masonry, &c.—J. Tolly, Bradford....
Joinery.—Wilkinson & Sanderson, Pudsey.....
Plumbing.—J. Scartle, Pudsey .....
Slating.—F. Thornton, Stanningley .. } £1,037 1 5

SMALLBURGH (Norfolk).—For additions to workhouse, for the Guardians. Mr. J. T. Lee, architect, 26, Great James-street, London, W. Quantities by Mr. W. Thornicroft, 6, South-square, Grays Inn, W.C. :—

T. H. Blyth	£1,620 0 0	W. & F. Appleton	£1,489 8 9
Carter & Wright	1,609 0 0	H. Skuffham	1,479 4 1
G. Riches	1,572 0 0	G. E. Hawes	1,440 0 0
W. Porter	1,570 0 0	Boddy & Son	1,399 0 0
H. C. Greengrass	1,587 0 0	R. C. Watts	1,396 0 0
W. Laycock	1,498 10 0	W. J. Hannant	1,357 0 0
		Batchelor & Sons, Stalham	1,198 12 0

TIPPERARY.—For the erection of two curates' residences. Messrs. W. H. Hill & Son, architects, 28, South Mall, Cork :—

Dennis Duggon, Cork* £1,600

B. NOWELL & CO.

STONE MERCHANTS & CONTRACTORS.

Chief Office.—Warwick Road, KENSINGTON.

Norway, Guernsey, and Leicestershire Granite, Kerb, Pitching, and Yorkshire Stone.

ESTIMATES GIVEN FOR EVERY DESCRIPTION OF ROAD MAKING.

WYMONDLEY (Herts.). — For alterations and additions to Wymondley House, for Mr. James W. Courtenay. Mr. W. Taprell Allen, architect, Hitchin and Stevenage. Quantities by Mr. Vincent Cattermole Brown, Paignton :—

J. Spratt	£4,358	Seymour & Sons	£3,955
Coulson & Lofts	4,200	Willmott & Sons, Hitchin*	3,489
Redhouse & Sons	4,049		

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following lists of tenders. Mr. T. J. Bailey is the Board's Architect :—

CULLODEN-STREET.—Painting interior and exterior :—

Parrott & Isom	£721 0	Gibb & Co.*	£459 0
Vigor & Co.	540 0	J. F. Holliday	458 10
Turnbull & Sons	498 0		

MORDEN-TERRACE.—Painting interior and exterior of housewifery centre, and exterior of main school buildings :—

M. E. Allen	£280 17 6	Proctor & Son	£232 0 0
W. J. Howie	270 0 0	H. Groves	219 0 0
E. B. Tucker	268 11 0	G. Kemp	186 0 0
W. Banks*	244 19 6		

CORRECTION.—In reference to the list of tenders in our last issue for Townmead Schools, Fulham, we stated that the amount of the tender of Messrs. G. E. Wallis & Sons, of Maidstone, was £14,143, whereas it should have been £24,148.

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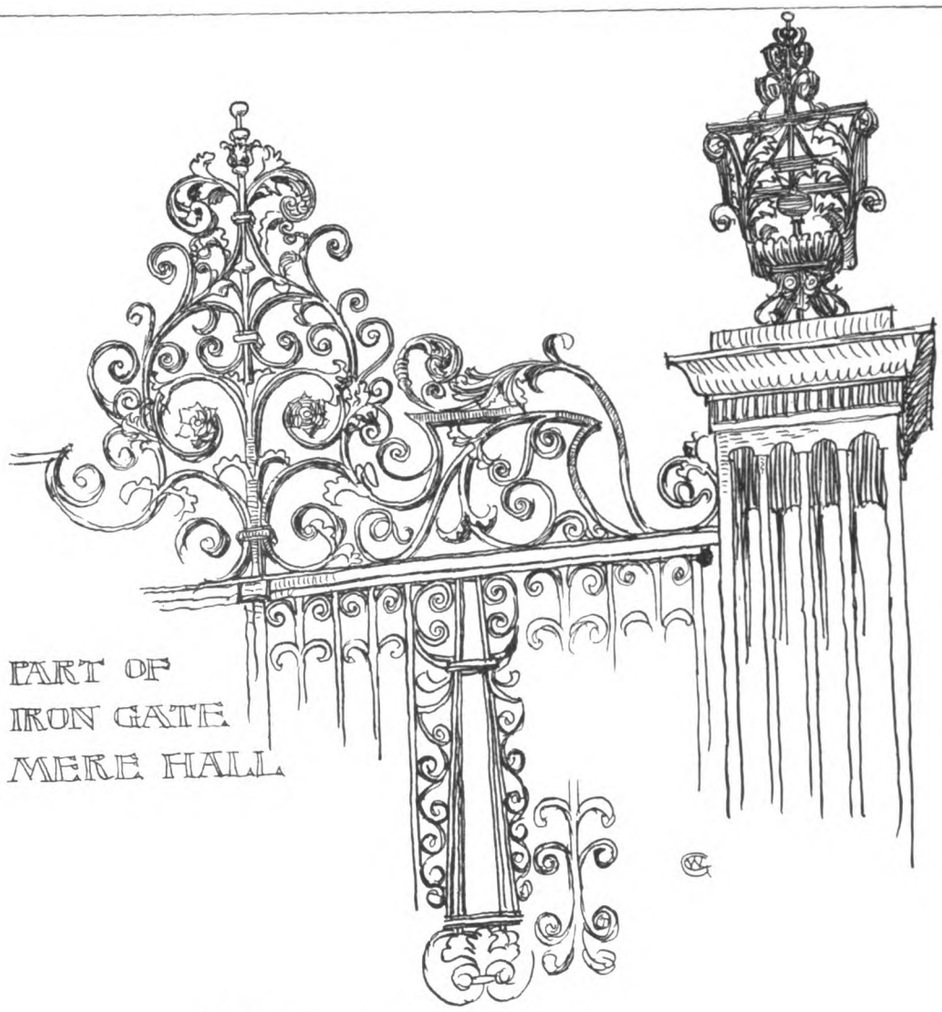

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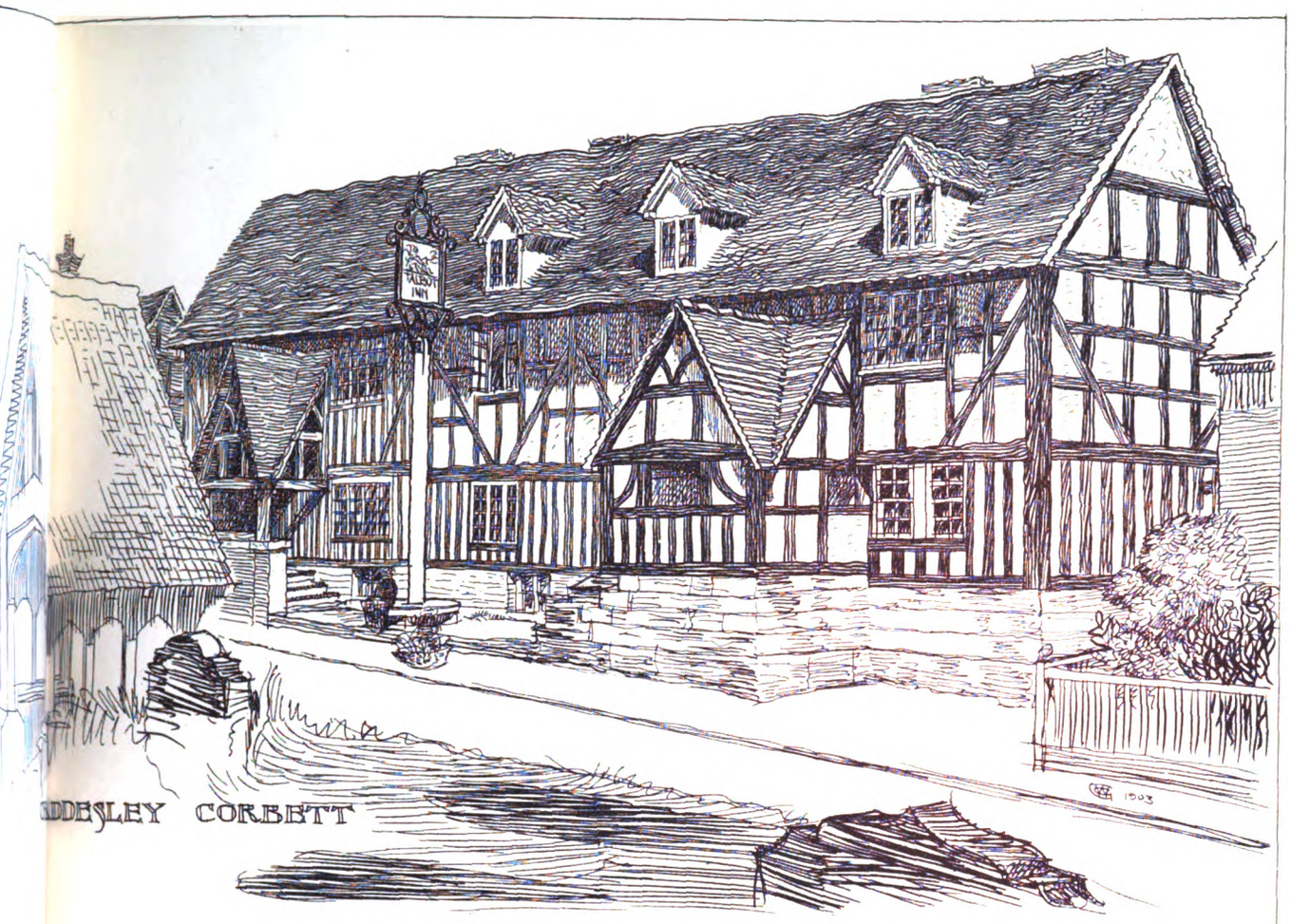

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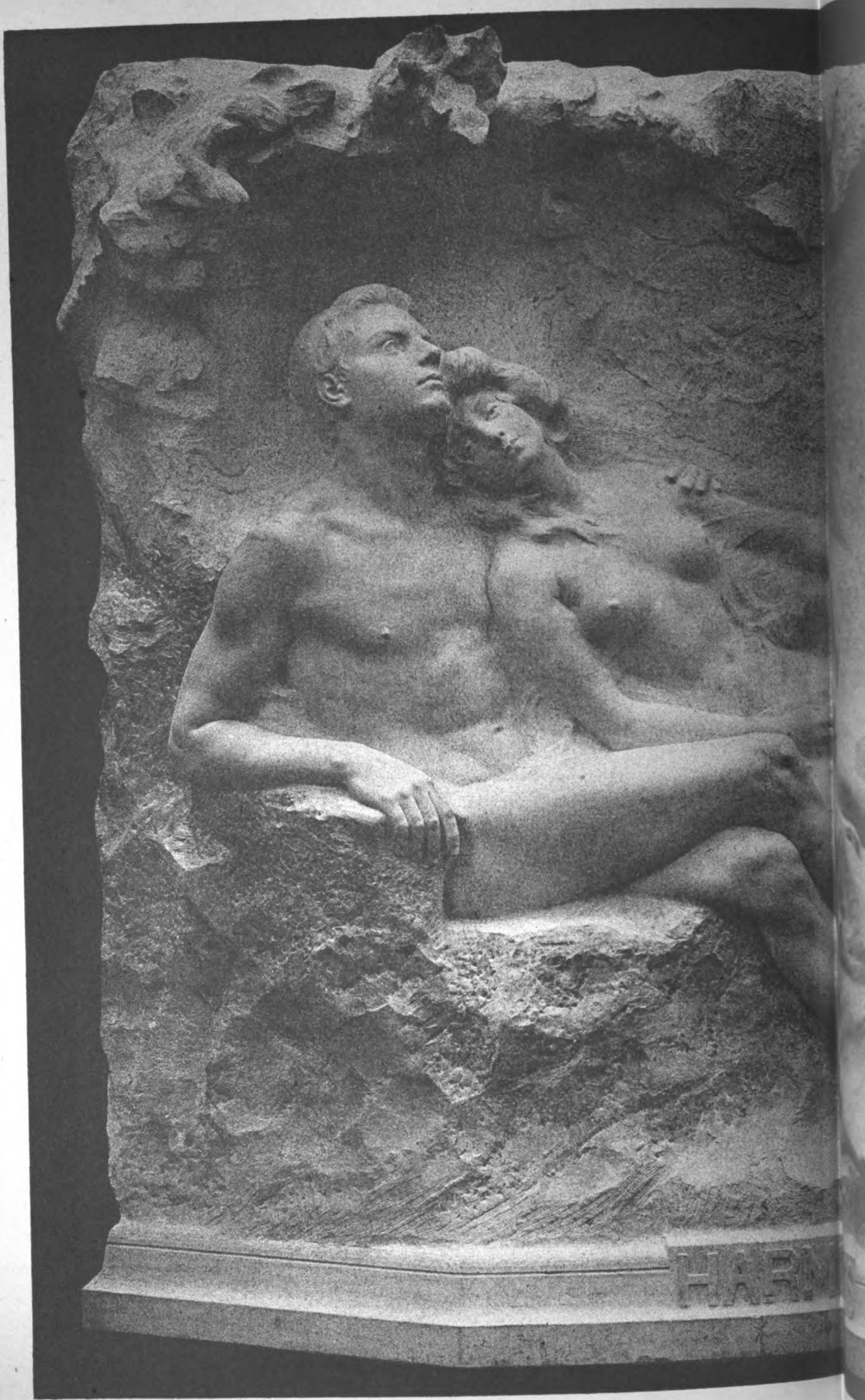

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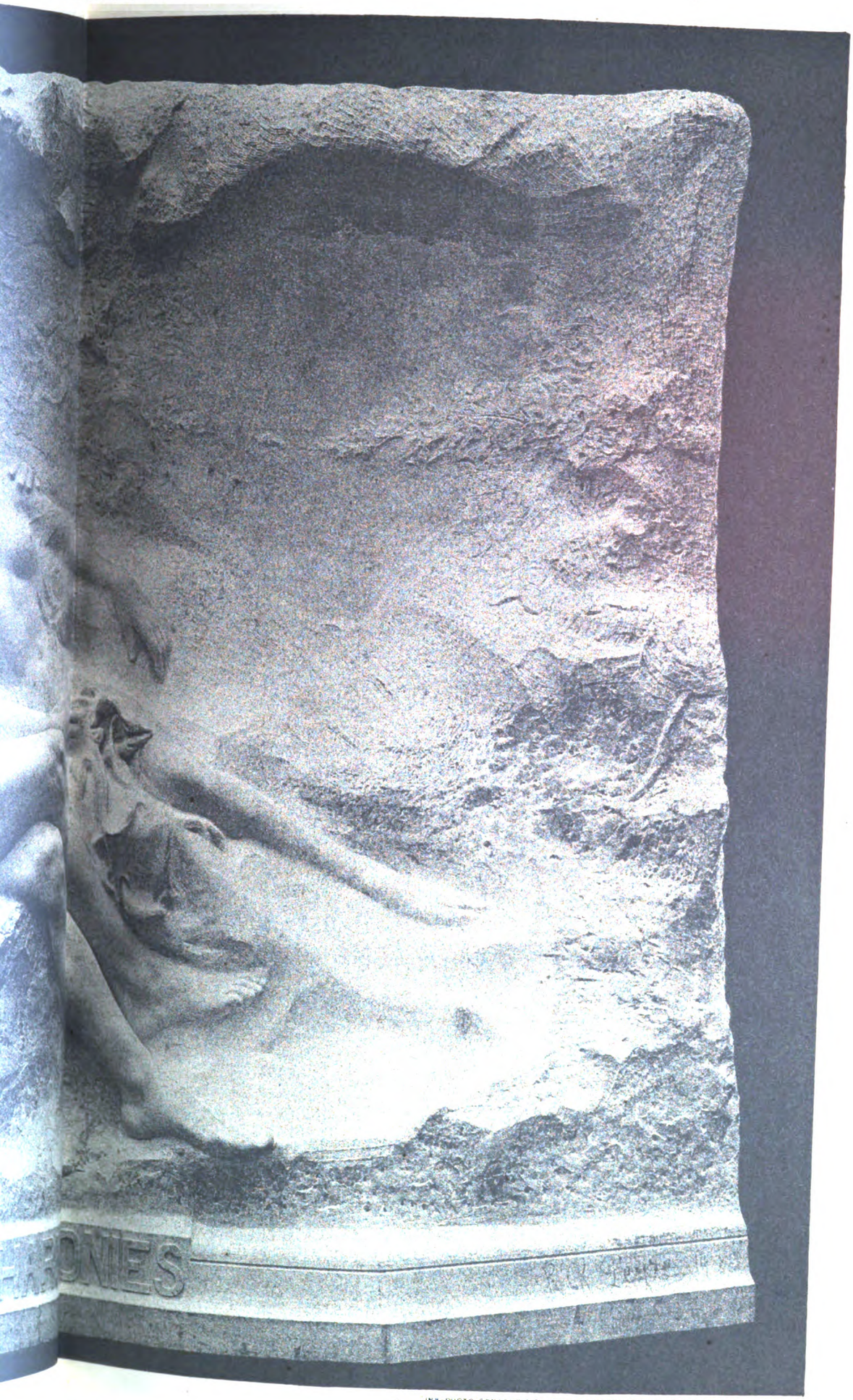

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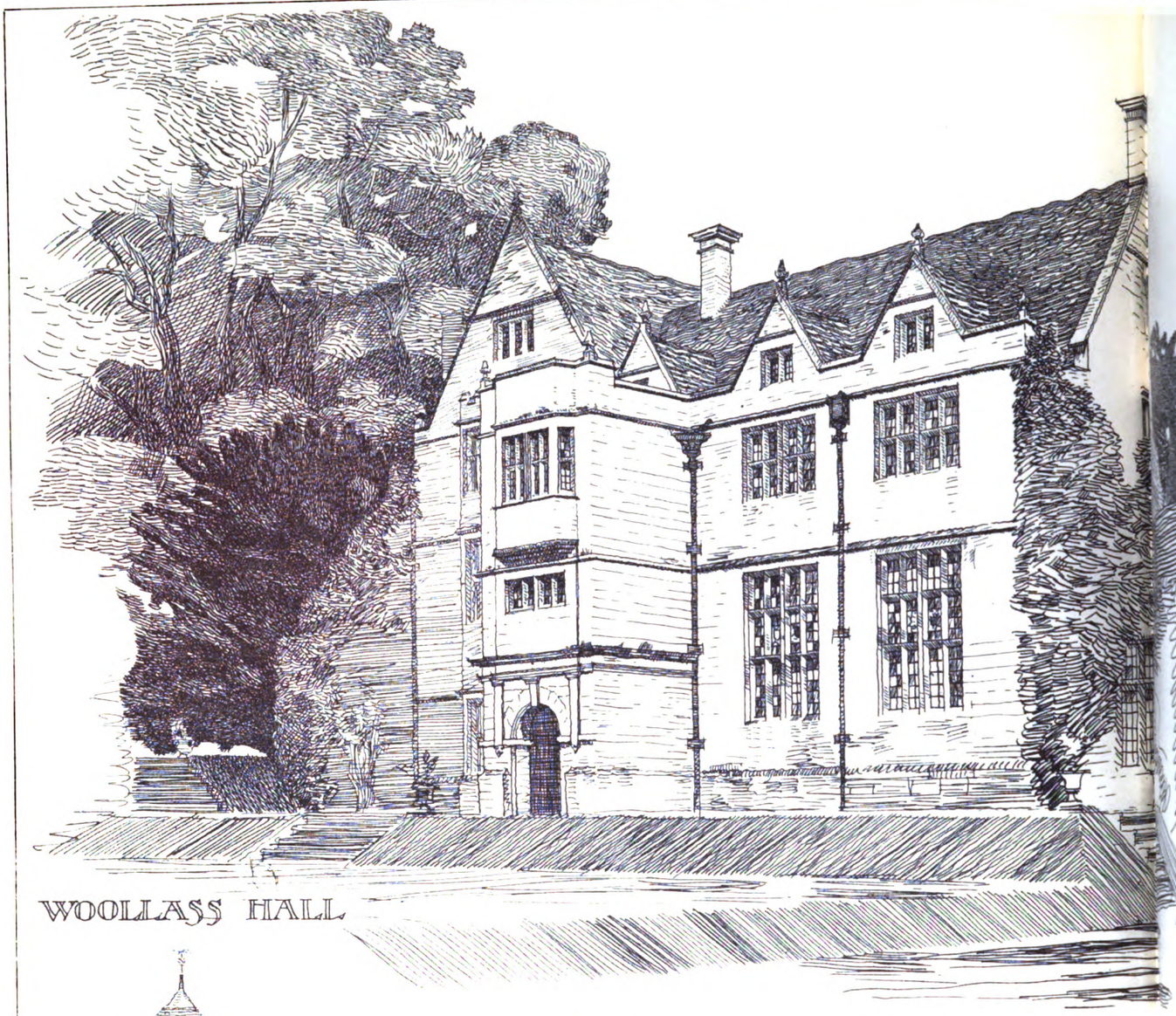

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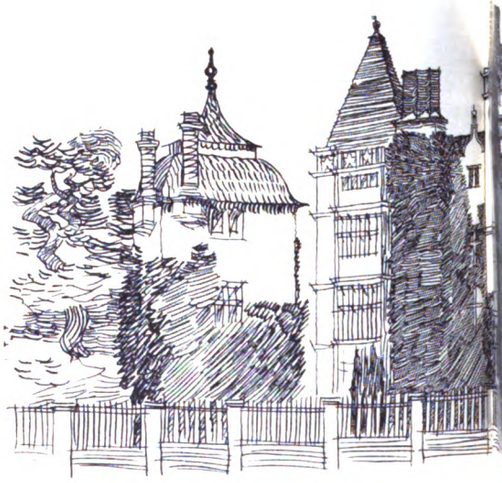

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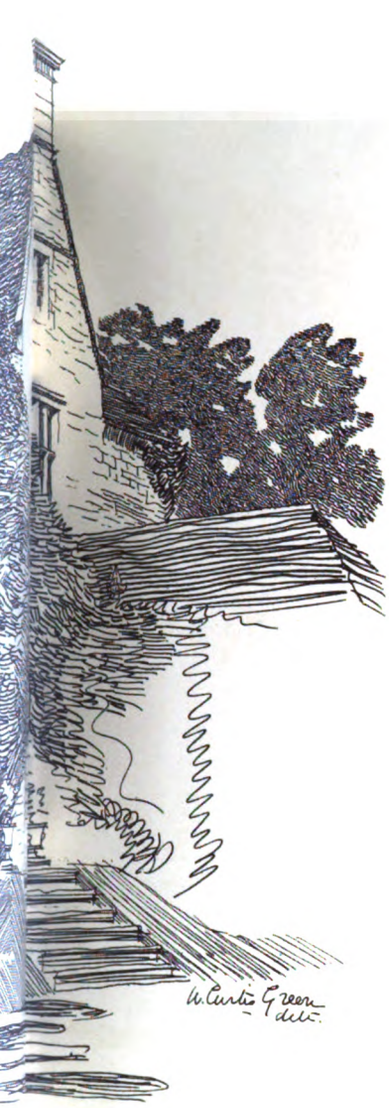

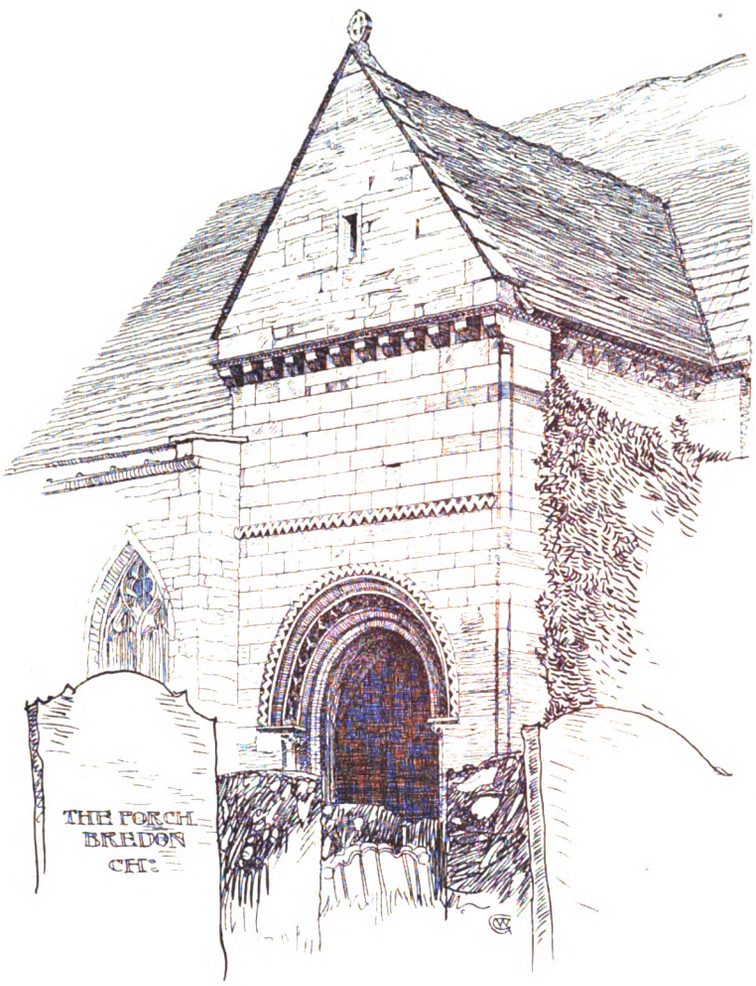

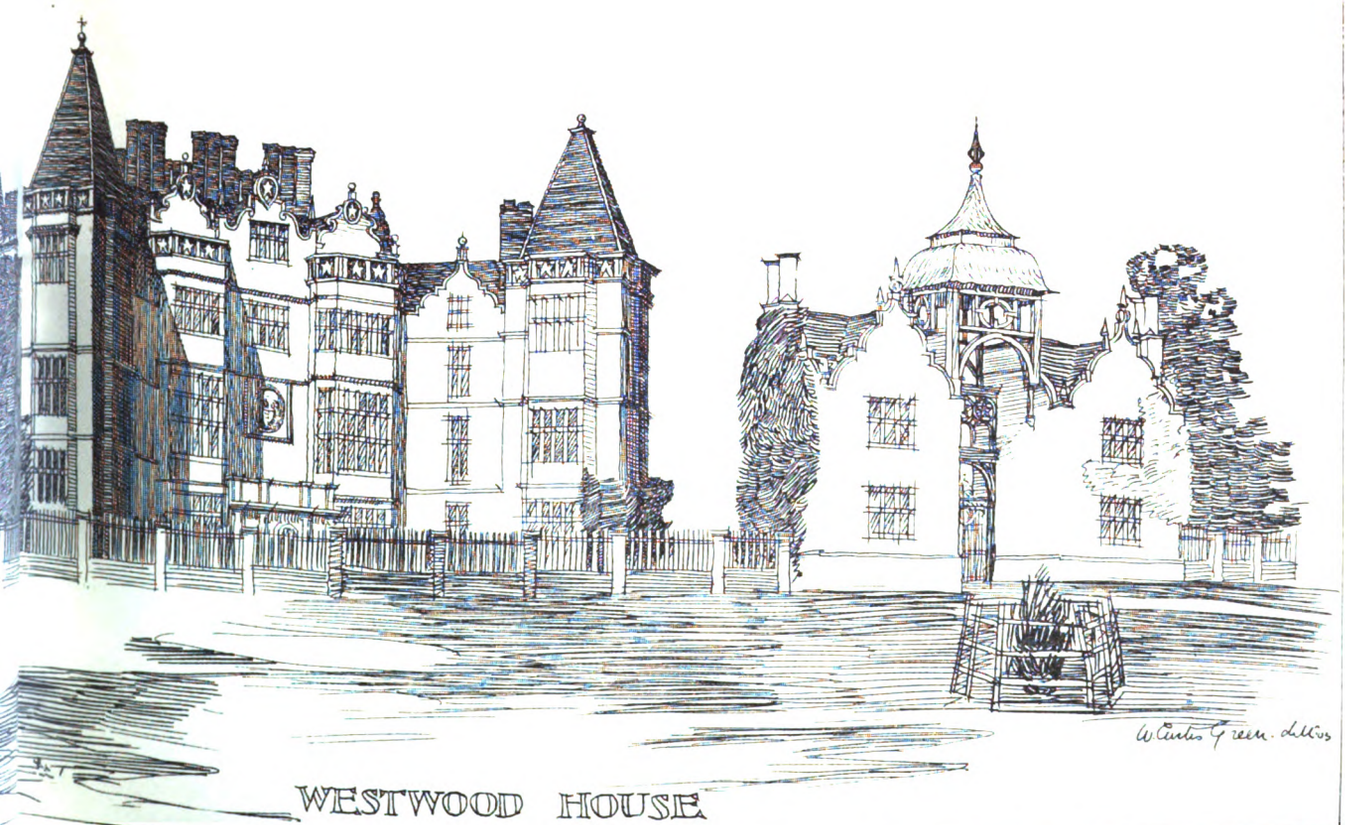

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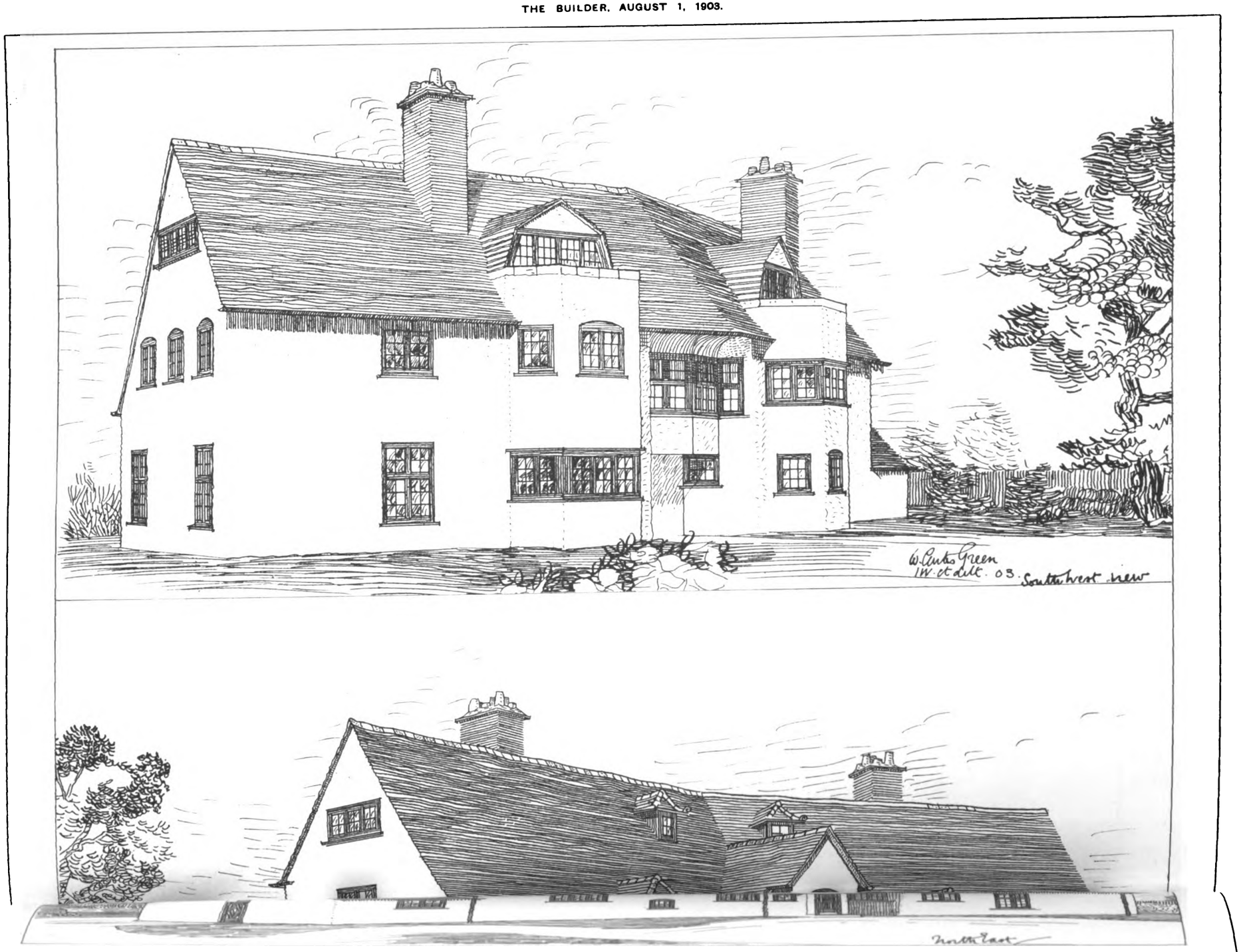

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HOUSE AT SHEPHERD'S GREEN, CHISLEHURST.—Messrs. W. Curtis Green & A. C. Dickie, Architects.

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HOUSE AT GREAT SHELFORD, NEAR CAMBRIDGE.—Messrs. W. Curtis Green & A. C. Dickie, Architects.

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The Builder.

VOL. LXXXV.—No. 3157. AUGUST 8, 1903.

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Kenilworth Hotel, Great Russell-street.....Mr. G. Waymouth, F.R.I.B.A., Architect.
Design for Kursaal, Cheltenham..... By Mr. G. H. Elphick.

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The Proposed London Technical High School.

A GREAT deal of excitement has lately been created by the proposal to found a technical high school in London on Continental lines. Lord Rosebery brought the matter forward, but there cannot be the slightest doubt that politics do not enter into the matter. Some opposition has been offered, on the ground that we already have institutions which are capable of doing what the proposed technical high school would attempt to do. We doubt that. For many years we have pointed out the immense advantage to architects, surveyors, and engineers of having an independent place, under Government control, where materials of construction could be tested. If we cannot get Government control, then we must have these tests made by the next best form of control, namely, the County Council or by the Municipality. We do not approach this question in a militant spirit at all, but we think that a consideration of the following facts will thoroughly convince anybody except interested parties.

At present, building stones, bricks, &c., are tested by private individuals, and the results are sent to those who required the information, who in most cases are the manufacturers; and it is perfectly well-known that unless the results are satisfactory to the manufacturers, the information never becomes public property. In this way architects are often misled by statements from interested parties as to their materials, a really good material frequently being passed over because it is asserted (without tests) that the one pushed by the canvasser is better. This may be an old tale, but it holds as good now as ever it did. The architect cannot nowadays be expected to know everything. He has to be guided in regard to his selection of materials he uses in his buildings either by previous experience or by practical tests in reference to new ones. The Yorkshire College at Leeds has for many years provided unimpeachable tests in this direction, and so have the City Guilds Institute and University College; but their accommodation is altogether inadequate for a national means of testing materials of construction.

We hear a good deal of talk about the London polytechnics being able to carry out this important matter. We should like to know where these institutions are. The best known of them has wisely given up "polytechnic" teaching long ago, and confines itself largely to University teaching; another well-known one is giving special prominence to commercial education; a third caters for boys and girls, with a sprinkling of adults; a fourth identifies itself with the teaching of technical education to young artisans, and so on.

We think the promoters of this new high school for technical education made a great mistake when they put forward Charlottenburg as a type of the institution we want. One man pertinently asks whether those who advocate the "Charlottenburg idea" have ever seen the "Technische Hochschule" there, and he asks also whether anybody in this country knows where Charlottenburg is. He is doubtless to some extent justified in his inquiries, and he may be quite sure that hardly anybody here knows much about that establishment. We happen to know it, however, and we think that a great deal too much fuss has been made about it during the past fortnight. Any one would think, from the remarks made, that it was the only place where technical education could be obtained in north-western Europe. We could indicate plenty of places in France, one in particular in connexion with the administration of "Ponts et Chaussées," where most excellent work is carried on. In the United States there are many colleges attached to Universities where practical work relating to architectural and engineering materials is carried on with great advantage. The Cornell University probably stands first in this connexion.

The County Council has been asked by Lord Rosebery to endow this new institution with 20,000*l.* a year. The Council knows its own business, and it is considering the question in a favourable light. But nothing more important, it seems to us, can be aimed at in the utilisation of the technical high school, if it is ever erected, than the making of it into an official testing station for materials of construction. That would provide the students with plenty of material to operate upon; it would ensure that the work was properly carried out; and, above all, the certificates would bear the imprimatur of the authorities of the institution. We do not say that private individuals at present engaged in such work are not doing their work properly—far from it; but the private individual very often has no authority to publish any results he may obtain, whilst a public institution would, or should have, such authority.

What the architect and engineer want is not merely the best results obtained in experimenting with a material: they want all the results, good and bad; and that is what they do not often get under present circumstances. Only the other day we were interviewing a quarry owner, and asked whether he had any "crushing strength" results on his stone. He replied that he had the stone tested some time since, but was not satisfied with the results. Some two or three years ago, another, on being asked why his soft limestone had yielded such extraordinary results, it coming out at about five times the usual strength of stone of the same kind, answered, "Well, I don't mind telling you now, because I am leaving this business. I sent cubes of granite to be tested, and they did not know the difference." Some place where people would know what was sent them to be tested would seem to be highly desirable in such a case. Of course, this is not the fault of the private experimenters, for they do not know, in most cases, what is the object of the experiments, nor is it their business to inquire. It is not for them to return the samples sent, and refuse to perform any tests upon them because the owner of a limestone quarry wants some tests on granite made. The certificate of the tests usually bears something to the following effect: "Received from Mr. So-and-so six cubes of stone marked ——, and we hereby certify the following to be the results." Nothing could be more satisfactory to the

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architect; but not so, always, to the person who sent the stone. He only publishes what he likes, as we have already said; and this often renders the experiment nugatory.

The best possible way, it seems to us, would be to get perfectly independent but experienced persons to go to the quarry, brickyard, or what not, to select the specimens to be operated upon in the Technical High School, and to have all the results published in its "Proceedings." That would certainly put a stop to persons playing fast-and-loose with the results supplied to them by perfectly *bonâ-fide* experimenters. We know of one case which occurred not long since, where the proprietor of a quarry produced to a scientific visitor an extraordinary result of the "crushing strength" of his stone. It so happened that the visitor had another result on the same stone in his pocket, arrived at some years previously, and he inquired from the proprietor why there was such a difference, the later result showing a much greater strength. The quarry was not a new one at the time the first experiments were made. The answer was not satisfactory, and the visitor said he should publish both results, and did so, in spite of the fact that the proprietor had previously threatened legal proceeding, which, however, were never initiated. Such facts as these are surely sufficient to warrant the establishment of a national testing station, where the public shall have access to all results arrived at; and it seems that this proposed Technical High School will offer greater advantages for the purpose than any other establishment in London at present.

We have already alluded to the circumstance that the proposed school has been compared with the school at Charlottenburg, near Berlin. The latter establishment is an immense place, and covers considerably more than four acres of ground; the subjects taught are architecture, civil engineering, chemistry, metallurgy, mathematics, physics, mechanical engineering, and ship-building. The work is done in laboratories and class-rooms, there is a research department for testing building materials, oil, metals, and paper, and the work is scientific throughout. The special function of the research department is to institute experiments "in the general scientific and public interest." There is nothing very wonderful about the place, except that the means for original research are, possibly, the best and most complete that money can purchase, and that the professors are men who thoroughly understand their subjects.

It is to be sincerely hoped that more discrimination will be exercised in the selection of students for this new London technical high school than is at present done in connexion with London University classes—for it is proposed to attach the new school to the London University. It is of no use suddenly to bring a raw student to bear upon a technical subject in its highest aspects, as is at present done in many instances. The student, being mentally acute, soon acquires sufficient knowledge to enable him to understand what is going on in the experiments or class-room lectures, and he then pushes ahead as best he can, after asking the professor or his assistants innumerable questions that are merely waste of time so far as most others of the students are concerned. We know of many students, for instance, who try to learn the applications of a science before they know anything at all about the science itself. The result is that all that such a student can obtain, even from the best school, is a smattering of the "applications."

This state of affairs is, doubtless, largely due to the fact that all the colleges attached to the London University which teach technical science are very poor. The bursar or treasurer, as a rule, has more than he can do to make both ends meet, unless he gets extraneous assistance. Therefore, the institution takes in all and sundry, and makes the best of a bad job. Nobody, possibly, regrets this more than the various colleges and institutions themselves, but there is no help for it as things stand. Perhaps this Technical High School, when it is established, will enable people better to understand the extreme impoverishment of existing institutions and colleges. They will then wonder how so much useful work has been done for years past under such adverse circumstances.

However, our main point is that, as at present proposed, the new school is to do a great deal to enable young architects, engineers, and surveyors to learn something of materials of construction—their composition, physical structure, strength, uses, and so forth. They will have to handle the materials themselves, and they will be expected to carry out some original work in reference to them. Whether the money proposed to be expended could not have produced a good result if it were distributed amongst existing schools is not a matter for us to discuss. We are satisfied that progress should be made, and only hope that the new school, when it is in existence, will satisfy the wants of higher technical education, especially in the building arts, in London and the country generally.

VENTILATION OF THE HOUSE OF COMMONS.

In the year 1723 Dr. Desaguliers adopted furnaces for removing vitiated air from the old House of Commons, but the system of ventilation was the subject of complaint for many years, in spite of the attention paid to it by various practical and scientific men. In the year 1836 Dr. Reid introduced a similar arrangement in connexion with the temporary House of Commons, and his apparatus appears to have been a most expensive means of attaining the desired object. After the retirement of Dr. Reid, in 1848, Mr. Goldsworthy Gurney was appointed to superintend the warming and ventilating arrangements of the new House. Considerable alterations were made from time to time. Upward and downward draught were both tried, as also were steam jets, furnaces, and fans for exhaust purposes. Steam batteries, ice banks, and washing screens were provided. From first to last more than half a million sterling was expended in experiments, and, finally, it was thought that the problem was solved.

Such, however, was never the universal opinion of members, and as years passed by, there grew up a settled conviction that the condition of things was far from satisfactory. Ultimately, as our readers are aware, a Select Committee was appointed to inquire into the whole question. This Committee has been laboriously employed for the last fifteen months, and having examined some seventeen witnesses, has now issued a Report which, however, is tentative and generally inconclusive. No other result could reasonably be expected from such a body, and the recommendations made could have been formulated in about a couple of hours by any competent ventilating engineer. We think this view will be found to be justified by perusal of the following summary of the recommendations in question:—

(1) The substitution of electric fans for the existing exhaust furnaces. (2) Simplification of the air inlet duct, and arrangements for its more thorough cleaning. (3) The substitution of modern air-washing screens for the present apparatus. (4) The adoption of improved intake fans. (5) The experimental introduction of air beneath members' seats. (6) More frequent cleaning of the floor matting. (7) Placing all cleaning arrangements under one authority. (8) The appointment of a sanitary officer to superintend the ventilation of the House. (9) The institution of experiments with the view of introducing further improvements in the present system.

From this summary it will be seen that in spite of the general use of exhaust fans throughout the civilised world, the House of Commons has only just made up its mind to abolish the exhaust furnaces which have been employed in succession ever since the time of Dr. Desaguliers—some 180 years ago. This example shows the strides that are being made in the acquisition of scientific knowledge in the present day. The proposal to employ improved intake fans and modern water screens is also a hopeful sign, and the suggestion that the cleansing arrangements should be placed under one authority indicates an appreciation of those principles which are to be found in every well-conducted establishment. Divided responsibility may sometimes be convenient for political reasons, but it never answers in administrative departments.

Up to this point there is little fault to be found with the belated recommendations of the Report; but in proposing the experimental introduction of air beneath the seats of the House, and the conduct of further inquiry into problems of ventilation, the Committee shows clearly that no real progress has been made with the inquiry undertaken. The Report states the obvious truism that no system of ventilation can give satisfactory results unless accompanied and supported by a thorough, systematic, and frequent cleaning of all parts of the chamber and its adjuncts. It then adds certain maxims that are thoroughly known and acted upon by every cleanly housewife, and thereafter it collapses. Pending the results of the inquiry recommended, the Committee is not prepared to make any recommendation with regard to the general scheme of ventilation, although the further introduction of fans is advised in committee rooms. Hence the general conclusion formed as the result of a fifteen months' deliberation is that an inquiry should be instituted.

If things go on in this way, the ventilation question will not be settled for a generation, or, perhaps, not before the completion of Vauxhall Bridge. Why so much trouble and mystery are made about the heating and ventilation of the Houses of Parliament we cannot imagine. Plenty of large buildings are successfully treated every year in this country and abroad, and we are confident that any experienced firm of heating engi-

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neers would be able to find a satisfactory solution of the problem, and to have all the necessary apparatus at work within a few months if the authorities would follow the course adopted in general practice.

NOTES.

The Motor-Car Bill.

THE public are to be congratulated on the concessions that have been wrung from the Government in the Motor Traffic Bill. A test of efficiency has been conceded and the Government have also yielded on the vital question of speed limit. When people in the position of Mr. Wilson Noble write to the *Times* describing a driver "who has been crawling along at twenty miles an hour on the Hog's Back" being tempted to exceed this limit down hill into Guildford, it shows such an utter lack of appreciation of what is a reasonable speed for light locomotives on high roads that it would be hopeless to leave motorists any discretion in the matter, and it is a matter for general congratulation that the Government have decided to enforce consideration for the public safety, to say nothing of good manners, by law. The form of the suggested amendment in the Bill is, moreover, most reasonable, as an infringement of the speed limit when it is dissociated from actual danger to the public at the time and place, will be visited with a different penalty, and will not involve the imprisonment of the offender. It only remains to be seen what speed limit the Government will suggest, but there will be some difficulty in arriving at a satisfactory determination on this point, for since this provision is in no way to affect the prohibition against reckless driving, it is obvious it must not be placed too low, whereas if a high speed is allowed it will be considered by many drivers as an indication of the minimum reasonable speed.

Municipal Trading.

THE Liverpool City Council announces a rehousing scheme which is estimated to involve an expenditure of 1,000,000*l*. It will be interesting to see what effect the resolution of the large financiers not to underwrite any more corporation loans for the present will have on new issues. It appears likely to have more effect in checking municipal trading than the report of any Commission, and since corporation stocks are issued for speculative purposes, trustees will certainly avoid them. A difficulty in raising these loans will necessitate a higher rate of interest being offered, a strain which the corporation undertakings cannot afford to bear, and which will make their financial position less satisfactory than ever. It has now become apparent that the public really hold the key to the position, and can decide this question of municipal trading one way or the other by the control of the purse, in which, as ratepayers, they are directly interested.

The Perth Cricket Ground Disaster.

IT is to be hoped that the collapse, on Saturday last, of the Grand Stand at Perth, following as it does the more serious misadventure at Ibrox Park, will have some salutory effect upon the officials in whom is vested the duty of inspecting such structures in Scotland. In the present instance there was no loss of life, but about 100 out of some 600 occupants were injured—some of them severely. The stand is stated to have been about 100 ft. long by 20 ft. wide. It included a platform, 4 ft. wide by 2 ft. high, in front, and nine tiers of seats rising to a height which in one report is given as 14 ft. and in another as 30 ft. It appears that the structure consisted of timber trusses spaced at 6 ft. centre to centre, and held together by battens and boards, and also by the seats. No other lateral bracing was provided, hence, on the failure of some horizontal timbers during an exciting part of the game, the whole structure collapsed like a pack of cards. From a structural point of view, this mishap is much worse than that at Ibrox Park, where only a portion of the decking dropped out leaving the framework intact, whereas in the present instance the sudden snapping of a few planks allowed the whole stand to fall flat upon the ground. It is stated that the usual official inspection had been duly made, but events have proved that there could have been no really adequate examination. We do not, of course, profess to make any suggestion as to who may be responsible for the mishap. That is a matter which, it is to be hoped, will be settled after due inquiry. Two points are clear, however —(1) That the horizontal timbers were inadequate to carry the weight of the spectators, and (2) that adequate lateral bracing was conspicuously absent.

Lands Compulsorily Acquired.

THE principle adopted by the arbitrator and affirmed by the Court in the case of the Mayor of Plymouth and the Duke of Northumberland is one of importance to those whose lands are acquired compulsorily. The Corporation was acquiring land compulsorily for the site of a reservoir, and the land required belonged to three separate owners. The Corporation contended that each plot ought to be valued as a separate and independent property, no regard being had to the fact that when acquired with the adjoining lots it afforded conditions peculiarly adapted to the site of a reservoir. The claimant, on the other hand, contended that all the plots should be valued as though they were all one in the same ownership. The arbitrator steered a middle course by regarding the lots as separate entities, but giving consideration to the advantages and disadvantages each was subjected to by the acquisition of its neighbours, and the Court has affirmed this decision. It is clear that either of the parties' contentions would have worked an injustice.

Wind Pressure and Moving Machinery.

WHILE the effect of wind pressure on buildings, bridges, and kindred structures is carefully considered, and the effort is always made to ensure stability, practically no care appears to be taken to guard against the overturning of railway trains, travelling cranes, and other machinery by the force of wind. Only a short time ago we had an example of a train being blown over on the Leven Viaduct, while the viaduct itself was able to withstand a wind pressure calculated at 94 lbs. per square inch, and on Friday last week a large steam crane was blown into the Mersey at the extension works of the Brunswick Dock, Liverpool. This crane, weighing about 20 tons, was situated upon an elevated travelling platform, and it was seen to fall over into the river when struck by a sudden gust of wind, carrying with it five men who were at work inside the house, and unfortunately, four of these men were drowned. It would be difficult to suggest any satisfactory means—except that of reducing the proportion of surface to weight—for preventing railway trains from being overturned, but the fact remains that at present passengers are exposed to risk in stormy times, and the problem is one deserving of attention from railway engineers. In the case of cranes in exposed positions there is not so much difficulty, and some mechanical device ought in future to be employed to guard against mishaps.

Repairs to Private Roads.

A CURIOUS point arose in the case of Moore *v.* Todd upon which the Court of Appeal have taken a view different from that of Mr. Justice Bigham. In the year 1888 a landowner, with a view to developing his property, widened a road in front of it, and, as this widening conferred some benefit on the land in other hands on the opposite side of the road, the owner of the latter agreed to contribute a lump sum on condition "that he should not be liable to contribute to the maintenance or repair of the said roadway, sewer, and main drain" until the same should be "taken to by the parish or some other local or public authority," and until that event happened the road was to be solely maintained by the other party, the defendant to this action. In 1901 the Local Authority, acting under Section 150 of the Public Health Act, 1875, made up the road and levied contributions on the owners of the land, and the plaintiff, by virtue of the above agreement, claimed to be repaid the amount so levied from the defendant. The Court of Appeal have now held that this agreement only applied to the roadway as originally constructed by the defendant, and that it did not embrace the expenses demanded by the Local Authority under the section. The Court said the question was one of some difficulty, and it affords another example of the care that should be applied in drawing agreements in relation to landed and town property. The parties too often regard only their own intentions, and forget the liabilities imposed on their property by the tangled mass of legislation dealing with the powers of Local Authorities. In the present case it seems fairly clear that the intention of the parties was that the lump sum payment was to cover all the liabilities of the plaintiff in respect of the road until the inhabitants at large should become responsible for it; yet a study of the statute would have revealed the fact that the Local Authority under Section 150 had power to call for considerable expenditure quite outside its "maintenance and repair," such, for instance, as for paving, lighting, &c., and that such expenditure must be a condition precedent to the adoption of the road by the Local Authority under Section 152.

The Proposed Yenikalé Bridge.

ONE of the most important bridge projects on foot at the present time provides for the construction of a railway bridge between the Crimea and Northern Caucasia. At the point selected by the consulting engineer

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the distance across the Straits of Yenikalé, or the Strait of Kertch, as the passage is alternatively called, is about 1½ miles, and the bridge would facilitate the establishment of direct railway communication between Russia and Central Asia. No details are available at the moment as to the type of construction to be adopted in this extensive scheme, but as the Straits of Yenikalé afford the only entrance from the Black Sea to the Sea of Azof it will clearly be necessary to erect a bridge of sufficient elevation to permit the passage of steamships and other vessels plying between the two inland seas. The proposed work will be fully 50 per cent. longer than the Forth Bridge, and bearing in mind the necessity for avoiding interference with navigation, it will probably be one of the most remarkable structures hitherto contemplated. According to the engineer's estimate the cost will be about 850,000*l.*, and it is announced that the project has been approved in principle by the Russian Government.

Vulcanised Timber.

We have received some samples of Powell's patent vulcanised wood, and are asked to express our opinion of them. By the process the timber is first saturated at boiling point with a thin solution of common refined sugar, and afterwards the water is evaporated at a high temperature, leaving the interstices in the wood filled in with solid matter, and the timber is said to be then vulcanised, preserved, and seasoned. Tests in regard to absorption, compression, and bending have been carried out with ordinary wood and wood treated by this process, and they have shown that the "processed" wood was superior in every respect, so far as these particular tests are concerned. Beech showed the most remarkable alteration after its conversion, for its specific gravity was increased by no less than 50 per cent. Whilst during immersion for fourteen days the normal beech absorbed one pint of water, the vulcanised blocks absorbed less than one-fifth of that quantity. We have made some independent experiments with the samples sent to us. Not having had corresponding pieces of the planks from which the treated samples were cut we cannot, of course, give any relative values in regard to absorption. But the sample of maple sent is remarkably non-absorbtive. The elm and oak also showed very little tendency to imbibe much, and the beech came fourth. For the rest, poplar, ash, Canary white wood, and three varieties of pine we have no elements for comparison, but none of them absorbed much water during a fortnight's immersion. Micro-sections of the different woods throw but little light on the nature of the alteration effected in them by this preserving process, but the majority of the cells are filled with some dark substance, and are not in their natural state. We are informed that the specimens we have examined have all been subjected to a fairly high temperature—over 140 deg. Fahr., and some over 200 deg. Fahr. They show no signs of splitting. We have come to the conclusion, after our experiments, that the process must increase the durability of the woods; and the only adverse criticism we have to make is that the woods are all to some extent discoloured. The process seems to make the grain of the wood more visible, however, and that is often an advantage where the wood is to be polished and not painted.

A Relic of Old St. Giles-in-the-Fields.

An interesting building, latterly used as printers' offices and as a workshop by the contractors for the Central London Railway, is being demolished for a theatrical-scenery factory to be erected by Mr. J. Carmichael, contractor. The old building stands in Little Denmark-street, at the north-eastern end of Lloyd's-court, near the churchyard gate, and was built in 1816 as a schoolhouse for the charity founded under William Shelton's will of August 5, 1672, in favour of the parishes of St. Giles-in-the-Fields, St. Martin-in-the-Fields, and St. Paul, Covent Garden. The land, of which the trustees of Carter's Foundation, at Wilford, near Nottingham, are the freeholders, had belonged to Mrs. Elizabeth Sewell, *née* Lloyd, whose will mentions that her house (pulled down in 1727) formerly stood on the site. The school-house had served of late years as a residence of the master of the adjoining National Schools; the tenancy by the Shelton Charity expired in 1877. It is, or rather was, octagonal on plan, with a central column or pillar that had been utilised for the flues of the fireplaces on the two floors. In our issue of June 13, 1891, we reproduced a bird's-eye view, of about 1560, showing the buildings on this spot and the precincts of Queen Mathilda's lazar hospital, having a high wall along each of the three sides; the triangular space being bounded by Elde-strate (since Hog-lane, or Crown-street, and now Charing Cross-road), Le-lane (since Monmouth, then Dudley-street, and now Shaftesbury-avenue), and a wide thoroughfare—the present High-street—that separated the precincts from the Pitaunce Croft or Sixteen-acre Close of Blemundesburye Manor. At the Reformation the property was granted to John Dudley, Viscount L'Isle and Duke of Northumberland, who built on the site of the hospitium a house, which subsequently belonged to the Dudleys, Earls of Leicester, and Alicia, Duchess Dudley, whose cenotaph (1669) is preserved in the parish church; that house stood between the later Lloyd's-court and Denmark-street. Just north of the old school-house is the "Judgment" or "Resurrection" gate of the parish churchyard. The stone gate, having the curious oaken carving in the tympanum of the arch, was removed thither in 1865 from the north side in High-street, where it had replaced the gate built in 1687 of red and yellow brick by Love, the carver, who was paid 20*l.*, after a design by W. Leverton; confer Hatton's "New View," 1708. The new National Schools at the corner of Endell-street—the way to the Elms of the bird's-eye view—were built after E. M. Barry's designs, and are illustrated, with two plans, in the *Builder* of December 22, 1860.

MAGAZINES AND REVIEWS.

The *Quarterly Review* includes, among the articles in a very good number, one on "The Royal Academy and Reform," which is full of truth and good sense, and will not be without its effect on public opinion; that it will have any effect on the Academy we doubt, for though there are individual academicians who are far-seeing men of wide artistic sympathies, they seem to have little weight in the body to which they belong, which in its official and corporate character and procedure is one of the most narrow-minded, prejudiced, and selfish of public bodies. Is it, indeed properly a "public body" at all? Is it not rather, as the writer of the article suggests, "a private art-club," chiefly concerned with the interests of its own members? The action of the Academy in using the Chantrey bequest to buy in the works of its own members is not alluded to in the article, though it might well have been. The two chief charges made by the *Quarterly* critic are that the Academy is far too limited in its numbers, and is jealously kept so; and that (as we have over and over again said) it is not really an Academy of Arts at all, but an Academy of Painting, with sculpture and architecture allowed a small show in a very unsatisfactory manner, and other forms of art ignored. The remedy suggested for the first evil—that the Academy should be open to all artists of repute without limitation as to numbers, we cannot concur in; it would be unworkable; but the number of Associates should be increased and they should have more voice in the proceedings than they have at present. In regard to the second point, a very good suggestion is made—that the Academy should hold two annual exhibitions of modern work instead of one; the first to be devoted to pictures and to such forms of sculpture as are meant to stand by themselves; the second to architecture, to sculpture and carving in connexion with architecture, and to such minor arts as jewellery, furniture, metal-work, &c. The writer seems to have forgotten stained glass, a very important art, perhaps hardly to be called a minor one; we have long urged that the Academy ought to make arrangements, to exhibit actual glass, and not the wretched expedient of small coloured drawings; and with the double exhibition it would be possible to do this. We must, of course, recognise the fact (touched on by the writer) that painting is the most popular of the arts; though the question may be asked whether it is the business of the Academy to bend art to popular standards. Why the *Quarterly* critic proposes that the Academy should give up its schools we do not understand, nor do we see any reason for such a course. On the contrary, it appears to us that the instruction it provides free of cost, for those who have shown that they are worth it, is the best thing the Academy does. Nor do we see at present any signs of the success of the large number of younger artists who we are told intend "to do without the Academy." After all is said, the Academy is still by far the best exhibition of modern painting and sculpture that we have in London; only it might be so much better.

Among other articles in the same issue of the *Quarterly* are a very useful one on Submarine vessels (with diagrams), and one by Sir Oliver Lodge on "The Survival of Personality," being a review of the late Frederic Myers's book; a subject which, as far as it can be grasped, interests us all, irrespective of profession or art.

To the *Art Journal* Mr. Howard Ince contributes an article which he entitles "A Reference to Tangier," accompanied by a number of excellent and characteristic sketches of his own, of bits of the oriental architecture of Tangier, almost untouched by European influence. Though the article is mainly written to describe the sketches and the architecture, there is a short but interesting summary of the history of Tangier in relation to England—a curious one, and not very creditable to English policy of a century ago. Mr. Arthur Tomson contributes an article with his own illustrations, on "Studland," the quiet and picturesque village near Swanage, with a Norman church. Under the title "A Decorative Achievement in Glasgow," Mr. Percy Bate gives a description, with illustrations from photographs, of what appears to be a really artistic set of business offices in Glasgow, in which a Glasgow sculptor has worked with a Glasgow architect, and the Scottish Guild of Handicraft has produced metal-work of original design. Of the two sets of finger-plates given, however, we object to those on page 251, as perspective interiors with figures are quite unsuitable either for repoussé work in general or for finger-plates in particular. Those on the preceding page are far better; the designs consisting of decoratively-treated figures with no attempt at realistic effect, and the lines of which harmonise with the general line of the plates.

The most interesting thing in the *Magazine of Art* is the rather sad but charmingly simple and sincere narrative of a Japanese artist, Mr.

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Yoshio Markino, who has been endeavouring with some difficulty to get his living in London by sketches and studies of London figures and scenes. Illustrations of three of his drawings are given, one in colour, and it is interesting to see the result of the Japanese habit and style in drawing, appearing through the portrayal of figures of London life. But every one who reads the narrative will feel drawn towards the writer of it, to whom we wish more success, as the world counts success. The best kind of success, the thorough enjoyment of his art, he evidently has already. Mr. Raffles Davison continues his essay on "The Recent Advance in Architecture" as illustrated in country houses. He quotes a characteristic remark from a client—"I am quite sure that in country houses it is pleasantest and best to build with simplicity, but I am equally sure that simplicity is very expensive." We believe it is usually found to be so, but the explanation of the enigma is that the only architects who will design with simplicity, at present, are those who demand, and specify for, good work and good materials. Many much more showy houses are built with inferior work and materials, and hence are cheaper though at first glance they may look more expensive. A jerry-builder's "simplicity" will be cheap—as long as it lasts. Mr. Davison's notion of the advance in architecture lies rather too much in the direction of eccentricity and of what we may call the self-conscious picturesque; that is to say, the illustrations selected tend in that direction. "The decorative figure-work of Mr. Frank Braugwyn" is the subject of another illustrated article. We deny that the "Panel for L'Art Nouveau" and the "Panel for a Bedroom" are "decorative," except in principle, for decorative work should surely be beautiful, and these are not. Now "The Flute Players," a design for stained glass, really is decorative, that is to say, its lines are beautiful and not merely its æsthetic treatment; correct æsthetic (as to flatness, proper treatment of material, &c.) is not enough in itself to save the soul of a decorative artist or of his spectators. The design for tapestry "Le Roi au Chantier," is also truly decorative, and so also is the elevation called "Design for an Interior." The article on "the Paris Salons" by Prince Karageorgevitch appears to us singularly wrong-headed in its preferences; or perhaps one should not say "singularly," since nearly all writers seem to have got something wrong in their heads about French art, and praise all its eccentricities as if they were virtues. We find the old cant, which we are tired of hearing, that the New Salon is full of the work of artists and the Old Salon of that of people who paint pictures to sell; a remark which it is almost supposed now to be the correct thing to make; whereas any one without a bias in his judgment can see well enough that the New Salon is getting steadily worse; that to fill its walls it admits things which the Old Salon jury would dismiss as utterly below the mark for exhibition; and that, in spite of all the "pot-boiling" which undoubtedly finds place in the Old Salon, it contains a considerable number of pictures far superior to anything to be found in the New Salon, while in respect of sculpture there is absolutely no comparison possible. Mr. Spielmann is continuing his valuable series of articles on "Art Forgeries and Counterfeits," the present number dealing with forgeries in leather-work, silver plate, gold jewellery, precious stones, cameos, and furniture and wood-carving. Some of the revelations in these articles are extraordinary; they should be read by all who are possessed with the desire to become collectors. The writer quotes Mr. King's Handbook on "Engraved Gems" to the effect that "for every antique gem of note fully a dozen of its counterfeits are now in circulation, and often so close is the imitation as to throw doubt on the authenticity of the original itself." In the 1900 Paris Exhibition a jeweller exhibited four strings of pearls, honestly stating that one of them was false, and defying any expert to say which of them it was, by any test short of crushing. The result, it is stated, "was entirely satisfactory to the manufacturer." In fact, Mr. Spielmann's evidence leads to the conclusion that in purchasing at the present time any kind of antique, you are on the whole more likely to be purchasing an imitation than an original, unless the objects are from a known collection formed and kept untouched before the present genius for imitation was developed.

The *Burlington Magazine*, the current issue of which is always published too late in the month to come into our review, contains in its July number a series of articles on artistic subjects, ancient and modern, which are all of interest, and some of which illustrate novel and rather out-of-the-way subjects. Such is M. Blochet's article on "Mussulman Manuscripts and Miniatures" as illustrated in the recent exhibition at Paris. The prohibition to paint figures, embodied in the Mahommedan religious code, of course weighs heavily on Mussulman art, though it appears to have been evaded or disobeyed at times, as some of the illustrations to this article show, among others the exceedingly curious drawing of a fat man struggling with or holding a serpent, from the astronomical treatise of Abd-er-rahman-el-Sufi; apparently a symbol of the constellation Draco. There is a good review of the Dutch exhibition at the Guildhall (not signed); the writer truly remarks that the modern collection was far more representative than the ancient one, and, as he says, must have been a revelation to many. He does full justice to Jacob Maris, without overlooking the two others of the name. That Israels is a very unequal painter we agree, but we should hardly say that Mauve was; certainly not as illustrated in this exhibition, except for one or two small and slight things which can only be regarded as sketches; and in the mention of his best works there we are surprised to find no reference to that perfect picture of the sheep under the trees, which hung close to the door (we forget its title), and which was certainly one of the finest things in the whole collection. "The Plate of Winchester College," an article by Mr. Percy Macquoid, is accompanied by some very fine illustrations; in fact, the illustrative department of the magazine is altogether of the highest order, as well as the printing and make-up. It includes examples of French furniture of the seventeenth and eighteenth centuries, and a number of illustrations from Sir Joshua Reynolds, including his fine series of figures for New College window—"Temperance," "Prudence," "Fortitude," and "Justice." It seems to be intended that the writing should be done by contributors with special knowledge of their subjects, and of course the magazine is not one for popular interest: it is issued for the esoteric circle of art-lovers and art-students. It is to be hoped there is a numerous enough public among these to keep such a periodical going.

The *Cornhill Magazine*, which has been giving a series of articles on "Prospects in the Professions," taking one profession after another, takes in this month that of "The Artist"; to which we may object in the first instance that art is not a "profession." As it is so ranked here, however, one is not surprised to find that the subject is treated from an exclusively money-making point of view. It is advisable to paint "small pictures," they sell better; a certain dealer attributed his success to "never buying a picture that could not be carried under the arm"; though unfortunately "the Academy and other exhibitions compel pictures to be of an absurdly large scale"; which at all events is something new. Artists neglect their opportunities, we are told, through want of worldly wisdom. The writer of the article was recently on a well-known salmon river in Scotland; "at every turn was a picture, and every pool was the haunt of a fisherman." The richest men in England and America come to fish in this stream: if an artist would only paint "portraits" of all the scenes on the forty miles of stream, the rich fishing men would buy them wholesale as reminiscences of their sport. That, apparently, is the writer's notion of the objects of landscape-painting—to make "portraits" of places that people are interested in. It is a truly British idea! There are some true remarks in the article, especially as to the want of encouragement to artists from the State or from Royalty in this country; but the article can hardly, we should think, have been written by an artist. If the writer is one, we can only say that he has a very poor and debased conception of his calling.

Knowledge contains an article by Mr. Arthur H. Bell, on the important subject of the possible future use of wireless telegraphy in assisting the preparation of weather forecasts. One of the principal difficulties in weather forecasting for this country is that the whole space of the Atlantic is out of the region of telegraphic communication in regard to the movements of storms; we can get the latest information from the eastern shores of America, but after that we have no information as to the path of storm centres till they reach our own shores. Mr. Bell's idea is that by the aid of wireless telegraphy, when further developed, information as to weather in any part of the Atlantic could be communicated from ships actually at sea. In the same number is what we suppose is the close of the discussion between Mr. Burkitt and M. Antoniadi as to the exterior cross on the dome of St. Sophia, supposed by Mr. Antoniadi to have been described by the Silentiary. M. Antoniadi adopts a very positive attitude, but we do not think he has made out his case. We, at all events, cannot be persuaded that the word ἔγραψε could refer to modelling a cross in the round. The word means indifferently "writing" or "drawing;" it may be applied to any form of design on a flat surface, such as mosaic or *sgraffito* (which is in fact the Italian form of the same word), but we never heard of it being used to signify modelling in the round.

References to some other periodicals of the month we must defer to our next issue.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS.—On the 25th ult. the members of this Society visited Bournville, near Birmingham, Messrs. Cadbury's model village. Mr. W. A. Harvey, the architect, met the party and showed them over a considerable part of the estate. Several houses were examined, and the nearly completed Ruskin Hall was much admired. It was thought that the great success, both social and architectural, of this experiment should do much to encourage similar schemes elsewhere. The Church of St. Agatha, Birmingham, was then visited, under the guidance of Mr. Bidlake, the architect, and also Messrs. Keep's warehouse, a refined piece of work by the same architect. The day was concluded by a visit to the Eagle Insurance Company's Offices, Messrs. Lethaby & Ball, architects, where the interior, with its beautiful marble and plaster work, was especially admired. Some of Mr. Edgar Wood's work at Middleton was visited on Tuesday evening, July 28, by twenty members. The Old-road Chapel has been lately decorated by the architect and Mr. Jackson, the painter, and has a charming internal effect of rich colouring. The new Wesleyan Chapel is an excellent piece of grouping, arranged picturesquely round a cloister or courtyard. Mr. Wood's own house is full of interest, and the formal garden he is developing shows what good results can be got on a very small scale.

COMPETITIONS.

WATER SUPPLY, FLAMBOROUGH.—The competition for the best scheme for the water supply of Flamborough has resulted in the plans of Messrs. Elliott & Brown, of Nottingham, being adopted. Fourteen schemes were submitted.

MAIDENHEAD FREE LIBRARY COMPETITION.—The following is the result of this competition:—1st. Messrs. Blangy & Van Baars, 19, Old-square, Lincoln's Inn; 2nd. Messrs. McEwen & Kale, 3, Newham-street, Birmingham; 3rd, Messrs. North & Robin, 203, Strand, W.C. Mr. Edward Mountford was the assessor, and there were eighty-six designs submitted.

MANCHESTER ROYAL INFIRMARY.—The following architects have been selected to send in plans in competition for the building of the new Manchester Royal Infirmary, viz.:—Mr. H. Percy Adams, London; Messrs. Campbell Douglas & Paterson, Glasgow; Messrs. Edwin T. Hall & John Brooke, London; Mr. W. Cecil Hardisty, Manchester; Messrs. Heathcote & Sons, Manchester; Messrs. Henman & Cooper, Birmingham; Mr. John W. Simpson, London; Messrs. Thomson & Sandilands, Glasgow; Mr. A. Hessell Tiltman, London; Messrs. Waddington, Son, & Dunkerley, Manchester; Messrs. Thos. Worthington & Son, Manchester; and Messrs. Young & Hall, London.

COUNTY SCHOOL, ACTON.—The architects chosen to compete for the Acton County School competition are Messrs. Pratt, Adams, Pywell, Clay, Tiltman, Osborne Smith, and Giles, Gough, & Trollope. The drawings are to be sent in by October 31.

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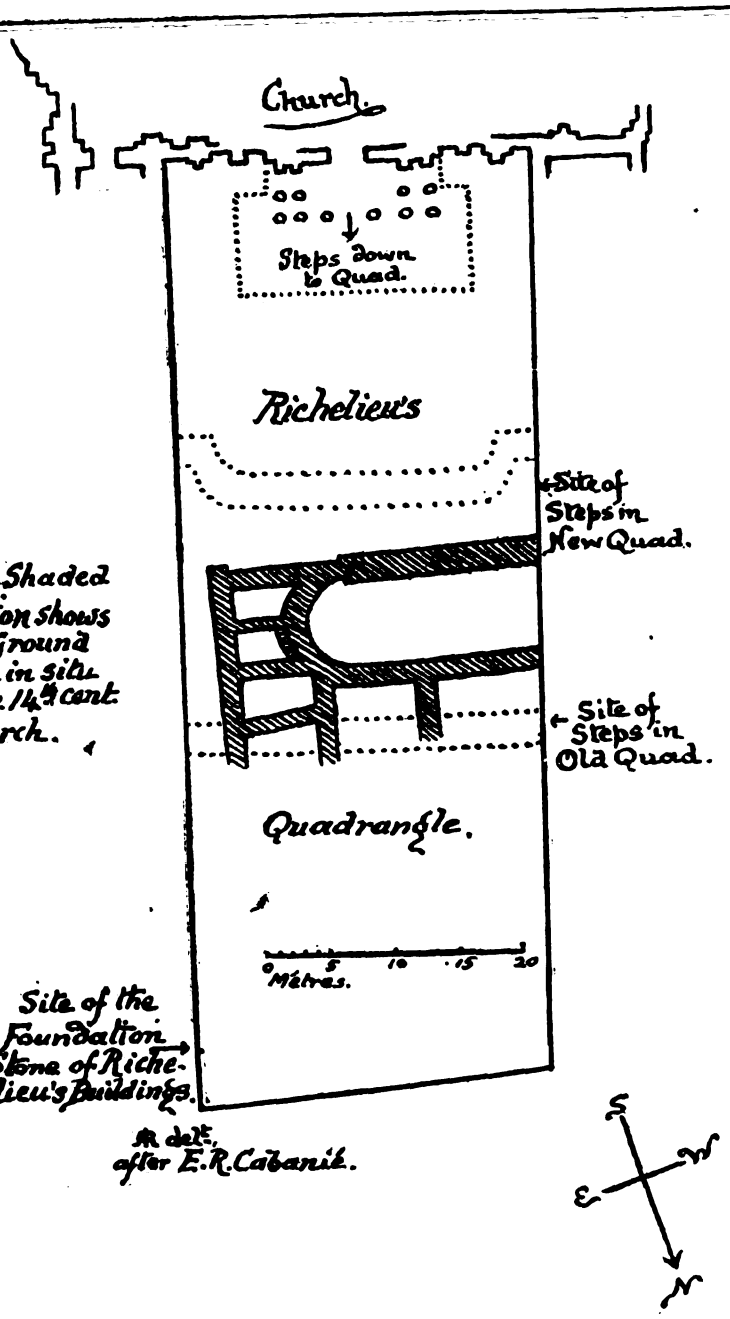

The Mediæval Church of the Sorbonne. Plan.

THE OLD SORBONNE CHAPEL, PARIS.

A LITTLE while ago it was announced that the foundations of the fourteenth century chapel of the Sorbonne had been discovered, and were going to be perpetuated by coloured slabs laid *in situ*, in the great courtyard north of the church. The plan is, however, being outlined in cement, and shows a semi-circular apse with a wall slightly thinner than the north and south walls of the chapel. There are rooms, or spaces (one of which has a staircase marked), at the east end; and a larger apartment, probably the sacristy, abuts on the north side of the chancel. There are no aisles and no transepts, but owing to the Rue de la Sorbonne "New Buildings" cutting across the western extremity of the nave, it is impossible to state for certain the length of the chapel, and whether it had any towers at the west end, as shown in the "Tapestry Map" of Paris.

The position of the chapel is at about 15 ft. below the steps across the great quadrangle, and, with the apartments at the east end, extends to within 10 ft. of the east wing of Richelieu's Quadrangle. The chapel was about 25 ft. wide inside, and from the interior extremity of the apse to the Rue de la Sorbonne buildings, measured about 75 ft. long. The south wall of the nave was about 8 ft. thick, the north one about 6 ft. thick, and the apse wall about 5 ft. thick.

The plan differs entirely from the one given on page 85 of Mr. Gréard's "Nos Adieux à la Vieille Sorbonne."

BOOKS RECEIVED.

THE MODERN CARPENTER, JOINER, AND CABINET-MAKER. Edited by G. L. Sutcliffe. Divisional-Volume V. (The Gresham Publishing Co.)

THE ROYAL ARCHÆOLOGICAL INSTITUTE AT YORK.*

THURSDAY, July 23, was devoted to a visit to the castles of Bolton and Middleham. The party, which numbered about a hundred, first went by train to Redmire, and then in carriages by a short but hilly journey to Bolton. Here the castle was described by Mr. W. H. St. John Hope, who pointed out that the building had been erected by Sir Richard le Scrop, probably in rivalry of the new works with which Ralph Nevill, the Lord of Middleham, had lately surrounded his Norman keep. Bolton had, however, been built upon a new site, and in the newest fashion, in the form of four ranges of chambers disposed round an open court with towers at the angles. Sir Richard le Scrop obtained licence to crenellate his house at Bolton in 1379, but Mr. Hope showed that he had already in the previous year entered into a contract with John Lewyn, mason, for the erection of certain works at Bolton, which, however, only appeared to extend to two sides of the existing building. The original contract is now in the possession of Lord Bolton, the owner of the castle, and is in French, but Mr. Hope submitted the following translation of the operative part of it:—

"In the first place a tower for a kitchen, which shall be vaulted and embattled, and shall be of a height of 50 ft. below the battlement, and shall be in length of 10 ells and in breadth 8 ells, and the outside walls of the said tower shall be of a thickness of 2 ells. Also there shall be made between the said tower for the kitchen and the gate a house vaulted and embattled, and above the vault shall be three chambers one above the other, and each chamber shall be of the length of 12 ells and in breadth 5½ ells, and the said house shall be of a height of 40 ft. below the battlement, and the thickness of the walls outside 2 ells and within 4 ft. Also there shall be an embattled tower which shall be of a height of 50 ft. under the battlements, in which tower there shall be a gate vaulted, and above the gate shall be three chambers, one above the other, and they shall be in length 10½ ells and in width 5½ ells. And in the same tower on the side of the gate towards the south shall be a vaulted chamber, and over that chamber shall be three chambers, one above the other, which shall be in length 13 ells, and in breadth 7 ells, and the walls outside of the said chambers shall be of a thickness of 6 ft., and within of 4 ft. Also there shall be a chamber adjoining the said tower on the side towards the west, which shall be vaulted and embattled, and of a height of 40 ft. under the battlement, and over the said vaulted chamber another house, vaulted, and above that a chamber which shall be in length 10 ells with the entry, and 5½ ells in width, and the walls without the said chambers shall be of the thickness of 2 ells, and the walls within of 4 ft. Also all the houses and chambers aforesaid shall have entries, chimnies, doors, windows, and privies, and all necessaries which are required for the said work. Also there shall be three staircases, one within the kitchen and two for the tower of the gate. Also all the walls within the aforesaid chambers which shall be parclose shall be of a thickness of 3 ft. or 4 ft., according as they require."

For the aforesaid works John Lewyn was to win his own stone, and to be paid 10*s.* for each perch, "measured by 20 ft. by the ell, as well for vaults as for walls" and to receive besides fifty marks. Sir Richard undertook to find wood for the lime-kilns, the carriage of all stones, sand, and lime, and the timber for the centres and scaffolds. According to Leland, the castle was eighteen years in building, and cost every year 1,000 marks. Mr. Hope also pointed out the arrangement of the buildings, and drew special attention to the singular way in which the portcullises that defended each doorway were merely drawn up above them, and not into a groove out of sight. He also indicated in the hall the singular contrivance noticed by Leland, whereby the smoke from the central fire escaped through holes in the heads of the windows instead of through the more usual louvre surmounting the roof. The castle, though for the most part in ruins, is well cared for, and from the top of one wing, which retains its floors and roof, the visitors were gratified by a magnificent view of Wensleydale.

From the castle a drive through Lord Bolton's park brought the party to Leyburn, whence, after luncheon, the journey was resumed to Middleham. Here Mr. Hope again acted as guide, and explained how the first Norman castle was now a small derelict moated mount on the rising ground to the north. The present castle consists of a quadrangle of ranges of chambers, with corner towers, erected by Ralph Lord Nevill of Raby, about the middle of the fourteenth century, enclosing a great rectangular keep or tower of two stories, the work probably of Robert Fitz-Ranulf, towards the close of the twelfth century. Were the tower absent, Mr. Hope pointed out, the plan would resemble that of the castles of Wressle and Bolton. Between the keep and the line of the eastern curtain, are the ruins of the chapel, which, though of the fourteenth century, is a curious example of imitation of the same style of architecture as the keep. The ranges of buildings forming the enceinte appear to have been erected within the lines of the surrounding ditch. From a survey of the castle made for King Henry VIII. in 1538, Mr. Hope was able to point out the uses of the various buildings. In comparison with Bolton, the present condition of Middleham Castle is most unsatisfactory, the mischievous ivy being allowed to grow unchecked, and only last February a large mass of masonry fell from one of the outer towers. An earnest hope was expressed that the owner, Lord Masham, would do something to prevent further loss, and take some effectual steps to support the overhanging turrets of the great Norman keep.

At the evening meeting a paper was read by Professor E. C. Clark, of Cambridge, on "College Caps and Doctors' Hats."

* Continued from last week, p. 133.

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Friday, the 24th, was devoted to a day in York with the members of the Yorkshire Archæological Society. The morning was spent in visiting in succession the churches of All Saints' North-street, St. John Ousegate, St. Michael Spurriergate, St. Denis Walmgate, Holy Trinity Goodramgate, and St. Martin, Coney-street, with the object of examining the notable remains of old painted glass still existing in them. Mr. N. H. J. Westlake acted as guide, and pointed out the chief characteristics of the glass, especially as regards the examples of the Jesse Tree, which he believed to have been first invented by the famous Abbot Suger, of St. Denys, in France.

After luncheon the party reassembled at Clifford's Tower, where Mr. Hope, on being called upon, briefly referred to its history, and pointed out the reasons for believing that the mount on which it stood formed part of the castle erected by William the Conqueror in 1068 to overawe and dominate the city. The Bayle Hill, on the opposite side of the river, was, he believed, the second castle thrown up by William later in the same year, when the citizens again revolted, to keep in order those on the south bank of the Ouse, and with the other castle to control the passage of the river. According to Orderic this Bayle Hill was thrown up in eight days. Mr. Hope also referred to a project for effectually defacing the grand earthworks that encircle the city by laying them out with walks, garden seats, and planting them with shrubs and flowers. Such defacement he considered would be nothing less than a crime. Mr. J. T. Micklethwaite next described the extensive salvage works that have lately been carried out to arrest the fall of the tower. He attributed the existing walls to the time of Henry II., and said that originally there were no doubt buildings inside, chiefly of timber. The rest of the castle had been converted into a prison. The prison part had at different times been rebuilt, but the tower itself had always been preserved as a relic. Seventy or eighty years ago some ingenious people cut away part of the mount to make a road, and, as a result, the weight of the building was too much for the earth, and it bade fair to go down into the yard below. He was asked to come down and consult with Colonel Beamish, official surveyor of such buildings, and there was no shadow of doubt that the mischief was not in the walls but in the earth below. They agreed to report that it was a matter to be dealt with by an engineer who was accustomed to deal with earth pressure, and in the end an arrangement was made to carry out certain repairs. The whole of the moving part had been buttressed up, and he believed that part of the wall was now safe from further movement. He would not say that the whole castle was, because the cutting away of the toe of the mount extended to the other end. There had up to now been no sign of movement, and they hoped this state of things would continue. In the course of the work some curious things were found, including the stones on which he was standing, most of them thirteenth-century work. At present, except that some few seemed to belong to the chapel, they could not say really what they were. Below the ground on which they were standing were a series of piles and rails joining them, and this was believed to be the palisade of William's castle, which Mr. Hope had told them about, and he believed it was all there below their feet. When these stone walls were built the mound was apparently heightened, and the piling was no doubt left to stiffen the new earthwork. He thought a little investigation to help them to plan it out would be well worth doing. As the Yorkshire Archæological Society had from time to time undertaken to investigate such work, they might put their hands in their pockets and spend a little on this. It would be most interesting to find the actual wooden fortification of the eleventh century.

Mr. Munby, the official custodian of the property for the Yorkshire County Council, in whom it is now vested, also added some remarks on the works lately completed.

A move was next made to the Merchants' Hall, in Forsgate, which was inpected under the guidance of Mr. H. Platnauer.

The day's proceedings ended with a visit, by invitation, to the pleasant grounds of the Yorkshire Philosophical Society, containing the remains of St. Mary's Abbey and of St. Leonard's Hospital, and the multangular tower and other portions of the Roman defences of York. For some time past an acrimonious local controversy has been carried on in the newspapers and elsewhere as to the treatment of certain recently-excavated portions of St. Mary's Abbey. Additional interest, therefore, attached to this visit, inasmuch as it had been decided to await the expert opinion of members of the Institute before coming to any conclusion in the matter.

The party having assembled at the scene of the excavations on the site of the destroyed choir, Mr. Hope briefly narrated the story of the foundation, and suggested that the recently-exposed apses were portions of the church begun by William Rufus in 1088. In plan they were at present quite unique in this country, and it behoved them to take every care of them. When they were first exposed he happened to come over and see them, and was asked what had better be done to preserve them. There were one or two courses open. The first was to bury them again, but the Society did not want to do that after spending money in uncovering them. Then there was a second course, which had been adopted, and for this reason. These gardens formed a playground for the children of the subscribers, and it was obvious that if such rough foundations, which were in a very tender condition, like all newly excavated work, were left unprotected the children would run over them and reduce them to a more or less shapeless mass. Obviously the first thing to do was to make secure in its place every one of the original stones, which he advised should be done with lias lime mortar, put in with a stick and not with a trowel. Cement, owing to its expansive property when used in small quantities, ought not to be employed. Seeing that the remains were standing up to various heights, he suggested that they should be brought to a common level with brickwork, the advantage of this being that there was no confounding it with eleventh-century rubble. Having done that, they had to guard against rain and frost, and the best way was to cover the top with Yorkshire flags. As a result, all this work had been anchored down for posterity. Mr. Hope went on to suggest that the areas which were originally within the church should not be turfed, but would have been better covered with gravel.

Mr. Micklethwaite, who followed, agreed with Mr. Hope as to the method of preservation adopted, and said incidentally that the fiend the archæologist had now to fight was the landscape gardener who worked for an ignorant public.

Mr. J. Bilson urged the carrying out of excavations on the opposite side, so as to clear up the history of the middle part of the building. There was no other building like this in the country, the analogies being in France. No architect could have put the points more clearly than Mr. Hope. By covering up the plan, they would be depriving their descendants of the opportunity of studying them. He himself had done precisely the same thing at Howden with regard to flag covers, and they could not see the top of the walls, and water could not get in, and no one objected. Last year he had the privilege of taking over the excavations at York M. le Comte de Lasteyrie, Professor of Archæology at l'Ecole des Chartes, Paris, and a member of the Commission des Monuments Historiques. There was not a man in France whose opinion would carry more weight, and he expressed cordial approval of what had been done, and expressed a wish that all the foundations might be treated in the same manner.

M. Camille-Enlart (formerly Librarian of l'Ecole des Beaux-Arts, now Director of the Museum of Comparative Sculpture at the Trocadero, Paris, and also a member of the Commission des Monuments Historiques), addressed the meeting in French, and likewise expressed his approval of what had been done.

The President, Sir Henry Howorth, accordingly proposed the following resolution:—"That the members of the Royal Archæological Institute, at this their meeting in York, desire to emphasise the importance of preserving the early remains of the Abbey Church of St. Mary, and are of opinion that the method which has been adopted for their preservation is the most satisfactory and excellent one available."

Mr. E. W. Brabrook (Vice-President) seconded the resolution, and, after some remarks by Mr. W. W. Hargrove on the part of the local objectors, it was put to the vote and carried unanimously.

The visitors were afterwards entertained at tea by the Philosophical Society.

In the evening the Lord Mayor and Lady Mayoress of York held a reception of the members of the Institute at the Mansion House, where the civic insignia and a number of interesting muniments and charters were displayed for their edification. At the request of the Lord Mayor Mr. Hope gave a description of the insignia and plate, which include a fine great mace and other pieces, the work of York, goldsmiths, and the sword of the Emperor Sigismund that was once hung over his stall as a Knight of the Garter in St. George's Chapel, Windsor. This was given to the city in 1439 by a Canon of Windsor who was a native of York.

On Saturday, the 25th, the members journeyed by rail to Doncaster, and thence by carriages to Conisburgh. Here the castle was described by Mr. Hope, who showed that historically it was no doubt the work of William de Warenne, and had at first consisted of a great moated mount, with a small outer bailey on the west, originally defended by palisades. On the substitution of masonry for the timber defences, probably early in the twelfth century, the outer court had been neglected, and the new defences confined to the margin of the mount. Subsequently, the splendid circular tower had been added towards one edge of the fortified area: perhaps from its likeness to the Orford keep, which was in building from 1170 to 1175 and onwards, about 1170, by Hammeline, Earl of Surrey, the husband of the heiress of the Warennes.

After a thorough examination of the keep by the party, the journey was resumed to Roche Abbey. Here, after luncheon, the remains of the Cistercian Abbey church and the foundations of the monastic buildings were explained by Mr. Harold Brakspear, who called attention to the extreme beauty and simplicity of the architecture, and pointed out the order in which the buildings had been erected.

M. Camille-Enlart spoke of the universa character of Cistercian abbeys wherever they were found, in Germany, Italy, France, or Grea Britain, and said he had been specially struck by the resemblance of the photographs of that abbey to certain Cistercian abbeys in the Alps. He referred to the mode of life and the habits of the Cistercians, who generally built in a valley near a stream, and engaged in agriculture and worked their mill by the stream. They provided an infirmary for old or sick monks, which was always an important part of a Cistercian abbey, but was always apart from it.

Tickhill Castle was the next place visited. It was, however, difficult to see anything of it except the gatehouse on account of the masses of ivy that hid the walls and the number of trees that concealed the mount. Mr. Hope, in describing the castle, pointed out that it consisted of one large court, roughly oval in form, with a lofty mount near one end. The remarkable early gatehouse was the work either of Roger de Buisli, the builder of the castle, before 1098, or of Robert of Bellesme before 1102. The curtain wall, which was certainly later, was mentioned in the Pipe Roll for 1130-1, and the ten-sided tower that crowned the mount was built in 1178-80. The chapel, hall, and other buildings have for the most part disappeared. The castle is encircled by a ditch, which is a rare example of a moat more or less filled with water.

A brief visit was also made to the fine parish church, which was described by Mr. John Bilson. The party subsequently returned to York.

Monday, the 27th, was devoted wholly to a visit to the little known but extensive remains of the Charterhouse of Mount Grace. The party first went by train to Northallerton, where carriages were in readiness for the rest of the journey. On arrival at Mount Grace the visitors were met by the owner, Sir Lowthian Bell, Bart., and as there was plenty of time the interval before luncheon was occupied in listening to an address from Mr. Micklethwaite on the characteristics of the Carthusian order, and the manner of the daily life passed by the monks, the peculiarity of it being that they lived most of it alone in their cells. After luncheon the remains of the buildings were inspected under the guidance of Mr. W. H. St. John Hope, who pointed out the division of the monastery into a large outer court containing the church, chapter house, hall, kitchen, guest houses, stables, &c., and an inner court, also of considerable area

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forming the cloister, and having round it the cells and gardens of the monks. A further set of cells and gardens which had subsequently been added, had, from want of other room, been arranged round a smaller cloister about the church in the outer court. Mr. Hope also described the subdivision of the cells by partitions into an entrance lobby, a bedroom, a study, and a keeping-room, this last being furnished with a fireplace. A narrow stair at one end of the lobby led to an upper room where the inmate could employ his spare time at such indoor work as was lawful, such as writing books, bookbinding, weaving, &c. The gardens might be cultivated or not, as the monks preferred. Considerable remains exist of the cells and other buildings, and the church is, with the exception of the choir, still fairly complete, even to the little pinnacles of its central steeple. One of the cells on the north of the cloister is being carefully reconstructed by Sir Lowthian Bell on the original lines.

The journey back to Northallerton was the first during the meeting upon which rain fell, but it ceased before reaching the station.

In the evening the annual business meeting was held under the presidency of Sir Henry Howorth, when the Report of the Council was read and approved, and a satisfactory balance-sheet presented by the treasurer. The concluding meeting followed, when votes of thanks were passed to all those who had assisted in the carrying out of a most excellent meeting. Several places were suggested for next year's meeting, including Bath, Bristol, Worcester, and Normandy; the two first-named received most support, but the decision was, as usual, left to the Council. The President also referred to the presence during the meeting of M. Camille-Enlart and other French archæologists, and spoke of the satisfaction it had given the members that so much interest had been taken in their proceedings by their French brethren.

Tuesday, the 28th, was the concluding day of the meeting. A special train conveyed about seventy of the party to Gilling, where the church was first inspected under the guidance of Mr. John Bilson, who called attention to the Fairfax and other monuments. A move was next made to Gilling Castle, which Mr. Bilson explained was a rare example of a fourteenth-century rectangular keep, with later additions. The chief feature of interest is the Elizabethan great chamber, now used as a dining-room. It retains its beautiful inlaid oak panelling, surmounted by a painted frieze representing trees hung with shields of arms, as well as its original heraldic stained-glass windows and moulded plaster ceiling. The chimney-piece is also of the same time, and there is another of even finer design in an adjoining room. The rest of the house presents no features of interest.

A beautiful drive through the park brought the party to Coxwold. Here, after luncheon, the leading features of the church were pointed out by Mr. Micklethwaite, especially the singular octagonal tower, the monuments of the Bellasis and Fauconberg families, and the curious-planned eighteenth-century altar-rail. A visit was also paid to Byland Abbey, where the ruins of the great church and monastic buildings were inspected, under the guidance of Mr. Hope. This concluded the day's proceedings, and the journey back to York brought to an end a very satisfactory meeting.

ARCHITECTURE IN RELATION TO HYGIENE.

What is known as the "Congress Lecture" was delivered in connexion with the recent Sanitary Institute Congress at the Technical College, Bradford, on the 9th ult., by Mr. J. Slater, B.A., F.R.I.B.A.

Mr. Slater said that he would endeavour to bring before them some of the points of contact between hygiene and architecture, taking each of them in their broadest aspects. He remembered nearly four and twenty years ago, in a paper read before the Royal Institute of British Architects, mention was made of an architect of some eminence at that time who had built a house for a client, and some four months after its completion this architect was asked to come down and inspect the house, because some of the drain-pipes were stopped and there were difficulties with the plumbing arrangements. The architect was most indignant, and simply told the client to send for his plumber. He (the speaker) doubted if nowadays any architect, however much he might be imbued with an exalted idea of the high artistic nature of his profession, would take up such an attitude, as we had learnt to appreciate the fact that, however beautiful you may make a building, its main purpose is to be lived in or worked in, and that, unless it is constructed with due regard to health, it will be but a whited sepulchre. Hence the necessity for close supervision of all details of construction, however small or apparently unimportant. But there was a wider aspect of the question which had not often been dealt with—viz., How far the purely artistic side of architecture is concerned with hygiene?

"It is as well to clear the ground at the outset by accurately defining the issues of the subject. I am not going to discuss the vexed question of architecture being an art, a science, or a profession, and I shall simply take it—as it was once defined—as building at its best, and hygiene embraces all matters concerned with the health and well-being, physical and moral, of the individual and the community. So you see I do well to warn you that you may find me somewhat discursive. . . . People sometimes seem to forget how very modern sanitary science is, and how enormously difficult it is for any one—and I include members of my own profession here—to get out of the ruts in which they have been quietly jogging along year after year. . . .

It is more particularly with the smaller houses for the working and middle classes that these survivals are to be associated. In a nobleman's mansion, where there is a large staff of servants, cleanliness is generally attended to, though even here the servants' quarters often leave much to be desired; but in smaller houses the one aim should be to construct them in such a way as to leave to the inmates the very minimum of attention required to keep the places clean, because you may be sure, in many cases, that minimum will never be exceeded and often not reached. The amount of money that is expended in England, and in all the more civilised countries on the cure of disease, and on buildings devoted to that purpose, is simply enormous. The greatest care possible is taken to ensure cleanliness and to minimise opportunities for the propagation of microbes, and there can be no doubt that since the principles of sanitation have been known and carried out, the percentage of cures of all kinds of diseases has enormously increased. And yet, how much better is prevention than cure! Every year, in the outskirts of all our large towns, acres and acres of new sites are covered with houses for the lower classes, which, even when they are new, are scarcely sanitary, notwithstanding all that local by-laws can do, and undoubtedly in a few months become foci, if not of disease, yet of poor health, and the inmates of such houses become increasingly unfitted to struggle against disease. . . . . I am not unmindful of the fact that a great advance has been made in artisans' dwellings, which now have the greatest possible attention given to their construction, but as soon as you get just above the artisan class, the poor struggling clerk or the shopman and the small tradesman, you will find that the dwellings themselves are not one whit better than they were fifty years ago, and the surroundings of these dwellings are infinitely more confined than used to be the case. The methods of construction which are good and necessary in a hospital are equally good, and, to my mind, almost as necessary in an ordinary dwelling-house, and they could be provided in the latter at a very small extra outlay beyond what is generally spent. The fact is, that of late years the working man has monopolised the attention of the benevolent and the charitable. I should like to see some capitalist take up the cause o the lower middle classes, and start a company for the erection of middle-class dwellings at reasonable rents, and as our municipalities are going in for commercial speculation they might find this not one of the least profitable. I know that the Artisan's, Labourer's, and General Dwellings Company, which has gone on these lines, has always managed to pay a dividend. Local by-laws have done much to rectify flagrant abuses, but you cannot frame by-laws to meet all small details, and the worst of it is that what by-laws specify as a minimum in the way of requirements, is always taken by the speculative builder as the maximum.

The fact is, we want fewer hard and fast lines laid down, and literal specification of requirements in our Building Acts and by-laws, but more discretion left in the hands of those who have to carry out these legislative enactments. This opens up what is, to my mind, one of the most important questions relative to the health of the people—I mean the standing and qualifications of inspectors and other officials, who have practically the whole matter in their hands, from the highest to the lowest, from the District Surveyors who have to carry out the provisions of the Building Act of a great city like London to the small building inspector of a rural district council. And it seems almost impossible to get local Councils to appreciate this. What do we see all over the country? A local builder, who has failed in business, gets some kind friends to propose him as building inspector, or perhaps even surveyor, to the local Council. Be he as honest and painstaking as possible, how can such a man enforce to the full regulations which he has been for years trying to evade as far as he could, and the necessity for which he is probably very doubtful of? He will inevitably incline to leniency, which will soon become laxity, and many of the minimum provisions of the Acts will not be enforced. It cannot too often be insisted upon that the national health is the most important factor in national life; even when looked at from the lowest pounds, shillings, and pence point of view—and that it would pay in the long run many times over to raise the salaries of the various building inspectors, &c., so that you would ensure the occupants of the posts being men of position and above all underhand influences. I do not know whether it would be possible for the Local Government Board—which I know is already an overworked department—to add to its burden of work, but, in my opinion, the appointment of every health officer in the country should be subject to the approval of the Local Government Board, and the amount of his salary, and then you might make the Acts themselves which have to be carried out much more elastic. The unhealthy conditions in which so many workers habitually live affects the death rate appreciably, but it does a great deal more than that—it lessens very materially the productive power of the community, and no one can estimate the cost to the country of the persistence of such conditions.

Now let us look somewhat more in detail at the development of a new suburban estate, where the roads and sewers have been made, and where the houses would probably let for about 20*l*. to 30*l*. per annum. When finished these houses would appear to an ordinary passer-by to be of very attractive elevation. There would probably be on the ground floor, or perhaps even carried up to the first floor, an octagonal bay window with stone jambs and head; small stone columns to a slightly-recessed porch with quite elaborate carved capitals; slated roof with tiled ridge; and, inside, stoves with tiled sides and elaborate cast-iron or enamelled slate chimney pieces—and people would say, 'How extraordinarily cheap!'

But let us look a little more closely, and follow up step by step the action of the builder who has erected these attractive bijou residences, having taken a number of plots on lease, and who desires to make the speculation a good thing. He will take care first of all to get his plans—drainage and all—passed by the local district council; then he sets to work merrily. We will suppose that the site has been pasture used for grazing purposes and that the subsoil has not been touched. The first thing the builder will do is to make some trial holes and ascertain if there is any gravel or sand. If this exists, he will be sure to provide a cellar; and, in addition, unless he is stopped by the freeholder, he will make extensive excavations in the space to be allocated to backyards and gardens and get out all the gravel he can. Now, this ought to be absolutely prohibited, because the ground made up over the hole excavated (even if this is not filled in with offensive stuff) will certainly not be so healthy as if the soil remained undisturbed; but so long as the house itself is not built on this made-up earth the local authorities cannot interfere. But suppose the soil is clay—waterlogged or not, as the case may be. He will then dispense with a basement, as costing too much, and he will take off the turf and a few inches of soil under it, and he will proceed to comply with the local Act by laying 6 in. of so-called concrete over the site to be built on. If he is not very carefully looked

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after, he will let this concrete act for the foundation of his walls, none of which will be more than 9 in. thick, but he may take the footings of his walls a little lower down. Now, what is the concrete composed of? There will be a certain amount of lime, a certain amount of ballast, and a very uncertain amount of what looks suspiciously like garden mould mixed with it. If the freeholder's architect sends down to see how the work is progressing, and asks questions about the ingredients, he will probably be told that the dark stuff is not garden mould—far from it!—but a most excellent substitute for sand, consisting of road-scrapings. Now, I am not prepared to say that, in districts where macadamised roads are laid with granite, *thoroughly washed* road-scrapings may not form by no means a bad ingredient for concrete or mortar, but the thorough washing is an essential, as otherwise horse-droppings and all sorts of filthy materials will be mixed in. But I have never seen this stuff carefully washed in such a case as I am describing; and, in my opinion, for all intents and purposes as far as the main object is attained of excluding ground-air from the house when finished, such a layer of concrete is practically useless. The finished level of the ground floor will probably be not more than two steps, or 12 in. above the ground level; the underside of the joists will be just the bare minimum above the concrete layer; the air bricks to ventilate the space under the ground floor will be placed so low down in the face of the external wall that they will be likely soon to get stopped up and be useless for their purpose, and dry rot will probably ensue; and the floor boards of the house will not be grooved and tongued, so that the joints will soon gape. The importance of excluding ground air cannot be too strongly insisted on. You may have your drains perfect, but if the warmer interior of a house is continually sucking up the air from the soil, which is liable to contamination from leaking sewers, gas-pipes, and all sorts of organic impurities, the effect on the health of the inmates cannot but be deadly. All this would be avoided if a thin layer of asphalte were laid on the concrete, *and* the whole of the ground floor were laid—as to the rooms, with solid blocks of wood, and as to the passages with cement or cheap tiles; and the extra cost of finishing the ground floor in this hygienic manner would not, in my opinion, be 1 per cent. on the cost of the house.

The walls of the house are rapidly run up, and it is desirable not to inquire too closely into the composition of the mortar, but what about the workmanship? The joints are not well flushed up, the consequence being that the damp caused by rain gets completely through the wall and damages the plaster, and is an inevitable source of catarrh, rheumatism, &c., and where the walls pass through the roof, a poor cement fillet will soon begin to shrink away from the bricks and let water in which will do more damage. Then the joists of the first floor are almost invariably carried on a weak stud partition, the sill of which, on the ground floor, rests on a half-brick wall; this partition is not trussed, and in many cases it is a perfect marvel how it manages to carry the joists. But these stud partitions have greater drawbacks than this; the space between the plaster on each side forms a run for mice and other vermin, and a receptacle for stagnant air which can never be purified, and retains the germs of all kinds of diseases which may have attacked the inmates. Furthermore, the plaster is never taken down to the floor level, but is stopped above the grounds for the skirting, and consequently the only separation between the rooms for 9 in. or 12 in. above the floor consists of a couple of 1 in. boards, and I have myself seen liquids spilt in one room run under the skirting into another, where, owing to shrinkage, the floor boards are no longer tight up against the skirting. Now, how by any possibility can a building constructed in this manner be healthy? For some few months after its erection perhaps no particular harm is done, but as soon as some infectious disease has been nursed in it contamination commences, and in a few years, my firm belief is, such a house becomes what in a hospital ward would be termed permanently septic, and it is almost impossible to get it sweet. Everyone must have noticed in visiting many a moderate-sized house the stuffiness which is apparent in the rooms. This means that for some time past the air has been in an impure condition. Now, how easily might this state of things be rectified. A half-brick wall in cement would cost no more than the stud partition, and would be a far more sanitary piece of construction, as affording fewer stagnant corners for air, and at any rate this half-brick wall would form a far more solid separation between the rooms; and on the upper floors, when a thin light partition is required, some of the new inventions of solid partitions, fireproof and vermin-proof, would avoid the necessity of stud partitions. The space between the ceiling and the floor is another harbouring space for dust, dirt, and germs of all sorts, but I fear it would be too much to expect that small houses should be built with solid iron and concrete floors, with the boards laid direct on and nailed to the concrete. In France, even in small houses, the upper floors are laid with concrete and tiles, and there can be no difference of opinion that such floors are far more sanitary than ours.

What is no doubt badly wanted is a cheap form of solid floor. A new solid concrete floor, which has the merit of cheapness, has recently been patented; it is known as terrast, and can be used with ordinary wooden joists. This floor consists of some metal lathing laid over the joists and sagging down slightly between them; over this is laid a layer of thick brown paper, and above this about 1½ in. of coke breeze concrete, to which, of course, the ordinary floor boards may be nailed. I know nothing about this floor, but it at any rate is an attempt to diminish the cost of a solid floor in the upper stories. But would it be very repugnant to our notions if the plaster ceiling were omitted and the joists of the upper floor shown? You find this form still existing in Yorkshire and other parts of the country; or if you do not like to show the joists, put two large beams across the room and cover first with 2½-in. planks, and then a cover floor of ordinary boards. I have seen this done quite recently, and a very good effect it has. The great objection is that sound passes through such a floor very easily, but the omission of the ceiling would pay for some good non-conductor of sound being laid between two layers of floor boards. Moreover, in the case of small dwellings such as I am thinking of, which would be generally occupied by one family, the passing of sound between two floors would not be so objectionable as in tenement houses. Of course, something to serve as a skirting is needed to stop the plaster next the floor and to prevent it from being damaged, but a cement skirting could easily be used on brick walls, or a solid fillet of wood if preferred. Now let us glance for a moment at the plumbing arrangements. If a bath or a water-closet be placed on the first floor it is almost certain that the supply cistern will be placed in the roof, where it is very difficult of access. Now in any large city, the inside of the roof of a small speculative-built house covered solely with slates and battens is one of the dirtiest places that can be imagined, and yet here the cistern is to be found which supplies water for all drinking and ablutionary purposes to the whole household. In the first place, why is a store cistern needed at all? The old intermittent service is happily well nigh obsolete, and with a constant service from the mains, I see no reason why every fitting should not be supplied direct. Waste goes on equally with leaky taps, whether they draw their water direct or from a cistern, and, in my opinion, a leaky fitting would be more easily found out and remedied if directly attached to the main than otherwise; and moveover, if the supply is direct from the main, much of the cause of leaky taps could be avoided by means of a good governor regulating the pressure and placed on the pipe leading from the Company's main to the house. The pressure in the mains is necessary because the water has to be forced up to a certain height, and it is this great pressure which so soon spoils the taps. When a tap is turned no one wants a rush of water—just as if it was coming from a siphon. I have often wondered why some one has not invented—perhaps they have, though I have not come across it—a regulating governor similar in action to the regulating valves which are used for gas or the transformers for electrical energy. But *if* cisterns are to be used, then it is imperative that they should be placed in an open and airy situation, so that they can always be inspected and cleaned out at intervals.

It has been urged that there shall be no roof properly so called at all, but that the building should terminate with a flat, and certainly, in town, where a parapet generally hides all appearance of a roof, and gives a monolonous straight skyline, there can be no possible reason why a flat should not be formed, and if this were cemented and covered with asphalt no more sanitary covering could be provided; but in suburban houses of a small type, I think the flat roof would be horribly monotonous, and that we must adopt roofs of a fair pitch, but the more space in the roof that is given to the rooms the better. I might mention several other forms of unsanitary construction, but I hope I have said enough to show what great improvements are possible. Drainage *per se* I have not touched upon, because the subject has been treated *usque ad nauseam*, and so much attention is given to drains that the greatest abuses connected with drainage have ceased to exist; but, in my opinion, it is a mistake to think that having the drains all right makes the house sanitary, and I fear this is the position too often taken up not only by the builder but by the sanitary inspector, and I should like to see everywhere a much wider view prevail of what is required for sanitary house building. Hospitals and infirmaries which are now built at a cost, as we have recently heard, of 500*l.* a bed, can take care of themselves because every detail of their construction is thoroughly well thought out, and the same applies to the large blocks of artizans' dwellings which nearly all our municipalities are now erecting, though I may have something to say about these from another point of view; but how can we secure improvement in the kind of dwellings of which I have been speaking, the inmates of which form the great mass of the workers of the nation? It is no new gospel I am preaching. In the past dozen years or more much that I have said to-night has been urged, far better than in any words of mine, at Hygiene Congresses and Sanitary Institute meetings all over Europe, and yet so little has been done; and why? Expense is generally considered the great obstacle, but I cannot help feeling that there is a greater one which is this: the people who build the houses are so rarely those who dwell in them, and there is so little fixity of tenure. I am no socialist, but I cannot shut my eyes to the fact that the improvement of the dwellings of the people is a question which is intimately bound up with that of the ownership of the land on which they are erected, and until we can get rid of the middleman in the shape of the speculative builder, who only cares to put up his buildings at the lowest possible cost, we shall never improve the separate small dwellings of the people. How this speculative builder can be abolished is a question of political economy which scarcely comes within the scope of this paper, but when we see what is being propounded in Ireland as a cure for all the ills from which the peasantry of that country are suffering, I think we get a hint of a possible solution.

I see no reason why the lower middle classes of this country should not be trusted to fulfil their obligations as well as those in the sister isle, and although it may not yet have come within the sphere of practical politics, I should not be surprised if, in the next generation, the Government were to take up the question of loans to small householders for the purpose of helping them to buy their own freehold sites and build their own houses, and if this were done we should soon see a vast improvement in the construction of the people's homes. My own belief is that such loans would be speedily and easily repaid. I know, as a fact, that small private houses, letting for, say 25*l.* per annum, are built and sold by the builder for 275*l.* An extra expenditure of 10 per cent. would convert an insanitary house into a healthy one, and an advance of one half the cost of the building and site to the intending householder could be repaid easily, principal and interest, in say twenty years. The State would, in fact, put itself in the position of a large building society. But this is wandering from the subject of my paper.

I have now dealt with various points connected with the construction of a house, and we have seen how some methods of building tend to promote the health of the inmates, and others to prejudice their well-being. These matters are concerned with the practical scientific side of architecture, and I would now ask you to consider a somewhat more difficult question, which is: how far is the health of a people affected by the artistic or the æsthetic

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side of architecture; by matters which are not constructional, but are connected with site, arrangement of plan, surroundings, style, and design? Here, again, I would quote the old adage, "Prevention is better than cure." As I pointed out in the early part of my paper that methods of construction which are deemed essential in buildings devoted to the cure of disease must be equally beneficial for all dwellings, so you will find it to be with the matters which we are now considering. I need not dilate on the question of site, for every one knows that a wet, damp site, or one subject to inundations, can never be healthy. It is the pressure of population which brings about the utilisation of low-lying, bad sites for human habitations, and I feel confident that there ought to be a power of prohibition against the erection of any houses, however small, for permanent occupation on sites which are manifestly unfit for the purpose, or if houses are built on such sites they should be raised on arches in order to make the principal or ground floor quite dry. Then again, as to surroundings, how is it possible for people to keep their health if they have never anything but dull dreary miles of streets to look at every time they come out of their house? I cannot imagine anything more depressing than the surroundings of some of the poorer quarters in many of the great towns of the north of England or in London, and bear in mind that mental depression inevitably reacts on the physical health in a way that is too often lost sight of.

I read very lately that in the opinion of an eminent oculist, a great deal of the defective eyesight which is annually becoming more prevalent in towns, is due to the fact that these urban dwellers look so seldom on the pleasant restful green of the woods and fields, and so constantly on dull bricks and mortar, and if this opinion is well founded, it might undoubtedly make us give more consideration to the prominent tints which we use for both the insides and outsides of our dwellings. The condition of the brain is seriously affected by the state of the nerves of the eye, and the undoubted increase in diseases of the brain of late years may possibly depend, not only on the hurry and bustle of the daily life of the average business man, but also upon the dull, gloomy, repulsive nature of his outlook for so many hours of the day. Just as light causes us to feel cheerful and warmth makes us feel comfortable, so I believe it will be found that colour in soft graduated tones has an immense effect on our well being. Staring, garish, inharmonious tints must have a somewhat similar effect through the eye on the brain, as loud cacophonous sounds have through the ear, and, strange as it may sound, I firmly believe that it is almost as essential for the construction of healthy homes that the tints of the woodwork and the wall coverings should be considered as that the drains should be properly laid. Why is it that, however luxurious and well furnished a house may be, we frequently feel a sensation of fatigue when we pass an hour or two in its rooms, whereas in another we feel restful? Often, I believe, because the nerves of the eye are strained and wearied. And here certainly is an opportunity for the builder to adopt sanitary methods rather than unsanitary ones at practically no expense at all. Instead of the haphazard arrangements of wall-papers, without any consideration of the aspect of the room and the quantity of light which it enjoys, a very little knowledge and thought would show that neutral tints are desirable in rooms which get a large quantity of sunlight and warmer tints for north facing rooms. This consideration leads me to my next point, viz., the enormous importance of paying proper attention to aspect. The immense value of sunshine, especially in these northern latitudes, cannot be too strongly insisted upon, and in this respect it appears to me that the large blocks of artisans' dwellings which have lately been erected in so many cities lamentably fail. As a rule, particularly in the cases where the municipalities build these dwellings, and the cost is charged to the rates, care is taken that all the blocks have an ample air space between them, but even with the London County Council, whose artisans' blocks are excellently designed, well-built, and with plenty of air space, the height to which they are carried makes them dull and somewhat gloomy. Of course, here again the question of cost comes in, and generally where old buildings have to be pulled down and insanitary areas cleared away, the capital expenditure becomes very large before a brick of the new buildings is laid, and in order to accommodate a sufficient number of families to obtain a rental that will give any return at all upon this expenditure, the buildings must be carried to a great height. I do not believe this can be done without prejudicially affecting the health of the inmates, especially the children. No doubt the conditions of life are infinitely superior to what obtained before, and the enforced cleanliness and general submission to regulations cannot but have an excellent effect on the dwellers in these buildings; and the mortality is admittedly low. But I should be sorry to see these huge blocks multiplied in the heart of our great cities. The object should be to get the workers away from their work when it is finished by increasing the facilities for quick and cheap transit.

The startling development of electric traction, which is the most marked feature of these last few years, offers a solution of the difficulty. I do not think the time is far distant when it will be the exception, and not the rule, for the workers to live in close proximity to their work when this is performed in crowded areas, and this would result in an enormous amelioration of the average health of the people as well as a fresh increase in the output of their work. There can be no doubt that the success of the bold experiment of which such places as Port Sunlight are the result, will encourage other large private firms to follow this example, and that manufacturing industries will have a tendency to be carried on at a distance from our large towns; but there must always be a large army of workers connected with the distribution and not the manufacture of commodities who will be compelled to carry on this work in the daytime under somewhat depressing conditions, and for these will come salvation in the shape of the tramway or the light railway. It is in this direction, combined with the erection of good small houses, amid bright and cheerful country surroundings, that I hope municipal enterprise will soon be turned. If some such policy could be carried out, just think how far-reaching would its results be. I sometimes look at the costly, well-equipped, Board Schools, which have been erected in thousands during the last thirty years, and when I see these places, as they often are, in the most dingy and depressing surroundings, I wonder how the children who attend these schools can possibly grow up healthy. Asphalted playgrounds, surrounded often by high walls, where the only view is of bricks and mortar, are not the ideal training-ground for the future mothers and fathers of the people. You have only to compare the pale faces and weakly forms of the town-bred children with the ruddy bloom of those who are in the country, to see what an advantage the 'atter have, and I look forward to the day when all the elementary education will be carried on away from the large towns. You will think that I am wandering from my subject, but while on the question of schools there is one matter which I have very much at heart, and which I have more than once alluded to in other places, and this is directly relevant to the subject of this address. I have been speaking of the outer surroundings of our elementary schools, but turn to the inside; these buildings are well-built and well-found in all respects, but are they beautiful? As a rule, perfectly plain walls, with no decoration on them, are all that you will find. Could not this be altered and improved at practically no cost at all to the ratepayers? There is scarcely a large city in the kingdom that has not its art school, where most excellent work is done in painting, modelling, iron work, &c., founded by the ratepayers and under municipal control. Why should not the art school students be employed in decorating the Board Schools? It would be far better practice for a student than merely designing and painting a coloured decorative frieze to be placed he knows not where, that he should, of course under the guidance of the art master, take an actual classroom and decorate it well. Or why should not a modelling student design and carry out some plaster enrichments or a little statuette for a niche? It might all be done as part of the work of the session, as I said, at no appreciable cost at all. And just think of the effect on the Board School children of spending so much of every day in surroundings which are bright and cheerful and which would teach them to know and appreciate what is beautiful! Their work would be better done, their characters improved, their minds trained unconsciously, and undoubtedly their physical health would be better. I might considerably amplify these remarks, but I cannot do better than conclude with a quotation from the old Greek philosopher, Plato, who says: "In the case of our artists, the bad habit must be stopped of depicting in statues or buildings or any other artistic production, what is coarse or illiberal or ugly. If a man cannot refrain from this, we must forbid him to produce anything, lest our children, if reared among images of evil as in a bad soil, drawing their impressions one by one from many sources every day, may unconsciously establish an evil precedent in their own souls. We must rather seek for artists to trace out what is beautiful and noble in nature, and thereby enable our children, like plants in a good soil, to be assisted by their environment, so that whatever meets eye or ear from these beautiful works may, like a health-bearing breeze, lead them unconsciously from their earliest years to love and be in accord with beauty and reason." These words are as true now as they were 2,500 years ago.

It is impossible to over-estimate the good which has been done in the last thirty years by the Sanitary Institute, by its examinations, its publications, and not least by its Congresses, which do so much to spread abroad in all parts of the country a knowledge of the principles of sanitation; and if its founders could see the results achieved, they would feel fully repaid for their exertions. But there must be no cessation of activity. Very much has been done, salient abuses have been abolished, and an excellent foundation has been laid, but the superstructure has yet to be erected. And everyone can help in the work. It cannot too often be dinned into the ears of the governing bodies that upon the health of the people depends the wealth and well-being of the nation, and the suggestions which I have thrown out will, I hope, show you that the health of the people depends upon very much wider considerations than the mere regulation of drains and ventilation, and that architecture, not only on its constructural side but on its highest and artistic side, has a closer and more intimate connexion with hygiene than might be at first sight supposed."

ENGINEERING SOCIETIES.

The Junior Institution of Engineers.—The summer meeting of this Institution, of which Colonel E. Raban, C.B., Director of Works of the Navy, is President, is to be held at Sheffield. The proceedings will be opened by the Lord Mayor, the Right Hon. J. Wycliffe Wilson, J.P., on the 17th inst., and he will receive the members at the Town Hall. Messrs. Davy Brothers' Works will then be visited, and afterwards those of Messrs. Hadfield's Steel Foundry Co., at Tinsley. On Tuesday, the 18th, there will be an excursion to Haddon Hall and Chatsworth. Messrs. Charles Cammell & Co.'s works will be visited on Wednesday morning, and in the afternoon, Messrs. J. Dixon & Sons'. Thursday will be occupied by an excursion to Castleton, and on Friday are to be seen the Toledo Steel Works of Messrs. J. H. Andrew & Co., and the Suffolk works of Messrs. T. Turner & Sons. The summer dinner takes place in the evening at the Royal Victoria Hotel, Sheffield. Mr. Ernest King, Messrs. Mellowes & Co., Corporation-street, Sheffield, is acting as honorary local secretary.

Decline of Building Activity in Christiania.—Mr. Consul-General Dundas writes to the British Foreign Office:—"Since 1898, building activity in Christiania has declined. The number of principal buildings reported completed in that year was 1,750, while in 1900, 1901, and 1902, the number was 704, 922, and 884 respectively. Of new dwelling houses in 1902, 158 were reported completed, and seventeen business and factory buildings. A still greater difference appears in the number of building undertakings sanctioned. These amounted last year to 681, compared with 900 in 1901. Naturally this stagnation in the building trade exerts an exceedingly depressing effect on the conditions of life in the city. For not only a large number of workmen go unemployed, but many trades and industries, which are largely interested in the building industry, are inactive. This state of affairs consequently had its effect on property, in which little business was done, and little capital expended in the purchase of property. The total value of the transactions in property, which in 1897 was estimated at 4,143,250*l.*, has, in the last two years, been estimated at from 220,000*l.* to 250,000*l.* in each year."

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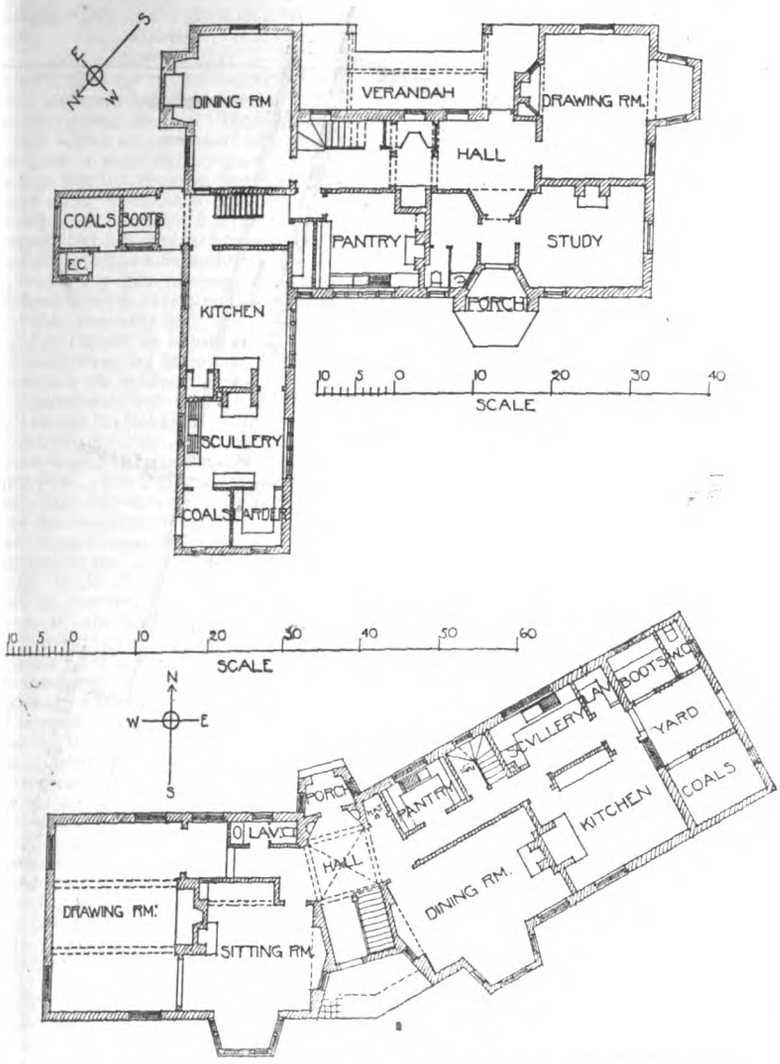

Plans of Houses at Shepherd's Green and Great Shelford (see issue of August 1).

HOUSES AT SHEPHERD'S GREEN AND GREAT SHELFORD.

THESE are the plans of the two picturesque little houses by Messrs. Green & Dickie, the exterior views of which were published in our last issue. It was impossible to find space for the plans owing to the number of other text illustrations in last issue; but we give them now so that they may be compared with the illustrations already published.

THE SEASONING AND PRESERVATION OF WOOD.

ON Wednesday, June 10, a lecture, entitled "The Seasoning and Preservation of Wood," was delivered by Mr. Hubert Higgins, M.A. Cantab., at the Society of Arts, John-street, Adelphi. The chair was taken by Mr. William F. King, the President of the Institute of Builders, who, in a short speech, introduced the lecturer. Mr. Higgins said he proposed briefly to recapitulate the main problems that had suggested themselves to him during a long series of experiments, and not to make more than a brief reference to the purely theoretical side of the subject. Wood had been treated in all sorts of ways with varying results. Experiments had been conducted by Governments and individuals from the earliest historical times. Two methods seemed particularly to stand out in the history of the treatment of wood, viz. treatment by heat for seasoning purposes, and impregnation by creosote for rendering it antiseptic and thus preserving it. With regard to the former method (viz., by heat), it was well known that charred wood was very durable, and many more or less unsuccessful attempts had been made to preserve wood by partly burning or charring it. But wood resents any very violent change of temperature by warping and cracking. Proceeding, he said:—

"I need scarcely tell you that wood consists of the solid matter cellulose, lignin, &c., permeated with a vast number of fine, almost capillary, tubes. The knowledge of this fact has been utilised in a very ingenious French process—making use of the property that an electrical current has, when passed along capillary tubes, of inducing circulation. This process consists of placing one end of the trunk of a tree in a resinous solution, and passing an electric current through the trunk, the resinous solution entering at one end, and the sap being driven out at the other. It is a very ingenious process, but I have not heard that it has been largely used in practice. To my mind the points connected with seasoning are mainly as follows:—

To make careful and exhaustive inquiry into the difference between seasoned and unseasoned wood;

To decide whether wood can be so altered by heat, as to produce the same effect as natural seasoning produces;

To investigate the nature of the combination of the solid structure of wood with water;

To discover the nature of the micro-organisms growing in wood, and the laws governing their growth.

The main characteristics of green or unseasoned wood are:—

A rough feeling when cut; dampness; contains more water or sap than seasoned timber;

It cannot be planed as well as seasoned wood;

Liability to warp and shake with changes of temperature.

It is somewhat more putrescible than seasoned timber; in other words, there is not so much cohesion between the fibres of wood and its particles. Our problems, then, are to so alter wood that it does not contain so much water and that it may resemble time-seasoned wood as much as possible; also to see that the process does not destroy the nature of the wood by interfering with the adhesion of the fibres one with another.

It is very difficult to know what changes actually take place in time-seasoning. All one knows is that there are very different physical qualities of the wood, and that the characteristics of the unseasoned wood are gradually lost, so that scientifically it is hard to state anything but the actual differences between the two. A method which naturally suggests itself is air-drying. This process has not proved altogether satisfactory. The reason for this, in my opinion, is one, among others, on which I based my experiments in seasoning. There is in combination with the sap and the growing portion of the wood a certain amount of albuminous material that is readily putrescible, and which has a considerable amount of water in combination with it. Now ordinary white of egg, which is mainly albuminous matter and water, can be dried in its uncoagulated state at a low temperature, but it will be found that it is very friable and soluble; in other words, it has a great affinity for water. You will find by looking at a specimen which I have here, that if you put it into water it becomes practically dissolved. The dry, uncoagulated egg possesses no strength and is very easily broken. Now supposing you dry coagulated white of egg: it is crisp and very hard indeed, and if you put some of it into water in a test tube, you see the difference, that it is scarcely dissolved at all, the water above being perfectly clear, and there is no sort of mixture of water with the albumen. Now here is a bit of the familiar hard-boiled egg, in water, which also shows no mixture with the water, and is not dissolved. I will now produce a little coagulated white of egg. [Here the lecturer poured a little white of egg into boiling water.] It coagulates very quickly, and is familiar to us in the ordinary poached egg. So, then, if you can coagulate the albuminous constituent in wood you obviously produce a very marked effect. You produce a very different effect by drying white of egg at a low temperature, than by coagulating it first and then drying it. I hope to show you that this is the point on which the drying process which I shall describe differs very considerably from air-drying, and to my mind accounts very largely for the difference in the results of the two.

Hot air-dried wood is subject to much greater warping and shaking with changes of temperature than naturally seasoned wood. The shavings from it are generally short, and the wood does not come out of the crushing and breaking tests as well as ordinary seasoned wood does. In connexion with this question of the hardness of dried coagulated albumen, when Mr. Lovatt first began experimenting on a large scale with the process I devised, I was somewhat alarmed on learning that the wood blunted the machines, for I had no method or device for preventing that result. But I was relieved to hear from him that he was very pleased, and that the wood was really better for being harder. A great point is, therefore, that in the process I will describe later, I coagulate the material in the wood and therefore harden it, and that explains the fact that the machines in this instance were rather blunted by being used on this wood seasoned with a high temperature.

You may look upon the albuminous constituent of wood as acting somewhat in the same way that starch does in a shirt-front; but there is one very great difference. Starch, as we all are aware, if brought in contact with water, absorbs it at once; whereas, when you get coagulated albumen, as I have shown you here, it has very little affinity with water.

I will now deal with the nature of the combination and relations of cellulose with water. The main question I found suggesting itself for explanation was: "In what way does unseasoned wood behave differently from seasoned?" This question is very largely concerned with this curious combination of wood with water. There are two forms in which water is found in combination with wood. One is chemical, and the other is purely physical—that is to say, that a union like that of a sponge with water is a purely physical one, but the union between the water and the white of egg, in the experiment which I made just now, is a chemical one; this white of egg contains an enormous amount of water, but is not easily separable from it, and is in chemical combination with it. Take the water in our own bodies. We consist of something like 80 or 90 per cent. of water, yet we are absolutely unable to wring a man out and squeeze water out of him.

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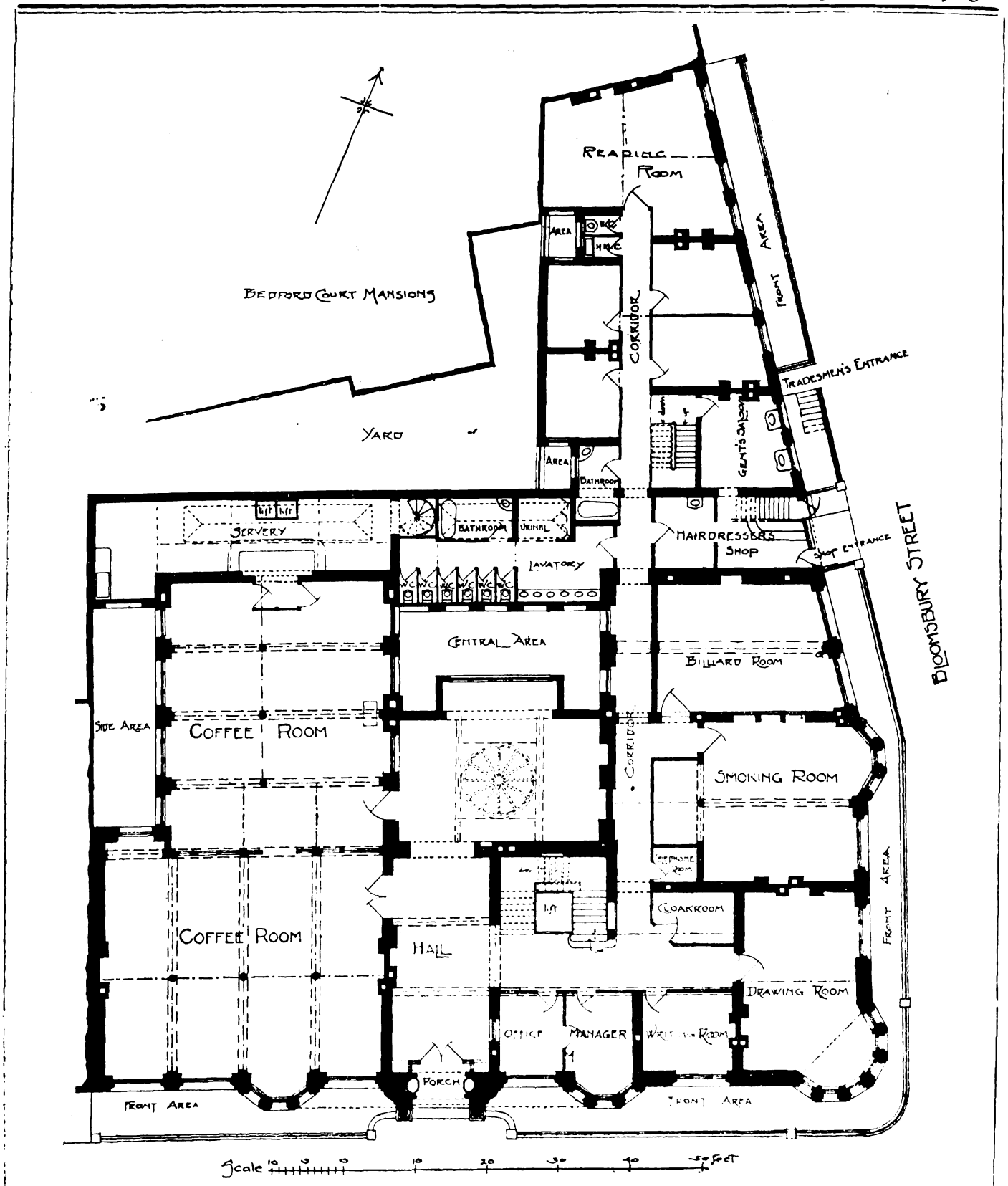

Kenilworth Hotel, Great Russell-street.—Plan.

Illustrations.

COMPETITION DESIGN FOR CAPE UNIVERSITY.

THIS design, by Mr. E. Wimperis and and Mr. H. S. East in conjunction, was the one placed third in the recent competition.

The main idea of the scheme, in the view of the architects, was the provision of facilities for extension, while not losing sight of the fact that the building must stand alone and as a complete unit, without being unsightly, until the time when the extension could be carried out.

This we think they have managed very well, as will be seen by the plan.

THE KENILWORTH HOTEL, GREAT RUSSELL-STREET.

The hotel, of which Mr. G. Waymouth is the architect, was fully described under the head "General Building News" in our issue of May 30 of this year, so that we need not here repeat the description. A plan is appended.

The building stands at the angle of Great Russell-street and Charlotte-street, Bedford-square, the turret forming a conspicuous feature at the angle.

In general, hotel architecture in London is of a commonplace and often tawdry description, and it is seldom that we find a building of this class which from an architectural point of view is worth illustrating. In the present case we have pleasure in publishing a hotel design which is free from these faults, and which, without attempting anything specially striking in architectural effect, is unpretentious, suitable, and in good taste, and in this respect forms a satisfactory contrast to some larger and more ambitious buildings of its class.

DESIGN FOR PROPOSED KURSAAL, CHELTENHAM.

THIS design was submitted in April, 1896, in a competition for a "Kursaal" proposed to be erected on the site of the old Winter Gardens. The elevations were to be of red brick with biscuit-brown terra-cotta and green Westmorland slating for the roofs. The design is by Mr. G. Harold Elphick, architect, of Broad-street House, E.C.

"SCULPTURE AT THE ROYAL ACADEMY."—In our issue of July 18, owing to an oversight in referring to the catalogue, Mr. Henry Pegram's bust entitled "Pensées" was erroneously attributed, under the title "Girlhood," to Mr. Bertram Pegram. The titles of the two busts, with the same surname attached to them, are close together in the catalogue, and hence the mistake.

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THE SEASONING AND PRESERVATION OF WOOD.

(Continued from page 161.)

The water taken up by dried coagulated albumen is very much less than that taken up by dried uncoagulated albumen. There is one rather deep subject in connexion with this chemical union of water and cellulose that I propose to go into. It is, of course, well known that paper, cotton, flannel, and such things, have an affinity for water, but it is not generally recognised that the combination of water with these things may be sufficiently energetic to raise considerably their temperature. Dr. R. E. Dudgeon seems to have been the first to point out that abnormally high temperature (106 deg. Fahr.) might be registered in the mouth by merely wrapping some cotton wool, or the corner of a silk handkerchief round the bulb of a themometer, and then forcing the expired air through the material. The normal temperature is 98·4 deg. Fahr., but you are able by this means to get a temperature of 106 deg. to 110 deg. Fahr. Dr. Dudgeon concluded that these high temperatures were attributable to the temperature of the breath, which he thought must be higher than that of the mouth; but, of course, this was quite wrong. Sir W. Roberts confirmed the observations but contested the conclusions of Dr. Dudgeon, and attributed the rise of temperature within the thermometer wrappings to the conversion of latent heat into sensible heat, by the rapid condensation of aqueous vapour. The phenomenon was rendered much more marked by previously drying the material used to surround the thermometor bulb. On the other hand, it became less and less marked when the experiment was repeated with the same strip of flannel, until, on the third attempt, the temperature recorded was only 98·6 deg. Fahr. "It is probable," says Sir W. Roberts, "that with the super-exsiccated flannel the first portions of the aqueous vapour, condensed at the beginning of the experiments, pass from the gaseous into the solid form and constitute that portion of water which is incorporated in intimate union with all organic tissues."

Dr. H. F. Parsons repeated the experiments with a clinical thermometer, and showed that the same action took place at a higher temperature by means of the following experiment:—A thermometer was wrapped in a few rolls of flannel and heated in dry air at 220 deg. Fahr. for some time; it was then allowed to cool a little, and as the mercury fell the index was shaken down till it stood at 212 deg. Fahr. The dry roll of flannel was then placed in a tin cylinder and exposed for five minutes to steam at 212 deg. Fahr., at the end of which time the thermometer was found to register 239 deg. Fahr. The explanation of this is that the energy which is released in the combination of water with cellulose is very considerable; it is in the nature of a chemical reaction.

Now, why have I gone into this question of the nature of the combination of wood and water? Because of one practical point. Fires have already occurred in wood dried with hot air when the wood was afterwards exposed to moist air, owing to the great energy of the combination between water and cellulose. Another reason—which is, in the process I am going to describe, I believe, one of the causes of success—is this: During the cooling process, energy or heat is developed that considerably raises the temperature of the wood. So then we have seen the difference between coagulated albumen when dried, and dried uncoagulated albumen. We have also dipped into this mysterious chemical affinity that water has for cellulose, and have, I hope, to some slight extent elucidated the mystery.

The only other scientific subject I have to touch on is the reason that wood decays. The active agents in the destruction of wood are micro-organisms and mould. The micro-organisms require three things for growth, viz., a sufficient degree of moisture, food, and often oxygen. All these conditions are well provided in wood, and unless we actually impregnate wood with chemicals such as creosote, so that micro-organisms cannot grow in it, we practically cannot guarantee that it shall not decay. But still a very great deal can be done. For instance, green unseasoned wood decays more readily, if placed under favourable conditions, than seasoned wood, because there is more water in it, and because the chief food of the mico-organism—the sap, the albuminous material—may be said to be present in a more digestible state.

So that a progress which kills all the micro-organisms in the wood, in which the albuminous material is coagulated, and in which there is less water, would theoretically be very efficacious. So I hope you will agree that I have led you to the conclusion that I have reasons for thinking that it is necessary to apply heat in some way to wood, to get the desired effect of seasoning. This cannot be done by air, at atmospheric pressure, for if the air is too hot the wood case hardens and warps. If you dry at a low temperature I believe that the albuminous material is dried in its uncoagulated state, and the wood is, therefore, not strengthened by the process, but if anything weakened. The only way in which hot air is successfully used is in Colonel Haskin's process—a very excellent one—in which the wood is subjected to a high temperature—about 320 deg. Fahr., if I remember rightly—and an enormously high pressure. Well, the effect of that is to cause a certain amount of change in the constituents of the wood, and to produce actually from the wood an antiseptic material which protects it and prevents it from so readily becoming the prey of micro-organisms. But unfortunately this process is extremely expensive, far more so than steam drying.

In applying heat to wood by steam, you can either use saturated steam at atmospheric pressure, or at a high pressure. In the first case the process takes very long, and you cannot get a good result; in the second (with high pressure) it is inconvenient and costly. In my experiments I was led to try superheated steam. Steam or water vapour may be said to be saturated when no lowering of its temperature or increase of its pressure is possible without condensation. The temperature, at which condensation occurs, varies according to the quantities of steam present in a given volume—in other words, it depends upon the pressure exerted by the steam. The closer together the molecules of the steam, the higher is its pressure, and the more readily does it condense. We may therefore say that the greater the pressure of steam the higher is its condensing point. Steam whose temperature is above the condensing point can be said to be superheated, that is to say, it is not readily condensible. Here I have a small apparatus for demonstrating the method by which superheated steam is produced. If I put a match into the superheated steam it is sufficiently hot to light it. Though superheated steam is so hot, yet, if it is in sufficient quantity, the hand can be placed in it with impunity, because it will take water from the hand to help it to reach a lower temperature at which it may condense.

Now it is always most convenient in thinking of any subject connected with heat, to look on it as being capable of being measured, as it were, by the bushel, so that you may be said to be carrying units of heat from one place to another, in passing hot water along a pipe. You can do the same thing with low and high-pressure steam, using it as a vehicle for conducting the heat from one place to another. In the case of superheated steam, you add more heat still.

One of the chief reasons for the value of superheated steam is because of one of its qualities that is also a positive defect under other circumstances—the property it has of giving up its superheat, quickly, in its effort to regain its condensing point; thus, it will evaporate water with remarkable rapidity; while at the same time it parts with its superheat so readily in transit through pipes that it is very uneconomical to employ it any distance away from its source. In the apparatus I have designed—for seasoning timber by superheated steam—no heat (except by radiation from the whole apparatus) is lost, and the steam is able to utilise all its heat in drying the wood. The material, the wood itself, and the adhesions between the fibres and the molecules generally, are such that they do not like any violent change. If you hurry the process, the timber, as I have said before, shows very considerable resentment; you find it cracking and warping in all directions.

[Mr. Higgins here exhibited a series of lantern slides showing the course of his experiments and the means by which they were carried out. He also showed slides of stoves in course of construction, and completed, at the works of Messrs. William King & Son, London, of Mr. Hy. Lovatt, at Wolverhampton, and at Tidworth, Andover. He also included a number of micro-sections of unseasoned and seasoned wood.] During his explanations he said: "The delicate fibres separating the air spaces are not in any way fractured. That is one of the best features of this seasoning process. It is a very good indication that the process does not cause any violent change in the wood."

The first experiment with superheated steam for seasoning wood on a large scale was carried out by Mr. Henry Lovatt, at Wolverhampton. The plant was erected regardless of cost. Mr. Lovatt built two large stoves, fed with live steam from a Babcock & Wilcox boiler. I think I am correct in saying that the horse-power of this boiler was nearly twice as great as was necessary; the firing was done by a man specially detailed for the purpose. There is really no reason why exhaust steam should not be used if it was available; it can be superheated just as readily as steam coming direct from a boiler. I am also convinced that it would be convenient and economical to take the steam as it leaves the first chamber and use it again in the second; it might even be superheated again between the two chambers.

Now the question naturally arises whether this method of treating the wood answers the purpose for which it is devised? The best answer to this is the attitude of the men in Mr. Lovatt's works. Mr. Wilson Lovatt recently told me that when the stoves were not at work for a week or so there were many anxious inquiries from the shops—indeed, he says he does not know how they ever got on without them.

Now what steps have been taken to show that the wood has not had its nature altered? The wood has been subjected to breaking and crushing tests at the Cambridge University Engineering Laboratory with most satisfactory results. With regard to the test of time, some seasoned wood has been made into joinery for two or three years, and I am informed that it has been perfectly satisfactory. Mr. Mackenzie, F.S.I., has also made careful tests of timber seasoned by my process, and reports most favourably about it. But the most important thing after all is the result of the practical work, for it is this only which really counts. This is roughly the record of what has been done in Mr. Lovatt's stoves at Wolverhampton during the last two and a half years:—

75,000	cubic ft.	of deal	...	average time	18 hrs.
8,000	,,	,, oak	...	,, ,,	26 ,,
11,000	,,	,, mahogany		,, ,,	26 ,,
4,000	,,	,, pitch-pine		,, ,,	29 ,,

This amount has been seasoned with *live* steam at an average cost of 1¾d. per cubic foot.

I feel I must mention a matter of some delicacy. The wood seasoned by my process has been referred to as better than wood seasoned by the natural time-seasoning method. The way I look at this point is this: after all, wood is but dead tree, and time-seasoned wood is dead tree subjected to the influence of certain physical agents, such as water, air, heat, and cold, and if I have, as I venture to claim, contributed something to the comprehension of the principles underlying the seasoning of wood, and have shown that certain physical agents do attain the result which from my theoretical reasons I feel they ought to attain, I wish to say that wood seasoned by my process is dead tree subjected to superheated steam, with the albuminous matter of the sap coagulated, and the relations of the wood with its water altered. I see no reason, personally, to look on time-seasoning as vital or mysterious in any way. I dare say the Egyptians looked on embalming as the natural method of seasoning dead Egyptians. Naturally the great test is time, and there is certainly no *primâ-facie* reason why, if wood presents the qualities that the wood seasoned by my process does, it should not be as natural and as enduring as wood seasoned by the time method.

The Impregnation of Wood with Liquids.

If you take a piece of wood—such as a sleeper—and put it in a tank inside a hot chamber and treat it with superheated steam, it will in the course of twenty-eight to thirty hours be thoroughly dried, and the whole of the air be removed by diffusion. If you can imagine this sleeper absolutely full of superheated steam, with no air, and with very much less water than when it was put into the chamber, then if you were to fill the tank with creosote and cover it up, in the course of an hour or two the quantity of creosote which had penetrated into the sleeper would surprise you.

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A process very much used in the United States is to add alkali, carbonate of soda, and water—so as to dilute the creosote. The process which I have described is the only one, I believe, at present devised that will absolutely impregnate wood right through. The reason for that is a very simple one, viz.: that all the air is taken out. If you take all the air out by diffusion, at the same time seasoning the wood, you get this very interesting result. Anything except colloids (substances which do not crystallise) will enter into the wood under these conditions. Creosote can be introduced to the extent of over 30 lbs. per cubic foot. So therefore this process has been carefully tested, and experiments have been made for some four or five years, and up to the present nothing but encouraging results have occurred.

Although I myself devised the process, I must admit that success is due to the enterprise and courage of Mr. Henry Lovatt, and to the energy and perseverance displayed by Mr. Wilson Lovatt in carrying out the real experiments. It needed a very great deal of courage to fill stoves as large as Mr. Lovatt's with oak or mahogany, or even deal, when all my experiments were made only with the small copper cylinder, a photograph of which I have shown you. The real test is work on a large scale. I would very much like to see extensive experiments made with millions of cubic feet instead of thousands, and, as far as I can see, there is no one I would rather ask to help me in that work than the audience I have had the honour of addressing."

The Chairman said that in considering this process the great trouble he found was that it seemed difficult to grasp the fact that he was dealing with superheated steam, which was a very different thing from damp steam; and he did not think Mr. Higgins could have brought that fact home to their minds more clearly and quickly than by his simple experiment of lighting a match at a jet of superheated steam. Certainly the last place at which we should usually try to light a match would be at a steam exhaust. "In trying this process, of course, I followed entirely on the experiments which Mr. Lovatt had made, and of which he kindly gave me the advantage. My stove, of which you have just seen a photograph, was formed on Mr. Lovatt's model, but was built as a single instead of a double stove; otherwise it was constructed in the way which has been already explained, and I will not detain you now by describing it in detail. The stove is practically an oven, with flues all round to assist in keeping it warm. There is a fire underneath which superheats the steam and at the same time heats the oven. A 4 h.-p. boiler supplies the steam, which passes over the fire, and then into pipes of varying lengths inside the oven. The superheated steam is thus evenly distributed, and the whole of the wood is impregnated with it. The total cost of the oven, as we constructed it, was about 180*l*. In building in an old place you have certain things to alter, and so on; but I think that would be a fair average cost. We found some little difficulty in clearing the steam out of the oven immediately after the process was completed, but that was finally got over by making increased draught holes in the roof and additional vent holes in the doors. We had been warned of the fact Mr. Higgins mentioned to you, that it is not well to introduce the cold air too quickly after you have reached the extreme heat—there may be a fear of spontaneous combustion. I followed, therefore, in order to be safe, the theory that the full draught of air should not be put in until the stove had cooled down to below 200 deg., but perhaps Mr. Higgins would tell us afterwards what he considers a fair temperature—a safe temperature—to arrive at in the cooling of the stove before any great amount of ventilation is allowed. There is another objection to introducing extreme air too quickly, that the wood is likely to split from being cooled too rapidly. Of course, it is necessary when the stove has cooled down sufficiently to get as much ventilation in as you possibly can, or else the remains of the steam may be left behind, and your wood may be slightly saturated. That was a difficulty we certainly found at first, but by inreasing the draught we found that the wood came out perfectly dry. One idea that I understood Mr. Lovatt had been working on was to use damp steam for the first few hours—*I think* generally about four hours, until a temperature of about 160 deg. or 170 deg. was arrived at. Now, although the temperature rose steadily about 10 deg. an hour from turning in the damp steam, I could not help thinking from the results that damp steam was detrimental. I, therefore, so far varied the process by discarding the use of damp steam. The steam from the boiler is now got up first, and is turned into the stove at the same time that the superheating fire is lighted, so that we get no damp steam into the stove at all; we start entirely with the dry steam. The result, in my opinion, is very much better, and we can take two or three hours off the times given by Mr. Lovatt for the process, with satisfactory results. I imagine that I am in this only carrying out the original idea of Mr. Higgins, which I understand was to use superheated steam only. The effect of the process seems to be that (if you have the wood cut down and then try to work it) directly it comes out of the stove, the wood is very slightly harder and seems to have lost its "nature" to a certain extent, but after a couple of days it not only regains its nature, but works in a more silky and easy manner. The wood seems to be firmer and more easily worked, and, far from having suffered from the treatment, I think, on the whole, that it is improved. With regard to the wood standing, of course it is difficult to tell for a good many months, and sometimes even for a year or so, how wood is going to stand. We all know, as builders, that it has an unpleasant habit sometimes of showing cracks in framings after many months, and it causes us very great annoyance at times in that way. There is a specimen here to-night of a little piece of framing that has been put together for some three months, and has stood over hot-water pipes with a continual heat of between 80 deg. and 90 deg. Fahr. the whole of that time. I think that it is a reasonable success. You will notice that the specimen has gone slightly, which would rather show the *bona fides* of it. I ought to explain that this little framing is made of deal which was newly imported and quite green when put into the oven; it was cut down directly the process was completed, taken at once to the joiners' shop, and framed as you see it. As regards the creosoting process, I am not very well acquainted with that. . . . ."

Mr. George T. Hine referred to the fact that Mr. Lovatt had secured the contract for an important building, of which he was the architect, and when approaching completion had informed him that he had used in the woodwork of part of the building a quantity of wood that was seasoned by this process. Mr. Lovatt said he had taken the responsibity for this on his own shoulders, believing that the result would be satisfactory and would comply with the specification. He (Mr. Hine) went down to examine the building and discovered very little difference in the woodwork. He looked for some defective woodwork and found a little—not very much—but he found afterwards that it was not in the artificially seasoned wood. He went down again at least two years after the work was completed, and found that this woodwork in particular was standing as well as, or better than, the other woodwork in the building. If by this process they could obtain good seasoned wood, he thought that Mr. Higgins would be a boon to the architectural and building professions, and to the community at large.

Mr. W. F. Wallis asked if it was necessary that the furnace should be kept alight during the whole time of seasoning—whether a man had to be in constant attendance to keep the steam super-heated. He also wished to know if the process made the wood more absorptive. He had sometimes found that he got into just as much trouble by using wood too highly seasoned as wood not sufficiently seasoned. If it happened to go into a damp, exposed place it seemed to absorb moisture and would consequently swell. If he used unseasoned wood he very often got into trouble through the framing shrinking. On the other hand, if the wood were too highly seasoned—and he thought it would be more likely to suffer from that than from the other defect—it would absorb moisture and would swell, forcing the shoulders of the framing over.

Mr. Wilson Lovatt replied that it was necessary for a man to be in attendance during the whole of the time the wood was under steam, but he need not be, in any sense, an expert. A night watchman would be sufficiently capable. It was essential that the superheated steam should be going in the whole time. With regard to Mr. Wallis's question as to absorption, so far as his experience went there had not been this difficulty.

Mr. C. S. Percival inquired the size of the stoves erected.

Mr. Lovatt: The Wolverhampton stoves are 20 ft. by 8 ft. by 8 ft., but those just erected and started at Tidworth, at our Salisbury Plain contract, and of which you have seen photographs, are 30 ft. by 9 ft. 6 in. by 9 ft. 6 in.

The Chairman: My stove is 20 ft. by 8 ft. by 8 ft. (To Mr. Lovatt: We should like to hear a little of your experience.)

Mr. Lovatt said he thought that he could say positively that during the last few years they could never have got their work through their joiners' shops without this artificial means of drying, so great had the demand for timber been. Their stoves were kept going practically day and night, week in and week out, and with, he considered, very satisfactory results. He had not had any complaints of the wood shrinking. He was sure that it would pay all builders, if their contract were large enough, to have one of these stoves erected on the site, if only for drying flooring. The stove need not be of brick. For temporary work it could be constructed in other ways, and would be just as efficient as a brick stove. As regards the cost of treating the timber, that included filling, drawing, conveying to the joiners' shops, also the fuel, and men's wages in attendance on the stove. There had also been a considerable saving in interest on capital locked up in timber, as they could now use the timber immediately after importation.

A Member: Eighteen hours, I take it, is the minimum time?

Mr. Lovatt: It entirely depends on the thickness of the wood, but flooring could be done in sixteen hours, or even less.

Mr. Hine (to Mr. Lovatt): Do you make steam for the purpose or use exhaust steam?

Mr. Lovatt: At Wolverhampton we make the steam specially, but at Tidworth we use exhaust steam.

Mr. Arthur Faulks: I would like to know whether it is necessary to use a forced draught in the cooling process, whether any firm is making the superheaters, and whether it would be possible to put a superheater in an iron pipe for a portable stove?

Replying to the latter question,

Mr. Lovatt said that it would be quite practicable.

Mr. Higgins said that it would not do to have the fire too close to the superheater pipes; they would waste very much more quickly. Forced draught was not necessary in the cooling process. One point was raised by the Chairman which was really a very interesting one—with regard to the possibility of the moisture combining with the wood too energetically if the stove were opened before the temperature was sufficiently low. The temperature should be under 200 deg. Fahr.—it had better be nearer 150 deg. Fahr. It really varies according to the length of time the steam had been on; and it applied just as much to air-dried wood as to steam-dried wood. It was merely this chemical property, water combining with cellulose and causing this liberation of energy, and increased heat. He thought that it was a very great advantage in this process that, during the cooling, when the steam was shut off, they probably got a rise in temperature in the wood to help to coagulate this material and assist the seasoning process. But of course it was absolutely necessary not to open the stove till the temperature was below 200 deg. Fahr., because, if they did that, it might be possible to get spontaneous combustion.

A vote of thanks to Mr. Higgins brought the proceedings to a close.

Correspondence.

"TACKY" PAINT.

Sir,—It would be useful and interesting to read the opinion of some of your practical decorative subscribers on the above matter. I buy the best lead, oil, turps, driers, and colours on the market, or, to be strictly accurate, should say that I pay for the best genuine quality of each. The colours are mixed and applied by different workmen, and at first dry and harden off as may be reasonably expected. Yet on standing a few weeks a kind of softness sets in, so that a person pressing his hands on the work or leaning against it would discern a distinct "tackiness." What are the probable reasons for this unsatisfactory condition? TARRUSH.

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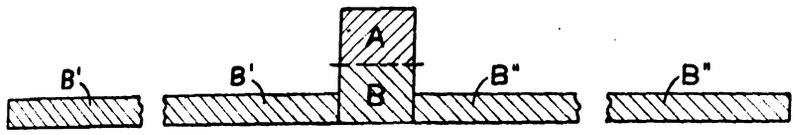

Fig. 7.

The Student's Column.

CONCRETE-STEEL.—VI.

GENERAL THEORY.

FROM consideration of the tables already given it is evident that the strength of concrete in compression is about ten times its strength in tension. In the case of a beam supported at each end, the unit stress due to bending moment is equal above and below the neutral axis, and the lower fibres would fail in tension long before the upper fibres could fail in compression. A similar though less noticeable inequality of compressive and tensile strength characterises cast iron, and the familiar section of a cast-iron beam illustrates the method adopted for making good the deficiency of resistance of the lower flange. Treatment of the same kind would be out of the question in the case of concrete, for if the difference of resistance were completely adjusted, the dimensions of the beam would assume absolutely impracticable proportions. This view is illustrated by Fig 7, where the beam is 8 in. wide by 12 in. deep. Assuming the neutral axis to be equi-distant from the upper and lower surfaces, the compression area A would be 48 sq. in., and to provide a tension area of equal value, say 480 sq. in., it would be necessary to increase the width of the lower portion, B, by adding two 3-in. flanges, B', B', each 72 in. wide. Therefore it is manifest that concrete alone does not lend itself to the economical construction of members intended to resist tensile stress. By the incorporation of steel in the tension area the lacking element of strength can easily be supplied, without altering the original dimensions of a concrete beam. The compressive strength of the concrete can then be fully utilised, and corresponding tensile strength is supplied by the steel. If the steel were intended to act quite independently of the concrete the principle involved would be as diagramatically represented in fig. 8, where

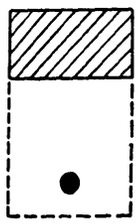

Fig. 8.

the upper area of concrete is supposed to be entirely in compression, and the steel bar in the lower area to be entirely in tension, these two elements being connected by an imaginary web. Assuming such an arrangement to be practicable, it would only be necessary to provide a steel bar of any convenient section, and of sufficient area to withstand the calculated street, and to connect the concrete and the steel by a suitable web. Taking the allowable unit stress of concrete at 500 lbs. per square inch, and of steel at 15,000 lbs. per square inch, the relative areas of concrete and steel would be 30 sq. in. and 1 sq. in. respectively. The most suitable and convenient means of connexion is to complete the beam, as indicated by broken lines in fig. 8, thus incidentally affording protection to the metal against corrosion and fire. If the metal were free to slide within the enveloping concrete, the compression and tension elements of the beam, as represented by concrete and steel, would still act independently, and the steel would also act independently of the concrete in the tension area. The concrete in the lower area would add little strength and would constitute an additional load to be supported. In practice, however, the concrete would adhere firmly to the steel, and it follows that every variation in the volume or length of one material, whether caused by temperature or by stress following the application of a load would be accompanied either by corresponding variation of the volume or length of the other material, or by internal stress due to the resistance of one material to the movement of the other.

Here, then, we have further points for consideration: (1) the adherence of the concrete to the steel; (2) the relation between the coefficients of expansion of the two materials; and (3) the relation between the values of the coefficients of elasticity of the concrete and the steel. These matters are the more important, as the object is to effect a combination so that the two elements of concrete-steel may act in unison and behave like a single homogeneous substance.

Various experiments have been carried out with the object of determining the adhesion of concrete to steel. Dr. Ritter* states the value to be from 568 lbs. to 668 lbs. per sq. in. In the recent investigations of M. Considère it was found to vary from 71 lbs., 157 lbs, and 171 lbs. per sq. in., according to the amount of water used in mixing the concrete; and in the case of steel upon which the mill scale has been left, it was 256 lbs. per sq. in. The general practice of engineers on the Continent and in the United States† is to adopt 570 lbs. per sq. in. as the basis of calculation, but this is probably too high a value for plain rods or bars.

The statement is sometimes made that the bond of concrete and steel is not destroyed by thermal or other stresses. There is, however, satisfactory evidence that adhesion may be overcome by interior stresses following unequal expansion of the two materials when under the influence of heat.

The adhesion originally existing between the constituent parts of concrete-steel is also affected by working stresses, as well as by vibrations and shocks such as are experienced in most structures. For this reason it is well that embedded rods should be of such section as will furnish a reliable form of mechanical bond in addition to that given by adhesion of the concrete. With this object, some designers make use of corrugated and twisted bars, and others use network of various kinds. A corrugated bar made in St. Louis, U.S.A., consists of a square with a system of corrugations extending around it. This bar is of considerable merit, giving great mechanical adhesion with a proportionately small quantity of metal. The Thacher bar, patented in the United States, is of circular section flattened at intervals, and it is claimed by the inventor that it never slips; also that the circular form does not cause incipient fracture, as may happen when square bars are employed. The Ransome twisted bar, another American device, has been used with considerable success. Some experiments made to determine the strength of the bond so formed are thus described‡:—

"Half-inch bars were embedded in blocks of concrete 6 in. square, and which varied in length from 12 in. to 28 in. The bars projected about 2 ft. from one end of the blocks. One face of the concrete bore against a plate, the bar passing through a hole in its centre. A direct pull was applied to the bar, and in each case, when the length exceeded 21 in., the bar broke outside the concrete without pulling therefrom. In these cases the ultimate stress on the steel averaged 81,835 lbs. per square inch."

From the data now presented it is possible to determine the exact length to which bars of all sizes should be embedded to secure a satisfactory bond.

The force (P) required to break a round steel bar without breaking the bond can be calculated by the equation: $P = F_t \frac{\pi d^2}{4}$; where F_t = ultimate tensile strength of the steel in lbs. per square inch, and $\frac{\pi d^2}{4}$ = area of the bar in square inches.

* Schweizecische Baureitung, 1899, pp. 47, 49, 59.
† Proc. Eng. Soc., Western Pa., vol. XIX., p. 147.
‡ Proc. Am. Soc. C.E., Vol. XXVI., p. 712.

The force (P_1) to break the bond without breaking the bar is shown by the equation: $P_1 = l \pi d \times f_a$; where l = length in inches of the embedded bar, $l \pi d$ being consequently the surface of steel in square inches in contact with the concrete, and f_a = adhesion in pounds per square inch.

By equating the foregoing expressions we obtain a simple rule for finding the length of steel that must be embedded in order to make the strength of the bond greater than that of the bar.

Thus: $l = \frac{F_t}{4 f_a} d$.

Calculated by this rule, we have the figures in Table XX. representing, in terms of the diameter, the minimum length for which a round steel bar should be embedded in concrete to ensure a satisfactory bond, the bases of computation being the data previously mentioned.

Table XX.—The Adhesion of Concrete and Round Steel Bars.

(Ft = Tensile stress per square inch on steel.)

Adhesion per Square Inch (f_a).	Type of Bar.	Length in Diameters to Ensure Bond.		
		Ft = 80,000 lbs	Ft = 40,000 lbs	Ft = 20,000 lbs
71	Plain round	281	140·5	70·25
157	" "	127	63·5	31·75
171	" "	116	58·0	29·00
256	* " "	78	39·0	19·50
487	Twisted square...	41	20·5	10·25
570	Plain round	35	17·5	8·75
668	" "	29	14·5	7·25

As the unit stress on steel would not exceed 15,000 lbs. to 20,000 lbs. in practice, it will be seen by the table that the embedded length necessary for security is always within moderate limits, and even if the lowest value for f_a be taken, the length for a ½-in. diameter bar is less than 3 ft., or for a 1-in. diameter bar less than 6 ft. In the case of twisted bars, with a unit stress of 20,000 lbs., the lengths for ½-in. and 1-in. diameters are 5-in. and 10-in. respectively. In ordinary practice it is probably quite safe to take the value of f_a at between 250 lbs. and 500 lbs., according to circumstances, but the embedded steel should never be painted, as paint prevents proper adhesion of concrete to the metal.

The assumption is frequently made that the coefficients of expansion for concrete and steel are of equal value. This supposition is not quite correct, for on comparing the figures already given we find the coefficients to be 0·0000060 for mild steel, and 0·0000055 for concrete, the difference being about 0·0000011. Hence the change of length for a given variation of temperature is about 18 per cent. less for concrete than for steel. Assuming the bond to be perfect, it is clear that temperature stresses must be caused in both materials. Increase of temperature above that prevailing during construction will cause tensile stress in the concrete, and, conversely, decrease of temperature will produce compressive stress.

Taking the coefficients of elasticity to be 2,800,000 lbs. for concrete and 28,000,000 lbs. for steel, and assuming the sectional area of the steel to be 2 per cent. of the concrete section, the resulting stress per deg. Fahr. would be about ½ lb. per square inch. Under ordinary circumstances it is not likely that temperature will be increased much above that prevailing during construction, and there is no reason for anticipating abnormal tensile temperature stresses. In the case of a fire it is not quite certain what might happen, for there are practically no records showing the precise influence of concrete in retarding or minimising the expansion of metal embedded therein. If both concrete and metal acquired a temperature of 2,000 deg. Fahr., the resulting tensile stress would probably reach an intensity of about 1,000 lbs. per square inch, but expansion might be equalised to some extent owing to protection of the metal on one hand and to exposure of the concrete to the direct action of flame on the other. As reinforced concrete is capable of sustaining without rupture a proportionate distortion of from ten to twenty times that sufficient to cause the failure of ordinary concrete, it does not follow that the inequality of expansion would necessarily be sufficient to cause cracks. This conclusion seems to be borne out by various fire tests of concrete-steel

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constructions in this country and abroad in which, although the effects of deflection and cold water are generally added, the damage caused rarely extends beyond the development of fine cracks. During severe frost, it is not likely that the temperature of concrete-steel work will fall more than 50 deg. Fahr. below the temperature of construction. The effect then produced would be compressive stress, tending to counteract tension on the lower side, and its amount would be quite inconsiderable. Of course, the precise effect of unequal expansion will depend in every case upon the value of the co-efficients of elasticity of the materials, and also upon the percentage and distribution of the steel in the concrete.

Finally, it should be remembered that changes of temperature will always be gradual owing to the heat resisting properties of the concrete; and that internal stresses are to some extent relieved by infinitesimal slipping of the metal in the enveloping material. Hence, we may say that the secondary thermal stresses due to difference between the co-efficients of expansion are never likely to be of great importance in ordinary practice.

GENERAL BUILDING NEWS.

CHURCH, BRIDLINGTON.—A new church at Bridlington was dedicated by the Archbishop of York on the 29th ult. The building will be known as Emmanuel Church, and has been erected on a site adjoining Cardigan-road, on the Hilderthorpe (or south) side of the town. The building consists of nave and aisle. It has already cost 2,700*l.*, and when completed, with chancel, vestries, and south aisle, the total cost will be about 6,000*l.* The church has been built by Messrs. Brodrick, Lowther, & Walker, architects, Hull. The completed building will provide seating accommodation for 794 persons.

BOARD SCHOOL, DUNSTON, NORTHUMBERLAND.—A new elementary school has been erected at Dunston by the Whickham School Board, at a cost of about 6,000*l.*, near the north end of Ravensworth-road. The chief feature in the new school is the central hall—a top-lighted assembly-room, 70 ft. long, rising through two stories, with a gallery round the upper floor. Opening directly on to this hall are the whole of the classrooms; thirteen in number, as well as the teachers' rooms, cloakrooms, entrance-halls, &c. Altogether accommodation is provided for 840 children of both sexes. The staircases are in duplicate for the two sexes, and for safety in case of fire or panic, and are placed at opposite ends of the hall. They are constructed of oak steps supported by steel strings and joists. The general contractors for the works have been Messrs. J. Parkinson & Sons, of Blackpool, with the following sub-contractors: Messrs. Emley & Sons for the heating; Messrs. J. Tweddle & Co. for plumbing and ironwork; Mr. J. Hall, of Blackpool, for painting and glazing; the Acme Wood Flooring Company, of London, for solid block floors; Messrs. Hope & Sons, of Birmingham, for steel work; and the North of England School Furnishing Company for the furniture. Messrs. Farrer and W. H. Pace acted as clerks of works, and the design and superintendence of the buildings was carried out by the Architect to the Board, Mr. J. Wm. Roundthwaite, of Newcastle-upon-Tyne.

PUBLIC SCHOOL, WOODSIDE, ABERDEEN.—The work of building the new school being erected at Woodside for Aberdeen School Board is proceeding rapidly. The total cost of the school will be about 18,000*l.*, inclusive of the heating and ventilating arrangements, but exclusive of the furnishings and desks. The school will provide accommodation for over 1,537 children. The southwing, now all but ready for occupation, has seven classrooms on the ground floor, which will accommodate 461 children, and eight classrooms on the first floor, containing 480 places. The plan of both the ground and first floors provides a central corridor, with, in addition to the classroom, accommodation for the teachers. The floors of the ground floor, hall, and corridors, are laid with wood blocks on concrete, and the dados of the corridors, staircases, &c., are lined with tiles, and the furnishings generally are of yellow pine. A janitor's lodge has been erected at the south end of the school buildings, and is already occupied. The architect is Mr. J. A. O. Allan, the architect and master of works to the board. The contractors are:—Mason work, Mr. George Hall; carpenter work, Messrs. Hendry & Keith; slater work, Messrs. Merson & Stewart; plaster work, Messrs. J. Scott & Son; plumber work, Messrs. Thom & Strachan; painter and glazier work, Messrs. Murray & Mitchell; steel work, Messrs. Wm. Mackinnon & Co.; and iron and blacksmith work, Messrs. J. Abernethy & Co.

HOUSING THE WORKING CLASSES, BATTERSEA.—On the Latchmere Estate, Battersea, three, four, and five room tenements—with a few small houses—have been erected by the Housing and Works' Committees of the Borough Council. There are altogether—or, rather, will be by the end of the year, when all is complete—173 houses, with accommodation for 315 families, or about 2,000 souls. There are no shops nor public-houses on the estate, and for such tenements as are open the applications made are treble the accommodation. Every tenement is fitted with kitchener, copper, bath, and sink, and has its own little piece of garden. The houses are brick-built, the heads and sills to the windows and the canopies over the entrances being of granolithic. There are plenty of cupboards and shelves, all the floors are fireproof, and every house is fitted with the electric light—to be supplied by the borough—under "the penny in the slot" system. The whole of the cost, amounting to 105,000*l.*, lent by the County Council, will be met out of the rents, which have been fixed at 11s. 6d. a week for a five-roomed house, 10s. 6d. and 10s. for four-room houses and tenements, and 7s. 6d. for three-room tenements. These rents will cover maintenance, interest, and sinking fund.

INSTITUTE, WALSALL.—The foundation stone has just been laid of a building which is to serve as an institute for the Walsall Brotherhood. The site of the new building is on the Church Hill, and the institute, which is from the designs of Messrs. Bailey and McConnell, is estimated to cost about 1,600*l.*

NORWICH UNION LIFE OFFICE.—On the 27th ult. the stone which is to form the apex of the new building of the Norwich Union Life Office in Surrey-street, Norwich, was laid. The new offices have been erected from plans prepared by Messrs. G. J. and F. W. Skipper, architects, Norwich. Mr. G. E. Hawes was the builder, and Mr. E. Bilby the clerk of works.

TOWN HALL, SCARBOROUGH.—On the 28th ult. Princess Henry of Battenberg opened Scarborough new Town Hall and unveiled a statue to the late Queen. The new Town Hall was formerly the residence of Mr. J. W. Woodall, banker, and was known as St. Nicholas House. It is a mansion in the Elizabethan style, and was purchased by the Corporation, together with the grounds and other property, in 1898 for 33,500*l.* A further sum of 19,500*l.* has been spent in the conversion of the building to its present purpose. The work was carried out from the plans and under the superintendence of Mr. H. W. Smith, Borough Surveyor. The statue is a replica of that of the late Queen on Blackfriars Bridge, executed by Mr. C. Bell Birch, A.R.A.

ST. LAWRENCE, OLD BRADWELL, BUCKS.—The external walling throughout has been cleared of loose plaster and whitewash, and carefully repaired and repointed. The church has been drained all round. A lightning conductor has been provided. The copings to gables, much decayed and injudiciously repaired, have been renewed with Hornton stone in the tower, as formerly, and with Weldon stone elsewhere. New crosses, five in number, have been added to the gables, as well as new springers and apex stones, and a buttress has been added to make secure the west end of the south aisle, and two new windows, which were absolutely necessary for lighting purposes, have been inserted. The tower and chancel have been retiled, and the former provided with lead gargoyles, and new oak luffers added to belfry stage. The work has been carried out at the sole cost of Mr. C. C. Baily, a nephew of the vicar, in memory of his brother, the late Mr. W. O. Baily. The works have been done by Messrs. Kemp & Sons, of Stantonbury, from the designs and under the personal direction of Mr. E. Swinfen Harris as architect.

VICTORIA HOSPITAL, BELFAST.—The Royal Victoria Hospital, Belfast, was recently opened by the King and Queen, as we announced last week. The building owes its special form to the consideration on the part of the architect (Mr. W. Henman) of the objections to pavilion buildings of several stories, viz., the distances apart of the wards, necessity for staircases and lifts, the excessive labour to the staff, and the difficulties of supervision and administration; he therefore suggested it might be better to spread out the wards on one story only, placed side by side, without intervening open spaces, lighted from the ends and by continuous lantern or clearstory windows. Sketch plans having been approved, working drawings were prepared in conjunction with his partner, Mr. Thomas Cooper, and in the autumn of 1900, a contract was entered into with Messrs. M'Laughlin & Harvey, of Belfast, who have carried out the buildings. Mr. G. A. Flower acted as clerk of works; Messrs. W. A. Stephens & Son, of Donegall-square North, being the quantity surveyors. The accommodation in the new buildings is for 300 patients, eight resident medical and surgical officers, a superintendent, a matron, seventy-six nurses, and thirty-two male and female servants. The administrative buildings, of four stories and basement in three separate buildings, provide a spacious domed entrance hall (above the porch to which is a bronze statue of the late Queen Victoria, executed by Mr. J. Wenlock Rollins, sculptor), a board room and general office in the central block, and accommodation for the resident staff; the nurses' home, the attendants' and servants' quarters, the dispensary, kitchen department, and storerooms in the east and west wings. These buildings open, on the ground floor, into a main corridor, running east and west, 440 ft. in length by 9 ft. in width, to the south of which open branch corridors leading to seventeen wards and their accessory rooms. The principal wards (each for fourteen beds) are alternately arranged for male and female patients, there being eight wards for medical, eight for surgical, and one for gynæcological patients, each honorary physician and each surgeon having control of two wards, one for either sex. On the north side of the main corridor are two wards for ophthalmic cases each for six beds. In connexion with each group of four medical wards there are two clinical rooms and a large classroom for students, and to every pair of surgical wards there is an operating-room, in addition to special operating-rooms for the gynæcological and for the ophthalmic departments, each completely fitted with sterilising, electrical, lavatory, and other necessary appliances, as well as surgical instruments. Near by each of the nineteen large wards is a separation ward for two beds. A ward kitchen serves each pair of wards (except for the gynæcological cases, where the department is self-contained). Bath rooms and conveniences are attached to all the principal wards, as well as linen cupboards, and there are storerooms for patients' own clothing. Two detached buildings are provided towards the west end of the site for isolation purposes, one being for six and the other for four beds, with kitchens, conveniences, and nurses' bedrooms. To the west of the administrative buildings is the out-patients' or "extern" department, consisting of a large waiting-hall, with medical and surgical consulting-rooms, two operating-rooms, registrar's office, &c., grouped around, all on the ground floor, and connected with the main corridor of the hospital, retiring-rooms for students being provided in the basement. Further to the west is a detached building containing the pathological department, which comprises a laboratory and microscopical examination room, a post-mortem room, mortuary, exhibit and viewing rooms. At the east end of the site are two detached buildings: one is the boiler-house, containing two powerful steam boilers, disinfecting apparatus, and an incinerator (the chimney from the furnaces, holding a prominent position, is treated architecturally); the other building is the laundry, fitted with very complete steam appliances. Soiled linen is taken from the wards to the end of the main corridor, sent down a glazed earthenware tube, and conveyed to the receiving-room in the laundry, when, after making the circuit of the washhouse, drying closets, and finishing department, it is transferred to the linen store in the basement of the administrative buildings, ready for re-use. Another building attached, at the basement level, to the east end of the main corridor, contains the appliances by which fresh air is supplied throughout on the "Plenum" principle. Everything is in duplicate, to allow of the necessary rest, cleaning, and repair of the several parts. There are two separate air intakes, each about 30 ft. square, with numerous openings on three sides for admitting air, which is drawn in, cleansed by passing through moistened screens, warmed in cold weather, and forced on by two powerful "fans" or air propellers, each 10 ft. in diameter (manufactured by Messrs. Davidson, of Belfast) into the main air duct, 9 ft. wide, starting at 20 ft. in height, gradually diminishing to 5 ft. 6 in., as branch ducts convey the air to the several wards, rooms, and corridors above. Either or both of the "fans" may be employed at will, provision being made for changing the whole atmosphere of the hospital seven times per hour in winter and ten times in summer, with a cubical capacity in the buildings of nearly one million cubic feet. Suitable inlets and outlets being provided, this change of air will go on continuously, and every part of the hospital will be maintained perfectly fresh and wholesome throughout the night as well as by day, without the necessity for opening any windows. It is this fact which has made it possible to place the whole of the accommodation for the patients compactly on one floor level. The cost of the buildings, including the whole of the mechanical appliances, will not exceed 300*l.* per bed.

OPERA HOUSE, NORWICH.—The new Grand Opera House, Norwich, has just been opened in St. Giles's-street. The house is built on the two-tier system. The stalls and pit are on the ground floor, the dress circle and family circle are on the first tier, and the gallery is on the second tier. The auditorium has a width of 54 ft., with a depth of over 60 ft. The stage is 75 ft. wide, and has a depth of 40 ft. The holding capacity of the theatre is as follows:—Four private boxes for four each, sixteen; stalls, 200; pit, 800; dress circle, 120; family circle, 200; gallery, 500. On a level with the family circle is a grand saloon and smoking lounge of about the same size as the crushroom, and directly over it. The pit saloon below is the same size, and there is a bar for the stall patrons on the prompt side of the stalls. Three pairs of doors lead out of the grand saloon on to what will be treated as a roof garden, over the circular arcading of the front. The theatre is lighted throughout with electricity, including the stage. All parts are heated with low-pressure hot-water apparatus. The decorations are in the French Renaissance style. Space has been allowed in the orchestra for a band of twenty-five performers. The architect is Mr. W. G. R. Sprague, of London. The contractors have been Messrs. G. Longden & Sons; decorators, Messrs. De Jong & Co., London; upholsterers, Messrs. Dean, Birmingham; electricians, Messrs. Mann, Norwich; constructors of the stalls and iron work, Messrs. Smith Walker, London; construc-

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tors of stage and other appliances, Messrs J. N. Lyons, London. The clerk of works was Mr. T. U. Hill.

THE YORKSHIRE INEBRIATES' HOME, CATTAL.—The foundation-stone of the new reformatory established for the county of York, under the Inebriates Act, was laid on the 30th ult. The building, the construction of which, from plans by Mr. Vickers Edwards, has just been commenced, is at Cattal, midway between Harrogate and York.

FIRE STATIONS, LONDON.—Mr. E. Smith, the Chairman of the Fire Brigade Committee of the London County Council, recently laid the memorial-stones of the fire stations now being erected in Old Kent-road and Evelyn-street, Deptford, to replace old buildings which have been demolished. The Old Kent-road station consisted of an engine-house, erected in 1869 at a cost of about 1,420*l.*, and of three cottages in the rear abutting on St. Thomas's-road. The Council some time ago acquired the neighbouring building, No. 336, Old Kent-road, and it was determined to pull down the old premises and to build on the site thereof a new station by the Works Department of the Council, the Architect's estimate being 10,650*l.* Work was commenced in May, and it is hoped that the building, which has been designed and is being erected under the supervision of Mr. W. E. Riley, the Council's Architect, will be ready for occupation by the end of April. The old station in Evelyn-street consisted of two houses, which the Council held on lease, and was erected in 1869 at a cost of about 1,600*l.* Two houses adjoining the station were purchased and the freehold of the station itself was acquired, the total expenditure under this head amounting to about 1,700*l.*, and the Council came to the conclusion to demolish the old premises and erect an entirely new station. The new building is being erected by the Works Department, the Architect's estimate being 10,350*l.* It is hoped that this also will be ready for occupation by the end of April. Both stations are to be what are known as "full stations."

NEW COUNTY HALL, NORTHALLERTON.—The foundation-stone of the new County Hall has just been laid at Northallerton. The building is to be erected on a site opposite the railway station, from the designs of Mr. W. H. Brierley, the County Architect. The contract is for 25,000*l.*, but with furnishing, &c., the expenditure will probably be about 35,000*l.*

BRISTOL STOCK EXCHANGE.—New Stock Exchange buildings, in the Renaissance style, were opened in Bristol on the 29th ult. The Exchange has a long frontage to Nicholas-street, the central portion of the front elevation for some length projecting beyond the line of the main building. Four granite bases and columns, having carved Corinthian capitals, support a moulded and carved modillion cornice with moulded pediment and cornices over, the tympanum of the pediment having the City Arms carved in the centre. The frieze and architrave to the main cornice is carved. The front of the building between the granite columns is of Bath stone. The windows are circular headed, with moulded architraves and carved key-stones, the spandrils over the windows being carved. The piers between and at the sides of the windows are rusticated, with moulded cornice and strings. At the sides of the windows are columns with carved caps and moulded bases. Immediately behind the granite columns are pilasters with Corinthian carved capitals. The entrance doorway has polished granite plinths and moulded bases on each side, with polished granite columns and carved Corinthian capitals, supporting a moulded and carved pediment over. The wrought-iron railing and gate claim special attention. The interior of the premises comprise, on the ground floor, entrance lobby, hall, secretary's office, telephone room, and the main Stock Exchange. The Exchange is elaborately furnished, and the walls are lined round with richly-polished walnut panels to a height of about 9 ft. The central doorway to the Exchange has two granite columns with carved Corinthian caps and moulded and panelled bases on each side of the doorway, the central doorway having moulded enriched arch over, resting on cornices supported by granite columns, caps, and bases. In the centre of the wall facing the door is a chimney-piece rising to a height of about 14 ft., an arrangement of polished walnut pilasters with arch between, framing a piece of wood sculpture. This panel, which is about 5 ft. 6 in. wide by 3 ft. 6 in. high, was carved by Mr. Benjamin Creswick. The title of the panel is "Commerce Uniting the Nations." The floor of the Exchange is fitted up with seats and desks for each member, the seats being upholstered in green morocco, and the desks having sliding tops and drawers. There are also telegraph desks and other accommodation for admitted clerks. The Exchange itself is fitted with chandeliers and brackets, and these, as indeed the whole of the building, will be electrically lighted. The basement floor has been laid out so that it is practically as light as the Exchange. On descending the staircase the tiled coves or niches, in which are to be placed bronze figures holding electric lights, and the wrought iron balustrade are noticeable features. The chamber immediately beneath the Exchange-room is of the same dimensions as the Exchange, and will be used as a library. The room is furnished in much the same manner as the Exchange. It has bookcases, desks, and seats, with chairs and lounges in crimson morocco, whilst walnut woodwork panelling is carried up to a height of about 8 ft. Here again the chimney-piece is made the chief feature of the apartment. Adjoining the basement hall is a series of lavatories and general offices. The whole of the walls of the approach and staircase are lined with tiles of special design, whilst the walls of the Exchange and library are of oak. The architect of the building is Mr. Henry Williams. The builders were Messrs. Cowlin & Son, and the whole of the furnishing has been carried out by Messrs. Smith & Co.—*Bristol Times.*

NEW OPERATING THEATRE, LYNN HOSPITAL.—On the 30th ult. the Countess of Leicester opened new buildings at the West Norfolk and Lynn Hospital, King's Lynn. On the ground floor are a washhouse, laundry, and drying closet, and the first floor contains the operating theatre, two anterooms, and a passage dividing them from the older part of the building, access to which is obtained through two doorways, direct communication with the outside being given by means of an iron staircase. The two ante-rooms (one of which has a doorway opening upon the passage) communicate with each other and with the operating-room through openings fitted with sliding doors. The building was designed by Mr. Herbert J. Green, of Lynn and Norwich, whose local representative (Mr. J. L. Carnell) has been largely responsible for the supervision of the work, and this has been carried out by Mr. A. F. Foreman.

SANITARY AND ENGINEERING NEWS.

WATER SUPPLY, CHELMSFORD.—A public inquiry was held at the Corn Exchange, Chelmsford, recently before Mr. W. A. Ducat (Local Government Board Inspector), into the application by the Chelmsford Town Council for permission to borrow 16,000*l.* for purposes of water supply, including the construction of a new reservoir with a capacity of 670,000 gallons, at Long Stomps. The 16,000*l.* included 9,400*l.* for permanent plant at the new bore well in the Mildmay-yard, and 6,600*l.* for the proposed additional reservoir. Mr. P. Griffiths said he was called in to advise the Council in November, 1901. A fourteen days' test had been made at the new boring. From the result of that test, and from other data, he felt satisfied that 10,000 gallons an hour could be obtained from this boring. The supply to part of the town, in fact, had been maintained during the interval of eighteen months from this boring.

RESERVOIR, LLANELLY.—Mr. W. Wilkins, J.P., Chairman of the Llanelly Borough Council, recently opened the new reservoir which the Council have constructed in the upper part of the Lliedi Valley. The new reservoir has a capacity of about 200 million gallons, and it practically doubles the storage at the disposal of the Council. Mr. Barnes (London) and Mr. George Watkeys, Borough Surveyor, were the joint engineers in the undertaking, the contractor being Mr. L. P. Nott.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Mr. Arthur T. Bolton, architect, has removed from No. 2, The Sanctuary, Westminster, to Victoria Mansions, 28, Victoria-street, Westminster, S.W.

IMPROVEMENT IN GERMAN BUILDING TRADE.—In a report on the trade and commerce of the consular district of Frankfort-on-Main, Mr. Consul-General Oppenheim mentions that the prospects of business in Germany certainly improved during the year 1902: "Markets have stiffened and business is characterised by a relatively lively export trade and by an increase of the goods traffic on railways." He adds that the building trade also revived, as the increased demand for dwellings for the growing population had to be satisfied, and this brought employment to a number of allied trades.

MANCHESTER SHIP CANAL.—The half-yearly Report of the Chief Engineer, Mr. H. Hunter, states that the depth of water in the ship canal and docks has been fully maintained by means of the dredging plant throughout the entire length of the waterway. The quantities of silt and sludge deposited in the upper reaches of the canal and docks have increased rather than diminished during the half-year. The deepening of the approach channel below the locks at Eastham has been practically completed. The timber work required for the formation of a leading jetty at the inner or southerly end of Eastham Locks has been commenced. Spare steel gates for the upper end of the 80-ft. lock have been ordered and are in course of construction. The coaling basin at Partington has been lengthened at both ends on the northerly side, and additional dolphins have been constructed for the better accommodation of steamers at the tips. The lengthening on the southerly side is in progress. A considerable addition to the railways and sidings in connexion with the coaling basin is being effected. Temporary steel gates have been constructed and erected at the upper end of the 65-ft. lock at Barton, in order to replace those damaged by the s.s. "Winkfield," and temporary steel gates to replace the lower gates are in course of construction. The timber work required for the formation of a leading jetty at the upper end and on the northerly side of the large lock at Barton is in progress. The open space in the timber work in the centre of Trafford Wharf has been filled up so that the wharf is now continuous from one end to the other. The lines of railway on the westerly side of Trafford Wharf-road are being extended to the northward. A number of additional railway sidings, service roads, timber storage ground, and a new cart road are in course of construction at Weaste on the land acquired there. The embankments and slopes of the canal generally are in good condition, and the works throughout have been efficiently maintained. The construction of the new dock under Mr. Henry Lovatt's contract with the Manchester Dock & Warehouse Extension Company is proceeding. More than one-half of the excavation has been removed and the concrete work in the foundations of the transit sheds and in the southerly wall of the dock is in hand. The contract for the ferro-concrete work for the new transit sheds on the southerly side of the dock has also been let to Mr. Lovatt, and the work is proceeding. Several other contracts in connexion with these sheds have been let by the Manchester Dock & Warehouse Extension Company.

A NEW RAILWAY LEVEL.—In the new level recently introduced by Messrs. Stanley & Co, a new system of manufacture is adopted giving greater strength and rigidity than heretofore, and at the same time reducing weight and the number of separate parts. The centre is cast in one piece, with, and directly upon, the telescope and object end, and the cast telescope body is cored out to a suitable thickness, thus avoiding the necessity for several separate soldered and screwed pieces. The rack is fixed under the draw tube, and the pinion is fitted from side to side of the outer body, being spindled at each end so that the pinion has a double bearing. The level has clamp and tangent adjustment, tribrach levelling, and locking-plate, making the instrument available for use upon a wall or masonary, as well as upon a tripod. Either webs, platinum-iridium points, or glass stadia diaphragm may be fitted at the option of the user. The two latter are set for 1 : 100 stadia reading, in order that the distance of the staff may be read in the telescope without other measurement. Although specially designed for railway work, this new level is well adapted for any hard wear and should be found serviceable in building operations. It is claimed by the makers that with ordinary care the instrument will keep in perfect adjustment for a lifetime.

LIVERPOOL WATER SUPPLY.—The annual report of the Liverpool water engineer, Mr. J. Parry, upon the Corporation Waterworks has just been issued to the members of the City Council. The total volume of water delivered from the works during the year, including compensation waters to rivers in Lancashire and Montgomeryshire, was:—In gallons, 17,572,202,000; in cubic feet, 2,810,058,000; and in tons, 78,447,000; and the increases over the previous year are shown by the following figures:—Increase of population in and around Liverpool, 0,233; increase in total quantity of water distributed in same area, 279,147,000 gallons; increase in quantity sold by meter for trade purposes in same area, 137,766,000 gallons; and increase in quantity sold by meter outside of compulsory area, 18,473,000 gallons. The average consumption per day was 20,002,000 gallons, and the demand has fluctuated from 18,650,000 to 34,188,000 gallons per day. Water was used from the street hydrants for the extinction of 101 fires in 1902. The total number of tenants on the rent roll of the water account at the close of the year was 184,467. Mr. Parry also gives a short history of the salt water supply in view of the fact that the time is approaching when a new scheme will have to be submitted for dealing with the matter. He adds, "Whenever a deficiency of water has been experienced and the question of an increased supply for the town has been under consideration, proposals have been made to supply salt water from the river for purposes not requiring fresh water, but the cost of any scheme involving the duplication of mains throughout the district has always been found to be altogether out of proportion to the relief that could be afforded or the benefits that would be derived." The total length of salt water mains already laid is 4 miles 120 yards. During the year, additional distributing and fire mains were laid to the length of 11 miles 012 yards. The number of new fire hydrants fixed was forty-eight, and of hydrants substituted for fire-plugs, 210, making the total number of hydrants fixed during the year, 204.

GOTHENBURG WOOD MARKET.—In a Consular Report just received at the Foreign Office from Mr. Duff, the British representative at Gothenburg, it is stated that the anticipations of an improvement in the timber trade in 1902 seem to have been fulfilled, and that there is reason to believe that the result of the year's transactions was, on the whole, fairly satisfactory to buyers as well as sellers. Fortunately, stocks at the beginning of the year were of moderate size at those centres of consumption which give tone to the market at large, and the exports during January to March having been comparatively limited, it soon became clear that a change for the better had taken place, and that prices, which in

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many places were unwarrantably low, might well be advanced. The quotations which had already been somewhat raised, and, in consequence of an expected late opening of the shipping season, appeared to warrant a further rise, gave impulse to increased activity and desire to resume buying. Negotiations consequently became very brisk, and enabled Swedish settlers during the four months, May to August, to dispose of the major portions of their stocks, not only for delivery during the summer, but also for autumn shipment. The consequence of this activity was large shipments during August and September. This produced a reaction, which, without occasioning a decline of prices, gave warning of the necessity of exercising caution —a state of affairs which continued up to the close of the year.

DEMOLITION OF PROPERTY IN WESTMINSTER.—In the House of Commons a few days ago Mr. Channing asked the hon. Member for West Derbyshire, as representing the First Commissioner of Works, whether he had considered the proposals of the Ecclesiastical Commissioners to demolish the old residential quarter immediately south of Westminster Abbey and Deanery Garden, with a view to selling the sites for important commercial buildings; and, whether, having regard to the undesirability and risk of erecting lofty buildings close to the Abbey, his Majesty's Government would make representations to the Ecclesiastical Commissioners or take other steps to prevent this proposal from being carried out.—Mr. V. Cavendish: This is a matter which does not come within the jurisdiction of the First Commissioner of Works. But he would strongly deprecate any building scheme which might impair the safety or amenity of the Abbey.—Mr. Channing: Has the Commissioner of Works no power over the height of works adjacent to such a building as Westminster Abbey?—Mr. V. Cavendish: I am afraid we have no such power.

CAPITAL AND LABOUR.

THE JOINERS' STRIKE AT SUNDERLAND.—There seems every probability of a lock-out occurring in connexion with the operative joiners employed in the northern counties, this serious situation being, of course, largely attributable to the present Sunderland joiners' strike. The notices, which state that the lock-out will take effect on August 29 next, will be issued by Mr. W. H. Hope, of Sunderland, the Secretary of the Northern Counties' Federation of Building Trade Employers. If the dispute is not settled by a lock-out, the Federation will then call upon the Yorkshire, Lancashire, and the Cheshire Federations, which combine to form the northern centre of the building trade employers, and with whose approval the present steps are being taken.—*Newcastle Chronicle.*

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

7,785 of 1902.—A. CUNNINGHAM: *Windows.*

In windows, the hingeing or moving of the upper sash frame by pivots working in vertical and horizontal slots in a bracket screwed to the fixed frame of window.

15,008 of 1902.—D. T. BOSTEL, F. J. BOSTEL, and E. BOSTEL: *Fire Grates or Fire Places.*

A fire-place or fire-grate having a back which is adapted to lean forwardly or rearwardly, or to be vertical at will.

15,237 of 1902.—A. MAUCHAIN: *Desks.*

An adjustable desk characterised by two metallic side standards connected with each other by means of wooden pieces, combined with a frame for supporting the table of the desk, said frame being pivoted on the side standards and being adapted to be set at different inclines by means of two racks with laterally projecting teeth, provided one at each side of the frame, and of a horizontally moving locking bar, said bar being arranged in such a manner that when the same is turned parts of the extremities of the bar are simultaneously introduced between two teeth of each rack so as to reach beyond the teeth on both sides.

21,106 of 1902.—C. HASS: *Construction of Nail, Spike, or Other Driven Holdfast.*

A nail, spike, or other driven holdfast constructed with the point portion tapering and of smaller diameter throughout the length than the body of the nail, and grooving a portion of the nail down to the base of the point so as to form a series of straight cutting edges surrounding the base of such point that on the nail being driven into the wood the cutting edges will cut their way through the wood and the grooves compress the fibre of the wood between the cuts and whereby the splitting of the wood is prevented.

23,163 of 1902.—H. T. FENLON: *Hot Water or Steam Heater or Radiator for Buildings and the Like.*

The construction of heater consisting of the combination of a series of radiator tubes joined together, a circulating boiler connected to said radiator tubes, a source of heat affixed near thereto, a filling cup at the upper part, a steam valve in said filling cup, draw off and air taps.

25,490A of 1902.—H. R. ANTCLIFF: *Locks.*

Providing locks with an all through solid-walled tubular passage or key-hole, and with engagement key ways cut in the back plate of the lock communicating with said tubular passage or key-hole, and also with the mechanism of the lock.

4,651 of 1903.—R. A. SKELTON and E. J. RILEY: *Billiard, Dining, and Like Tables.*

A device, of which several are used for each table, by which the top of a table can be raised, consisting of two metal plates shaped to slide one upon the other, one of the said plates being fixed to the rail of the table, and having grooves and a recess formed in it for a freely sliding pin or bolt in the other plate, which is attached to the table top, and is preferable provided with means by which the top of the table can be adjusted to correct level

7,476 of 1903.—W. HEATLEY; *Metal Lifts for Sashes and the Like.*

The manufacture and use of lifts formed from metal by stamping or otherwise, for the inner faces of window sash stiles and vertical bars.

10,513 of 1903.—T. POTTERTON: *Kitchen Ranges and Boilers therefor.*

In a kitchen range flues arranged and controlled in such a manner, as to divert the passage of flames and products of combustion either to the top of the oven and the outer side or to the inner side and bottom of the oven independently or conjointly.

11,142 of 1903.—S. D. LEWIS and H. M. FESSENDEN: *Combined Ventilator and Weather-shield for Windows and the Like.*

A combined ventilator and weather-shield, comprising, in combination, a plurality of angularly adjustable dependent shield sections, means for supporting the device in a window, and means for angularly adjusting the shield-sections.

11,512 of 1903.—V. DEMERBE: *Tramways or Trackways for Common Roads.*

The invertion consists in the employment of concrete tracks, with metal for the running or wearing surface of the trackway, and in the mode of laying the same to ensure solidity and security. In carrying out this invention the metal bar, girder, or sleeper, having a trough-section with downwardly-splayed sides, is employed, and this sleeper is placed in an inverted position on a concrete foundation and is packed internally with concrete, thus producing a slight concrete track of suitable depth and width, with an outer shield of metal, which forms the wearing surface.

11,919 of 1903.—G. R. HILL: *Hinges.*

A hinge comprising a leaf adapted to be secured to the door frame, a second leaf hinged to the first leaf, stems rigidly projecting from the second leaf, and adapted to loosely operate between the opposite faces of the door, the plate secured to the face of the door, and means for adjustably coupling said plate to the hinge.

11,929 of 1903.—A. G. ROODHUIJZEN: *Apparatus for the Automatic Opening and Closing of Doors in Lifts and the like.*

An apparatus for automatically opening and closing doors in lifts and the like, comprising a groove in the form of a screw-thread running down the door shaft forming the axis of rotation of the door, which groove from one end of the shaft up to the middle turns through 90 deg., and from there up to th other end turns in a reverse direction througe 90 deg., and in which groove, when the catc passes a door opening, a rod fixed on the catch engages, so that by the movement of the catch in either direction the door is opened and again closed.

12,517 of 1903.—C. B. S. MOLLER: *Locks or Fastenings for Doors.*

A lock having a lockable bolt or latch, the tumbler of which serves both for locking said bolt and for moving it into the lock-case, by means of the door handle, the said tumbler being pivotted in the lock-case with its free end adapted to slide on an inclined surface on the bolt, so that when the tumbler is moved, it moves the bolt so as to allow of opening the door.

12,566 of 1903.—F. E. R. OKRASSA: *Hand Saws*

In a hand saw having a handle bar and arms thereon, the arrangement of the headed hollow shanks engaging loops on the free ends of the arms, and the blade holders adjustable lengthwise in the said shanks and engaging the ends of the saw blade.

12,748 of 1903.—G. T. MCCAW and H. R. VAUGHAN: *Fastening or Securing Ridge Tiles in Position on Roofs.*

Fastening a ridge tile immovably in place by means of a roll, strip, or bead, or its equivalent, secured to the ridge piece or other suitable part of the roof, said roll strip, or bead, or equivalent fitting in the tile and holding it in place.

12,846 of 1903.—H. BIRKBECK (New York Lock Co.): *Attachment for Door Knobs*

A knob adapted to receive a spindle, a locking plate adapted to engage said spindle, and plate-shifting means capable of a sliding and of an independent rotary motion.

15,768 of 1902.—SUTCLIFFE, SPEARMAN & CO., LTD., and E. R. SUTCLIFFE: *Process for Making Artificial Stone, Bricks, Paving Flags and the Like.*

A process of manufacturing artificial stone goods, having a calcareous cement as a binding medium, which consists in thoroughly grinding the raw materials adding thereto a proportion of cement in the form of a slurry previously prepared with hot water at or near the boiling point, and in the presence of heat, mixing of the materials until the cement is fully incorporated therewith, moulding the mixture to the required shapes in a press, which removes the excess of moisture out of the material, and finally treating the moulded pieces with heat and steam in a closed hardening chamber.

16,100 of 1902.—K. HEINRICH and T. HAARDT: *Fireproof Material.*

A solid fireproof material resembling stone, the said material consisting of a mixture in suitable proportions of asbestos, blast furnace passed from a Cowper's hot blast stove, Portland cement and water, the whole being incorporated so as to form a more or less consistent pulp, which can be moulded into any desired shape and afterwards dried.

17,476 of 1902.—R. W. B. CREEKE: *Apparatus used in the Mixing of Concrete.*

In apparatus used in the mixing of concrete, the use of a hinged shoot whose position is determined by the mixing drum.

28,668 of 1902.—C. E. PRICE: *Joints for Rods for Cleansing Drains, Running Cables through Pipes, and the Like.*

A joint-fitting for rods that has a centrepiece which when turned will lock or unlock the joint, according to the direction in which it is turned, the screw entering the centre piece, having a square or other shaped head or projection, with or without a cut out.

3,175 of 1902.—H. AIKEN: *Roof Structures.*

A roof structure having a series of trusses parallel with each other, and alternate roof surfaces at different levels extending between the trusses and affording intermediate space for admission of light.

5,369 of 1903.—A. A. RAYMOND and W. L. ROSS: *Piles or Foundation Elements and the Method of Constructing the Same.*

A shell for piles comprising a plurality of shell sections, the said shell sections being adapted for interlocking engagement when longitudinally distributed, in combination with a conveying tube in mechanical engagement with the innermost section whereby soil beneath said shell sections may be removed to effect longitudinal distribution of said shell sections in the earth.

6,158 of 1903.—C. H. STEPHENSON: *Garbage Receptacles.*

A garbage receptacle having a hinged primary cover formed with a garbage receiving mouth, a secondary cover hinged to the primary cover and adapted to cover said mouth, and operating member supported by the primary cover and movable independently thereof, and connexions between said member and the secondary cover, whereby a movement of the operating member is caused to raise the secondary cover.

7,976 of 1903.—F. R. A. SUNDELL: *Methods of Covering Walls or Ceilings and Compositions therefor.*

A method of covering walls, characterised thereby that the mass which is to form the surface layer (the surface mass) of the covering is in a wet condition placed on a suitable movable support, for instance, a glass plate, that the surface mass is thereupon caused to assume a firmer e.g. (jelly or dough like) consistency, and that when the support has thereafter been placed near the inner wall, which is to be covered, in such a manner that a space between the wall and the surface mass is left, a mass (binding mass) is poured into this space, which mass, when setting binds the surface mass to the wall, whereupon, when the binding mass is set, the support (glass plate) is removed.

12,264 of 1903.—F. BLIVET: *Sound-proof Floorings.*

A sound-proof or hollow flooring having its interior divided into distinct spaces by mats or sheets.

12,701 of 1903.—W. N. WIGHT: *Floorings and Other Concrete Structures.*

In a flooring, the combination of supporting beams and a concrete structure moulded in place between said beams comprising upper and lower plates of concrete spaced apart from each other at their intermediate portions and united at their ends, said lower plate being provided with wire netting embodied in the plate and extending continuously therein and increasing its tensile strength, said netting being embodied in and over and between a number of said beams.

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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12,899 of 1903.—A. GASPANY: *Moulding Machine for Artificial Stones.*

A machine for simultaneously moulding a large number of artificial stones, in which the mould, formed of two sides and a number of sliding division plates, is open at both ends, and the tracks which bridge over the mould and serve for moving the filling box are removably arranged so that, after the stones have been duly formed, the tracks can be swung sideways or downwards in order to release the bottom of the mould for the purpose of effecting the simultaneous removal of the moulded material, the tracks being so arranged that the filling-box, which is moved over the mouth, is held suspended above the same at such a height that the mould is over-filled to an extent necessary to facilitate the compression of the material.

MEETINGS.

TUESDAY, AUGUST 11.

Institute of Builders.—Council meeting, 4 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

July 23.—By WALTON & LEE (at Dartmouth).

Stoke Fleming, Devon.—Woodbury Farm, 155 a. 0 r. 4 p., f. £4,000
Freehold house and 0 a. 0 r. 34 p., y.r. 11*l.* 225
Enclosures of land, 54 a. 2 r. 35 p., f. 750
Pugford and Hillfield farms, 208 a. 1 r. 25 p., f. 4,510
Hillfield Cottage and 5 a. 1 r. 19 p., f., y.r. 30*l.* 700

July 24.—By COBBS (at Sittingbourne).

Lower Halstow, Kent.—A freehold cottage and 2 a. 3 r. 26 p. 600
Ash Wood Field, 3 a. 3 r. 20 p., f. 250
Newington, Kent.—Snakesbury hop-garden, 4 a. 0 r. 10 p., f. 400
Freehold hop-land, 2 a. 3 r. 19 p. 290
Two freehold cottages and 5 a. 1 r. 7 p. 770
Road Garden Orchard, 1 a. 3 r. 35 p., f. 410

By BRUTON, KNOWLES, & Co. (at Stroud).

Miserden, Glos.—The Camp Farm, 208 a. 3 r. 29 p., f. 2,100

July 25.—By COBBS (at Canterbury).

Ash, Kent.—King's Head or Richborough Farm, 118 a. 3 r. 27 p., f. 2,200
Sturry, Kent.—Georgie's Enclosure, 3 a. 1 r. 27 p., f. 200
Small Gains and Broad Oak Meadow, 6 a. 2 r. 6 p., f. 195
Freehold Woodland, 28 a. 2 r. 18 p. 350
Sturry, Kent.—Freehold Rectorial Tithe Rent-Charges of 68*l.* 6,600

By PETLEY'S (at Canterbury).

Sturry, Kent.—Little Walnut Tree Farm, 40 a. 0 r. 1 p., f. 1,000
Bridge, Kent.—Freehold house and shop, q.r. 40*l.* 600

July 27.—WATERER & SONS.

Staines, Middlesex.—The Knowle Green Brewery, with 94 tied houses, f. (including goodwill) .. 200,000

By GOODMAN & CROWTHER.

City of London.—65, Aldersgate-st., s., area 1,785 ft., f., y.r. 560*l.* 7,500

By WM. HOUGHTON.

Leyton.—11, 13, 15, 19, and 21, Amberley-rd., f., e.r. 130*l.* 1,300
14 to 22 (even), Amberley-rd., f., e.r. 130*l.* 1,290
112, 114, and 116, Grove Green-rd., f., e.r. 80*l.* 145. 795
Walthamstow.—58, 60, and 62, Queen's-rd., f., w.r. 70*l.* 4s. 930
Stroud Green.—48, Victoria-rd., u.t. 70 yrs., g.r. 6*l.* 10s., y.r. 44*l.* 445

By JENKINS & SONS.

Deptford.—1, Charles-st. (shop, also stabling), f., y.r. 32*l.* 320

By NORRIS, SON, & HADLEY.

Holloway.—George's-rd., f.g.r. 18*l.*, reversion in 19 yrs. 450
Clapham.—28, Little Manor-st., f., y.r. 120*l.* 1,575

By A. SAVILL & SONS.

Rochford, Essex.—Main-rd., enclosure of building land, 23 a. 1 r. 29 p., f. 1,100
Enclosure of building land, 0 a. 3 r. 26 p., f. 175
Eastwood, Essex.—Cherry Orchard Farm, 44 a. 3 r. 12 p., f. 1,850
Little Wakering, Essex.—Cottage and market garden, 2 a. 2 r. 12 p., f. 380
Ashingdon, Essex.—Part of Beckney Wood, 22 a. 0 r. 4 p., f. 350
Rawreth, Essex.—Beeches Common, pasture land, 19 a. 1 r. 8 p., f. 260
Canvey Island, Essex.—Round House Farm, 51 a. 0 r. 13 p., f. 270

By C. SPARROW & SON.

Oakleigh Park.—Drumna House and 1¼ a., f., p. 2,500

By A. H. TURNER & Co.

Woking, Surrey.—Mount Hermon, Northaw Lodge and ¾ a., f., p. 2,375

By NORMAN & SON (at Stratford).

Leytonstone.—Barclay-rd., Homelea, f., y.r. 30*l.* 425
Leyton.—Grosvenor-rd., four plots of land, f. 240

July 28.—By ARTHUR BARTON.

Lea.—Burnt Ash Hill, Lynton and ¾ a., u.t. 77 yrs., g.r. 10*l.*, p. 1,200

By L. CAVEY & Co.

Forest Hill.—35 and 37, Dalmain-rd., u.t. 76½ yrs., g.r. 9*l.*, w.r. 72*l.* 16s. 400

By CHAMBERS, GIBT, & FORD.

Clapton.—157, Glynn-rd., u.t. 72 yrs., g.r. 4*l.* 7s. 6d., y.r. 36*l.* 8s. 260

By GRAVES & SON.

Streatham.—80 to 86 (even), Eardley-rd., s., f., y.r. 155*l.* 2,500

By H. S. HAWLEY & Co.

High Holborn.—No. 159, s., beneficial lease for 13¾ yrs., y.r. 7*l.* 410
Strand.—11, Houghton-st., s., f., y.r. 50*l.* 1,500

By HUMBERT & FLINT.

Soho.—25A, Lisle-st. (White Bear-yard—stabling), u.t. 76½ yrs., g.r. 135*l.* 4s., e.r. 700*l.* 6,300

Hammersmith.—3, 4, 5, 6, and 7, Hughenden-rd., u.t. 83¾ yrs., g.r. 21*l.* 5s., w.r. 208*l.* £1,500
15, Berestede-rd., u.t. 83¾ yrs., g.r. 4*l.* 5s., w.r. 41*l.* 12s. 340
Lewisham.—33, Gilmore-rd., u.t. 54½ yrs., g.r. 6*l.*, e.r. 40*l.* 310

By NICHOLAS, DENYER, & Co.

Battersea.—46 to 64 (even), Wilson-st., u.t. 49½ yrs., g.r. 39*l.* 10s., w.r. 218*l.* 8s. 1,300
8 to 20 (even), Hope-st., u.t. 55 yrs., g.r. 12*l.*, w.r. 109*l.* 4s. 735

By RUTLEY, SON, & VINE.

Euston-road.—No. 177, f., y.r. 122*l.* 1,390
290, Stanhope-st., u.t. 18 yrs., g.r. 8*l.*, w.r. 87*l.* 2s. 290
St. Pancras.—40, Chalton-st., s., u.t. 34 yrs., g.r. 8*l.*, y.r. 55*l.* 10s. 460
Tottenham.—6, Station-rd., f., w.r. 29*l.* 18s. 235
Wood Green.—1 to 5, Lordship-cottages, u.t. 60 yrs., g.r. 12*l.* 10s., w.r. 97*l.* 10s. 530
Peckham.—43, Blenheim-gr., f., y.r. 28*l.* 440
Chadwick-rd., f.g.r. 9*l.*, reversion in 66 yrs..... 215

By WESTON & SONS.

Brixton.—Carlton-gr., the Brixton Club and the Carlton Hall adjoining, f., p. 2,800
Tunstall-rd., f.g.r. 55*l.*, reversion in 87 yrs. 1,375

By BOYTON, SONS, & Co. (at Fulham).

Fulham.—204, 206, 208, and 208A, New King's-rd., s., u.t. 93 yrs., g.r. 35*l.* 10s., y.r. 185*l.* .. 1,730

By W. & B. HOBBS (at Ashford).

Kennardington, &c., Kent.—Kennardington-pl. or Cross Farm, 129 a. 1 r. 30 p., f., y.r. 130*l.*. 1,700

July 29.—By ARBER, RUTTER, WAGHORN, & BROWN.

New Bond-street.—No. 47; also 60, Maddox-st., s., area 1,300 ft., Corporation lease, g.r. 6*l.* 15s., fine 47*l.* 5s., y.r. 245*l.* 20,200

By BLAKE & DANNATT.

Peckham.—16 and 18, Wellington-rd., u.t. 65 yrs., g.r. 12*l.*, y.r. 68*l.* 750
Dulwich.—2 and 4, Dunstan's-rd., s., with stabling, &c., u.t. 62 and 66 yrs., g.r. 6*l.*, y.r 65*l.* 8s. 445

By HIND & SONS.

St. George's East.—22, Cannon-st.-rd., u.t. 99 yrs., g.r. 7*l.* 7s., w.r. 36*l.* 8s. 350

By R. TIDEY & SON.

Shoreditch.—24 and 26, Brunswick-st., f., y.r. 44*l.* 32, Dunloe-st., f., y.r. 35*l.* 725
Preston-on-Wye, &c., Hereford.—The Lower House Estate, 200 a. 1 r. 11 p., f., y.r. 275*l.*.. 570
Bishop's Froome, Hereford.—Swill Villa and 9 a. 1 r. 39 p., f., y.r. 35*l.* 5,000

PERKINS & SONS (at Southampton).

Braishfield, Hants.—Taunton Vale Farm, 64½ a., f. 825

F. WINTERTON (at Harringay).

Harringay.—104, Rutland-gdns., u.t. 87 yrs., g.r. 6*l.* 6s., e.r. 34*l.* 2,000
Hornsey.—88, Raleigh-rd., u.t. 79 yrs., g.r. 6*l.* 6s., e.r. 34*l.* 325
King's Cross.—22, Canal-ter., u.t. 39¾ yrs., g.r. 4*l.*, w.r. 36*l.* 8s. 335

THORNBORROW & Co. (at Shap).

Bampton, &c., Cumberland.—Toathmain and Rawhead farms, 53 a. 2 r. 21 p., f. 220

July 30.—BISLEY & SONS.

Bermondsey.—18, Southwark-pk.-rd., u.t. 16 yrs., g.r. 4*l.*, e.r. 36*l.* 2,000
Clacton-on-Sea, Essex.—Ellis-rd., a freehold building plot 190
Frinton-on-Sea, Essex.—Station-rd., two freehold shop plots 150

By CHANCELLOR & SONS.

Richmond Hill.—15, Cardigan-rd., u.t. 73 yrs., g.r. 12*l.* 10s., y.r. 90*l.* 140
Staines, Middx.—Gresham-rd., Winkfield, f., y.r. 40*l.* 995
52 and 54, Richmond-rd., f., y.r. 36*l.* 650
44 to 50 (even), Richmond-rd., with plot of land, f., y.r. 81*l.* 500

By J. G. DEAN & Co.

Balham.—Ouseley-rd., f.g.r.'s 15*l.*, reversion in 12 yrs. 1,210

By FISHER, STANHOPE, & DRAKE.

Stoke Newington.—243, Amhurst-rd., u.t. 60¾ yrs., g.r. 7*l.* 7s., y.r. 65*l.* 338

By G. HEAD & Co.

Camden Town.—Moiety of interest in 19, 21, 22, 24 to 28, 43 to 51 (odd), Bayham-pl.: 4, 5, 6, 7, and 12, King's-yard, and 9, Camden-st. (houses, cottages, stabling, and factory), u.t. 27 and 49 yrs. g.r. 224*l.*, y.r. 849*l.* 6s. (in one lot) 550

By HEDGER & MIXER.

Edgware, Middlesex.—Edgware-rd., St. Albans Lodge and 2¼ a., f., p. 1,400

By HOLCOMBE, BETTS & WEST.

Harringay.—116, Fairfax-road, u.t. 85 yrs., g.r. 5*l.*, w.r. 33*l.* 16s. 2,500

By LINNETT & LANE.

Willesden.—Barry-rd., Gordon House, f., e.r. 36*l.* 8s. 200
Harlesden.—21, Nicoll-rd., u.t. 69 yrs., g.r. 8*l.*, e.r. 60*l.* 460

By C. C. & T. MOORE.

Bow.—1 and 3, British-st., f., y.r. 60*l.* 570
Forest Gate.—49, Latimer-rd., f., e.r. 30*l.* 1,100
Mile End.—229, Burdett-rd., u.t. 70 yrs., g.r. 7*l.*, y.r. 45*l.* 420
Clapton.—82 and 84, Overbury-st., f., w.r. 59*l.* 16s. 500
92 and 94, Overbury-st., f., w.r. 59*l.* 16s. 550
Islington.—16 and 18, Arlington-st., u.t. 24 yrs., g.r. 8*l.* 8s., y.r. 70*l.* 550

By STIMSON & SONS.

Camberwell.—102, Boyson-rd., u.t. 48 yrs., g.r. 5*l.* 5s., y.r. 38*l.* 505
Balham.—21 to 31 (odd), Temperley-rd., u.t. 75 yrs., g.r. 33*l.*, y.r. 176*l.* 390
Wandsworth-rd.—42, New-rd., s., u.t. 58 yrs., g.r. 5*l.*, w.r. 41*l.* 12s. 1,700
Walworth.—27 and 28, Sutherland-sq., u.t. 39 yrs., g.r. 8*l.*, y.r. 66*l.* 275
New Kent-rd.—46A, Adam-st. (steam joinery works), u.t. 68 yrs., g.r. 30*l.*, e.r. 150*l.* (including machinery and plant) 530

Forest Gate.—Reginald-rd., f.g.r. 12*l.* 12s., reversion in 75 yrs. £290
Bexley Heath, Kent.—1, 2, and 3, Shirley-cottages; also Union Cottage, f., w.r. 106*l.* 12s. 940
Fulham.—1A, Strode-rd., u.t. 76 yrs., g.r. 8*l.* 10s., y.r. 3*l.* 200

By WILLOUGHBY, SON, & Co.

Norwood.—27, Chestnut-rd., u.t. 88½ yrs., g.r. 10*l.*, y.r. 48*l.* 600

By WILTSHIRE & THURGOOD.

Lee.—2, Dorville-rd., u.t. 60 yrs., g.r. 7*l.*, e.r. 38*l.* 300
263, High-rd., u.t. 54 yrs., g.r. 14*l.* 16s., e.r. 80*l.* 540

By BATCHELAR & SON (at Croydon).

Warlingham, Surrey.—Stafford-rd., 80 plots of building land, f. 1,775

READ, STANFORD, & GAYFORD (at Beccles).

Brampton, Suffolk.—Brampton Old Hall Farm, 167 a. 1 r. 31 p., f., y.r. 61*l.* 13s. 9d. 1,900
Shaddingfield, Suffolk.—Shadingfield Church Farm, 131 a. 3 r. 6 p., f. 1,450
The Valley Farm, 80 a. 2 r. 26 p., f. 875

BOULTON & COOPER (at York).

Kirby Grindalythe, &c., Yorks.—The Duggleby and High Mowthorpe Estate, 2,805 a. 3 r. 24 p., f. 41,600

ERNEST OWERS (at Hampstead).

Hampstead.—49, 50, and 55, Achilles-rd., u.t. 81½ yrs., g.r. 17*l.* 3s., y.r. 116*l.* 1,230
25 and 30, Ulysses-rd., u.t. 81½ yrs., g.r. 11*l.* 18s., y.r. 76*l.* 8 5
11, 17, and 19, Agamemnon-rd., u.t. 81½ yrs., g.r. 18*l.* 15s., y.r. 115*l.* 1,260
32, Agamemnon-rd., u.t. 81½ yrs., g.r. 5*l.* 19s., y.r. 38*l.* 475

July 31.—F. DOD & Co.

Leytonstone.—Granleigh-rd., Park House, area 5,657 ft., f., p. 900
80 to 86 (even), 86A, 88, 88A, 90A, and 92, Lansdowne-rd., f., w.r. 211*l.* 18s. 1,170

By DOWNES & Co.

Cricklewood.—16 and 18, Howard-rd., u.t. 87 yrs., g.r. 13*l.*, y.r. 74*l.* 760

By HAMPTON & SONS.

Highclere, Hants.—Ivy House and 103 a. 1 r. 11 p., f. 7,000
East Molesey, Surrey.—Palace-rd., Greenway and half an acre, f. p. 2,200

By MARTEN & CARNABY.

Norwood.—34, Thurlestone-rd., f., e.r. 40*l.* 550
Dulwich.—10 to 24 (even), Thurlow Hill, f., e.r. 325*l.* 4,300

By JOSEPH STOWER.

Whitechapel.—Chicksand-st., &c., f.g.r. 75*l.*, reversion in 65 yrs. 1,720
Bayswater.—Chepstow Villas, f.g.r. 20*l.*, reversion in 41½ yrs. 710

By VARLEY & LOCKING.

Stamford Hill.—1, St. Andrew's-rd., u.t. 76 yrs., g.r. 6*l.* 10s., e.r. 50*l.* 510
Islington.—319, Essex-rd., u.t. 31 yrs., g.r. 5*l.*, e.r. 48*l.* 375

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.			
Hard Stocks	1 15 6	per 1,000 alongside, in river.		
Rough Stocks and Grizzles.....	1 12 6	,,	,,	,,
Facing Stocks....	2 12 0	,,	,,	,,
Shippers	2 5 0	,,	,,	,,
Flettons	1 8 6	,,	at railway depôt	
Red Wire Cuts ..	1 12 6	,,	,,	,,
Best Fareham Red	3 12 0	,,	,,	,,
Best Red Pressed Ruabon Facing	5 0 0	,,	,,	,,
Best Blue Pressed Staffordshire ..	4 5 0	,,	,,	,,
Do. Bullnose	4 11 0	,,	,,	,,
Best Stourbridge Fire Bricks	4 8 0	,,	,,	,,
GLAZED BRICKS.				
Best White and Ivory Glazed Stretchers.....	13 0 0	,,	,,	,,
Headers	12 0 0	,,	,,	,,
Quoins, Bullnose, and Flats.....	17 0 0	,,	,,	,,
Double Stretchers	19 0 0	,,	,,	,,
Double Headers..	16 0 0	,,	,,	,,
One Side and two Ends.....	19 0 0	,,	,,	,,
Two Sides and one End	20 0 0	,,	,,	,,
Splays, Chamfered, Squints.....	20 0 0	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,,	,,	,,
Quoins, Bullnose, and Flats.....	14 0 0	,,	,,	,,
Double Stretchers	15 0 0	,,	,,	,,
Double Headers..	14 0 0	,,	,,	,,
One Side and two Ends.....	15 0 0	,,	,,	,,

[See also page 170.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Library Building	Borough of Heywood	30*l.*, 20*l.*, and 10*l.*	Sep. 14
*Plans for a New School	Gillingham U.D.C. Education Com.	Not stated	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Bank Buildings, Exeter	Messrs. Prescott, Ltd.	E. H. Harbottle & Son, Architects, Exeter	Aug. 10
Road Works, Stanley-road	Bootle's (Lancs) Corporation	Borough Engineer, Town Hall, Bootle	Aug. 11
Additions to Station Buildings, Tenby	G. W. R. Company	G. K. Mills, Paddington Station, London, S.W.	do.
Church, &c., Newlyn Church	.....	H. White, Architect, Penzance	do.
Workshops, &c., Wall-street	Glasgow Corporation	Sinclair & Ballantyne, Architects, 95, Bath-street, Glasgow	do.
Tenements, St. Margaret's-place	do.	City Engineer, 64, Cochrane-street, Glasgow	Aug. 12
Bridge Works	Farnham R.D.C.	A. J. Stedman, Architect, Farnham	do.
Additions to Municipal Buildings	Aberdeen Town Council	J. Rust, City Architect, 224, Union-street, Aberdeen	do.
Sewerage Works, Morton Grange	Houghton-le-Spring R.D.C.	W. Morley, Surveyor, Houghton-le-Spring	do.
Brick Culvert, Cromwell-grove	Levenshulme U.D.C.	J. Jepson, Engineer, Tivlot Dale, Stockton	do.
Drainage Works, Deeping Fen, Spalding	The Trustees	A. Harrison, Little London, Spalding	do.
Paving Works	Romsey R.D.C.	J. Jewey, Surveyor, Romsey	do.
Farm Buildings, Longrigg Green, Eskdale	.....	J. H. Rea, Gatehouse, Eskdale	Aug. 13
Schools	Cummertrees School Board	A. S. Nichol, Annan (N.B.)	do.
Schools, Pill-street, Cogan	Penarth (U.D.) School Board	G. A. Birkenhead, Architect, Cardiff	do.
Stabling at the George Inn, Rastrick	Messrs. Ainley & Sons, Ltd.	J. Berry, Architect, 3, Market-place, Huddersfield	do.
Sewerage Works	Castletown (Ireland) R.D.C.	R. Evans, Civil Engineer, 53, South Mall, Cork	do.
Two Houses, Heaton (Yorks)	.....	J. Ledingham, Architect, Bradford	Aug. 14
Nine Houses, Ala-road, Pwllheli, Wales	.....	H. Thomas, Architect, 7, Castlefitch, Carnarvon	do.
Schools, Rathmullan (Ireland)	Miss Gallagher	J. P. M'Grath, Architect, Londonderry	do.
Vestry, Pontlottyn, Wales	.....	Fisher & Sons, Architects, Pontypool	Aug. 15
Sewers, &c.	Tadcaster R.D.C.	F. Massle, Civil Engineer, Tetley House, Wakefield	do.
Car Depot, Hook-road	Epsom U.D.C.	E. R. Capon, Surveyor, Council Offices, Bromley Hurst, Epsom	do.
Rebuilding Church, Newchurch, near Warrington	.....	Travers & Ramsden, Architects, 44, Church-street, Leigh	Aug. 17
Sewage Disposal Works, Pleasley Hill	Mansfield Town Council	R. F. Valance, Borough Engineer, Mansfield	do.
Free Library, Bagley-road	Stourbridge U.D.C.	F. Woodward, Architect, Town Hall, Stourbridge	do.
Sewerage Works	Longton (Staffs) Town Council	J. W. Wardle, Civil Engineer, Town Hall, Longton	do.
Sewers, &c.	Wilton (Wilts) R.D.C.	Lemon & Blizzard, Civil Engineers, 38, Silver-street, Salisbury	do.
*2½ miles Sewers, &c.	do.	do.	do.
*New Post Office at Ilford	H.M. Works	The Secretary, H.M. Office of Works, Storey's Gate, S.W.	Aug. 18
*Isolation Hospital Buildings	Acton District Council	Council's Surveyor, 242, High-street, Acton, W.	do.
Additions to Infirmary	.....	E. Seward, Architect, Cardiff	do.
Sewers, &c.	Leatherhead U.D.C.	T. Salkield, Engineer, Leatherhead	do.
Road Metal, &c.	Mountain Ash U.D.C.	J. Williams, Surveyor, Town Hall, Mountain Ash	do.
Schools, &c.	Hasland (Derby) School Board	Rollinson & Son, Architects, 13, Corporation-street, Derby	do.
*Draining, Levelling, and Tarpaving Playgrounds	Wimbledon Education Committee	Thomson & Pomery, Architects, Hill-road, Wimbledon	Aug. 19
Additions to Parish Church, Llandilofawr, Wales	.....	D. Jenkins, Architect, Llandilo	do.
Water Supply Works, Blaen-cwm-Clowyn, Cwmdu	Maestag (Wales) U.D.C.	J. Humpheys, Civil Engineer, Town Hall Chambers, Maestag	do
*New Isolation Hospital	Upton-on-Severn R.D.C.	Lewis Sheppard & Son, Architects, 51, Foregate-street, Worcester	Aug. 20
Six Houses, Hough-lane, Wombwell	Mrs. E. Bashforth	A. B. Linford, Architect, Wombwell	do.
*Foundations of 10th County Lunatic Asylum (Epsom)	L.C.C. Asylums Committee	Clerk to the Committee, 6, Waterloo-place, S.W.	do.
*Out Relief Stores at Tooley-street	St. Olave's Union	Newman & Newman, 31, Tooley-street, S.E.	Aug. 21
Hospital	Colwyn Bay U.D.C.	W. Jones, Civil Engineer, Council Offices, Colwyn Bay	Aug. 24
Road Works, Basils and Grove-roads	Stevenage U.D.C.	W. O. Times, Council Offices, Stevenage	do.
Boiler House at Workhouse, Selly Oak	King's Norton Guardians	C. Whitwell & Son, Architects, Birmingham	do.
*New Branch Post Office, Barry Dock	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	Aug. 25
*Enlargement Head Post Office, Birmingham	do.	do.	do.
Storm Water Drainage Works, Upper Higham	Strood (Kent) R.D.C.	W. Brooke, Civil Engineer, Strood, Rochester	Aug. 28
*Sinking and Steining a Well, &c.	Kempston U.D.C.	Beesley, Son, & Nichols, 11, Victoria-street, Westminster, S.W.	Aug. 29
Warehouses at Docks, Cumberland Basin	Bristol Corporation	W. W. Squire, Engineer, Cumberland Basin, Bristol	Aug. 31
*New Public Offices, Morgan-street, Pontypridd	U.D.C. of Pontypridd	Clerk to the Council, District Council Offices, Pontypridd	Sep. 24
*Making-up and Paving, &c. Roads	Borough of Paddington	Borough Surveyor, Town Hall, Paddington, W.	Sep. 21
*Two Blocks of Flats, Wimbledon	Soldiers & Sailors Families Assoc.	C. E. Lancaster Parkinson, Architect, 44, Bedford-row, W.C.	No date.
Houses, Thurles	.....	W. Maher, Main-street, Thurles	do.
House, Cockton Hill, Bishop Auckland	.....	T. E. Davidson, Arch., 32, Clayton-street West, Newcastle-on-Tyne	do.
House, Bramhope, near Leeds	.....	Child & Co., Architects, 149, Park-lane, Leeds	do.
Additions to Bagdale, Old Brewery, Whitby	.....	H. G. Walker, Architect, Skinner-street, Whitby	do.
Club Premises, Woodhouse	Liberal Association	Buttery & Birds, Architects, 1, Basinhall-square, Leeds	do.
Additions to Winfrith House, Winfrith, nr. Dorchester	Mr. E. Hughes	F. B. Bates, Architect, Newport, Mon	do.
Furniture Repository, Commercial-road, Hereford	Messrs. Greenlands, Ltd.	W. W. Robinson, Architect, King-street, Hereford	do.
Four Houses, Glyncorrwg, Wales	.....	Daniel Lewis, Glyncorrwg	do.
Roads, &c. Liscard and Wallasey	Palmerston Land & Property, Co.	O. Roberts, Architect, The Temple, Dale-street, Liverpool	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Draughtsman (Engineer and Surveyor's Department)	Wimbledon U.D.C.	12*l.* per week	Aug. 10
*Quantity Surveyor	Fulham Borough Council	1½ per cent.	Aug. 31

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, lv. *Contracts*, lv. vi. viii. x. *Public Appointments*, xi.

PRICES CURRENT (*Continued*).

BRICKS, &c.

	£ s. d.	
Two Sides and one End	15 0 0	per 1,000 at railway depot.
Splays Chamfered, Squints	14 0 0	,, ,, ,,
Second Quality White and Dipped Salt Glazed	2 0 0	,, less than best.
	s. d.	
Thames and Pit Sand	6 0	per yard, delivered.
Thames Ballast	6 0	,, ,,
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime	20 6	,, ,,

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime 11s 6d. per yard, delivered.
Stourbridge fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

BATH STONE—delivered on road waggons, Paddington depôt — s. d. 1 6½ per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt — 1 8½ ,, ,,

PRICES CURRENT (*Continued*).

STONE.

PORTLAND STONE (20 ft. average)—
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf — s. d. 2 1 per ft. cube.
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf — 2 2½ ,, ,,

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt.
Beer in blocks	1 6	,, ,,
Grinsbill ,,	1 10	,, ,,
Darley Dale in blocks	2 4	,, ,,
Red Corsehill ,,	2 5	,, ,,
Closeburn Red Freestone	2 0	,, ,,
Red Mansfield ,,	2 4	,, ,,

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super.
6 in. Rubbed two sides Ditto, Ditto	2 6	,, ,,

PRICES CURRENT (*Continued*).

STONE.

YORK STONE—*Robin Hood Quality.*

	s. d.	
3 in. Sawn two sides slabs (random sizes)	0 11½	per ft. super. dld. rly. depot
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,, ,,
1½ in. to 2 in. ditto, ditto	0 6	,, ,,

BEST HARD YORK—

Scappled random blocks	3 0	per ft. cube ,,
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. ,,
6 in. Rubbed two sides Ditto	—	,, ,,
3 in. sawn two sides slabs (random sizes)	1 2	,, ,,
2 in. self-faced random flags	0 5	,, ,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.
,, ,, ,, 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
,, ,, ,, 3 in. do.	1 8½	,, ,,

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PRICES CURRENT (*Continued*).

SLATES.

	£ s. d.	
in. in.		
20×10 best blue Bangor	13 2 6	per 1000 or 1200 at ry. dep.
20×12 " " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green	15 8 6	" "
20×12 " "	17 8 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000, at rly. depôt.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" "
Hip and valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0 "	" "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¼ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (20 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.

	At per Standard.	
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 3 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Odderits	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¼ in. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	- -

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0

PRICES CURRENT *Continued*.

WOOD.

Prepared Flooring—	Per square. £ s. d.	£ s. d.
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	8 19 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
" " galvanised	16 0 0	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	- - -
" " to 24 g.	10 15 0	- - -
" " to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
" " 22 g. and 24 g.	16 10 0	- - -
" " 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	- - -
" " 22 g. and 24 g.	12 15 0	- - -
" " 26 g.	14 0 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 5 0	- - -
Pipe in coils	14 15 0	- - -
Soil pipe	17 5 0	- - -
Compo Pipe	17 5 0	- - -
ZINC—Sheet—		
Vieille Montagne ton	26 5 0	- - -
Silesian	26 0 0	- - -
COPPER—		
Strong Sheet per lb.	0 0 10½	- - -
Thin "	0 0 11½	- - -
Copper nails "	0 0 11	- - -
BRASS—		
Strong Sheet "	0 0 10	- - -
Thin "	0 0 11	- - -
TIN—English Ingots "	0 1 4	- - -
SOLDER—Plumbers' "	0 0 6	- -
Tinmen's "	0 0 8	-
Blowpipe "	0 0 9	

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d.	per ft. delivered.
" fourths	2¾d.	" "
21 oz. thirds	3¼d.	" "
" fourths	2¾d.	" "
26 oz. thirds	4d.	" "
" fourths	3¼d.	" "
32 oz. thirds	5d.	" "
" fourths	4¼d.	" "
Fluted sheet, 15 oz.	3d.	" "
" 21 oz.	4d.	" "
½ Hartley's Rolled Plate	1¾d.	" "
☆ " " "	2d.	" "
‡ " " "	2½d.	" "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 11
" " in drums	"	0 2 3
Boiled " in pipes or barrels	"	0 2 2
" " in drums	"	0 2 6
Turpentine, in barrels	"	0 3 2
" in drums	"	0 3 4
Genuine Ground English White Lead	per ton	20 0 0
Red Lead, Dry	"	20 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

H. W. (Below our limit). C. E. L. P. (Too late; next week).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The proof by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

CAERPHILLY (Wales).—For the erection of an hotel, Aber, for the Glamorgan Public Trust Co., Ltd. Mr. H. Snell, architect, Stanwell-road, Penarth:—

Bowers & Co.	£6,105	T. F. Howells	£5,583
J. Howell	5,950	Rossiter & Sons	5,500
J. Jones	5,680	Evans Bros.	5,450
Allen & Son	5,650	W. Morgan, Cardiff*	5,350

CARSHALTON.—For villa residence, Rotherfield-road, Carshalton, Surrey. Mr. Chas. Botterill, architect, 583, Fulham-road, Walham Green, S.W.:—

Page & Son	£2,120	Cusden & Co.	£1,447
Akers & Co	1,651	M. D. Wills	1,445
Edwards & Medway	1,520	S. J. Evans*	1,375

DARTMOUTH.—For the erection of four houses, Victoria-road. Mr. E. H. Back, C.E., architect, Dartmouth:—

Pillar & Row	£929 0 0
Wills & Anderson	878 7 6
Back & Watts	809 15 0
Ferris & Haydon, Stokefleming and Dartmouth	828 17 6

FALMOUTH.—For the erection of conveniences near the Town Hall, for the Corporation. Mr. W. H. Tresidder, Borough Engineer:—

E. H. Moss, Falmouth* £153

FELIXSTOWE.—For the erection of a cottage residence for Dr. Wm. Elliston. Mr. G. W. Leighton, architect, Ipswich. Quantities by the architect:—

F. Thurman	£1,108 0 0
Ward & Son	1,059 10 0
Cubitt & Gotts	1,034 13 7
R. W. Pratt	997 7 6
H. J. Lingell	954 0 0
H. G. Knights	917 15 0
Parker Bros., Felixstowe*	869 6 2

[*See also next page.*

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WALTHAMSTOW.—For road works, for the Urban District Council. Mr. G. W. Holmes, A.M.Inst.C.E., Town Hall, Walthamstow :—

Name of Road.	G. Bell.	G. Porter.	W. Griffiths & Co.	T. Free & Son.	A. W. Porter.	B. M. Glenny.	Surveyor.
	£	£ s.	£ s. d.	£	£ s.	£ s. d.	£ s. d.
Carlton-road	947	863 19	885 1 10	820	840 0	*812 13 9	880 10 3
Lancaster-road	632	559 5	567 1 6	551	—	*447 15 2	553 5 4
Oakfield-road	261	234 10	237 2 7	250	—	*200 13 6	235 0 0
Selwyn-avenue	913	930 10	925 13 3	866	849 0	*787 11 6	866 8 0
Wolsey-avenue	689	686 9	645 19 6	675	—	*564 0 2	669 9 9
Devonshire-road	801	739 7	826 5 0	716	698 10	*692 6 6	707 12 4
Paramatta-road	679	671 16	693 19 8	640	—	*589 8 10	565 5 4
Waverley-avenue	—	377 0	410 11 9	440	—	*302 0 0	350 3 5
Passages.							
Duke's Head	—	—	—	345	—	*355 7 6	338 16 8
Beulah	—	—	—	421	—	*411 2 0	426 4 1
Brandon-road (north side)	—	—	60 19 0	36	—	*65 9 0	54 15 8
,, (south side)	—	—	48 14 0	32	—	*49 1 6	43 11 2
Cuthbert (north side)	—	—	106 10 0	117	—	*120 9 0	90 18 2
,, (south side)	—	—	66 18 9	82	—	*74 19 6	61 13 8
Linford (north side)	—	—	68 12 6	75	—	*61 4 0	57 9 10
,, (south side)	—	—	61 15 6	44	—	*52 12 0	47 10 0

GLASGOW.—For the erection of University buildings, for the University Court. Mr. Jas. Miller, architect, 15, Blythewood-square, Glasgow :—

Masonry.—Muir & Sons, Glasgow	£42,937 15 2
Joinery.—Walker & Dick, Glasgow	13,336 14 9
Structural Steel-work.—Miller & Sommerville, Glasgow	1,025 6 1
Slating.—John Anderson, Glasgow	891 5 9
Plumbing.—Barton & Sons, Edinburgh	3,897 19 0
Plastering.—D. & J. Mackenzie, Glasgow	2,645 18 11
Tiling. — Galbraith & Winton, Glasgow	2,588 2 9

HEELEY, SHEFFIELD.—For two villa residences and conveniences in new road off Meersbrook Park-road, for Mr. George Hall. Messrs. Hall & Fenton, architects and surveyors, 14, St. James-row, Sheffield. Quantities by the architects :—

A. Bradbury	£1,322 0	T. Margerrison	£1,170 0
Bee & Son	1,284 10	M. Hancock	997 0
Martin & Hughes	1,295 0	G. Vaughan	900 0
H. Watkinson	1,212 0	M. A. Earl, Chesterfield-road*	875 0
Geo. Allen	1,210 0		
E. & W. Oxley	1,198 0		
Hy. White	1,193 10		

LONDON.—For pulling down and rebuilding entrance lodge, Hatcham, S.E., for Messrs. John Dicks. Mr. Delmé G. Mootham, architect, Effingham House, Strand, W.C. :—

Warren	£965 16 11	Snewin Bros.	£729 0 0
Lawrence	850 0 0	Andrews	£83 0 0
Jarvis & Son	795 0 0	Wallis	660 0 0
Downes	737 0 0	Andrews	600 0 0

LONDON.—For certain pile-driving and underpinning work at the Cyclops Ironworks, Millwall, for Messrs. Edward Le Bas & Co. Mr. Chas. E. Gritton, A.M.Inst.C.E., Engineer, The Briars, Selhurst :—

F. & T. Thorne* £205

PAIGNTON.—For alterations and additions to the Curledge-street Board School, for the Paignton School Board. Mr. Frederick William Vanstone, architect, Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton :—

Webber & Sons	£1,968 0	N. Drew	£1,920 0
Maunder & Mudge	1,950 0	E. Westlake‡	1,885 10

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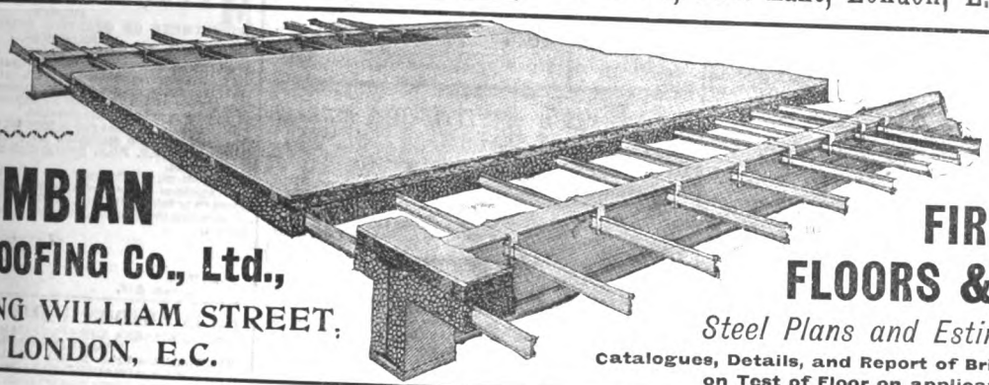

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THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

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Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

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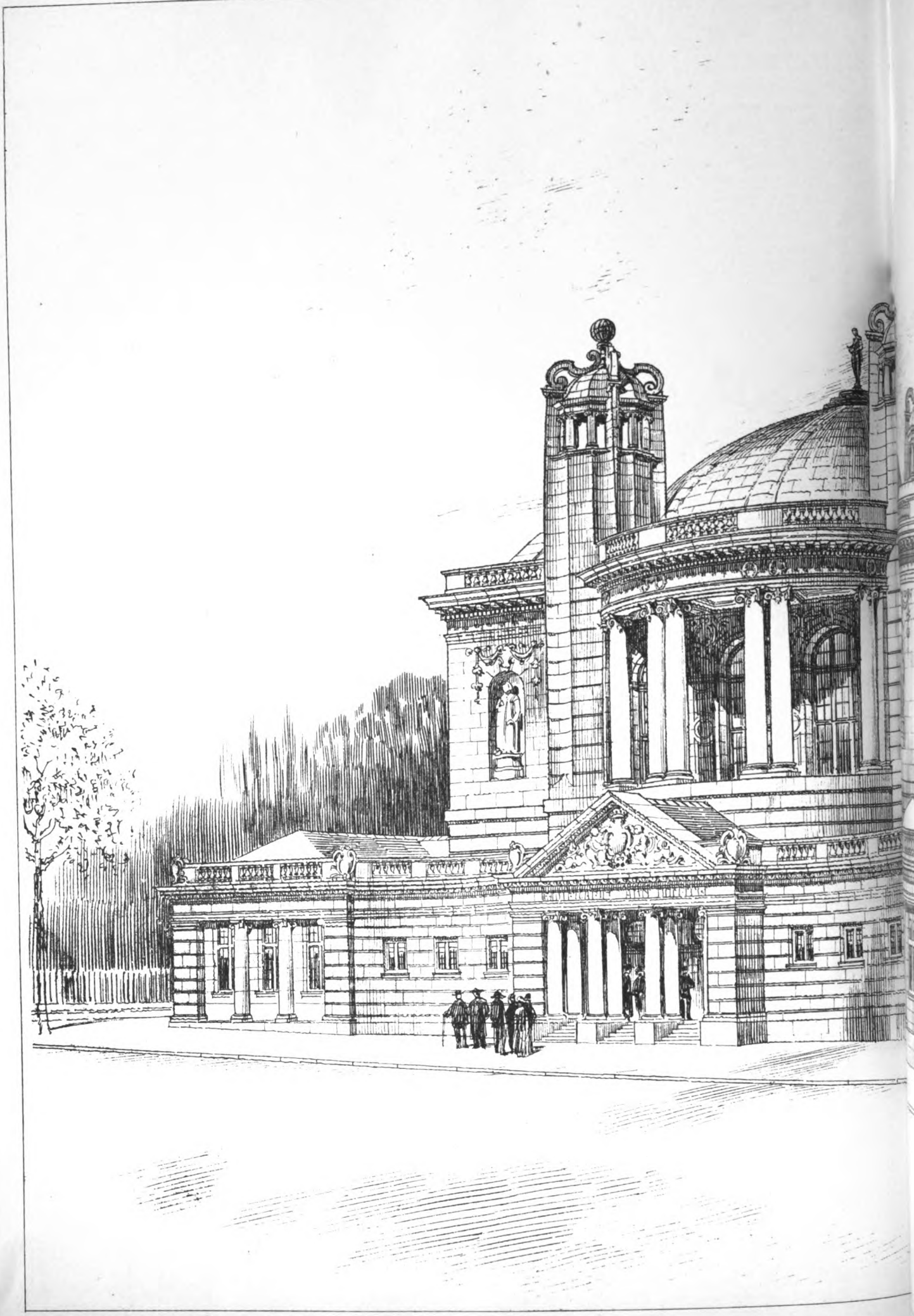

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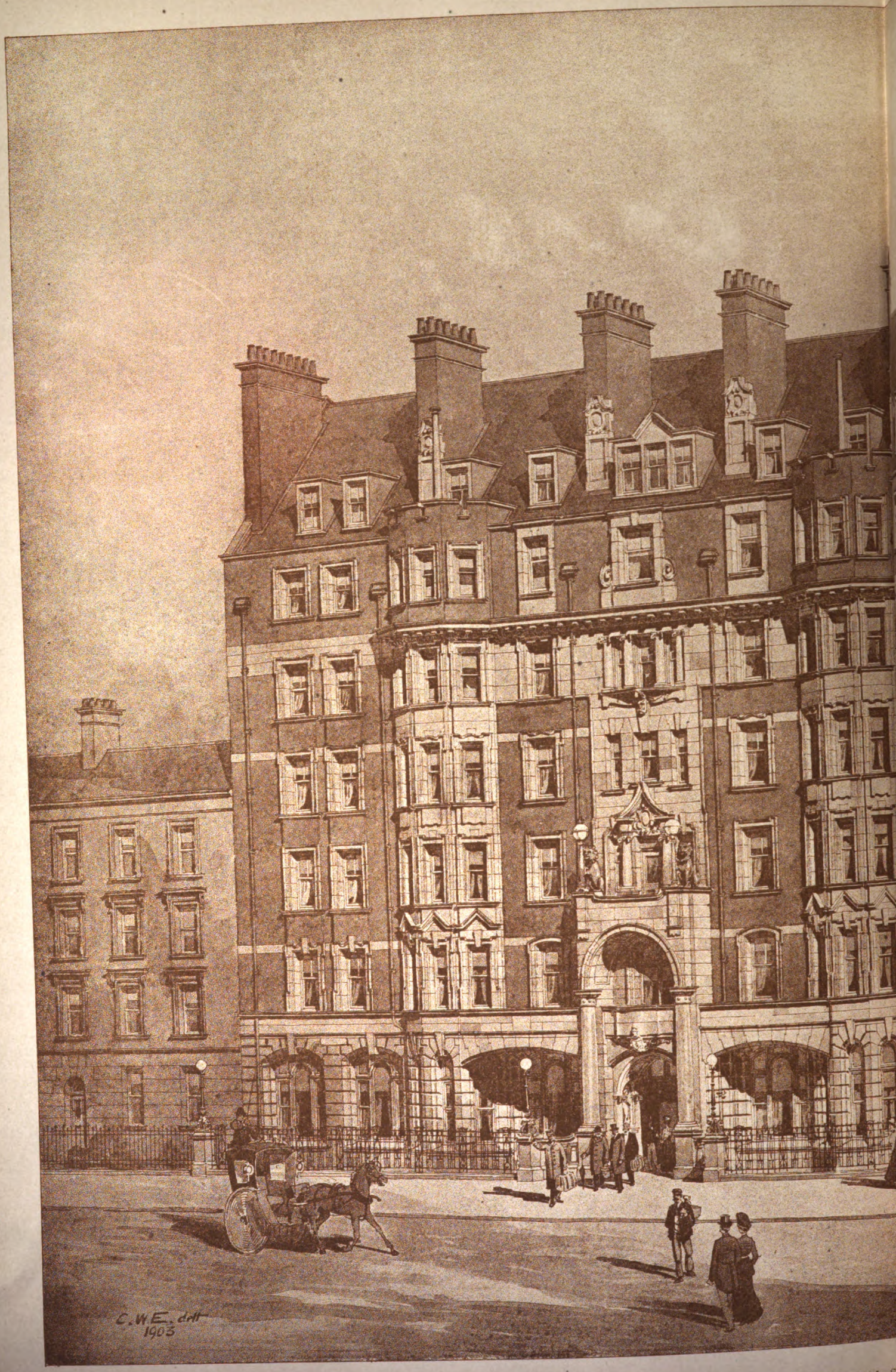

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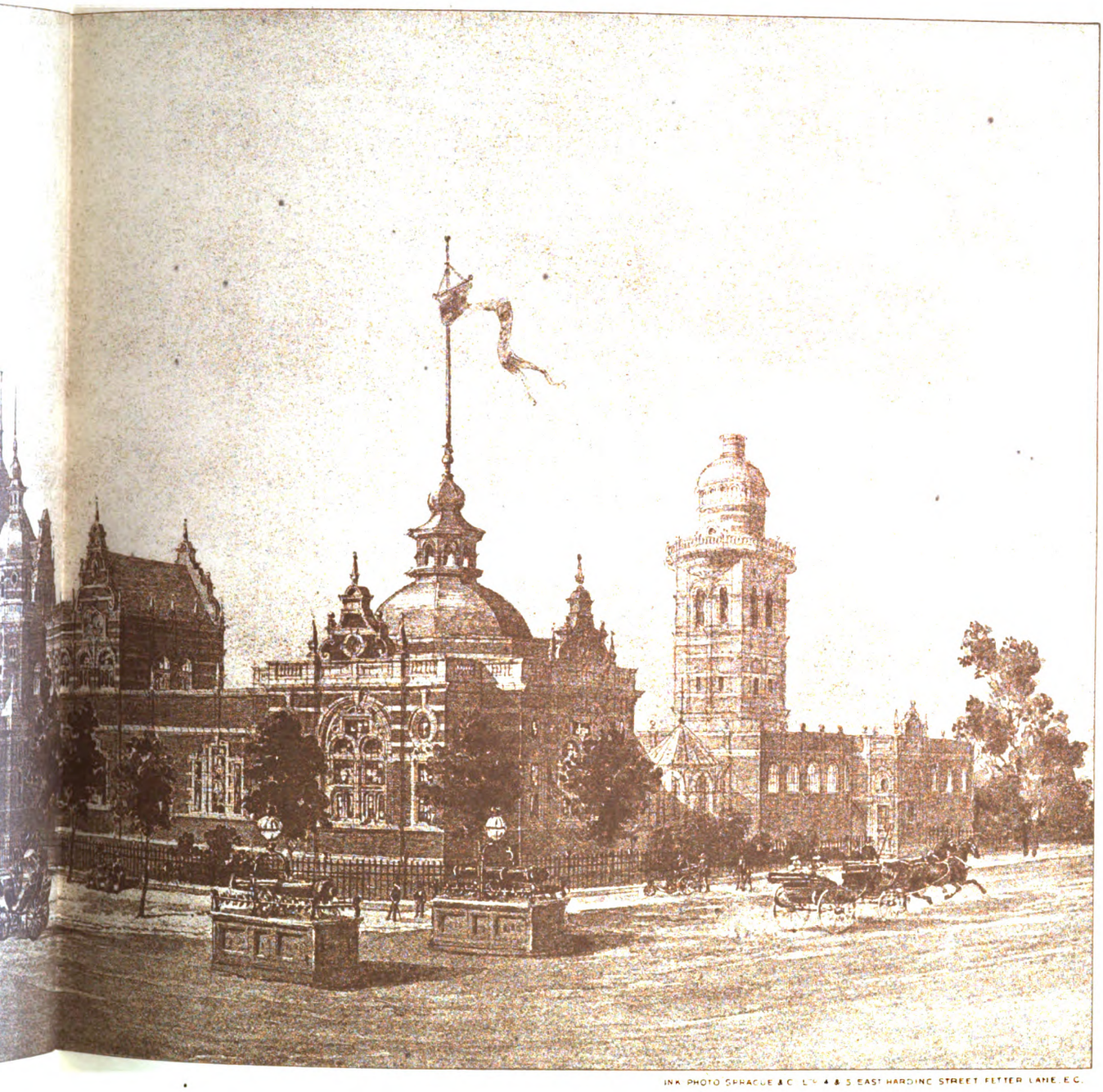

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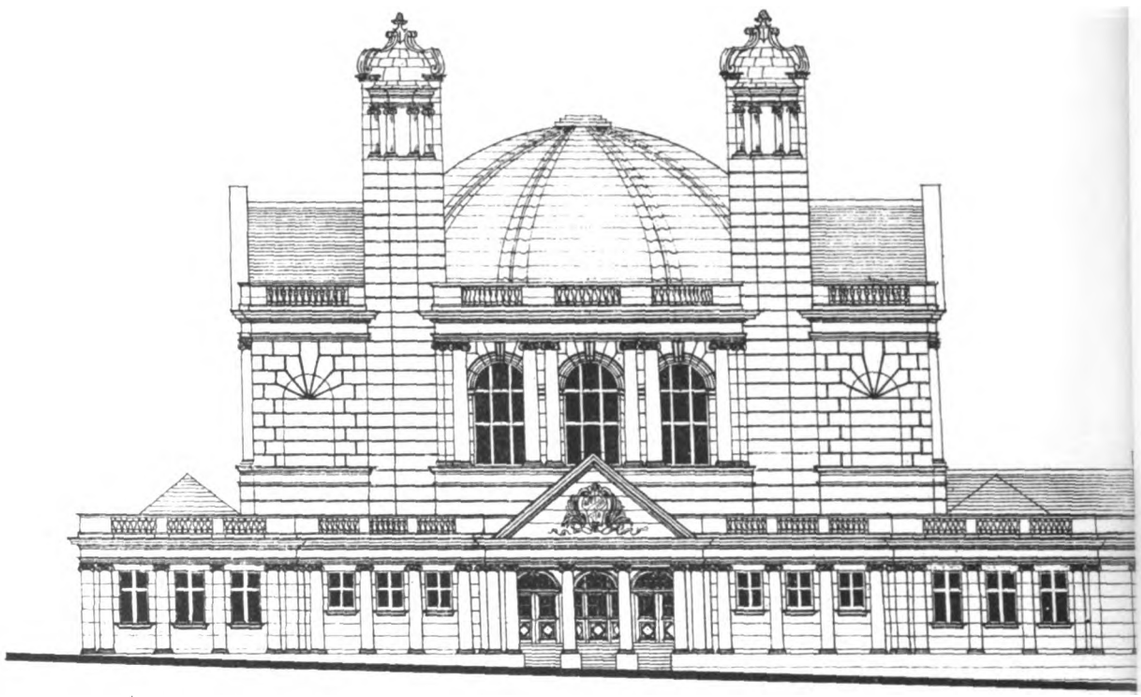

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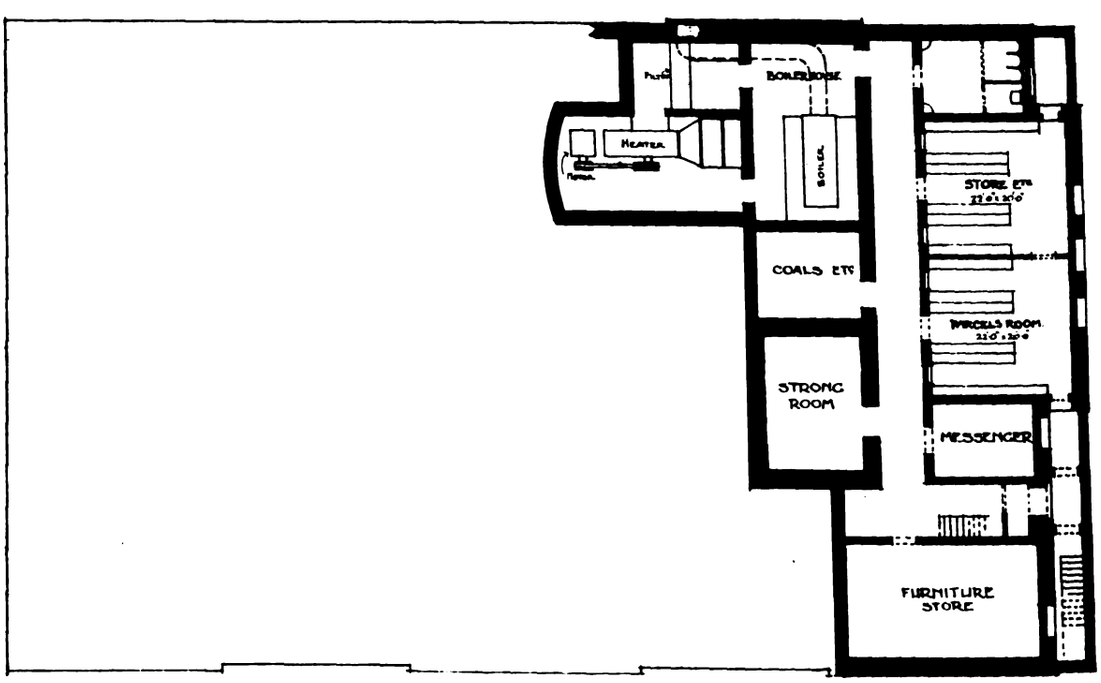

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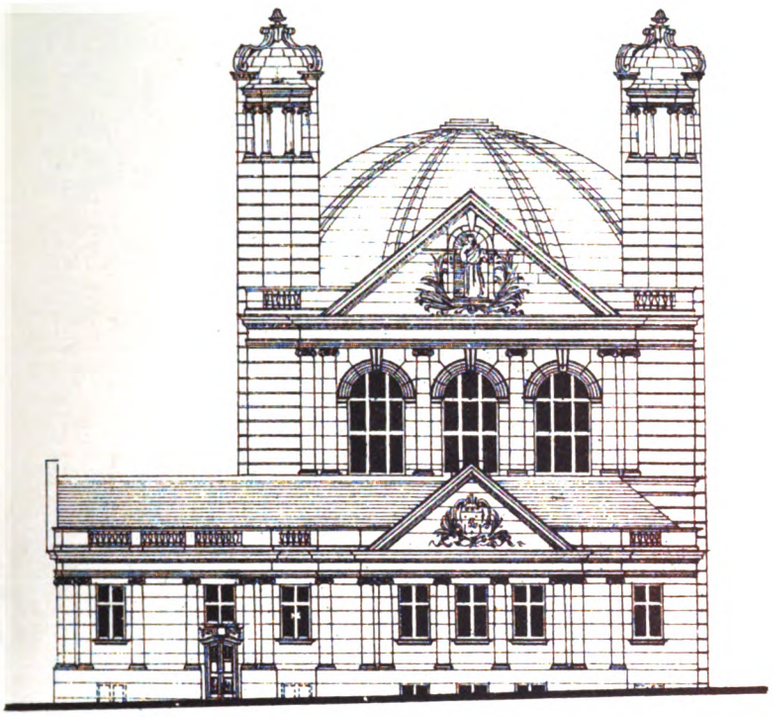

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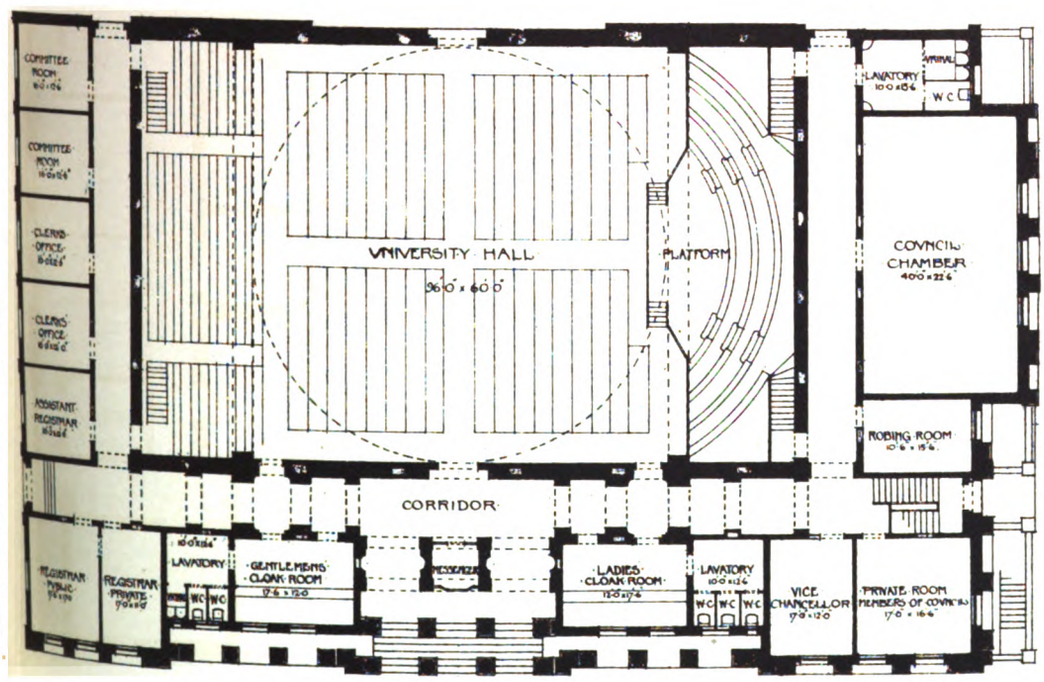

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VOL. LXXXV.—No. 3158. AUGUST 15, 1903.

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Nether Swell Manor, Gloucestershire.....Mr. E. Guy Dawber, A.R.I.B.A., Architect
Sanatorium for Consumptives, Frimley.....Mr. E. T. Hall, F.R.I.B.A., Architect.
Design for Drawing-room Decoration.....By Mr. T. Wallace Hay.

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Rock-hewn Dwellings.

THE primitive manners and customs of mankind have a way of surviving throughout the ages, in spite of the modifying influences of luxurious and scientific development. Sometimes a mode of living may be observed in vogue in these latter days of the world's history which carries the imagination back to a quite geologic age, when our rude forefathers dwelt in the caves where their fossilised remains are chiefly to be found.

Ever since the most remote ages, countless thousands of years ago, the caves in the warmer regions of the earth have been used as dwellings, and in some cases by people belonging to civilised races. Such a mode of being housed would naturally suggest itself to the poorer classes of the community, and so the system has found favour in every age. But, in addition to the numbers of people who have sought such a home from reasons of economy or concealment, there have been others affected with apparently superstitious or religious motives. In making a study of these developments it will be sufficient to confine attention to the shores of the Mediterranean and their immediate vicinity, where caverns have been used, perhaps, in more various ways than elsewhere in the world. In the most primitive times of Greek or Etruscan history, caves were used for religious purposes. An oracle was associated with innumerable caverns in Greece and Italy as a particularly fitting combination. The idea of the primitive cave-temple even survives in the majority of more important Greek temples in the form of the Adytum or Megaron constructed beneath the floor of the building. This cave of mystery seems to be copied over again in the crypt of the earlier Christian basilicas, and although its use and significance may have been changed in later ages, it is clearly a singular instance of a surviving idea from extreme antiquity.

In regard to rock dwellings in America, the Aztecs are amongst the most ancient of such dwellers in the New Continent; but in all parts of Central America are to be found traces of this primitive mode of taking advantage of natural capabilities amongst the rocks and caverns. In Arizona, Colorado, and New Mexico whole villages have been formed in this manner, the means of communication between the houses being sufficiently ingenious, but often extremely difficult of access. The inhabitants of such houses belonged probably to the Puebla race of Indians in modern times, and as late as the sixteenth century they were still to be found in Central America occupying the "homes" of untold past-away generations and centuries. In Northern Europe few, if any, such dwellings existed within historical times in Germany or the British Isles. Here and there a hermit's cell may have been tenanted at times; but the rigorous climate, and the general unsuitableness of such a life under the circumstances, prevented any regular development such as may be observed in the south. Abyssinia from Berenica towards the south was known to the ancients as "Troglodytica."

The land where the cave-dwellers and cave-worshippers have always been found in the greatest numbers, and where they still survive at the present day in innumerable communities, is Palestine. Here this mode of life is closely associated, apparently, with certain religious customs and traditions—in other countries like Spain or Italy the cave villages are made use of for more sordid reasons. For instance, the very curious rock-cut village of the Barraneo at Grenada in Spain, inhabited at the present day by innumerable gypsy families under the rule of their "king," is chosen by such people for merely indolent reasons. Gypsies in other parts of the world have similar lazy characteristics, and a degraded part of the population in Cyprus exists under this name and in this manner. In such cases the settlements have usually been made in abandoned quarries. In Palestine these Troglodytes have been almost exclusively Christians ever since the introduction of the religion, both as dwellers and worshippers in natural or rock-cut caverns. And this fact is of particular interest in connexion with the early history of Christianity all over the Roman Empire.

In Italy and Greece the hermits' cells in community, or as solitaries, were invariably caves, sometimes left in their natural condition, to judge by the numerous examples remaining amongst the Apennines.* In the Levant, on the contrary, these places are almost always more or less artificial. In the valley of the Jordan, and its ramifications on either side, the Orthodox and other Christians still make their homes amongst the rocks in almost incalculable numbers. At the present day it is comparatively easy to inspect this curious method of life, followed by such numbers of men (and even women are not unknown) who, renouncing the comforts of civilisation, prefer to live in the most primitive style possible. One of the easiest visited of such communities exists in the Wady el Kelt, a long narrow valley leading down from Jerusalem to the Dead Sea and Jericho. This valley, being the traditional scene of Elisha's retirement, and of the story of the miraculous feeding by ravens, has always possessed particular attractions for the imitators of the prophet; though of late years the legend of the ravens has been somewhat discounted by the discovery that the Hebrew word "Horim" may have meant the name of a Semetic tribe of the locality, as well as the birds in question. Here at the bottom of the valley, where a tiny rivulet affords a constant supply of drinking water, the successors of untold generations of hermits still live as in the days of Elisha, and on the same meagre fare—a dish of pulse and a few fruits—the produce of their scanty gardens their only means of sustenance. A certain amount of additional food may, however, be supplied by the modern Arab representatives of the "Horim," who in this district are Christians of the Orthodox Church.

In Syria rock-hewn dwellings (often amplifications of natural caverns) are a particular characteristic of the country. The comparatively little-known Hauran is full of ramifying underground excavations, partly the result of digging for lime in the soft limestone of the country, but enlarged and augmented for residential purposes. The German Palestine Exploration Society has

* In Central Italy some rock-hewn villages are still in use. One such village may be observed from the railway in passing between Parma and Reggio Emilia. In Cyprus, towards the extremity of the Carpus range of mountains, where they form a finger-like promontory pointing into the Gulf of Alexandretta, an immense underground town or convent appears to have been excavated in a particularly inaccessible range of cliffs. This curious place is described in Sir Samuel Baker's book on the island. Very few persons seem ever to have visited it, and its date is problematical.

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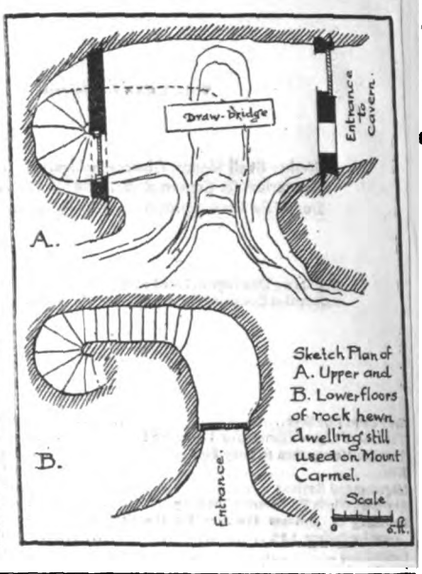

done much towards investigating this district, in spite of the natural opposition evinced by the natives, who still make very considerable use of these excavations as places of concealment from Turkish tax-gatherers, if not, as in the old days, places of refuge from impending massacres. The interesting town of Ed Deràah in the Hauran has been partly explored by Professor Schumacher, a German engineer of Maifa, and described in the papers of the English Palestine Exploration Fund,* where will be found an interesting account of his adventures in an underground labyrinth of ancient dwellings leading one out of another. The Professor employed the ancient device for finding his way about in these somewhat dangerous places by tying one end of a ball of string at the entrance and exploring the interior as far as the string allowed. The chambers of this ancient town are in some cases lined with masonry, and also the long airholes, often 70 ft. in height, which lead up to the earth's surface, are constructed with masonry. To judge, however, from Mr. Schumacher's plans and sketches there is very little to be found in these underground recesses of an architectural character. The columns used as supports to ceilings, and other fragments of wrought stone, have evidently been furnished by Roman ruins in the vicinity. Above this subterranean town of Ed Deràah are the ruins of an ancient village, probably of Byzantine times, which may have been built of stone quarried in the underground town.

The Shefalah, or district of Southern Palestine between Hebron and the sea-shore, is almost as full of these excavations as the Hauran, but the lower portion of the Jordan Valley and the neighbourhood of the Dead Sea are perhaps as remarkable for the prodigious numbers of the rock-cut tombs, convents, and hermitages crowded together in this part of the world as for the singularity of the scenery and the historical associations. The immense number of the rock dwellings and tombs still in use give an importance to this mode of life which can hardly be realised in any other country at the present day. Quarantena, or the "Mount of Temptation," a hill to the north-west of Jericho, which was early identified with the story of Christ's temptation in the Wilderness of Judea, is honeycombed with convents and hermitages, many of them being of extreme antiquity. The most important of these convents constituted a small village. The winding road which mounts the side of the sacred mountain passes through rock cuttings which remind one almost of a Swiss *axenstrasse*, and through large caverns which have been built up with sub-dividing walls, forming houses of one or more stories. The view from the windows of such houses embraces the Jordan Valley and the Dead Sea plain. This particular convent may be easily distinguished from so far away as Jericho by the enormous gilded cross recently erected in front of a cavern, against the darkness of which it shines resplendent in burnished metal.

Farther to the south in this district are the famous caverns so graphically described in the "Talisman," although Sir Walter Scott's account of their use by Queen Berengaria is probably a little more romantic than historic. At the present day this centre of ancient hermit life seems abandoned, and is even difficult to visit on account of the predatory character of the *felaheen* of the district. In the upper valley of the Kedron, not far from Jerusalem, a considerable convent of Greek "caloyers" has grown up in a series of ancient sepulchres, probably Jewish, and in addition to the underground chambers occupied by the monks, a number of superterranean buildings have made their appearance during the past few years.

The Greek Monasteries of Meteora in Thessaly may, perhaps, be classed with rock-hewn dwellings. They, at least, owe their existence to a desire to take advantage of the most inaccessible rocks on the part of the Christians of the fourteenth century—whether for reasons of a superstitious nature, or merely as refuges from the impending Turkish persecutions. They contain rock-cut chambers and chapels decorated with the usual frescoes of the Orthodox Church. These monasteries are reached by dizzy ladders and by the usual windlass arrangement; the highest of them is over 1,800 ft. above the plain. The Greek Government has of late years been converting this most interesting national monument to the use of a convict establishment! It is an unfortunate fate, but the original need for these religious refuges no longer exists, and the modern monks of the Orthodox Church have long since abandoned them for more reasonable habitations under ordinary conditions. The Meteora (*i.e.*, in the air) anchorets may have some relationship to St. Simon Stylites.

The subject of our sketches is a picturesque example of the kind of rock-cut dwelling still used by the Greek caloyers in Syria and Palestine. It is, of course, very difficult to define the age of such a habitation—it may be of comparatively modern construction, or it may, on the contrary, date back to the most primæval times. It has, at least, been fitted with quite modern doors for use at the present day. It is situated in a very narrow and picturesque valley of the Carmel Hills, where a garden of orange and walnut trees makes a dark seclusion round a well spring, and affords a glimpse into the ideal existence of the hermit life under most favourable circumstances. At the time our sketches were made the large cavern, an entrance to which is shown on the upper of the two plans, was inaccessible. The curious and ingenious device of using the natural cleft in the rock, with a rough drawbridge spanning it, as a means of security, reminds one of the famous story in Josephus of the cavern at Masada defended by the Jews against the Romans, who attacked it by being lowered over the cliff in boxes prepared for the purpose.

* "Across the Jordan," published by P. E. F. Papers on rock-cut villages, &c.

THE LAW OF LIGHT—DAMAGES OR INJUNCTION?

In discussing in a recent issue the Ancient Lights Bill brought into Parliament this Session under the auspices of the Royal Institute of British Architects and the Surveyors' Institution, we referred to the need for legislation on the lines of Lord Cairns' Act—that is to say, to the desirability of increasing the jurisdiction of the Courts to award damages rather than to grant injunctions. The point is one of so much practical importance, and the necessity for an alteration of the law has been so clearly exemplified in the recent case of Cowper *v.* Laidler (Law Reports, August, 1903) that it may be desirable to allude to this point in somewhat greater detail.

Where a right to light exists it may either be actually interfered with or there may be danger of interference by proposed buildings. This distinction is important in regard to the subject under notice, because, while under

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Lord Cairns' Act, preserved by the fifth section of the Statute Law Amendment Act, 1883, there is clearly power in the Court to award damages in place of an injunction, it is doubtful if there is any such jurisdiction to give damages instead of a prohibitory injunction—that is, when an injury to a right to light is threatened but has not occurred. In 1894, in the case of Martin *v.* Price, the Court of Appeal said that the question was one of very great importance, and not free from difficulty; but they did not decide it, holding that under the circumstances of the case before them, namely, an actual diminution of light by a building in course of construction, and a further diminution by the proposed but not completed portion, the owners of the dominant tenement were entitled to an injunction. In other words, they exercised their discretion by granting an injunction, a proceeding which prevented the need for deciding if they had power to give damages. In the case of Cowper *v.* Laidler, decided by Mr. Justice Buckley a few weeks ago and now officially reported, there is a careful review of the law on this subject, and the Judge clearly came to the conclusion that the Court would only award damages in place of an injunction under very exceptional circumstances. Indeed, his judgment comes prettly nearly to this, that unless the owner of the easement agrees that damages shall be paid instead of an injunction being granted, the Court ought not to oblige him to receive money for the violation of the right. It was, he says, stated in a case decided in 1895 that since Lord Cairns' Act only fourteen cases were to be found in which damages were awarded against the will of the plaintiff, and that these were cases where a mandatory injunction would have been granted. If these figures are approximately correct, they show that Lord Cairns' Act has been practically a dead letter, for it is nearly half a century since it became law. They show, also, that a distinct change is required, and that the court should award damages, unless the owner of the dominant tenement cannot be properly compensated by them. It must not, of course, be supposed that damages are not in fact frequently paid; but the power of obtaining an injunction enables the owner of the dominant tenement to obtain from the owner of the servient tenement exorbitant and unreasonable sums. The case recently tried before Mr. Justice Buckley shows how fallacious, in our opinion, is the legal basis on which injunctions are granted.

The owners of the dominant tenement claimed an injunction in respect of the light to a small cottage in Newcastle-on-Tyne, in a part of the town where new and important buildings were in course of erection. "The defendant," said the Judge, "says that the plaintiff is extorting money by asking for an injunction, and thus compelling the defendant either to buy at an unreasonable price or to keep his buildings down." Now let us observe the answer. "It is not extortion to ask a price which a property for exceptional reasons commands." But there is an obvious fallacy in this remark. The cottage in question—it will serve very well as an example—did not command an exceptional price by reason of its intrinsic value, but partly because there existed a right to light in respect of which an injunction could be obtained, and so a high price has to be paid for a building in itself of little value.

If the owner of the servient tenement could have so erected his building as not to interfere with the light of the cottage, it would have doubtless turned out that a small price only could have been obtained for this insignificant building; for the sum paid in respect of the right to light must not be confounded with the price for the site. Throughout the latter portion of Mr. Justice Buckley's judgment there is in fact a confusion between the value of a dominant tenement in respect of site, and the existence of a right to light for the use of a tenement, and the fancy or unreal value caused by the power of preventing the erection of a building on the servient tenement. In other words, the owner of the latter does not give the dominant owner a sum to represent a valuable right in fact, but a sum to prevent an action at law or the stoppage of his own building operations. If land is taken by a railway or other company under compulsory powers, the claimant is only entitled to its real value plus 10 per cent. for compulsory purchase. If the owner of the land could prevent the company from carrying on its operations by reason of the proximity of the undertaking, unless he were bought out, then he could put a fancy price on his land. This would be analogous to the present state of affairs in regard to the law of light. The owner of a building of the most trumpery kind, occupying a site of infinitesimal size, but having a right to light through a single small aperture, can under present conditions obtain from an adjoining owner many times the real value of his property simply by the threat that he will stop the erection of important buildings if the sum which he demands is not paid.

If the law were changed so that the Court should award reasonable damages, then exorbitant and unreasonable sums would not be obtained. Mr. Justice Buckley appears to think that there is something unjust in obliging an owner of a dominant tenement to be recompensed by money. "To refuse," he says, "to aid the legal right by injunction and to give damages instead is, in fact, to compel the plaintiff to part with his easement for money." As a matter of fact, this is what owners of dominant tenements are doing every day, but they are obtaining unreasonable sums on account of the state of the law. If an owner of a house is properly compensated, he is not suffering an injustice, and if the law were that only where damages cannot reasonably compensate the owner of a dominant tenement he should obtain an injunction, then his rights would be completely safeguarded. We recommend the perusal of the case of Cowper *v.* Laidler to all interested in this subject, and if the Institute of Architects would bring in a modest Bill next Session to deal with the point of injunction and damages, they would, if it became law, have done much to place the matter in a sounder and more reasonable state.

THE PARIS METROPOLITAN RAILWAY FIRE.

No previous railway disaster approaches the tragedy of Tuesday last with regard to the loss of life and the horror of the surrounding circumstances. Looking at the bare facts as they are reported by those who were present, it appears that a train coming from the Porte Dauphine stopped in the tunnel beyond the Barbes Station, owing to some fault in the electric motor, and the passengers were obliged to descend and walk to the next station. Fire then broke out in the trolley-car, and a succeeding train, full of passengers, was used to push the disabled train along the line. On arriving at Couronnes Station flames were already visible, but the driver, apparently acting upon his own responsibility, made no stop and entered the next tunnel at full speed with the object of removing the burning train to the terminus. Unfortunately for the success of this attempt, the two trains had not proceeded far when an explosion was heard, and the carriages of the empty train burst into flames, and, the electric conductors parting, the lights were extinguished. The passengers in train No. 2 fled hastily in both directions down the dark tunnel. By this time a third train had reached the Couronnes station, and was unable to proceed owing to the absence of current. After some trouble passengers in this train were persuaded that real danger existed, and most of them escaped into the open air. Many, however, found their way in the darkness to one end of the platform at which there was no means of egress, and there they were suffocated. Some others, being unable to force their way up the staircase, walked back to Belleville station, and so escaped. At Menilmontant station, beyond the burning trains, thick smoke commenced to pour out from the tunnel, and several persons who were waiting for trains, being thereby prevented from reaching the staircase, ran along the line towards Père Lachaise station. Subsequent examination showed that, of the sixteen coaches constituting the two trains in the tunnel, absolutely nothing was left but the iron wheels and frames. Not an inch of the woodwork remained, and even the glass of the windows was melted, some of it lying in lumps upon the permanent way.

That the loss of life was increased by the absence of intelligent supervision is quite clear from the foregoing history of the calamity. When the first train was discovered to be on fire, it was quite right for the passengers to be turned out, but all traffic should have been suspended until the officials were certain that no danger existed. Instead of this, another train was allowed to proceed along the same line, and the driver adopted a course which was directly calculated to fan the flames and to imperil the lives of his own passengers. But, further, it is clear that no materials of a combustible nature ought to be used in the construction of carriage bodies employed on underground lines. The floors, sides, ends, roofs, doors, and window-frames should be of material that will not afford a foothold for fire or furnish fuel to flames. Danger comes in the first instance from the motors, and it should be perfectly easy to isolate these by metal and fireproof material, so that ignition of the trolley-car and adjoining coaches should be absolutely out of the question. Any wood or textile fabrics used for interior fittings should be treated by some approved process, so that they may be able to resist flame for a sufficient period of time. If precautions such as these had been taken on the Paris Metropolitan Railway, this disaster, which is now regretted by the world at large, could never have occurred. With carriages built of combustible materials it would be highly dangerous, if not impossible, to send a rescue train on the other line of metals to

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remove passengers from the scene of danger, and if carriages were built on fire-resisting principles, no such device would ever be necessary. Considering the liability of electric lamps to become extinguished by disorganisation of the conductors, facilities for the use of gas or oil light ought always to be provided for cases of emergency, and, in view of the fact that many passengers lost their lives this week owing to their inability to make their way from the platforms, it seems clear that further means of egress should be provided in all underground railway stations. One of those who escaped on Tuesday last states that "it was impossible to get out into the street. The stairs of the Couronnes station were encumbered by people coming down to take the train. They did not want to make way for us. . . . The two streams of passengers were thus at a standstill at the foot of the stairs." This passenger then ran back to Belleville station, where he found that the people thronging the staircase did not wish to go up. He continues, "However, we had to get out. We were up to our necks in smoke. I sprang forward with my fists extended, and managed to get up the staircase."

This account illustrates the necessity for more staircases and for the better management of those that already exist. Railway companies delight in erecting barriers and gates, and very frequently opposing streams of passengers are compelled to fight their way to and from the platforms. This is the case in many of our London railway stations, and as no disaster has yet been recorded to arouse general condemnation, such arrangements will probably continue.

The Paris disaster will no doubt cause some people to think twice before entering the low-level lines in our own metropolis, the means of escape from which are less accessible than those in shallow subways. We observe that the General Manager of the Central London Railway has already made an announcement stating that no similar accident could occur on that system owing to the precautions taken for the prevention and extinction of fire, and to other regulations intended for the safety of the public. We do not gather, however, that the adoption of non-combustible cars is one of the precautions in question. The application of fire-resisting construction to railway carriage building is a development which must be insisted upon, and especially in the case of underground railways.

NOTES.

A National School of Architecture.

In this month's issue of *Architectural Association Notes* Mr. A. N. Prentice puts forward, in a short leading article, a plea for the establishment of a National School of Architecture. He argues that while the Institute, the Royal Academy, and the Architectural Association, have each been contributing in different ways towards architectural education (we may add that the work of the Architectural Association in this field has been by far the most practical and important), why should not the Institute, with the aid of the allied societies, make a strong representation to Government to establish "a National School of Architecture?"—Parliament to give an annual grant for the purpose, and the Government to issue diplomas to those who had successfully passed through the course of training. Mr. Prentice goes on to suggest the formation of a "British School of Architecture" in Rome: in short, assimilating the whole education of the architect in England to that existing in France. "First catch your hare," would be our first comment. It will take a generation of training to get the House of Commons to see that public money ought to be spent on such an object. If it could be done, it would in the main be a great thing for English architecture, though in regard to the proposed school in Rome for the study of monuments of classic art we may remind Mr. Prentice that in France the effect of this special study has been much questioned—it has been said that it leads inevitably to an academical quality in architectural design. The great thing in the French Government system of architectural training is that the Government really cares about it and about the architects who do well in it; that if a French architect has obtained such a distinction as the "Prix de Rome" he is never lost sight of by the State; he is certain to have important work put in his hands at the first opportunity. If we could create in this country a Government willing to spend money liberally on public architecture, and desirous to encourage the men who had distinguished themselves in a national architectural training, by putting important work into their hands, there would be a great difference in the condition of architecture in this country; but, as we said, it would take at least a generation to get such an idea into the heads of English politicians.

Manchester School of Architecture.

This school, as we announced some time since, has been established pursuant to arrangements made between the Owens College, the Manchester Municipal School of Technology, the Municipal School of Art, and the Manchester Society of Architects. A representative advisory committee has been appointed, with Professor S. H. Capper, M.A., A.R.I.B.A., Director of the School. The following courses have been arranged, viz.:—1. History of Architecture. 2. Elements of Architecture. 3. Architectural Drawings and Design. 4. Freehand Drawing and Modelling. Mr. Glazier, A.R.I.B.A., Mr. Corbett, A.R.I.B.A., and other members of the staff of the School of Technology and of the Municipal School of Art will take part in the instruction given in those institutions respectively. The courses are intended (1) for students who intend to take the degree of the Victoria University in the Honours School of Architecture; (2) for students who desire to take a full course in architecture without proceeding to the degree; (3) for students who desire to attend any of the special lecture courses of Professor Capper; (4) for students who desire to attend special courses at the School of Technology or School of Art, including certain of the courses in the School of Architecture. An announcement will be made after Professor Capper's arrival in Manchester in September as to courses for a second and third year, and a further announcement will be made with regard to the classes on Building Materials and Construction, Descriptive Engineering, and Sanitary Engineering. A course of four popular introductory lectures will be given by Professor Capper in the Whitworth Hall, in October and November, at 8 p.m. The subject will be "History in Architecture: The Mediæval Abbey and Monastic Orders and the Mediæval Cathedral." Admission to these lectures will be free. Inquiries may be addressed either to the Principal of the Owens College, or to the Principal of the Municipal School of Technology, Manchester.

Landlord and Tenant.

Since the year 1875 when the Judicature Acts abolished much of the formality in legal procedure, a feeling has grown up that technicalities are entirely abolished in the law. We have from time to time drawn attention to the fact that this is by no means true, and the case of Harman *v.* Ainslie, reported in the current Law Reports, furnishes another example of how technical the wording of leases is. The defendant was the assignee of a lease of certain premises at Southend which contained two classes of covenants; the first positive covenants relating to the payment of the rent and taxes, the second negative covenants against using the premises for certain trades and against sub-letting without leave, and the lease further contained a proviso that "if the lessee shall commit any breach of the covenants hereinbefore contained, and on his part to be performed" there should be a right of re-entry by the lessor. Under this proviso the plaintiff, the purchaser of the reversion, claimed to re-enter on the ground that the defendant was using the premises for trade in breach of the covenant, but the court has held that the proviso for re-entry in the above form only applies to the affirmative and not to the negative covenants. The court pointed out that had the clause been worded slightly differently—for instance, had it referred to any breach of the covenants, omitting the words "on his part to be performed," or even had the words "and observed" been added to the clause as it stood, after the word "performed," it would have sufficed to embrace the negative covenants. A subsidiary point decided also in this case is that a licence given by the original lessor to the original lessee, under the terms of the lease, also operates as a licence to an assignee. Since, therefore, the trade carried on by the defendant came within the description of trades for which his predecessor had obtained a licence under the lease from the lessor, no breach of covenant was, in fact, committed.

London Traffic Commission.

Some practical suggestions have recently been made by the Automobile Club for the consideration of the Royal Commission on London Traffic. The first of these is quite out of the question, although it possesses considerable intrinsic merit. It is a proposal to continue Pall Mall through the Green Park, so as to converge upon Piccadilly at the widened portion near Hyde Park Corner. This would certainly be more effective than any widening of Piccadilly, as it would permit a large proportion of the traffic from Charing Cross to proceed by a most direct route to Hyde Park Corner. However, we cannot afford to bring the roar of London traffic into one of the few comparatively quiet places still remaining. Another proposal for which a good deal may be said involves the forma-

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tion of a thoroughfare round London, so that traffic from Middlesex to Essex need not pass through the crowded streets of the West End and the City. Attention was also directed to the dangerous junction of Tottenham Court-road, Euston-road, and Hampstead-road, a point where the expenditure of about a quarter of a million is contemplated for widening works. The Club suggested the construction of a tramway station near this junction. This would be very useful, as it would relieve Hampstead-road from the permanent obstruction caused by the tramcars, which at present occupy a sort of informal station in the middle of the street.

The Beginning of a New City.

IN the selection of a site for the new capital of the Commonwealth of Australia, the Commissioners appointed to report upon the question have been fortunate in discovering a place which is conveniently situated between Sydney and Melbourne, and is equidistant from Adelaide and Brisbane. At one time Melbourne hoped to become the Federal capital, a similar aspiration being entertained by Sydney, the capital of the oldest Australian colony. The site selected is within the State of New South Wales, and is at present occupied by a small township, known as Tumut, containing some 1,300 inhabitants. Tumut is situated in a high valley among the mountains around Mount Kosciusko; it is well watered, and the climate is not only cool, but is also free from those extremes which are so much felt in other parts of the continent. In early times Tumut was chiefly known as a gold-digging centre, but most of the inhabitants are now interested in agricultural pursuits. What is termed the town consists of a single street descending from the slope of a hill to the river below. Most of the dwellings are one-storied timber cottages, the better-class buildings being of brick, built in the bungalow style, and in the central part of the street there are a few two-storied houses used as banks, hotels, and stores. The public buildings comprise the post-office, school of arts, two schools, and four churches. This isolated village will presently become one of the chief cities of the world. Its isolation can be removed by the construction of some twenty miles of railway line from the terminus at Gundagai The latter town is only thirty miles from an important junction, whence the Federal legislator can travel at will to Queensland, Victoria, or South Australia. The Commissioners are to be congratulated on their choice of a site. They have found one that possesses all the required natural advantages, that is convenient of access from all parts of the Commonwealth, and that gives no occasion for political jealousy.

The Working Men's College, Great Ormond-street, and Proposed Removal.

THIRTY years ago a corporation was formed as a company, limited by guarantee, for taking over the property and liabilities of the Working Men's College, which had been established in 1854, in a house, since renumbered 46, in Great Ormond-street, by the joint efforts of Frederick D. Maurice, who was the first principal, Ruskin, Thomas Hughes, J. M. Ludlow, and Charles Kingsley—"to provide instruction for working men at the smallest possible cost in the subjects with which it most concerns English citizens to be acquainted." In the autumn of 1900 a building fund of 8,000*l.* was opened for the enlargement and reconstruction of the premises, after designs prepared by, we understand, Mr. W. D. Caröe, as a memorial of the late "Tom" Hughes, who succeeded Maurice in the principalship. The corporation recently entered into possession of the adjoining house, No. 44, but determined to postpone its adaptation for purposes of the College in view of certain negotiations for sale of their property in the street. Finding that the accommodation afforded by the two houses and their outbuildings at the rear had become inadequate to meet the increasing requirements of modern education and the growth of the institution, they had begun preparations for partially rebuilding and enlarging the existing premises. In the meanwhile negotiations took place between the corporation and the trustees of a fund provided by Mr. W. Waldorf Astor for the benefit of the adjacent Hospital for Sick Children, for the sale of the entire premises at a price of 21,000*l.*, and upon conditions in favour of the corporation. In June-July last they passed and confirmed a special resolution for altering a clause of their memorandum of association so as to enable them to carry on the College in either its present situation or elsewhere, and to dispose of any part of their existing property. The resolution has been duly approved by the Board of Trade, and last week Mr. Justice Swinfen Eady made an order, under the Companies (Memorandum of Association) Act, 1890, in confirmation of the special resolution. In their petition to the Court for the order the corporation represented their desire to ratify the sale for 21,000*l.*, and to acquire a new site for more commodious buildings. We may add that in June of last year the Board of Education made an order to establish a scheme in respect of a sum of 400*l.* a year, payable, in terms of a scheme under the City of London Parochial Charities Act, 1883, to a joint committee of the College and of the now dissolved College for Men and Women in Queen's-square, Bloomsbury. The house, No. 46, in Great Ormond-street, which will thus be displaced, contains a fine main staircase: it has been identified with the residence of Lord Thurlow whence, in the night of March 24, 1784, thieves carried off the Great Seal, having broken in over the wall of the garden that then lay open to the fields beyond. No. 44 has a finely decorated interior; the railings, with the gates in front of the door, and the lamp-holders, are handsome examples of old domestic ironwork now very uncommon in London.

McDonald Chair of Architecture, McGill University, Montreal.

MR. PERCY E. NOBBS has been appointed to the McDonald Chair of Architecture at McGill University, Montreal. A pupil of Mr. Lorimer's at Edinburgh, Mr. Nobbs has given several instances of the fine quality of his architectural designs in the annual competitions of the Royal Institute of British Architects, his drawings in water-colour being specially noticeable. That architecture is beginning to be one of the subjects upon which competent instruction is provided at the universities is a matter of satisfaction to all interested in its welfare; instruction cannot fail to bring about good results if it is based on present-day needs as well as historic instances.

The Late Mr. Phil May.

MR. PHIL MAY, whose death was announced last week, was an artist in black and white of remarkable natural genius, which he might have turned to far more artistic account than he actually did. As a master of pen-line drawing he came nearer to Charles Keene than any one else; but his range of subject was exceedingly limited. Whether he really felt an inability to portray effectively any other type but the *gamin*, or whether he thought that the *gamin* had been neglected in art and offered a new field for the artist—whether, in other words, his limitations were of necessity or of choice—it would be difficult to say. He appears to have entered into the ways and characteristics of the London *gamin* (and *gamine*) as no one else did, and treated them with that mastery of pen-line drawing which knows not only what to indicate, but also (an equally valuable knowledge) where to stop; his sketches remained sketches, and were never weakened by an unnecessary line. To come across one or other of them singly in *Punch* was always a pleasure and an amusement; but a collection of a number of them in a volume (one such was sent to us once) formed a depressing study—that of a talent entirely expended on the illustration of mean, ugly, and vulgar types of human existence. His talent was much appreciated among artists; and on one occasion, when he was invited to accompany the members of the Royal Academy on one of their out-of-town excursions, the menu-cards of the Academicians were successively passed up to Mr. May, at the close of the dinner, to be decorated with an extempore caricature from his pen.

MAGAZINES AND REVIEWS.*

Public Works, of which the first number is before us, seems likely to form a very useful *répertoire* of practical information. The publication, apparently, is to be in the middle of the month, the first number being dated July 15, so that the current number will generally arrive too late for our monthly summary. The July number contains an article on "Public Irrigation Works for South Africa," by Sir W. Willcocks; one on the Uganda Railway, by Mr. H. B. Molesworth, describing the special difficulties encountered in consequence of the nature of the country through which the line has to be made; one on the "Tramways of Glasgow;" one on "American Sewerage Design," in which American practice is compared with English in some particulars. There seems to have been an idea also of leading off with descriptions of certain bodies or institutions connected with public works, as there is an article on Cooper's Hill College, one on the Institution of Civil Engineers, and one on the Office of Works. The latter article, which is anonymous, will surprise many readers by the account of the numerous and varied matters which rest in the hands of the Office of Works, but the writer does not seem the least aware of the objections that exist in the architectural world to the Office of Works; more especially to the system by which the appointment of First Commissioner of Works is made on merely political grounds, without any reference to special acquaintance with architectural work. We happen to have a very capable First Commissioner at present, but it is merely by a kind of fortunate accident; the system of appointment does not ensure it, and we have had a good many very incapable ones who did a great amount of mischief. The writer is mistaken also in saying that the

* Concluded from last week.

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designs for the War Office and the Great George-street offices had been severely criticised; they never were so far as we know; what was severely criticised was the action in regard to them of the Government and (in the case of the Great George-street block) of the Office of Works itself; the writer appears to have mixed up two totally different things.

The *Berliner Architekturwelt* is almost entirely occupied with the description and illustration of the Fest-Halle and adjoining gardens at Mannheim designed by Herr Bruno Schmitz. This seems to be going beyond the "Berlin architecture-world," as far at least as the work is concerned. The plan of the Mannheim Palace shows two blocks at right angles; a front one, rectangular in plan, containing the smaller concert-hall on the first floor, with a *salle des pas perdus*, or, as it is here called, a "Garderobe vestibule," on the ground floor; at right angles to this projects a larger concert-room with a semicircular termination, and a large chorus platform, evidently intended for those choral *lieder* performances on a large scale of which the Germans are so fond, and which they execute in a style to be found in no other country. Architecturally the block of building is rather remarkable and original, though marked by that restlessness and striving after novelty which is the bane of so much contemporary German architecture. The general lines of the building are based on classical architecture, but with exceedingly free treatment of details and a liberal employment of symbolical decorative sculpture. Part of this is grouped about two twin doorways, called respectively "Beethoven-Portal" and "Mozart-Portal," each with a colossal bust of the composer named, over the doorway, and symbolical figures on the flanking pilasters and over the cornice; also a pinnacle on each angle formed of an eagle treated with an Egyptian severity of line, which is the best bit of detail in the whole. The sculptured figures (apart from the eagles) appear to be on four different scales; the symbolism in the figures is certainly not sufficiently distinctive to characterise two such different arts as those of Mozart and Beethoven; and as to harmony or reserve of line, it does not seem even to be aimed at; the whole thing may be described as a kind of inspired scramble. This is a great pity, seeing that the idea embodied in these sculptured portals is a fine one, and the treatment in detail is in many ways original and suggestive; but there seems to be a total want of the perception of decorative treatment of the composition as a whole. The *ensemble* of garden effect shown in the general sketch of the lake, fountain, water-tower, and pergola is very good.

In the *Antiquary* Mr. Dukinfield Astley concludes his "Ramble round Thetford," and Mr. J. A. Clapham contributes a short but interesting article on "The Marmion Chapel and Tower" on the banks of the Ure, which brings within the historical pale a name that we are accustomed to think of only in connexion with the imaginary nobleman and warrior of Scott's poem. The Marmions, however, were a real family; Scott, with his instinct for fine-sounding names in poetry, probably attributed his questionable hero to that family purely on account of the heroic sound of the name. The Marmion tower was once the gate-tower of Tanfield Castle, and in Tanfield Church is the Marmion aisle, containing the sculptured tombs of various members of the Marmion family. Among the "Notes of the Month" we read that those who are carrying on the interesting discoveries at Caerwent are very anxious about funds to continue the excavations. The work, we are told, has already excited great interest among scholars in Italy and Germany as well as in our own country. Near the north city wall a building that appears to be an amphitheatre has been uncovered, and in another quarter an interesting house has just come to light. To finish this year's work nearly 200*l.* is required, and there seems, unfortunately, to be little expectation of obtaining it. In any other country but this public money would be devoted to continuing such a work; but England is hopeless in this respect. Those who wish to subscribe can communicate with Mr. A. Trice Martin, the Hon. Treasurer to the Caerwent Excavation Fund, at Bath College, Bath.

To the *Monthly Review* Mr. Langton Douglas contributes a well-written and valuable article on the artistic work of Duccio, with illustrations from several of his principal known works.

In *Harper* Mr. G. W. Ritchey, of the Yerkes Observatory, gives an account of recent photographing of the moon, with some fine illustrations, reproduced from photographs. It is hoped that by the use of telescopes of much greater focal length than have been hitherto used, photographs of the lunar surface to a much larger scale and with much fuller detail than has hitherto been obtained, will before long be practicable. With this object a telescope of 24-in. aperture and 165-ft. focal length is now being constructed under the personal superintendence of Mr. Ritchey, the writer of the article. Telescopes of this length are, of course, stationary horizontal tubes—they could not be worked on any other method, the image of the moon or other object to be observed being reflected into them by a clock-driven mirror. The instrument referred to will, when completed, give a photographic image of the moon 18 in. diameter, after an exposure of from two to five seconds. But whether we shall see anything of much more interest than we can see now on the moon may be a question. If we could see the scenic effect of a lunar landscape, as if standing on the moon, it would be something to our sense of effect; but with the largest telescope we are still only looking down on the top of it and constructing the probable effect in our mind by calculation. We know already that it is a bare and desolate scene devoid of life, and we shall hardly know any more. The following comment by the writer of the article, in regard to the most remarkable and effective of his present photographs, is worth quoting:—

"No more imposing group of craters exists on the moon than that shown in the illustration—Theophilus, Cyrillus, and Catharina. Theophilus, the lower of the three, is 64 miles across, and is the deepest of all visible craters. The circular rampart ranges from 14,000 *ft.* to 18,000 ft. in vertical height above the gulf within. The central mountains, so well shown in the photograph, are more than a mile high. But the most striking features of this crater are the vast radiating ridges and ravines of its outer slopes: some of these can be traced for a hundred miles from the crest of the rampart. Can they be the remains of lava-streams which at one stage of the volcano's activity overflowed the crater's rim? Imagine the sublimity, and yet the utter desolation of the scene, if we could stand upon the crest of the rampart, and look out upon those thousands of square miles of gigantic radiating ridges, or turning about, look down into the vast amphitheatre, the crater-floor 18,000 ft. below. There is no scene on the earth which approaches it."

The *Century* contains an article describing "Yellowstone Park as it now is," and one by Mr. F. W. Stokes on "An Artist in the Antarctic," which however is more interesting on account of its description of the scenery and the *fauna* than of the illustrations, which are chromo-lithographs of somewhat too startling a vivacity to be accepted. "New Light on Lhasa, the Forbidden City," is of some interest, as it appears that the Kodak has in recent years enabled some adventurous unbelievers to obtain surreptitious photographs of portions of the city, but we do not get very much of the results in this article; the most interesting illustration is one of the half-ruined palace of the ancient Kings of Tibet at Lhasa; a collection of truncated pyramids in rubble-walling, with narrow windows, above each of which is some kind of rudely-formed projecting hood to keep the sun off.

In *Scribner* Mr. Montgomery Schuyler, under "The Field of Art," considers the question of "The Sky-scraper Problem." In architecture he considers that the sky-scraper is still *fera natura*, and has to be brought under the reign of law. In short, he implies that the question is already being raised, whether the law should not take more severe cognisance of the sky-scraper, and cut down its height, at all events in positions where it is a nuisance. Mr. Schuyler ends his article by misquoting a line of an English poet—

"And that which brings it to some perfect end."

"That which *shapes* it," it should be. Tennyson was so careful a literary artist that you cannot misquote him without spoiling either the sense or the sound, or both.

The *Church Builder* (quarterly) contains an illustrated account of the condition of St. Peter's Church, Astley (Worcestershire), together with the proposals for repairing and restoring it, not all of which are satisfactory. The church evidently wants much repair to put it into a fitting condition for use as a church, which is all quite right; but why is it "hoped eventually to substitute fifteenth-century windows for the present debased and modern ones?" What is the value of "fifteenth-century windows" inserted in the twentieth century?

We have received a copy of the first issue of a monthly periodical entitled *Everyday Electricity* (26, Cannon-street, Manchester). It is a popular journal describing the uses of electricity as applied to domestic and industrial purposes. An article by Mr. Perren Maycock on "Wiring Specifications" gives some useful hints as to drawing up a specification for the electric wiring of a building. A special feature of this journal is that expert opinions are offered free of charge to all readers who qualify for this "privilege" by paying six months' subscription (1*s.* 6*d.*).

The current issue of the *Architectural Record* (New York) contains illustrations of a wooden church built in 1787 in the Connecticut Valley. It is to-day in practically the same form as when originally built, and though nearly deserted by the removal of the larger part of the surrounding population, is still kept in thorough repair by the remaining inhabitants, who rightly value it for its traditions and its excellent design, which is one of simplicity and dignity suitable to a church, even though built of wood. A note on the "Improvement of the Chandelier for Gas and Electric Lighting" deals with the improvement of patent chandeliers, and professes to admire their artistic attempts towards merit. As a matter of fact, there are only about half a dozen firms who make sensible and beautiful light fittings, and these the writer of the present article and the large majority of the public would pass over with contempt! Emerson says somewhere "that the line of beauty is the line of perfect economy," a truth recognised by all true craftsmen, but by very few else. The architects' portfolio shows a beautiful view of Saint Ouen, Rouen, and three instances of good modern buildings.

APPRENTICESHIP IN ENGINEERING TRAINING.*

The subject of this discussion is wide and complex, and as the scope of the title may be misunderstood it is well at the outset to make it clear, although it may seem, at the same time, to be extended and restricted. "Engineering" is to be understood as including all branches—to be, in fact, civil engineering in the wide meaning of the term. The use of the word "apprenticeship" may, to some indicate that only one or two branches of engineering are to be considered, and to others it may seem that it is the training of the workman which is to be the subject of the discussion. But an apprentice is simply a "learner"; whatever be the branch of engineering, or whatever be the aim or the ultimate end of a young engineer—whether he is to be a workman, or whether he is to be an employer—during his apprenticeship he is a learner. The title, therefore, includes "pupil," although this term is sometimes used to distinguish a learner in certain branches, while in other branches it is used to distinguish the "paying" apprentice who aims at being an employer or designer, from the "paid" apprentice who becomes a workman. These extended definitions embrace too wide a field, and it is necessary to limit it by confining ourselves to the training of youths who are destined to be employers, manufacturers, or consulting engineers, designers, heads of departments, technical managers, and men in responsible positions. Whether or not such an apprentice should pay or be paid is a matter for the decision of individual engineers, or engineers in different branches, and this question may, therefore, be left out of the discussion.

Until the beginning of the last century entrance into the trades and the professions could only be obtained by means of an apprenticeship extending over seven years, during which the apprentice was bound to serve a master, who on his part undertook to keep the apprentice and to teach him his work. The system, as it then was, led to many abuses, and the Act of 1814 was designed to counteract these. It opened wide the doors to all except a few professions, and no restriction was placed either on the manner in

* An address by Professor John Dewar Cormack, B.Sc., A.M.Inst.C.E., delivered in June before Section III. (Machinery) of the Engineering Conference of the Institution of Civil Engineers.

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which a youth learned his future occupation, or the duration of his training. At that time engineering, except in a few branches, was just emerging from its position among the crafts. The removal of the restrictions to entrance may have been harmful in some ways, but at all events it allowed free entrance to many men who, although trained for other pursuits, became pioneers in different branches of engineering. Although the restrictions were removed there still remained the idea that the proper way to become an engineer was to spend a period of five years or seven years in the workshop or office. Probably, then, in the existing state of what we are now proud to call the profession this was desirable, but now, after a century which has seen vast developments in engineering practice, and during which, with ever-increasing rapidity, scientific discovery is turned immediately to practical utility, it seems reasonable that some more generally recognised system of apprenticeship should be devised or recommended to suit the new conditions.

The inadequacy of the old system of apprenticeship has been realised for some time; so long ago as 1866, Sir John Fowler laid stress on the importance of combining the study of science and engineering theory with the ordinary apprenticeship. Since then it has become more generally recognised that the proper training for an engineer involves training both in theory and practice, and this has for the past seven years been emphasised by the Institution in demanding a knowledge of theory from candidates for Associate membership. When the technical education fever was at its height, opinion, to some extent, went to the other extreme, and it was thought by many that at last we had arrived at the solution of the problem. The numerous universities and technical colleges were expected to be able to turn out young engineers equipped not only with the necessary technical knowledge, but with experience gained in the college workshops.

In the United States and on the Continent this system of training has been, to a large extent, adopted, but there are indications of an increasing tendency to diminish the workshop practice in the colleges, and to substitute a training in workshops under commercial conditions. Especially in the case of the United States does one see excuse for such a system, for the extraordinary rapidity of the increase of engineering business there has created a corresponding demand for young men, possessed of scientific knowledge and some technical training, and capable of filling responsible positions. In this country, however, starting with a pre-eminent position in engineering, we have advanced with the times, perhaps at a less rapid rate than elsewhere, but still with sufficient prosperity. Interest in the training of young engineers has not been so generally aroused. Biassed as some were by the old traditions, infected as were others by the technical education fever, the advice given to our young engineers has been very varied, with the result that at present training is, in some quarters, found to be in a rather chaotic condition.

The ever-increasing keenness of international competition urges us to a solution of the problem, and this alone should be sufficient; but the call seems still more emphatic when we remember that the function of the engineer is "to direct the sources of power in nature to the use and convenience of man," and realise his cosmopolitan duties. The beneficial directing of the forces of nature implies a knowledge of the laws governing their behaviour. The definition of the title "civil engineer" demands from him both theoretical knowledge and practical experience, and in this discussion I think we may take as agreed that both are essential in the training of the engineer.

The Institution has for many years devoted most careful attention to the conditions of training which should be fulfilled by those coming under its purview. The "regular training" prescribed by its by-laws is defined by the Council's rules to involve a *minimum* period of three years' pupilage or training as an assistant, where the standard of education is simply that required for admission as a student; and such *minimum* period of practical training may be reduced to two years where a recognised college course of study is taken. In each case the practical training must comprise both experience in the office and in or upon the works.

The Institution clearly contemplates a scientific and a practical training for all, and, taking this as a matter of common agreement, the questions to be discussed are:—

1. How should the knowledge and experience in each be acquired?

2. Is there any arrangement suitable for all branches of engineering, and if not, what modifications are required for the different branches?

3. Over what period of time should the complete training extend, and what is the best arrangement and division of the time?

Let us look for a moment at the raw material and the finished product, leaving out of account the genius who may achieve eminence in engineering without special training. The raw material is a youth of seventeen or eighteen, fresh from school, educated, perhaps, to a standard below that which might be desired or expected, and supposed to be endowed with common sense, natural aptitude for the profession, and sufficient physical strength; and the finished product is a blend of scientific and technical knowledge, practical experience, and business method. Our colleges should supply the first two requirements, but I venture to submit that the last two can only properly be acquired in the workshops and offices, and that no training can be considered efficient that does not include a considerable period of practical apprenticeship. Colleges may supply knowledge relating to the properties of materials, the theory and structure of machines, instruction in testing and in the methods of attacking new problems; but it is only under actual commercial conditions that there can be acquired the proper type of practical experience, adequate knowledge of the design and construction of machines, experience of and sympathy with the workman. It is in the factory or office that there can be gained, by observation and imitation, some knowledge of routine, estimating, organisation, and management, business methods and administration, the production of the maximum amount of work with the minimum friction and at the minimum cost. Imitation of good example counts for much in engineering as in other professions, and to this, no doubt, can be largely traced the continuance of the success of our national engineering, despite our comparative slowness in advancing with the times. It is in this respect that Continental and American systems of training will be found deficient. There the young engineer is launched into his future occupation after a college training of four or five years with workshop experience gained, especially in America, only in the college, and with sometimes a total commercial experience of a year or less.

It is seldom that a youth when he enters the profession knows what special line he will eventually follow. The organisation of this Engineering Conference indicates at least seven important branches of the profession. He may be trained as a mechanical engineer and eventually end as a railway engineer, an electrical engineer, or a naval architect. There is no broad line of distinction, the branches being so closely related. The mechanical engineer must not build machines without considering the purposes for which they are intended. The dynamo manufacturer cannot look at a combined set solely from the commutator or collector end; the railway engineer cannot confine his knowledge to the finished girder or the finished locomotive, and the naval architect is not concerned simply with the lines or hull of a ship.

Underlying all branches there is to some extent the same practical foundation. All demand knowledge of the properties and uses of materials of construction, and of the methods and processes by which they are converted into structures and machines. In many of the branches it is generally realised that a man must go "through the shop," and after all, the processes in one "shop" do not greatly differ from those in another. Workshop experience is not, however, generally included in the training of all engineers, but surely it is desirable for all, and especially and increasingly so when steel has displaced to a large extent masonry and timber, when all types of motors bulk largely in their work, and when machines of all kinds are utilised to construct to their designs.

If it is considered desirable that the training of all engineers should include experience in suitable workshops and factories, specialisation being confined more or less to the drawing-office, the question under discussion is limited to the consideration of the time required, and the best division of that time between the college and the workshop. The duration of training depends to some extent upon the arrangement of the course; but, probably, it may be safely said that to produce the ideal young engineer the training should extend over five or six years, which might be about equally divided between the college and the workshop.

Is there any one system that is the most desirable? I leave it to discussion chiefly by engineers in practice, as I feel certain that the colleges are anxious to have a solution of this problem, and to adapt their courses to any scheme or schemes that may be thought desirable.

In this country at the present time the systems in operation might be classed as:—(*a*) 1 and 2, "separate" systems; (*b*) 3 and 4, "combined" systems; (*c*) 5 and 6, "compromises."

1. *Workshop only.*—This is a survival of the old traditions. It demands physical exertion during the day and mental strain at night if theory is to be acquired. Many eminent men in the past have undergone the strain and emerged successfully; but in the future the ever-increasing demand upon the engineer will render it unpractical, and almost impossible. Many clever youths enter the shops on this system with limited opportunities but with great ability, and provision should be made for them in any scheme of training.

2. *College only.*—This has already been alluded to. Under exceptional circumstances, such as obtain in the United States, it may be expedient, but it is undesirable.

3. *Works before College.*—A youth entering college after, say, three years in the factory and office is in many respects a good type of student. He has gone through the shops at the receptive and imitative age; he has ascertained whether engineering is still to his liking, and comes to college with a knowledge of processes, materials, and machinery. He has some idea of what he wants to know and what branch he wishes to enter; but has often wrong theories which are difficult to uproot. Teachers prefer this type, provided he has continued his studies during his apprenticeship; but this is not always or even generally the case. The youth may have forgotten much of his school training, and, what is worse, he may have forgotten how to study. If he has studied it is under trying conditions, when he is physically tired, and he may wish to confine his studies to the more interesting technical subjects, the science underlying them being more or less neglected, and in consequence his progress is less rapid. He comes to college probably disinclined to begin again and gain the scientific knowledge which ought to precede all its applications.

4. *College before Works.*—A youth fresh from school and sufficiently educated is likely to make good progress in his scientific studies. In the technical work he is handicapped by his want of knowledge of manufacturing processes and the operation of machines, and is unable to associate his theoretical studies with practical examples of which he has had experience. Laboratories help to some extent to reduce the handicap. If this was to be the standard training there would be a greater plea for college workshops, which would supply some little practical experience, but which could not supplant, even partially, the workshop training under commercial conditions. Some may urge that this system produces a man disinclined to undergo what he calls the "drudgery" of the workshops, but others will be as ready to admit that the proper type of youth acquires his practical experience at a much more rapid rate after he has undergone a college training, and has no such disinclination. This system may be preferred by employers as distinguished from system (2), which may be preferred by teachers.

Other systems are in vogue, either by accident or design, whose object is to avoid the disadvantages connected with "separate" and "combined" systems or to minimise the required period of training.

5. *Intermittent Systems.*—These include the Works-College-Works and College-Works-College systems. Many arguments can be advanced by the advocates of each. The first arrangement has to a lesser extent the disadvantages attached to system (3), and the latter system those of system (4). Both waste time in so far as the usual college terms extend over only nine

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months of the year, and the remaining three months may be wasted, as few engineers care to take youths for three months in the year. But probably, on the whole, this system is preferable to (3) or (4). In the College-Works-College system the youth fresh from school has an opportunity of acquiring a foundation of science on which to rest his works' experience; but if study is not continued his knowledge may evaporate in the works, and at the end of his training he is out of touch with his employers.

6. *Sandwich System.*—This system goes one step further. During a period of, say, five years training, for four years, six months of each year are spent in the factory or office and six months in the workshops, and the additional year is spent in the workshops or office. It lessens the discontinuity between the two parts of the training and effects a saving of time, inasmuch as the college long vacations are utilised. An objection which may be put forward is that the youth is always "on the move." He has no time to settle down to either the workshop or college work, and he may have difficulty and extra expense in arranging for lodgings. It must not be forgotten, however, that each part of his work forms a recreation for the other, and the student is likely to return to each with considerable keenness.

7. *Concurrent Systems.*—These either give time for study in classes in connexion with workshops, or offer workshop training in connexion with college. Both systems have already been alluded to.

The objections to (1) and (2) may be applied here. Time taken off the workshops for study gives less time for the practical experience, and this is not acquired under strictly commercial conditions. Except in the very largest works it is impossible to provide the requisite standard of teachers, and if it is necessary that the youths should breathe the atmosphere of the shops, probably it is perhaps equally necessary for him to breathe the atmosphere of the college.

The list may not comprise all the systems in vogue, and the arguments for and against them are merely indicated, but it serves to emphasise the diversity of the ways in which a youth may enter engineering. Is it not possible, at least to some extent, to standardise the training?

Leeds Water Supply Arbitration.—Lieut.-Colonel W. H. Wellsted, the umpire upon the claim recently heard at Westminster of Lord Masham against the Leeds Corporation, has just issued his award. The arbitration had reference to the compulsory acquisition of 395 acres of freehold land, belonging to Lord Masham, for the purposes of the Leeds new waterworks. The claim was for 196,000*l.* The valuations of the expert witnesses called by the Corporation amounted to 27,000*l.* The umpire has fixed the amount of purchase at 46,489*l.*

Rebuilding of Business Premises for the Stowmarket Co-operative Society, Ltd.

The new buildings which are now being erected in Bury-street will consist of a grocery and a boots shop on the ground floor, entered from the street through a common lobby. An oak staircase from this lobby to the first floor will form the entrance to the committee-room (27 ft. by 16 ft.), secretary's office, lavatories, &c., and a large room (33 ft. by 24 ft.) for a proposed future department of the Society's business. Under the shop there will be a large basement with heating chamber, and a warehouse at back, two stories in height.

The whole of the woodwork of the front is being carried out in oak, with red brick facings, and green glazed bricks under the shop fronts. The overhanging gables will be finished in rough cast, with ornamental plaster panels executed by Mr. Geo. P. Bankart, of Bromesgrove.

The shop fittings are being made by the Wholesale Co-operative Society, Ltd., Broughton; the steel casements by Messrs. Henry Hope & Son, Birmingham, and the constructional steel work is being supplied by Messrs. Drew-Bear, Perks, & Co. The heating will be by low-pressure hot water with radiators, and the lighting by electricity.

The builders are Messrs. Scales & Robins,

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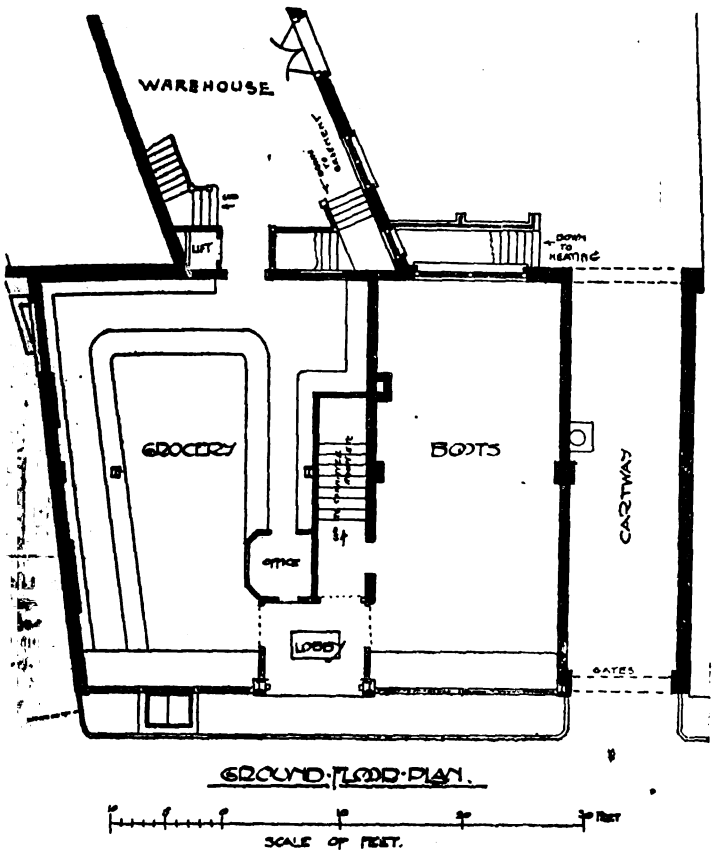

Stowmarket Co-operative Society's Premises.

Cambridge, and the architect, Mr. Philip J. Turner, of Stowmarket, Suffolk, and Westminster, S.W.

COMPETITIONS.

SOLDIERS' MEMORIAL, KINGSTON-UPON-HULL.—The first premiated design in this competition was by the Leeds Slate and Marble Co., Ltd., Leeds, and the second by Messrs. J. Whitehead & Sons, London.

MAIDENHEAD LIBRARY COMPETITION.—We are informed that there was a slight error in our paragraph under this heading last week. Messrs. A. McKewan, A.R.I.B.A., and G. H. V. Cale, of Birmingham, were placed second by the assessor, not "McEwen & Kale," though we may say that we printed the information as it was sent to us.

ELECTRICITY FOR SMALL HOSPITALS.*

ALTHOUGH electric light is now fairly universal in large hospitals, it is too seldom adopted in small institutions situated in more or less remote districts where public supplies of electricity are not available, and in many small institutions where the engineering equipment is of very limited character. Moreover, the convenience and economy of electricity for the provision of power and heat in hospitals are still inadequately recognised.

In districts where current is obtainable from the systems of municipal or industrial corporations, it may often be thought advisable to buy the current required. Such a decision may be influenced by the laudable desire to support an industry conducted by the local authority; by the low rates charged in a particular district; or, in the case of a very small hospital, by the consideration that outlay for the establishment of a separate source of supply would be unjustifiable. The sale price of energy varies very much in different places, and not always proportionately with the price of coal, which is the factor chiefly governing the cost of actual production. In many districts those employing current for power receive specially favourable terms, and this introduces another element for consideration. Charges for lighting are almost invariably based upon what is termed the "maximum demand system," according to which the rate for the first hour is generally double the rate for succeeding hours. This method has the effect of levying from all consumers a fair proportion of expenses incurred over and above the actual cost of energy at the works, and it also has the advantage of encouraging the consumption of current for a larger number of hours. To illustrate the variable nature of charges, some figures are quoted in Table I. from accounts recently published for the year 1902. Although these data were not specially selected, they show fairly well the rates prevailing in towns where local conditions are essentially different.

Table I.—Charges for Light and Power in 1902. In Pence per Board of Trade Unit.

Place.	Light.	Power.	Average (net).
Huddersfield	4·5d.	2·5d. & 1d.	3·75d.
Hull	5d. & 2d.	2·0d. & 1d.	3·80d.
Northampton	6d. & 3d.	2·0d.	4·70d.
Worcester	4·7d. (average)	3·48d (average)	3·77d.

While the general average is only 4·00d. per unit, considerably more is payable for energy used for lighting, and inspection of the figures shows clearly that the purchase of current is less advantageous for hospitals where electricity is employed for lighting alone, than for those where it is utilised in the provision of both light and power. On comparing Tables I. and II., a very important difference is seen to exist between the sale price and the cost of energy, and, moreover, the sale price does not appear to be governed by the works cost. The difference between cost and sale prices is accounted for by the expense of distribution, general trading expenses, and profit. In the case of a public hospital, the equipment of a generating station involves no liability in respect of rent, rates, and taxes, and its operation adds practically nothing to the cost of management. All modern hospitals possess steam boilers and auxiliary plant, and thus the motive power for generation can be furnished at far less cost than in an establishment where boilers have to be specially worked for electrical machinery. The cost of attendance will be very little increased, or may not be increased at all. It is a generally accepted rule that a given product cannot be manufactured so economically in small establishments as in large works, but there is reason for anticipating that the cost rate per unit of electricity generated in a public institution should be less than the average sale price charged by electricity supply corporations. It may here be added that, according to a recently-published summary of electric supply records for 1901, the average works cost in Great Britain was 1·74d., and the average price obtained for light and power was 4·47d. The highest and lowest prices were 7·06d. in Harrow, and 2·41d. in Prescot.

Table II.—Works and Distribution Cost of Electric Energy in 1902. In Pence per Board of Trade Unit.

Items.	Huddersfield.	Hull.	Northampton.	Worcester.
Fuel	·37d.	·84d.	·46d.	·63d.
Water & Engine-room Stores	·05d.	·07d.	·04d.	·07d.
Wages for Generation, Distribution, &c.	·44d.	·53d.	·69d.	·44d.
Maintenance	·31d.	·31d.	·33d.	·31d.
Totals	1·17d.	1·75d.	1·52d.	1·45d.

We will next inquire into the probable cost of producing energy in a hospital generating-station. In the first place, it may be convenient to define the machinery and appliances required, and to indicate the relation between capital expenditure and output.

The absolute essentials of a generating plant are the following:—

1. Prime mover—furnishing motive power by the agency of steam, gas, or oil;
2. Dynamo—generating current at the required voltage;
3. Main switchboard—for the regulation and distribution of current.

To these it is usually desirable to add—

4. Storage battery—the cells varying in number with the required voltage, and in capacity with the discharge in ampere-hours.

Steam and other engines are now provided with such efficient means of control, and dynamos are made to run so steadily that the storage battery is not so much a necessity as a convenience. In hospitals where electric energy is simply used for lighting, the generating set is, or ought to be, quite separate from the engine employed for driving laundry and other machinery, and the installation of a battery permits the storage of electricity during the day, when steam can conveniently be spared. Thus the generating plant need only be operated for a few hours daily, and current required in the evening can be drawn entirely from the battery. In cases where energy is applied both for light and for power, the battery can be slowly charged throughout the day, and used (either alone or in conjunction with the generator) for carrying the evening load. As the voltage required for charging a battery is about one-third more than the normal voltage, it is evident that some means of adjustment must be provided if charging is to be conducted while the generator is being used for other purposes. The most satisfactory method is to add a machine of the type known as a "booster," which is capable of raising the voltage of current from the ordinary circuit to the voltage necessary for charging. As usually made, the booster consists of a small dynamo and a motor of suitable power, combined to form a self-contained and very compact machine. The booster is also made without the motor, and in this form it can be driven from the shaft of the main generator, or in any convenient manner. In special cases, where highly-fluctuating loads occur, owing to the sudden starting of machines absorbing considerable amounts of power for a few moments, a booster can be applied in connexion with a small regulating battery, and so connected that the average current of the variable load may be suppled as a constant load, the battery being charged while there is little or no demand for power, and discharged heavily when the momentary strain comes on; thus adding to the normal supply from the booster sufficient current to meet the augmented demand. Such an arrangement prevents injurious shocks in the generating set, and various unsatisfactory disturbances of the service generally.

For the purpose of affording a basis for calculation, a small power station recently

* Part of a paper by Mr. W. N. Twelvetrees, A.M.I.E.E., M.I.Mech.E., read at the recent Sanitary Institute Congress at Bradford.

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equipped under the direction of the author will be taken as an example. This installation was designed simply for lighting, but it would be quite capable of dealing with a moderate power-load in addition. The capacity of the plant is 10 kilowatts, or 100 amperes at 100 volts, which is sufficient for the continuous supply of 155 16 candle-power lamps. The storage battery has a capacity of 216 ampere-hours when discharging in six hours, and the rate of discharge is then 36 amperes per hour. This capacity is sufficient for the present requirements of the institution, and is equivalent to annual output of about 8,000 Board of Trade units. Motive power is provided by a quick-revolution vertical engine, operating a belt-driven bipolar continuous-current dynamo, and steam is furnished from the boiler provided for the general supply of heat and power for ordinary purposes. The cost of the machinery and plant, erected in working order, was 475*l.*; but to this should be added the amount of 100*l.* to cover the increased cost of boilers, owing to the higher pressure necessary for the electric-light plant. The total capital expenditure is thus brought up to 575*l.*

In considering the further outlay required to make the plant available for power as well as for light, it is only necessary to add the cost of providing and fixing a booster, say, 100*l.*; as the value of the laundry engine and auxiliaries is about the same as that of the electric motor and fittings that would be required instead. Thus, 675*l.* represents the total capital value of the plant for light and power. If fully employed for light and power during five days a week, and for light alone during the remaining two days, the annual output would become 23,000 units.

Calculated upon the amounts stated above, the annual repayment of principal with interest at 3 per cent., extending over twenty years, would be 40*l.* for lighting alone, or 47*l.* for light and power. The amount to be included in the total cost of energy on account of repayment and interest is consequently 1·2d. per unit in one case, and 0·5d. per unit in the other.

In a steam plant, coal is the chief item for consideration. Taking the consumption at 7 lbs. per brake horse-power, or, say, 10 lbs. per kilowatt, the cost with fuel at 15s. per ton comes out at 0·8d. per unit. Water and engine-room stores may be put down at 0·07d. per unit; an increase of 1s. a day in the engine-driver's wages would represent 0·55d. per unit on the output of 8,000 units, or 0·2d. per unit for the output of 23,000 units. Including 5 per cent. on the value of the plant for maintenance and repairs, and including also the items in respect of repayment and interest, we have the figures stated in Table III.

Table III.—Estimated Cost of Electrical Energy in Hospital Installation. In Pence per Board of Trade Unit.

Items.	Light only.	Light and Power.
Fuel	·80d.	·80d.
Water and Engine Room Stores	·07d.	·07d.
Attendance (extra)	·55d.	·20d.
Maintenance	·75d.	·37d.
Works Cost	2·17d.	1·44d.
Repayment and Interest	1·20d.	·50d.
Total Cost	3·37d.	1·94d.

Results such as these are only to be attained if the entire plant is properly designed and managed. The efficiency of all details must be considered, and capacity must be duly proportioned to the required duty. The boiler plant must be designed so that perfect combustion of the fuel may be secured, stoking should be effected by mechanical means, and the excess heat contained in the furnace gases should be utilised by the employment of fuel economisers. Every available means should be adopted for utilising exhaust steam and water of condensation, and loss of heat from the surfaces of the boilers and steam-pipes should be minimised by suitable non-conducting material. Unless precautions such as these be taken, the cost of electricity will be materially increased, although it is most likely that no accounts will be forthcoming to demonstrate the fact.

So far as structural work is concerned, very little outlay is involved in the application of electrical plant in a hospital. In new buildings the dimensions of the ordinary boiler-house need not be increased, unless space has been unduly economised; an engine-room of average size will be ample for the generating set and main switchboard, but space must be found for the accommodation of the storage battery. The battery-room must be well ventilated in such a manner that acid vapour may be discharged at a sufficient distance above the roof. The floor should be asphalted or tiled, and made with a suitable fall to prevent the accumulation of water, and the interior walls, roof, and timber fittings should be protected with acid-proof paint. In existing buildings, where boilers are already provided, it will generally be necessary to extend the boiler-house to afford space for the addition of another boiler. If this should be impracticable, or, owing to exceptional circumstances, undesirably expensive, it may be advantageous to leave the boiler-house as it stands and to make use of a gas or oil engine for the provision of motive power.

The internal combustion motor has several advantages which commend it for use in connexion with electric generators. In places where steam is not required for other purposes, this type of engine provides power more cheaply than the steam engine, and one great advantage it possesses is that of adaptability to intermittent work. When the engine is stopped the consumption of fuel instantly ceases, whereas in the case of the steam engine, there is continuous waste of fuel during the intervals of work. Hence the internal combustion motor is particularly suitable for very small institutions, where the general demand for steam is of limited extent.

Only a year or two back the running of the gas engine was far from satisfactory, but at the present time several well-known firms are making special types of electric light engines that give a perfectly steady current without the application of a fly-wheel to the dynamo, as was formerly necessary. Another improvement is to be found in the diminished consumption of gas, and various engines are now to be obtained in which the volume required per brake horse power is between the limits of 15 cubic ft. and 25 cubic ft. per hour. As our attention is devoted particularly to electricity for small hospitals, we will take the consumption of gas at the upper limit of 25 cubic feet per b.h.-p., or, say, 37·5 ft. per kilowatt. With gas at 2s. 6d. per 1,000 cubic ft. the cost of energy works out at about 1·12d. per unit. Substituting this value for the cost of coal given in Table III., we find that the total cost of generating energy in a gas-driven plant to be 3·69d. per unit for light alone, or 2·26d. per unit for light and power. At the average rate of 30 cubic ft. per kilowatt, the cost of production would be 3·47d. in one case and 2·04d. in the other. No alteration is necessary in the item referring to repayment and interest, because the higher cost of the gas engine practically balances the saving in respect of the amount allowed for increased boiler power.

Before leaving gas-engines, it may be well to direct attention to the efficiency of gas employed in direct lighting, and in electric lighting through the medium of a gas-engine. The amount of light furnished per cubic foot per hour by the three best-known forms of gas-burner is stated in Table IV., the burner in each case being new and in perfect condition.

Table IV.—Light Given in Direct Lighting by One Cubic Foot of Gas.

Type of Burner.	Candle Power.
Batswing	2·75 to 3·00
Argand	3·00 to 3·50
Incandescent	12·00 to 15·00

When consumed in a gas-engine at the rate of 37·5 cubic ft. per kilowatt, each cubic foot of gas will give 0·65 candle-power in the form of electric light—approximately 2·3 times the light furnished by an ordinary burner, twice that by an argand burner, and half that by an incandescent burner. Although the superiority of the incandescent burner is very marked at first, its economy is not maintained. In about 100 hours the efficiency has fallen off more than 25 per cent., and in 300 hours more than 33 per cent. Similar loss of efficiency is found in the incandescent electric lamp, but not in the same degree, for the original candle-power is not diminished by 33 per cent. until the lamp has been used for some 600 hours.

A matter of much importance, from the hygienic standpoint, is the effect of illuminants upon the atmosphere of the space in which they are burned. The following table, taken from Dr. Louis Bell's recent work, "The Art of Illumination," gives the approximate effects produced by the combustion of oil and gas, so far as concerns vitiation of the air. The fact that each ordinary gas burner will vitiate the air of a room to the same extent as five adult persons is a strong argument in favour of electric

Table V.—Vitiation of Air by the Combustion of Oil and Gas (Bell).

Illuminant.	Quantity per hour.	Candle-power.	Oxygen consumed. C. ft.	CO_2 produced. C. ft.	H_2O Vapour C. ft.	Vitiation = adult persons.
Paraffin oil	992 gr.	16	6·2	4·5	3·5	7·5
Kerosene oil	1,069 gr.	16	5·9	4·1	3·3	7·0
Gas (batswing)	5·5 c.f.	16	6·5	2·8	7·3	5·0
,, (Argand)	4·8 c.f.	16	5·8	2·6	6·4	4·3
,, (Welsbach)	3·5 c.f.	50	4·1	1·8	4·7	3·0

light, and the enormous hygienic advantage to be gained should alone be sufficient to justify its adoption in place of gas, even at a slightly increased cost. Another argument in favour of electric light is to be found in the deterioration of painted, distempered, and other surfaces in buildings where gas is employed for direct lighting, and it is possible that the cost of re-decoration may frequently equal, if it does not exceed, the difference between the two methods of illumination.

The oil-engine offers another alternative to steam for the generation of electrical energy. In many parts of the country it will be found more convenient and more economical than the gas-engine. For small country hospitals, where no public supply of gas is available, the oil-engine often presents the most economical means of providing motive power for the generation of electricity. In design the oil engine is practically the same as the gas-engine, with the addition of a vaporiser at the end of the cylinder. Any common form of petroleum oil may be used, such as Royal Daylight, Tea Rose, Broxburn, or Russolin. These and other oils of the kind are readily obtainable in any part of the country, and they have the recommendation of being both cheap and safe. The consumption in well-designed engines, as small as seven brake horse-power, is not more than 0·82 lb., or one-tenth of a gallon, per brake horse-power. Allowing 1·2 lbs., or 0·15 gallon per kilowatt, the cost of oil at 4d. per gallon does not exceed 0·6 per unit of energy produced. Substituting this value for the cost of coal as stated in Table III., we find the total cost of energy from an oil-driven plant to be 3·17d. for light alone, or 1·74d. for light and power. As before, no alteration has been made in respect of repayment and interest, as the value of the plant remains practically unaltered.

Comparing the efficiency of oil used for direct lighting, and for lighting by electricity through the medium of an oil engine, we find a considerable advantage follows the latter method of procedure. Table VI. contains a summary of some results obtained by Professor Vivian B. Lewes from a selection of twelve different lamps in use at the present day:—

Table VI.—Consumption of Oil in Direct Lighting, in Grains per Candle-power per Hour (Lewes).

Type of Wick.	American Oil.	Russian Oil.
Circular	60·32	75·11
Flat, Single	62·63	74·00
,, Duplex	53·70	51·15
Average	58·88	66·75

Taking the general average of 63 grains per candle-power as the basis of calculation, we find that the consumption of 63 grains of oil in an engine, at the rate of 1·2 lbs. per kilowatt, would produce 1·87 candle-power in the form of electric light, nearly double the amount obtained by direct lighting.

Reference to Table V. will show the effect produced upon the atmosphere of a room by the direct combustion of paraffin and kerosene,

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and it will be seen that the volume of CO_2 is from 150 per cent. to 250 per cent. greater than that due to gas, and that one oil burner in the room has the vitiating power of from 7·0 to 7·5 adult persons.

Another form of fuel which is rapidly coming into general use for internal combustion engines is known as producer or power gas, a product which is destined to effect great changes in existing methods of developing power. In some parts of the country arrangements are already being made for the distribution of this gas on a large scale, and as it can be produced from the cheapest forms of fuel, the sale price will probably not exceed 2d. per 1,000 cubic ft. Allowing for the lower calorific value of this product, which is about one-fourth that of coal gas, the equivalent cost would be about 8d. per 1,000 cubic ft. In a plant of the size previously defined, the use of power-gas would reduce the cost of fuel to about 0·2d. per unit, and the cost of electricity to about 2·77d. per unit for light alone, or to 1·34d. per unit for light and power.

Some of the general results already ascertained are summarised in Table VII., and the cost of gas and oil are stated in Table VIII., in a form convenient for comparison.

Table VII.—Estimated Cost of Electrical Energy in Hospital Installation. In Pence per Board of Trade Unit.

Motive Power.	Cost of Production.			
	Plant partly used.		Plant fully used.	
	Works cost.	Total cost.	Works cost.	Total cost.
Steam Engine: coal at 15s. per ton....	2·17	3·37	1·44	1·94
Gas Engine; gas at 2s. 6d. per 1,000 cubic ft.—				
Average consumption.....	2·27	3·47	1·54	2·04
Maximum ,,	2·49	3·69	1·76	2·26
Oil Engine: oil at 4d. per gallon	1·97	3·17	1·24	1·74

Table VIII.—Cost of Gas and Oil for Direct Lighting. In Pence for a Quantity Producing the Same Candle-power as One Board of Trade Unit of Electricity.

Illuminant.	Average of various Burners.	Batswing Burner.	Argand Burner.	Incandescent Burner.	
				New.	At 300 hours.
Gas at 2s. 6d. per 1,000 cub. ft.	1·55	2·61	2·30	·56	·75
Gas at 3s.	1.82	3·1	2·76	·67	·89
Gas at 3s. 6d.....	2·14	3·6	3·23	·78	1·05
Oil at 4d. per gallon..	1·22	—	—	—	—

It will, of course, be understood that these figures are merely intended to represent the cost of energy at the switchboard, or of illuminating material at the point of distribution. The figures relative to the generation of energy apply particularly to the installation which has been taken by the author as fairly representative of a small hospital plant, and although variations of output and working conditions have been considered, the results are not of universal applicability. Hence, it is impossible to institute an exact comparison between the calculated cost of electricity per unit, and the equivalent cost of gas and oil. Nevertheless, we may fairly assume that similar ratios will generally exist between the cost of the various methods of producing power and light.

The following conclusions may be drawn from the foregoing investigation:—

1. That electrical energy can be generated in a hospital of moderate size, even under unfavourable conditions, at a cost considerably lower than the average rate charged by public supply corporations.

2. That economical production is greatly aided by utilisation of the generating plant for power as well as for light.

3. That under favourable conditions energy can be generated at such cost that electric lighting becomes less costly than direct gas lighting when ordinary burners are employed, although more costly than gas-lighting by incandescent burners, and more costly than direct lighting by oil lamps.

4. That, in view of its deleterious effect upon the atmosphere, the combustion of gas and oil for the direct lighting of hospitals is distinctly inadvisable, and that these substances may be more advantageously employed in the provision of motive power.

5. That the facilities offered by modern gas and oil engines are such as to place electricity within the reach of all hospitals, for which the outlay upon generating plant has hitherto been regarded as unjustifiably heavy.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

AT the meeting of the Building Act Committee of the London County Council, held on July 27, being the day before the Council adjourned for the summer recess, the proceedings were governed by the clause in the order of reference which empowers the Committee at certain seasons to act on behalf of the Council in relation to matters included in the Committee's order of reference :—

Lines of Frontage and Projections.

Paddington, North.—Buildings on the north side of Harrow-road, Paddington, westward of No. 474, Harrow-road (Mr. J. H. Bethell for the London and South-Western Bank, Ltd.).—Consent.

Chelsea.—A block of water-closet buildings on the north side of Lots-road, and of a block of water-closet buildings on the west side of Upcerne-road, Chelsea (Mr. T. J. Bailey for the School Board for London).—Consent.

Dulwich.—The retention of a wooden porch in front of No. 9, East Dulwich-road, Camberwell (Mr. A. J. Walke).—Consent.

Holborn.—A projecting clock at the second floor level of Nos. 82 and 83, High Holborn (Mr. M. V. Treleaven for Messrs. Boots, Limited).—Consent.

Lewisham.—Two iron and glass porches in front of Nos. 14 and 16, Chudleigh-road, Lewisham (Messrs. J. W. Heath & Son).—Consent.

Lewisham.—The conversion into shops of the bay windows of Nos. 66, 68, 70, 72, and 74, Brownhill-road, Catford, and the extension of such shops (Mr. I. Davis).—Consent.

Norwood.—Twenty-one houses with bay windows and porches on the north-east side of Holmdene-avenue, Herne Hill (Mr. E. Evans for Messrs. Gray & Murphy).—Consent.

Peckham.—A one-story shop upon part of the forecourt of No. 20, Rye-lane, Peckham (Mr. E. J. Strevens for Mr. E. Swiffen).—Consent.

Rotherhithe.—A one-story shop in front of No. 256, Southwark Park-road, Rotherhithe (the Empress Tea Stores, Ltd.).—Consent.

Westminster.—One-story shops and an entrance porch in front of No. 121, Victoria-street, Westminster (Mr. J. B. Martin).—Consent.

Woolwich.—That the application of Mr. A. E. Habershon, for an extension of the periods within which the erection of three houses at the south-east end of Elm-grove, The Slade, Plumstead, was required to be commenced and completed, be granted.—Agreed.

Hampstead.—A brick and timber porch at the entrance to "Caldecotts," Elsworthy-road, Hampstead (Mr. W. Willett).—Consent.

Kensington, South.—A porch and bay window in front of No. 3, Addison-road, Kensington (Mr. H. T. A. Chidgey for Mr. A. Wright).—Consent.

Kensington, South.—An iron and glass shelter at the entrance of No. 50, Holland-park, Kensington (Messrs. S. Dowsing & Sons, Ltd., for Mrs. Young).—Consent.

Kensington, South.—An oriel window in front of the proposed fire-station on the north side of Clarence-mews, High-street, Kensington (Mr. O. Fleming for the Fire Brigade Committee of the Council).—Consent.

Lewisham.—Houses, with bay windows, on a site abutting upon the northern side of Perry-vale and western side of Sunderland-road, and upon a site abutting upon the eastern side of Church-road, Lewisham (Mr. J. M. Kennard for Mr. M. E. C Christmas).—Consent.

Marylebone, East.—Retention of a bay window in front of No. 16, Langham-street, St. Marylebone (Mr. A. J. Hopkins for Mr. T. Stevens).—Consent.

Paddington, South.—A wood and glass conservatory at the first floor level of Inverness House, No. 4, St. Agnes-villas, Bayswater-road, Paddington (Mr. H. J. Appleton for Mr. J. B. Kennedy).—Consent.

Westminster.—A projecting porch in front of the Royal Horticultural Society's hall, on the site of Nos. 77, 78, 79, and 80, Vincent-square, Westminster (Mr. E J. Stubbs for the Building Committee of the Society).—Consent.

Woolwich.—A projecting porch at the entrance to the Woolwich Town Hall on a site on the north side of Wellington-street, Woolwich, eastward of Upper Market-street (Mr. A. B. Thomas).—Consent.

Lambeth, North.—An addition to St. Thomas's Hospital, Lambeth Palace-road, to abut also upon Westminster Bridge-road, to the lines shown upon the plan, dated July 27, 1903, and (with the exception of any modifications that may be made by the President of the Royal Institute of British Architects) in accordance with the elevation submitted in connexion with the application of Mr. P. Currey on behalf of the Governors of the hospital.—Consent.

Wandsworth.—Houses on a site on the east side of Mitcham-road, Wandsworth, abutting also upon Vant-road (Mr. W. C. Poole for Mr. H. Keen).—Refused.

Hampstead.—A two-story building on the eastern side of Edgware-road, Hampstead, between the abutment of the Great Central Railway and No. 358, Edgware-road (Messrs. Done, Hunter, & Co. for Messrs. Neal Brothers).—Refused.

Kensington, South.—Buildings on a site abutting on the north-western side of Kensington-road and the eastern side of Melbury-road, Kensington (Messrs. Rolfe & Matthews for Messrs. Jones Brothers).—Refused.

Lewisham.—Nine houses upon the site of Walmer House, Perry Hill, Catford (Mr. W. Burrell for Mr. Leech).—Refused.

Marylebone, East.—Oriel windows in front of proposed buildings on the north-west side of Union-street, St. Marylebone, eastward of Candover-street (Messrs. Clark & Boulting for Mr. T. J. Boulting).—Refused.

St. George, Hanover-square.—A porch, water-closet and lavatory, with bay window over, in front of No. 7, Seamore-place, Park-lane, St. George, Hanover-square (Mr. J. A. Tregelles for Sir J. L. Mackay).—Refused.

St. George, Hanover-square.—A projecting wood and concrete bay window in front of the ground story of No. 17, Lower Belgrave-street, St. George, Hanover-square (Mr. W. Woodward, for Miss E. Kerr).—Refused.

Strand.—An iron and glass shelter in front of the Tudor Hotel, No. 80, Oxford-street (the Falkirk Iron Co., for the proprietors of the hotel).—Refused.

Wandsworth.—One-story shops in front of four houses on the south side of Replingham-road, Southfields, Wandsworth, westward of Elsenham-street, and of a one-story bakehouse addition to the easternmost house to abut upon Elsenham-street (Mr. D. Matthews, for Mr. G. A. Gale).—Refused.

Wandsworth.—A motor carriage-house adjoining "Carrick House," Ullathorne-road, Streatham Park, Wandsworth (Mr. F. D. Smith, for Mr. W. Christie).—Refused.

Width of Way.

Southwark, West.—A building on the west side of West-street, St. George's-road, Southwark, with external walls at less than the prescribed distance from the centre of the roadway of the street (Mr. T. J. Bailey, for the School Board for London).—Consent.

Deptford.—A building to abut upon the south side of Prince-street and the east side of New King-street, Deptford, with external walls at less than the prescribed distance from the respective centres of the roadways of those streets (Mr. J. H. Forbes, for Messrs. Vornberger & Co., Ltd.).—Refused.

Lines of Frontage and Width of Way.

Holborn.—A new stone facing to the flank of the Old Holborn Bars public-house, Holborn, to abut upon Staple-inn-buildings (Mr. P. M. Roberts for Mr. H. Finch).—Consent.

St. George, Hanover-square.—A one-story lavatory addition to the Grosvenor Hall, Buckingham Palace-road, St. George, Hanover-square, with external walls at less than the prescribed distance from the centre of the roadway of Flask-lane (Messrs. Woodrow & Helsdon for the proprietors of the hall).—Consent.

Hammersmith.—A two-story addition at the rear of No. 93, King-street, Hammersmith, to abut upon Bridge-avenue (Messrs. Bull & Bull for Mr. J. Broughton).—Consent.

Islington, West.—An iron and glass shelter, in Macready-place, to the Marlborough Theatre, Holloway-road, Islington (Mr. F. Matcham for Mr. F. W. Purcell).—Consent. An iron and glass shelter to the entrance to the said theatre in Holloway-road.—Refused.

Wandsworth.—Residential flats upon the east side of River-street, Lower Richmond-road, Putney (Mr. R. C. Overton for Mr. R. Emerson).—Refused.

Chelsea.—A one-story shop upon part of the forecourt of No. 55, College-street, Chelsea, to abut also upon Pond-terrace, with external walls at less than the prescribed distance from the centre of the roadway of Pond-terrace, and such shop to the line in College-street (Messrs. Selby & Kislingbury for the Motor Car Industries Co.).—Refused.

Greenwich.—Four two-story cottages on the southern side of John Penn-street, Greenwich, to abut also upon the eastern side of Bennett-street (Mr. W. H. Ansell for Mr. J. W. Collins).—Refused.

Marylebone, West.—A projecting doorway in front of the coachhouse of No. 9, Bryanston-mews East, Bryanston-square, St. Marylebone (Messrs. Frere & Co. for the Hon. Richard Dawson).—Refused.

City.—An oriel window at the first, second, and third floor levels of a warehouse building on the

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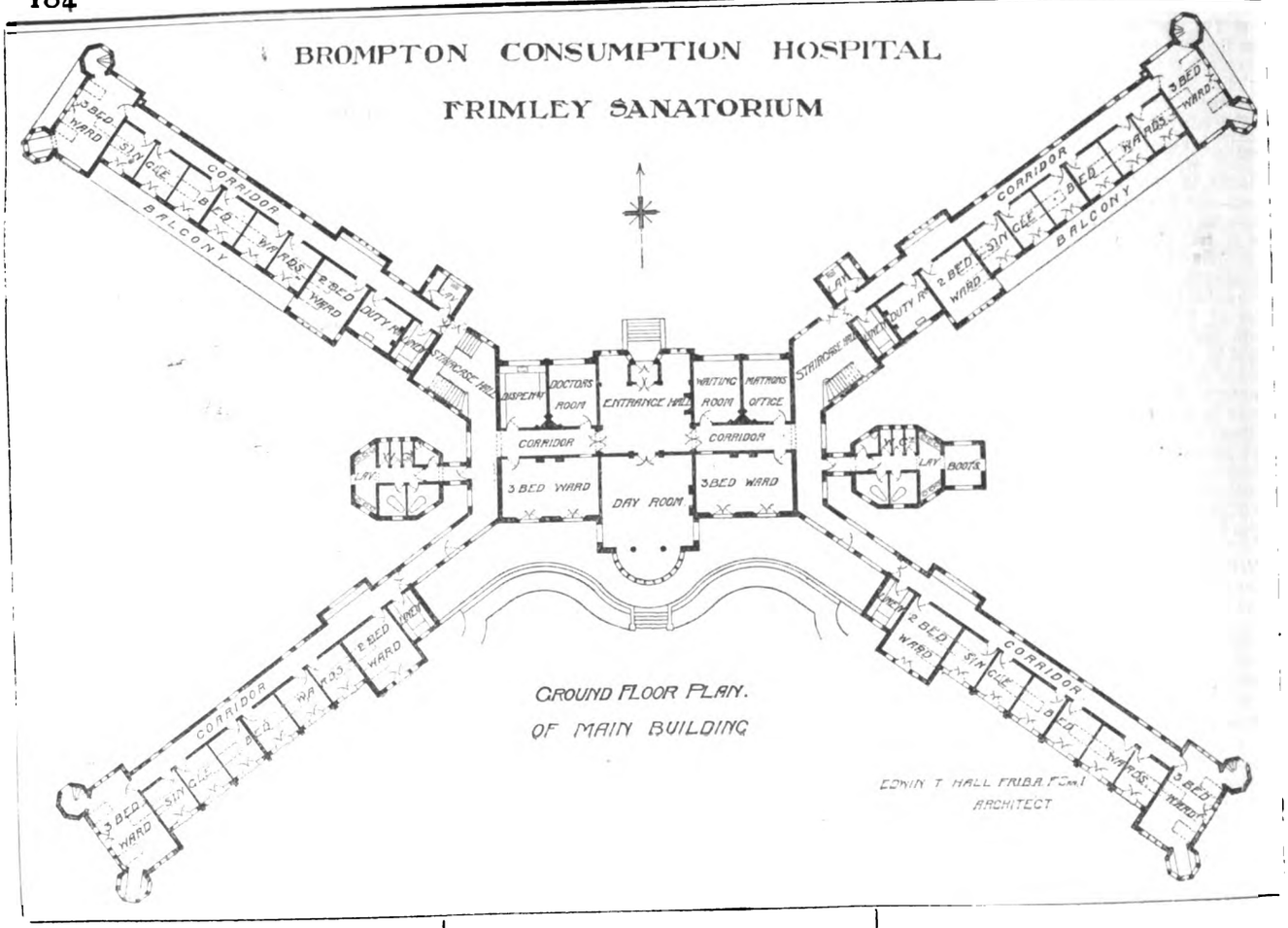

site of Nos. 27 and 29, Carter-lane, Godliman-street, City (Mr. E. Locke for Mr. W. J. Fryer).—Refused.

Width of Way, Lines of Frontage and Construction.

City.—A gangway across Freeman's-court, City, to connect No. 1 with the rear of No. 99, Cheapside Mr. B. Norman for Messrs. Viney, Price & Goodyear).—Consent.

Southwark, West.—A structure for a luffing crane on the north side of Bankside, and of a gangway across that street to connect such structure with No. 6, Bankside (Messrs. T. Osborn & Sons for Messrs. Harrison & Crossfield).—Refused.

Space at Rear.

Lewisham.—A house on a site on the southern side of Old-road, Lee, at the corner of Manor-lane, with an irregular open space at the rear (Messrs. Sills & Leeds for Mr. G. F. Havell).—Consent.

St. George, Hanover-square.—Alterations to No. 207, Regent-street, and No. 3, Conduit-street, St. George, Hanover-square, with an irregular open space about the premises (Mr. T. Kissack for Messrs. Fullers, Ltd).—Consent.

St. George, Hanover-square.—Deviation from the plans approved on April 25, 1899, for the erection of a three-story dwelling-house (known as No. 1A, Belgrave-square) on a portion of the site of No. 1, Belgrave-square, St. George, Hanover-square, so far as relates to the erection of additions at the rear of, and alterations to, such dwelling-house (Messrs. Todd & Wrigley).—Refused.

Width of Way, Line of Frontage, and Space at Rear.

Hampstead.—Five blocks of flats upon a site abutting upon the south side of Dennington Park-road, and west side of Kingdon-road, Hampstead (Mr. G. H. B. Quennell for Mr. A. Bretzfelder).—Refused.

Width of Way and Deviation from Certified Plan.

Marylebone, East.—A building on the site of Nos. 120 and 122, Marylebone-lane, St. Marylebone, abutting also upon Cross Keys-mews (Mr. W. Woodward for Mr. S. H. Griffiths, trading as Messrs. Blyth & Co.).—Refused.

Formation of Streets.

Wandsworth.—That an order be issued to Messrs. Holloway Bros. sanctioning the formation or laying-out of a new street for carriage traffic, to lead from Lyford-road to Ellerton-road, Wandsworth.—Consent.

Hammersmith.—That an order be issued to Mr. E. Collins sanctioning the formation or laying-out of a new street for carriage traffic, to lead from Scrubbs-lane to Hythe-road, Hammersmith.—Consent.

Wandsworth.—That an order be issued to Mr. R. C. Overton refusing to sanction the formation or laying-out of new streets for carriage traffic out of the south side of Lower Richmond-road, Putney (for Mr. R. Emerson).—Refused.

Woolwich.—That an order be issued to Messrs. Tapp & Jones refusing to sanction the formation or laying-out of a new street for carriage traffic, to lead northward from Fernhill-street, Albert-road, North Woolwich.—Refused.

Wandsworth.—That an order be issued to Mr. W. Bartholomew refusing to sanction the formation or laying-out of a new street for carriage traffic out of the south side of Mitcham-road, Tooting.—Refused.

Means of Escape at Top of High Buildings.

St. George, Hanover-square.—Deviations from the drawings approved on July 31, 1900, showing the means of escape in case of fire proposed to be provided on the two top stories of a block of residential flats on the site of Nos. 1 and 2, Grafton-street (now known as Nos. 1 to 11, Hay Hill), St. George, Hanover-square (Mr. B. Slade).—Consent.

Westminster.—A deviation in the means of escape approved on April 5, 1898, proposed to be provided for the persons dwelling or employed in the two topmost stories of the Institute of Mechanical Engineers, Storey's Gate, Birdcage Walk, Westminster (Mr. E. Worthington for the Institute).—Consent.

Working-class Dwellings.

Kennington.—That the Council do make an order as follows—Whereas Mr. R. Robertson on July 14, 1903, under the provisions of Section 42 of the London Building Act, 1894, delivered on behalf of the Housing of the Working Classes Committee of the Council at the County Hall a plan of a block of intended dwelling-houses, to be known as "Clere-cottages," to be inhabited by persons of the working classes, and proposed to be erected, not abutting upon a street, on a site at the rear of Lennox-buildings, Wandsworth-road, Lambeth . . . . now the Council does by this order sanction the said plan so far as Section 42 of the said Act is concerned. . . . .—Agreed.

Buildings for the Supply of Electricity.

Strand.—The conversion of a generating-station at Maiden-lane, Strand, into a distributing-station (Mr. W. B. Pinhey for the Charing Cross and Strand Electricity Supply Corporation, Ltd.).—Consent.

Dwelling-houses on Low-lying Land.

Lambeth, North.—A building on low-lying land, being the site of No. 15, New Cut, Lambeth (Messrs. Flood & King for Mr. E. H. Ruscoe).—Consent.

Illustrations.

NETHER SWELL MANOR, GLOUCESTERSHIRE.

THIS house, situated not far from Stow on the Wold, is now being built. Local stone both for the walling and roofing is used throughout.

The stables, entrance-lodge, home farm, and terraces and gardens, are also being built, the whole laid out and planned so as to form an estate as compact and well arranged as possible. The site is on the slope of a hill, facing south, and overlooking the vale of the Dickler, with views stretching away to Oxfordshire. The builders are Messrs. Heyward & Wooster, of Bath, and the architect is Mr. E. Guy Dawber, of London.

FRIMLEY SANATORIUM.

THIS institution, which is the country branch of the Brompton Consumption Hospital, stands on a site of twenty acres, fronting the Bisley-road, over two miles from Frimley Station, in Surrey. It consists of sixteen buildings. The patients' block is cross-shaped, with accommodation for eighty-eight patients in four two-storied radial pavilions, and for twelve in the centre, where special cases may be under closer surveillance. Every patient's room faces south, south-south-east, or south-south-west. There are also dayrooms and disconnected sanitary towers, and office.

In addition to the two main staircases, there is a fire-escape staircase at the extremity of each pavilion; and, further, two of the pavilions are cut off from the other two by means of a corridor of fire-resisting construction, with a glass roof.

The shelter afforded by the recess will be used for reclining couches.

To the north of the main building are the assembly or recreation hall, the dining-rooms, and kitchen block. To the extreme east is the nurses' home, and to the other extreme the home for the medical men.

The roofs are of brown tiles, with tile-hung upper stories, and red brick walls beneath. Portland and Box ground stone are used for dressings.

The institution has its laundry, boiler and engine houses, laboratory, postmortem-room, mortuary, &c. It will be lighted by electricity

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generated on the premises, and electric motive power will be used in the laundry.

The general contractors are Messrs. Holliday & Greenwood, Ltd., of Brixton, S.W. The clerk of works is Mr. T. Chaney, and the architect Mr. Edwin T. Hall, of Bedford-square, W.C.

DESIGN FOR DECORATION OF A DRAWING-ROOM.

THIS design for a room decoration, by Mr. T. Wallace Hay, is based on a free treatment of Byzantine forms.

It is intended to be carried out with walls hung with crimson Venetian velvet, having embroidered borders and frieze in tones of old gold and deep brown; architraves of opening and door to be in carved onyx with mosaic panels on gold grounds; the door in ebony, with ivory inlay; the dado, soft deep-green wood tiles, with a rail border in gold mosaic ground, and a rich pattern in purple and blue; the coved panels having heraldic designs on gold mosaic grounds. The ceiling panels in decorated leather in colours, with stiles in inlaid boxwood, margins in sycamore, mahogany, and black lines and gold; furniture in olive wood.

BOOKS RECEIVED.

WALL PAPERS AND WALL COVERINGS. By Arthur S. Jennings. London: The Trade Papers Publishing Co., Ltd.

PATON'S LIST OF SCHOOLS AND TUTORS, 1903. Sixth Annual Edition. London: 143, Cannon-street, E.C. Price 1s. 6d.

REPORT ON THE HEALTH OF THE CITY OF LIVERPOOL DURING 1902. By E. W. Hope, M.D., Medical Officer of Health. Liverpool: C. Tinling & Co.

Correspondence.

THE ARCHITECTURAL ASSOCIATION.

SIR,—The Architectural Association has now acquired possession of the Royal Architectural Museum in Tufton-street, Westminster, and has obtained from the Ecclesiastical Commissioners a new lease for 999 years on most advantageous terms.

A contract with Messrs. Holloway Bros. for the necessary reconstruction to suit our requirements has been entered into, the amount of which is 8,440*l*. This expenditure is a considerable one, but the Committee has felt that it is bound to make adequate provision for future requirements.

Donations and promises have been received amounting to about 4,500*l*., leaving a balance of 5,000*l*. still required to meet the building contract, furnishing, and equipment.

In view of the importance of the work of the A.A. to the profession generally, I venture to appeal through your columns for further donations to assist us in meeting our liabilities. It is earnestly hoped that we may be able to enter our new premises free from debt.

HENRY T. HARE,
President.

The Student's Column.

CONCRETE-STEEL.—VII.

GENERAL THEORY—(*continued*).

ADHESION of the concrete to the steel, in spite of stresses caused by the load, or by variations of temperature, is a matter of prime importance, and without it the distinctive qualities of concrete-steel could not be realised. The high resistance of the combination is largely due to the fact that the constituent parts adhere so strongly one to the other that the action is that of a homogeneous structure. Adhesion enables the concrete to offer resistance against sliding along the surface of the steel, and thereby facilitates the transference of forces from one material to the other. The result is uniform behaviour somewhat akin to that obtained by the employment of iron or steel plates in the ordinary flitch-beam. Should the resistance to sliding fall below the required amount, the materials will act independently, and the resistance of the structure will be greatly reduced.

Equally important with the physical and mechanical adhesion of the concrete, are the disposition of the steel so that all stresses may be properly resisted, and the sub-division of the steel so that its influence may extend to all parts of the concrete.

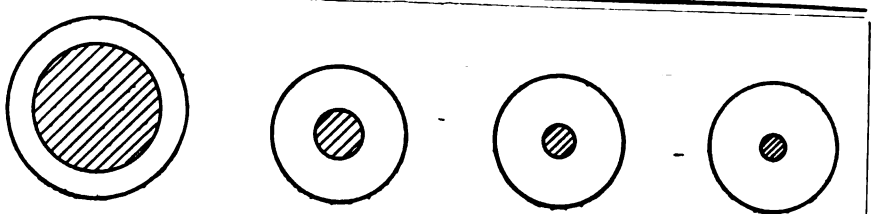

FIG. 9 FIG. 10 FIG. 11 FIG. 12

Illustrations to Student's Column.

The correct function of the steel is to ensure the thorough distribution of strain in every part of the concrete in which it is embedded, thus preventing the concentration of strain and consequent rupture at any point where there may be an element of weakness. In the case of a beam, the steel has chiefly to resist tensile stress, and if it is applied in large units—such as bars of T or I section—it will be impossible to attain the required result. Here we find the line of demarcation between ordinary "steel and concrete" construction, and concrete-steel construction. In the former, the steel beams and joists constitute the main source of strength, supporting the applied load and the weight of the concrete, receiving little or no aid from the concrete, and imparting no new qualities to that material. In the latter, the steel reinforcement is not expected to do more than half the work, as the concrete takes care of compressive stress. Further, it is known that the concrete actually resists part of the tensile stress, thus reducing still further the duty of the steel. At the same time, the steel increases the original resistance and elasticity of the concrete.

The exact disposition of the steel must be settled in each case in accordance with the distribution of stress, which can be ascertained by the usual analytical or graphical methods. With regard to subdivision of the steel, we may say that if absolute compliance with theory were practicable, the proper course for adoption would be to employ steel wire of the smallest possible gauge, distributed so that numberless hair-like filaments of metal might be present in every square inch of the concrete, for picking up and transmitting stress. Of course, ideal methods are not suited to the exigencies of every-day work, but in concrete-steel, as in other construction, the best results are always obtained when practice most faithfully represents theoretical principles. Hence, the most successful designers of concrete-steel structures are those who make use of reinforcement in finely-divided forms, and apply it so that the stresses encountered may be adequately met.

For the purpose of obtaining a clear conception of concrete-steel, the elastic properties of the constituents must be considered. The correct proportion of steel to concrete is directly contingent upon the ratio between the coefficients of elasticity of the two materials, and the whole theory of concrete-steel is dependent upon recognition of the values of these coefficients.

The modulus of elasticity represents the reciprocal of the extension or compression per unit stress and unit length. It represents the force that would, if such a thing were possible, stretch a bar of any material to double the original length, or compress it to half the original length. Thus, the statement that the value of E for steel is 30,000,000 lbs. per sq. in. implies that a force of 1 lb. would stretch or compress a bar of 1-in. area by $\frac{1}{30000000}$, or 0·00000033 of its original length. Similarly, if the value of E for concrete is 3,000,000 lbs. per sq. in., a force of 1 lb. corresponds with an extension or compression of $\frac{1}{3000000}$, or 0·00000033 of the original length of the bar. Therefore the application of tensile force of any given intensity to a unit area of concrete will be followed by an extension ten times the length of the extension caused by the application of an equal force to a unit area of steel. Hence, for an equal elongation, the steel will carry ten times the stress carried by concrete.

Further, it should be remembered that the greater the value of E, the less will be the extension or compression for a given stress, and that the smaller the value of E, the greater will be the extension or compression for a given stress.

We now see the importance of knowing in every case what are the actual values of the coefficients of elasticity for the materials to be used in concrete-steel. As evidenced by the tables previously given, the value of E for steel is a fairly constant quantity, but the value of E for concrete is extremely variable. The value varies with the proportions and materials adopted in making the concrete, and with the increase of unit stress. Tables may be used for the purpose of arriving at averages for ordinary work, but for important structures it is to be recommended that the elastic properties of the concrete should be specially determined.

Suitable allowance should always be made to compensate for the decrease of E with increase of unit stress. It is also necessary to decide the question whether calculations should be based upon the coefficient E, corresponding with total deformation, or upon the coefficient E_1, corresponding with purely elastic deformation. Assuming the bond between the concrete and the steel to be perfect the deformation of both materials must be equal, and all permanent deformation or "set" must, similarly, be equal. But permanent deformation is greater in the case of concrete than in that of steel. Hence, on the removal of load, the elastic contraction of the steel induces tensile stress in the steel and compressive stress in the concrete; and the reimposition of load causes stresses which are additional to the previously-created internal stresses. For these reasons, it appears that the coefficient of pure elasticity is of less service to the designer than the coefficient E calculated from total deformation.

When the relationship between the coefficients of elasticity was first considered in connexion with concrete-steel, the value of E for concrete was assumed to be about 710,000 lbs. per square inch, which is about one-fortieth the value of E for steel. Using the symbol r to represent the ratio of one coefficient to the other, we have in this case $r=40$. Subsequently the opinion was formed that the value of E for concrete was 1,400,000 lbs., giving $r=20$; and more recently the value of E for 1 : 2 : 4 and 1 : 3 : 5 concrete has been shown to be from 2,800,000 lbs. to 3,500,000 lbs., so that $r=10$ is an expression very generally used to indicate the relationship between the coefficients of elasticity for steel and concrete.

During the period when knowledge on the subject of concrete-steel was being acquired, the values for E for both steel and concrete really remained constant, and were in no way altered by the changing views of investigators. Consequently, structures designed upon the theoretical basis, $r=40$, really embodied the basis, $r=10$. Therefore in such cases the concrete was able to take, and actually did take, a greater share of the duty than was intended or known by the designers. The inference is that an excessive proportion of steel was used in former years.

One or two simple calculations will serve to make these points clear, and to indicate the importance of properly taking account of the values of E, in concrete steel design.

With the object of avoiding unnecessary fractions we will take the value of E for steel at 30,000,000 lbs. per sq. in., with a corresponding extension of 0·00000033 per lb., and in each case we will consider a unit length of 1 in. so that extensions shall represent fractions of an inch. We will take three values for the ratio between the values of the coefficients of elasticity, viz.—$r=40$, $r=20$, and $r=10$, cor-

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responding with values of the coefficient for concrete, E = 750,000 lbs., E = 1,500,000 lbs., and E = 3,000,000 lbs. The allowable unit stress for steel will be taken at 15,000 lbs.

In fig. 9 let the shaded area represent the cross section of a steel bar of 1-in. area; and the outer ring a 1-in. area of concrete surrounding the steel. If a direct pull be now applied to the steel, so that the bar shall be under a stress of 15,000 lbs., the extension for a unit length will be 15,000 × 0·000000033 = 0·0005-in. The stress equivalent to an equal extension of the concrete will vary with the ratio of the coefficients of elasticity, and assuming stress to be strictly proportionate to strain, the results are :—

	Stress in concrete.
If $r = 40$ (0·0005 × 750,000) =	375 lbs. per sq. in.
„ $r = 20$ (0·0005 × 1,500,000) =	750 „ „
„ $r = 10$ (0·0005 × 3,000,000) =	1,500 „ „

We will now look at the matter from a different point of view, assuming the direct pull on the steel to be such that the stress in that material shall be only 50 lbs. The elongation of the concrete, varying with the value of the coefficient of elasticity, will be (0·000000133 × 50) = 0·000066 for $r = 40$; (0·00000066 × 50) = 0·000033 for $r = 20$; and (0·00000033 × 50) = 0·0000166 for $r = 10$.

For equal extensions of the steel in tension the stresses will be as follows :—

	Stress in Steel.
$r = 40$ (0·000066 × 30,000,000) =	2,000 lbs.
$r = 20$ (0·000033 × 30,000,000) =	1,000 „
$r = 10$ (0·0000166 × 30,000,000) =	500 „

Comparing the above results, we find in the first set of figures that the equivalent stress in the concrete is abnormally high for ordinary concrete, and in the second set of figures that the stress in the steel is ridiculously low, and the work left for the steel decreases with the increase of the value of E for concrete. In each case the whole of the concrete is fairly within the sphere of influence of the steel, and, assuming the bond to be perfect, the elongation of the concrete must be equal to the elongation of the steel.

We will now see how the materials may be used to better advantage. As Hooke's law of the proportionality between stress and strain does not hold good for concrete, the elongation of 0·0005 in. would not involve stress to the extent shown in the first set of figures, and recent investigation has shown that the concrete should be capable of proportionate distortion of twenty times that at which simple concrete would fail in tension. Consequently the proportion of steel can be reduced, as shown in figs. 10, 11, and 12, to $\frac{1}{15}$ sq. in., $\frac{1}{30}$ sq. in., and $\frac{1}{60}$ sq. in., according to the values, $r = 40$, $r = 20$, and $r = 10$, thereby raising the stresses in the second set of figures to 15,000 lbs. per square inch, without involving failure of the concrete.

The foregoing figures are based upon the assumption that a direct pull is applied to the steel, and that the bond is theoretically perfect. Consequently, tensile stress is only communicated to the concrete through the steel, and we may say that the elongation of the concrete is directly caused by the elongation of the steel. In a beam the state of things is different. Tensile stress is then distributed over the area below the neutral axis in accordance with the laws governing flexure in beams. If no reinforcement be present, the whole of the stress will fall upon the concrete, the elongation of which will then be governed by the value of the coefficient E. If reinforcement be present, the tensile stress will still come upon the concrete, being transferred in part to the steel. In the latter event, as steel elongates less than concrete for a given stress, and if the bond be perfect, the concrete will only be permitted to elongate to the same extent as the steel. The proportion of the total stress carried by the concrete will depend upon the proportion of steel to concrete. If the area of steel be proportionately great, most of the stress will be taken up by the steel; and if the area of steel be proportionately small, most of the stress will remain to be resisted by the concrete.

Therefore, we see that in the case of a simple pull applied to the steel, tensile stress is transferred to the concrete from the steel; while in the case of flexure, tensile stress is transferred from the concrete to the steel, or comes simultaneously upon the two materials. Notwithstanding this difference of action, the fact remains that the behaviour of concrete-steel is invariably governed by the ratio of the coefficients of elasticity of the two materials.

It is also evident from figs. 9-12 that as the area of the steel diminishes in comparison with the area of the surrounding concrete, so the sphere of influence of the steel diminishes, and the transference of strain from one material to the other is rendered more difficult. Close to the steel the two materials will act in unison, but as the distance increases, there will be a tendency for the concrete to act independently, because the reinforcing effect of the steel varies inversely as the square of the distance. If the steel be concentrated in the form of a single bar, it is certain that strain must be unequally distributed in the concrete, so that its ultimate strength may be reached in remote parts, while stress in the immediate neighbourhood of the steel may be well within permissible limits.

GENERAL BUILDING NEWS.

CHURCH ADDITIONS, PRIORSLEE, SALOP.—The foundation-stone of a new chancel to Priorslee Church, Salop, has just been laid. Plans were prepared by Mr. C. R. Dalgleish, architect, Wellington, for the work, the estimated cost of which is 300*l.*, and the contract was let to Mr. J. T. Hayes of Shrewsbury. The new chancel will be 25 ft. by 20 ft., and the style will be in harmony with that of the old part of the church. On the north and south sides will be placed two lancet windows. There will be a new traceried east window of triple lights, surmounted by a circular ornamental light.

PRIMITIVE METHODIST CHURCH BUILDINGS, HIRST, NORTHUMBERLAND.—The foundation-stones of new church buildings, which are to be erected by the Hirst Primitive Methodist Society, were recently laid at Hirst. The church, when finished, will provide seating accommodation for 750 persons. The scheme also includes the erection of new Sunday schools, the total cost being estimated at 2,500*l.* The buildings were designed by Mr. T. Tulip, of Choppington, Messrs. Gordon, of Stakeford, being the contractors.

CHURCH OF ST. COLUMBA, DRUMCONDRA, DUBLIN.—The foundation-stone of the new church of St. Columba, Drumcondra, was laid on the 7th inst. The new church will occupy a site at the top of St. Alphonsus-road, Drumcondra. It is in the Romanesque style, and the plans provide for a nave and aisles, north and south transepts, chancel and side chapels, and a tower flanking the north side of the west front. The nave is 30 ft. wide in the clear, and 100 ft. long to the crossing, divided in six bays with stone quatrefoil columns with moulded caps, and annulets embellished with Celtic ornamentation. The arches and hood moulds are also in stone, enriched with chevron ornament, while blocks are left on the hood moulds for the carved heads of Irish saints. The height of the nave to the ceiling is 54 ft., and is lighted by an arcade of semicircular-headed windows in the clearstory, with moulded hood moulds and jambs, filled with lead-light glazing. The end bay adjoining the west front is devoted to the organ gallery, the front of which will be divided into three bays with polished granite columns and stone arches, carved and ornamented, the balustrade being arranged with moulded semicircular arches and small, polished columns. Access to the organ gallery is obtained through the circular turret flanking the front on the south side. Underneath the organ gallery provision is made for the nave entrance porch, which is panelled and framed in pitch pine, with lead-light glazing. The aisles are 15 ft. wide in the clear. The total length of the church, including the chancel, is 162 ft., but the present contract only includes the nave and transepts, the total length of which will be 128 ft., the width across transepts being 101 ft. The walls will all be built with coursed granite, with brick lining internally, the foundations being in cement concrete. The dressings of the windows and doors, externally, will be in white limestone. The church is being built by Messrs. W. Conolly & Son, from the designs, and under the supervision, of Messrs. Ashlin & Coleman, architects, Dublin. Mr. J. P. Cox is acting as foreman.—*Freeman's Journal.*

BLUECOAT HOSPITAL, WAVERTREE, LIVERPOOL.—The new buildings of the Liverpool Bluecoat Hospital, the foundation-stone of which was laid on the 5th inst. at Wavertree, have been designed by Messrs. Briggs & Wolstenholme and Messrs. F. B. Hobbs & A. Thornely. Seven and a half acres of land, situate on the south side of Wavertree Parish Church, comprise the site, of which five acres will be occupied by the buildings. The remainder is reserved as a playing-field. On the east side the site is bounded by Church-road, and in this thoroughfare will be the principal entrance. The gate, with a lodge on each side, gives access to a short drive, conducting to the main doorway, situated in a tower which is to form the central feature of the east façade. When completed, the tower will be 125 ft. in height; it is to be furnished with a clock and bells. The aspect of the hospital from this point is that of a one-story building, with the tower in the centre, and at one end the chapel, and at the other a gymnasium and swimming-bath. The base of the tower forms a vestibule 17 ft. square, from which open on one side the boardroom, and the other the office. In front, facing the outer door, is the entrance to a corridor 9 ft. wide, extending from the chapel to the gymnasium, and lighted from the interior quadrangles. From this corridor, turning to the left, there is access to the headmaster's apartments, which adjoin the office; and, turning to the right, the access to an applicants' waiting-room (with separate street entrance), medical examination-rooms, &c., these communicating with the boardroom. At right angles to this first corridor, and right in line with the entrance, is the main corridor, 14 ft. wide, which leads to the central hall, 100 ft. by 47 ft. and 30 ft. in height. The hall, lighted by windows on both sides, will seat 616 persons. It is intended for school celebrations, lectures, and entertainments. The adjuncts include platform, retiring-rooms, a bandroom, &c. Beneath the central hall is the dining-hall, 18 ft. high, and of the same dimensions. On the north side of the central hall is the main staff quadrangle, and on the south side the female staff quadrangle, each 196 ft. by 60 ft. They will be laid out as lawns. The main block is beyond the central hall, and at right angles to it, and faces west, with an outlook over Wavertree Playground. Owing to the fall of the land, the buildings on this side are three stories high. The main block will be flanked by wings extending 70 ft. beyond the west main front. The buildings, therefore, will enclose on three sides the boys' playground, 782 ft. by 76 ft. On the fourth side of the quadrangle will be a cloister. The lower story of the central building and wings will be used altogether for classrooms, recreation-rooms, the two upper floors for dormitories, and apartments of masters and mistresses. The accommodation is for 250 boys and 150 girls. The kitchens and offices are placed on the east side of the female quadrangle. The chapel, circular in form, with four bays like the arms of a cross, will seat 600 worshippers. The entrance on the north faces the organ in the bay to the south. Like the existing hospital in School-lane, the buildings are designed in the Late Renaissance style. They will be of red brick, faced with white stone. The estimated cost is 65,000*l.*

HOTEL, SOUTH SHIELDS.—The first portion of a scheme of extension in connexion with the Golden Lion Hotel, King-street, South Shields, has been completed. In the old building the number of bedrooms was fourteen, but this has now been augmented to fifty, with bathrooms. In North-street a new entrance, with a glass canopy roof over the pavement, has been provided, and from this point a corridor runs the whole length of the building. The accommodation includes a new smokeroom or sitting-room, a restaurant, a billiard-room, and a stockroom. Over the restaurant and smokeroom, on the first floor, is a banqueting and assembly hall, which will be known as the "King's Hall." It is over 60 ft. long by 32 ft. wide, and will seat 300 people. The hall is approached by a separate staircase, and, on the landing, retiring rooms are provided; while to the left of the banqueting hall is a reception hall. The kitchen and scullery are situated over the stock and service rooms. On the two floors above the extra bedrooms have been provided. The existing hotel entrance in the King-street section has been improved and the main staircase altered. The flooring of the staircase and hall has been laid with terrazzo, and the space furnished with an office for the hotel bookkeeper. The entire work has been executed from plans prepared by Mr. J. H. Morton, architect, South Shields. The building has been erected by Mr. R. Allison, Whitburn; while the rest of the work has been done by the following:—Mr. John Taylor, tiling; Mr. Hugh Niven, plastering; Messrs. Dinning & Cooke, Newcastle, heating and cooking apparatus; Mr. G. T. Grey, ironwork; Mr. W. Allon, decorating; and Mr. J. T. Dagleis, plumbing and electric lighting.

CLUB BUILDINGS, BLYTH.—The new premises of Blyth and District Social Club and Workmen's Institute were opened on Bank Holiday (Monday). The buildings, which occupy a freehold site in Station-street and Keelman's-terrace, Cowpen Quay, have been erected from plans prepared by Mr. John Goulding, of Blyth, and the estimated cost is 7,000*l.* They provide on the ground floor a bar-room, a large parlour, and two smaller rooms, together with four bathrooms and the necessary adjuncts. The space on the first floor is largely utilised in providing a billiard department fitted up with three full-sized tables and the usual accessories. Adjoining, there are a refreshment bar and games-room; and near the stairhead is the directors' room. On the second floor there is a hall, to which access may be gained by a separate entrance. The news-room and library are also situated on this floor.

DRILL HALL, CHATHAM.—Lord Roberts laid the foundation-stone recently of a new drill hall and headquarters at Fort Pitt Fields, Chatham. The building will be of ferro concrete. The drill hall itself will be 120 ft. by 70 ft., and attached there will be an armoury, Colonel's and Adjutant's rooms, orderly-rooms, quartermaster's stores, bandroom, and rooms for officers, non-commissioned officers, and men. There will also be quarters for the resident staff, and provision made in the basement for ambulance waggon and machine guns. The total

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cost is estimated at 6,500*l*. Mr. G. H. Wells, of Chatham, is the architect.

POST OFFICE, SUNDERLAND.—The new Post Office at Sunderland has just been opened. The site occupied by the buildings, which serve both the Post Office and the Inland Revenue, is a portion of the old "Shrubbery" in West Sunniside. The remaining vacant plots are laid out as ornamental gardens. The site measures 270 ft. by 63 ft. The plans were by Mr. Henry Tanner, of London; the style is Renaissance. The contract was let to a local builder, Mr. J. W. White, and the construction was supervised by Mr. E. J. Searchfield, of H.M. Office of Works.

ST. MARY'S SCHOOL, CLELAND, LANARKSHIRE.—This new building has just been completed. There are two floors—that on the ground level being devoted to classrooms, while the upper floor is a large hall for drill and recreation, it being ultimately intended to divide part of it into additional classrooms by movable partitions. The school, the architect of which is Mr. W. Brenan, of Glasgow, has accommodation for about 350 children and 350 more if the hall upstairs is utilised.

BAPTIST SUNDAY SCHOOLS, PAIGNTON.—The memorial-stones of the new Baptist Sunday schools, to be erected in Winner-street, Paignton, were laid recently. Messrs. Bridgman & Bridgman are the architects, the builder being Mr. R. Harris.

CORPORATION BATHS, BRISTOL.—New baths have been constructed at Barton Hill by the Bristol Corporation. The swimming bath tank is 75 ft. by 30 ft., the water being 3 ft. 6 in. deep at one end and 6 ft. 6 in. deep at the other. The gangways are 10 ft. wide excepting at one end, which is 8 ft. The tank is lined with white glazed brickwork with white glazed scum-trough. There are special blocks indicating the depths of the water at the various points, and the depths are also indicated on the posts of dressing-boxes. The floors of the gangways are of terrazzo with sandstone kerb, &c. A shower bath and foot bath are also provided. The dressing-boxes (of which there are forty-three) are made to fall back against the wall, leaving the gangways free when special aquatic entertainments are given, or when the swimming-bath is being used as a public hall. The main walls are lined with glazed bricks to a height of 7 ft., and finished above with Keene's cement and roofed with steel principals, boarded and having lantern light, provision being made for fixing gymnastic appliances. A gallery for spectators is provided over the dressing-boxes, giving about 280 seats, and having proper entrances and exits. In the winter time the swimming bath will be converted into a public hall by flooring over the plunge bath at gangway level, folding back dressing-boxes, removing the chute, diving stage, spring board, &c., and providing a platform for speakers, lecturers, &c. The heating arrangements will also be altered to suit the changed use. Separate entrances, ticket offices, exist, and retiring-rooms are provided, giving ample facilities both for the public and the performers. The hall will be available for concerts, lectures, public meetings, and the like during the winter months. The slipper baths are grouped into compartments formed by glazed brick walls 7 ft. high, finished above with painted Keene's cement, with open timber roofs having lantern lights, and floored with terrazzo paving. Each bath is placed in a separate cubicle, 6 ft. by 6 ft., formed with enamelled slate, and fitted with electric bell, time indicator, floor flushing pipe, &c. The water supply is arranged with valves in such a manner as not to throw more than four baths out of use when repairs are required. There are ten slipper baths for women, six first-class and eighteen second-class baths for men, besides two in Kane's baths. The plans of Kane's Baths illustrate a method of constructing bath compartments so that the bath-room is separated from the dressing-room, whether slipper or spray baths are the cleansing medium employed. The author of the system believes that it is absolutely essential that the bathing compartment should be maintained at a considerably higher temperature than the dressing compartment, both as a means of more thoroughly cleansing the body and as a preventative of chills to the bather. The system consists of a specially-designed central bath-room, in which are placed the bath compartments, fitted with slipper, spray, shower, and needle baths, or a combination of each, and a suitably-designed system of dressing-rooms. The dressing-rooms are arranged on either side of the bathroom, but they might have been grouped in a separate room, which might or might not have been on the same floor level. The dressing-rooms are arranged on either side of the bathroom. The bathing compartments are grouped in pairs along the centre of the bathroom, with a corridor on each side. Opposite to the entrance to each compartment on either side is a door in the wall, which communicates with the dressing-room. Each dressing-room has, therefore, two doors, one communicating with the outer corridor by which the bather enters the dressing-room from the main entrance, the other communicating with the bathroom, and directly opposite to the corresponding bathing compartment. Ample fresh, warm, dry air is delivered to each bathroom at 110 degrees, and to each dressing-room at 65 deg. Fahrenheit. The blower, with the steam heater in the chamber below, is driven by electric motor, which can be worked by the attendant above. Extract gratings and flues are provided in the adjoining walls capable of adjustment to suit any conditions. The engineering work in the buildings has been carried out by Messrs. Thomas Bradford & Co., of London. The building is lighted throughout by electricity, all the wiring and lights being in watertight tubes and fittings. The general contractor is Mr. A. J. Beaven, of Bristol. The sketch-plans for the establishment were designed by the City Engineer and approved by the Local Government Board. The working-drawings, specifications, and superintendence of the erection of the buildings and engineering contract have been undertaken by Mr. W. S. Skinner, architect, of Bristol; and Mr. James Hurn has acted as clerk of the works. The amount of contract for the building work is 13,680*l*., and for engineering close on 3,000*l*. —*Bristol Mercury*.

GORDON BOYS' MEMORIAL HOME, NOTTINGHAM.—The memorial stone of the new permanent premises for the Nottingham Gordon Memorial Home for Destitute Boys was laid recently. The premises have been designed to accommodate seventy-two boys, compared with forty in the existing building in Peel-street. Mr. E. R. Sutton, of Nottingham, is the architect.

VICTORIA HALL, SUNDERLAND.—The Victoria Hall, Sunderland, the scene of the catastrophe of 1883, is about to undergo remodelling and enlargement. The architect is Mr. John Eltringham, of Sunderland, whose designs were accepted in competition.

NEW BUILDINGS, HASTINGS.—The Roads Committee of Hasting's Town Council have just recommended approval of plans for new buildings as follows:—Alterations to school premises, Archery-road, Mr. P. Jenkins, builder, per Mr. A. Reeve, architect; two houses, Downs-road, per Messrs. Cooper & Coussens, architects; new flats, Mount Pleasant-road, Mr. J. Hayhurst, per Messrs. Cooper & Coussens, architects; additions at rear of No. 17, Mount Pleasant-road, Mr. R. Reeks, per Mr. A. Dray, architect; alterations and additions, Eversfield Hotel, and 22, Eversfield-place, directors of the Eversfield Hotel, per Mr. P. Tree, architect; temporary workshops, Downs-road, Mr. E. W. Hodge, per Messrs. Cooper & Coussens, architects; alterations forming opening in party wall, 11 and 12, Eversfield-place, Mr. P. Tree, architect; new laundry premises, Brickfield Ridge, Old London-road, Mr. H. Martin, per Mr. T. King, architect; new buildings, upper part of Edward-road, Hollington, Mr. S. Roberts, per Mr. T. King, architect.

NORFOLK MARKET HALL, SHEFFIELD.—The Sheffield Market Committee have passed the following resolution for adoption by the City Council:—"That the tender of Messrs. John Eshelby & Son, of Sheffield, for the rebuilding of the Haymarket front of the Norfolk Market Hall, according to plans and specifications prepared by Messrs. Holmes & Watson, for the sum of 8,850*l*., be accepted, and that the corporate common seal be affixed to the necessary contract."

PUBLIC LIBRARY, INNERLEITHEN, N.B.—A new public library is to be erected at Innerleithen, from the designs, selected in competition, of Mr. Peter L. Henderson, Edinburgh. The building is two stories in height, with lending library, reading-room, and committee-room on the ground floor, and a lecture-hall and librarian's house on the upper floor. The cost is not expected to exceed 2,000*l*.

EXTENSIONS TO NORFOLK COUNTY ASYLUM.—The enlargements and alterations in connexion with the Norfolk County Asylum are now nearing completion. The scheme adds another 150 beds to the accommodation, and the total cost of the improvements amounts to 70,000*l*., but probably half of this sum has been spent on the reorganisation of the engineering department, the electric lighting, warming, &c. The general contractors for the work are Messrs. King, of Norwich. Messrs. Haydon, of Trowbridge, Wiltshire, supplied the engines; Messrs. Reavell put in the electric light machinery; Messrs. Lawrence, Scott, & Co., of Norwich, are responsible for the dynamos; and Messrs. Mann, of Norwich, for the wiring. The alterations have been carried out from the plans of Mr. A. J. Woods, architect, of London.

BRITISH MUSEUM EXTENSION.—Plans for a new wing of the British Museum were on view on the 10th inst., in the Tea-room at the House of Commons. They were shown in connexion with the grant which Parliament is making for the extension. The cost will be about 200,000*l*. The present addition, says the *Daily Chronicle*, is part of a general scheme which will ultimately see the British Museum covering the whole area bounded by Great Russell-street, Montague-street, Montague-place, and Bedford-square. The ground forming this block and not already occupied by the Museum buildings was acquired some time ago from the Duke of Bedford. An important step in its utilisation is represented by the plans which Mr. Henry Tanner, the Architect of the Office of Works, has just completed. They concern the frontage towards Montague-place, or the northern side of the Museum. Here a fine block 380 ft. long will be erected. This length does not cover the whole frontage towards Montague-place. Corner wings, as they may be called, like the White Wing, which was built twenty years ago to the south-east of the main building, will some day be added. The design of the new block is in harmony with the general scheme of the Museum. The new building, when it has been erected, will be utilised in connexion with the Museum library and exhibition galleries. It is to be of five stories. There will be a basement devoted to storage, and then a sub-ground floor, which will be utilised for storage, and also as receiving and packing rooms. Next will come a ground floor of galleries, and over it a mezzanine floor with a variety of rooms for general purposes and the use of students. Lastly, there will be an upper floor, which will consist of galleries and further working space for students.

SANITARY AND ENGINEERING NEWS.

NEW WATER SUPPLY, MARGATE.—The question of a better water supply to Margate has pressed heavily on the Corporation for many years past. The original pumping works are situated at the Tivoli, and, to meet the requirements of the growing population, the Dane Works were constructed in 1886. These works have been the means of averting the complete breakdown of the water supply for some years, but the carrying out of the main drainage scheme in 1888-90, and the consequent great impetus to building operations, caused a much greater demand for water, which the combined works were unable to meet. In 1895 Mr. Mansergh, C.E., was called in to advise the Corporation, and the following year he made a report, recommending that a new supply should be taken from the surface-water stream running from Wingham. For several reasons this scheme fell through, and in 1898-99 the Corporation put down an experimental deep bore-hole in the Dane, penetrating the lower green sand, at a cost of 1,470*l*., but the water was found to be too brackish for domestic use, and therefore the work had to be abandoned. In the year 1900 the Corporation promoted a Bill in Parliament to procure water from Brooke's End—Mr. Baldwin Latham, C.E., being the Engineer—but which failed to obtain Parliamentary sanction. In 1901 the Corporation put down a supplementary salt-water scheme at a cost of 3,225*l*., and the same year experimented further in trying to obtain water from Nash Court, at a cost of 975*l*., which experiment also failed to supply any appreciable amount of water. The scheme which was finally adopted received Parliamentary sanction last year, and is now carried out: it was propounded by Mr. Albert Latham, M.Inst.C.E., the Borough Engineer. The site of the works is on the mainland at Uffington, in the parish of Wingham, near the outcrop of the line of chalk hills ranging from Canterbury to Dover. The scheme includes the sinking of the pumping well and adits driven in the chalk to a length of 3,000 yards, at the level of ordnance datum, which is 132 ft. below the surface at the pumping station, the site of which is at least a mile from the nearest house in the village of Wingham. On this site, which is 6 acres in extent, have been erected engine and boiler houses, workshops, storehouses, coal-shed, weighbridge, a block of cottages for the staff, engineer's house, board room, workmen's bath, stable, coach-houses, &c. It was estimated that 2,000,000 gallons of water per diem could be obtained from these works as the water line stood at 33 ft. above O.D., rising to 156 ft. above O.D. at Womenswold, about four miles to the south, there being an area of fifteen square miles to draw upon. It has been found that this estimate was very much too low, it being now evident that there is sufficient water to be obtained here to supply the whole of the Isle of Thanet. One-third only of the length of adits has been driven, which length yields over 2,500,000 gallons per diem, or more than double the present requirements of the town, which quantity can be increased to 5,000,000 or 6,000,000 gallons, if required, in the future. To construct this length of 1,000 yards, it has been necessary to pump about 500,000,000 gallons of water to waste, which is more than the total quantity of water supplied from both pumping stations in Margate for the last two years. To show the recovering power of the wells on the cessation of the pumping, the water line rose in a few days to within 4 ft. of its original level. The water is delivered into the town by means of an 18 in. cast-iron main, fourteen miles in length, through which the water is pumped from the well by two duplicate triple expansion engines and pumps of 166 horse-power each; each pump at its normal speed will deliver 2,000,000 gallons of water in the twenty-four hours, or 1,000,000 gallons in the twelve hours, but they are both capable of working at a much greater speed. The 18 in. main was designed to pass 1,000,000 gallons of water in the twelve hours, but such care has been taken in the laying and such easy curves have been introduced that, in consequence, the estimated friction has been reduced, so that the main will readily deliver a much greater quantity of water per diem. This also carries with it a reduction in the amount of coal consumed. The Parliamentary estimate, including the rising main, buildings, engines and pumps, well and adits, with 10 per cent. added for contingencies, amounted to 83,985*l*., whereas the contracts entered into by the Council for carrying out this work amounted to 70,750*l*. In connexion with this scheme the Corporation of Margate have extended their water district, so as to include about seventeen parishes in east Kent, covering an area of about fifty square miles. They have already the work for supplying this district well in hand. Two supplementary

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pumps have been erected at the works and also a reservoir completed at Uffington and a high level tank at Woodlands, three miles distant on the high ground, the top water line of which is 332 ft. above ordnance datum and the level of the floor of the adits at Uffington. One of the contracts for the mains comprises over fourteen miles of main, of which ten miles have been completed. Before the scheme was finally adopted by the Corporation they took the opinion of Messrs. Hawkesley & Eaton and Mr. Whittaker, the geologist, who reported that "they considered the scheme would afford a good and ample supply of water, admirable in quality and sufficient in quantity to meet the growing demands of Margate for many years to come."

Water Supply, the Rosyth Naval Base.—The principal business before a meeting of Dunfermline District Committee, held at Dunfermline on the 4th inst., was the question of the introduction of a new water supply into the district, including the Rosyth naval base. A Report by the Water Supplies Committee proposed that the Glenquey burn, in the Glendevon district, should be harnessed, and that an 18-in. pipe should be laid from a reservoir at the burn to a point near Dunfermline, and that from there a 12-inch pipe be put down to Castlandhill, near the naval base. It was estimated that the cost of the works would be from 100,000*l.* to 120,000*l.*

MISCELLANEOUS.

Professional and Business Announcement.—Messrs. Knight & Parkinson, of Temple Chambers, E.C., architects and surveyors, have dissolved partnership. Mr. Samuel Knight, F.R.I.B.A., will continue to practise at the above address, and Mr. C. E. L. Parkinson, A.R.I.B.A., will practise at 44, Bedford-row, W.C.

New Park, Tottenham.—Mr. L. E. Ward, Chairman of the Tottenham District Council, on the 6th inst. opened Downhills Park—twenty-six acres of land in the centre of the district. The new park has been acquired at a cost of 31,150*l.*, of which sum the Middlesex County Council contributed 5,300*l.* It adjoins the estate which the London County Council will use for building dwellings for 40 000 persons. Previous to declaring the park open Mr. Ward laid the foundation-stone of a dust destructor, which will cost 27,000*l.*

Workmen's Dwellings at Rotherham.—The committee of the Council of the County Borough of Rotherham have considered plans, report, and estimate prepared by the Corporation architect in regard to workmen's dwellings. Class A house will have accommodation:—Ground floor: sitting-room, with projecting window; kitchen; small scullery, with bath in niche opening into scullery; pantry. First floor, two bedrooms; attic floor, one bedroom; separate yards. Cost, 100*l.* per house. Class C accommodation:—Ground floor, living-room, kitchen, lobby and pantry; first floor, two bedrooms and closet; attic, one bedroom; separate yards. Cost, 150*l.* per house. The estimated cost of twenty-five houses Class A is 4,750*l.*; of thirty-five houses Class C, 5,250*l.*; total 10,027*l.* Adding cost of land, roads, and drainage, the amount is brought to 11,627*l.* The total annual charge to pay interest and sinking fund is 543*l.* 10*s.* 3*d.* The rental expected is twenty-five houses at 6*s.*, and thirty-five houses at 5*s.*, 845*l.*, from which has to be deducted 281*l.* 13*s.* 4*d.* for rates, repairs, &c., leaving a net rental of 563*l.* 6*s.* 8*d.*, or showing a clear profit of 19*l.* 7*s.* 5*d.* a year. The two schemes mentioned have been adopted, and the plans have been sent to the Local Government Board.

Crystal Palace Engineering School.—Sir J. Fortescue Flannery, M.P., distributed on Friday last week, at the Crystal Palace School of Practical Engineering, the certificates gained by the successful students during the past term. Several references were made in the course of the proceedings to the excellent appointments gained by the majority of the 1,000 students who had passed through the school since its foundation thirty-one years ago. Among the latest recorded appointments are Mr. H. T. Jackman, executive engineer for Hong Kong under the Government; Mr. W. Evetts, chief draughtsman and assistant locomotive engineer, C.S.A. Railway, Bloemfontein; Mr. S. A. Hollis, assistant engineer, waterworks, Bloemfontein; and Mr. E. M. Bate, surveyor to the Frinton Urban District Council. In his speech, Sir Fortescue Flannery referred to the competition we have to encounter from foreign nations, and said it rested with the technical schools to help England to maintain and improve her position.

Holy Trinity Church, Tredegar-square, E.—An important judgment was delivered on August 6 in the Church House, Westminster, by Sir Lewis Dibdin, Dean of the Arches, in the case of the London County Council *v.* Dundas (the Vicar) and others, which was an appeal by the Council from a judgment of Dr. Tristram, K.C., Chancellor of the Diocese of London. In August, 1900, Dr. Tristram granted a faculty, on the petition of the vicar and churchwardens, for some additions to the parish church of Holy Trinity, comprising an enlargement of the east aisle of the chancel, which is at the north end of the church, for a side chapel, vestries for the clergy and choir on either side of the south (the conventional west) end, and a new parish room over the two vestries to extend across the south end. The parish room was intended for vestry meetings, missions and other religious services, Sunday schools, and kindred parochial purposes. But Lord Tredegar, chief ground landlord in the parish, and whose father, Sir Charles Morgan, Bart., gave the fabric and site, took exception to the altering of the front of the church by a departure from the original design of 1839, and proposed that the vestries and parish hall should be erected at the north instead of the south end. Thereupon, on June 27, 1901, Dr. Tristram ordered a supplemental faculty to issue—no opposition being made—for the building of two vestries on the east side, and a larger hall, 80 ft. by 40 ft., with sitting room for 240 persons, on the north side behind the chancel—the chancel being extended, and the south wall of the hall serving as the north wall of the church. The order under appeal set out in greater detail the uses to which the hall was to be put, with the addition that it might be made to serve "for other ecclesiastical purposes, but not for any secular purposes." The graveyard as an open space or garden has latterly been under the care and control of the London County Council, who, in March, 1902, after the works had been begun, filed a petition in the Consistory Court asking for a revocation or amendment of the second faculty, on the grounds that, in terms of the Disused Burial Grounds Act, 1884, no buildings can lawfully be erected upon any disused burial ground except for the enlargement of a church or other place of worship, and that the projected parish-hall did not come within those exceptions. The learned Chancellor, having satisfied himself as to the cause of the Council's non-appearance in June, 1901, adjudged (July 31, 1902) that, whilst the Consistory Court had jurisdiction to issue a faculty for a vestry-hall in the situation proposed, and communicating with the church, the desired faculty should be expressly worded so as to preclude the use of the room for secular objects, and that he felt able to grant authority for its use as a vestry-room for purposes of the church. The London County Council appealed from that order. In the course of a long and exhaustive judgment, in which he reviewed the powers and jurisdiction of the two Courts, the Dean of Arches stated that, in his opinion, the hall, as not serving directly or indirectly the primary purpose of a church, could not be deemed an "enlargement of the church" within the scope and meaning of the Act, and that the faculty was, to a certain extent, contrary to the provisions of the Act, and invalid. Sir Lewis Dibdin then showed how he thought it by no means followed that the Consistory Court or the Court of Arches could entertain the petition of the Council inviting the Consistory Court to re-hear the matter and reverse its decision. Taking, however, the view that he did of the invalidity of the faculty so far as the hall is concerned, he considered the right course would be to vary the order by omitting certain provisions, which might be taken to reaffirm the faculty in respect of the hall, and merely to dismiss the petition without costs.

Electric Lighting Scheme, Bootle.—At Bootle, on the 6th inst., a Local Government Board inquiry was held into the application of the Bootle Town Council for sanction to borrow 40,000*l.* for purposes of electric lighting, and 2,500*l.* for the purpose of laying out certain land in Stanley-road fronting the South Recreation Ground as public walks and pleasure grounds. The inspector was Mr. W. O. E. Meade-King.

The Architect to the Board of Education.—In the House of Commons, on Tuesday, Mr. Lambert asked the Secretary to the Board of Education what length of time Mr. Robson had served as consulting architect to the Board of Education; whether he had received notice that his services would be terminated on September 30; was such notice due to his incompetence, if not, what was the reason for it; and whether, in view of appeals permitted by the Education Act to be made by the denominational managers to the Board of Education, he would take steps to secure that the highest expert assistance should continue to be at the service of the Board. Sir W. Anson replied that Mr. Robson had been engaged for eighteen and a half years as Consulting Architect to the Board of Education. "His engagement will terminate on September 30. No question of the competency of Mr. Robson is involved. The Board of Education are making new arrangements to meet new conditions, and will, of course, take care that they are properly provided with expert assistance in the matters to which the question refers."

Columbus Circle Station, New York.—One of the most important stations on the New York Rapid Transit Subway is that taking its name from the Columbus Statue, near Sixtieth-street. The roof is carried on steel columns and girders, with concrete roofing between the latter, and lighting is effected by vault lights in the footpaths, and by incandescent electric lamps. This station includes four tracks, two for express and two for ordinary traffic. Some interest attaches to the method adopted for underpinning the Columbus Statue, which is about 75 ft. high and weighs nearly 725 tons. The statue is partly undermined by the station works, and during excavation it was supported by a pair of heavy steel girders, carried on two timber trestles. In order to prevent any subsidence of the old work, a new foundation of rubble and concrete with a central steel column was carried down beneath a part of the area to a level lower than that of the station foundations. The permanent steelwork was then erected, and after the concrete filling had been placed and allowed to set for a sufficient time, the temporary supports were removed, and the remaining spaces were filled up.

Exports of Timber from Norway.—From official returns it appears that the quantity of timber exported from the whole of Norway in 1902 was 1,961,725 cubic mètres, made up of 508,508 cubic mètres of planed timber, 536,174 of sawn, 105,080 of hewn, 542,375 of round, 85,500 of staves, &c., and 93,416 of laths. In 1901 the exports amounted to 1,805,224 cubic mètres, and in 1900 to 2,002,243. What proportion of the exports was taken by the United Kingdom in 1902 has not yet been ascertained, but in 1901 such proportion amounted to 1,187,200*l.* in value, and it will be observed that in 1902 the total export was larger by nearly 10 per cent. than in that year. The principal exporting centres are Fredrikstad, Christiania, Drammen, Frederikshald, and Porsgrund. From Fredrikstad the export increased considerably in 1902 compared with the two previous years. The total quantity exported from that port was 508,404 against 534,763 cubic mètres in 1901 and 553,744 cubic mètres in 1900. Of flooring boards 225,225 cubic mètres went to the United Kingdom and 35,884 and 24,034 cubic mètres to Africa and Australia respectively. The prices for the Colonies ruled from 7*l.* 10*s.* to 8*l.* 5*s.* for white, and 8*l.* 10*s.* to 9*l.* 5*s.* for red f.o.b. From Christiania the exportations in 1902 amounted to 202,472 cubic mètres, compared with 200,702 in 1901 and 231,585 in 1900. At Frederiksbald the total export in 1902 was 5,204,720 British cubic feet, as against 5,172,932 cubic feet in 1901. The termination of the war in South Africa caused increased demand from the United Kingdom and Colonies, raising prices 10 to 15 per cent. Of the various descriptions, the greatest demand was for planed and sawn timber. Attention has been called at Porsgrund to this peculiar feature in the present state of the sawn timber trade: that white wood is selling at comparatively higher prices than red, a circumstance which is thought to be due to the continually increasing drain on white wood logs by the pulp mills. About 21 per cent. of the total area of the country, or 26,324 square miles, is considered to be covered by forests. The consumption of timber has been enormous, but more replanting is going on—a precaution that is very necessary if this important Norwegian industry is to hold its own, for in some parts of the country the felling goes on faster than the growth.

Safe Deposit, Belfast.—The Ocean Accident and Guarantee Corporation, Ltd., have opened a safe deposit in Chichester-street, Belfast. The safe deposit has been built to the plans of Messrs. Young & Mackenzie, architects, by the Ratner Safe Co., Ltd., London.

Electricity Scheme, Ludlow.—At a meeting of the Ludlow Town Council recently it was decided to make application to the Local Government Board for powers to borrow 8,250*l.* for carrying out a scheme of electric lighting, and for the purpose of a refuse-destructor. The scheme has been prepared by Mr. John Parker, Hereford.

A Crematorium for Sheffield.—At a recent meeting of the Burial Grounds Sub-committee of the City Council it was resolved that detailed plans of the proposed crematorium to be erected at City-road Cemetery, submitted by the architect (Mr. Chas. Hadfield), be approved, and that the Town Clerk be instructed to forward the same to the Local Government Board and to the Home Secretary for their approval.

Extension of the Mall to Charing Cross.—The Office of Works have taken the necessary steps to carry out the long-projected scheme of extending the Mall to Charing Cross. The whole of the Crown property on the south side of Spring-gardens, until recently occupied by Admiralty departments, will shortly be demolished. The raw material will be sold by auction, and immediately after the work of demolition will be commenced. The old corrugated buildings in the Admiralty gardens will also come down. In order to carry out the enterprise, the Office of Works have acquired blocks of commercial and other property on the north side of Spring-gardens and in Charing Cross, the expenditure involved in this part of the scheme being nearly 100,000*l.* One of the buildings to come down is the Architect's department (Factories' section) of the London County Council. The tenants of the scheduled property have already commenced to leave. After the demolition of the Crown property, the extension scheme will be commenced, and will be pushed forward with as little delay as possible. The clearance will improve considerably the frontage of the County Council buildings in Spring-gardens. —*Pall Mall Gazette.*

Window, Ince Parish Church, Lancashire.—A stained window has just been placed in Christ Church by Mrs. Richard Johnson, of Ince Hall, Mayoress of Wigan. The subject is the "Angel Announcing the Resurrection to the Women at the Tomb." The artists were Messrs. Holt, of Warwick.

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CAPITAL AND LABOUR.

JOINERS' STRIKE, SUNDERLAND.—The adjourned conference between representatives of the masters and house joiners at Sunderland, called on the initiative of the Mayor (Councillor H. J. Turnbull) for the purpose of discussing the strike, was held on the 7th inst. in the Mayor's parlour at the Town Hall, the chair being again occupied by his Worship. At the first meeting, a week ago, the Mayor threw out suggestions for a settlement on the following lines:—That the masters withdraw their notice of a reduction of ½d. per hour and the men their notice for an advance of ½d.; that work be resumed at the old rate (9½d.); and that the question of an advance be considered three months hence. Both sides had considered these suggestions, and their replies were now read. The communication from the men's society stated that they had, at a mass meeting, unanimously voted against the Mayor's suggested terms of settlement. The letter added—"We trust that some more reasonable offer will be made by the employers. . . . . The fact of the joinery being the only trade that finds the tools to do the work, and is paid 2s. 1d. less than the rest of the workmen engaged in the building trade, make us think our request is only a reasonable one." The letter from the Masters' Association stated that they had passed the following resolution:—"That the terms of the agreement set out in the Mayor's letter be confirmed by this Association as a basis of settlement of the dispute." After these letters had been discussed for a couple of hours, the Mayor made some fresh suggestions, to the following effect:—That arbitration be accepted by both sides, as between 9½d. and 10d. per hour. The joiners to take the instructions of their general body with a view of a ballot being taken on the question by the men affected only; and, if found favourable, the matter to be forthwith submitted to an arbitrator to be appointed by the Board of Trade. Meanwhile, work to be resumed on the understanding that the decision of the arbitrator shall take effect as from the date of the award. This further effort of the Mayor to bring about a settlement will now be brought before the respective Associations.

LEGAL.

CHELSEA ANCIENT LIGHT DISPUTE.

IN the Chancery Division this week Mr. Justice Farwell concluded the hearing of the case of Barr v. The City & Suburban Electric Carriage Co. (1903), Ltd.

Mr. C. G. Jenkins, K.C., and Mr. Christopher James appeared for the plaintiff, and Mr. W. H. Upjohn, K.C., and Mr. Percy Wheeler for the defendants.

Mr. Jenkins, in opening the case, said the action was for an injunction and damages brought by the plaintiff in respect of the obstruction of an ancient light. The plaintiff, Mr. Barr, was the lessee and occupier of a block of buildings. If he (counsel) could prove that the plaintiff's light was ancient he did not think it could be contended that he was not entitled to succeed in the action, as it was apparent there was obstruction of the plaintiff's light by the defendants' building operations. The plaintiff's premises were known as No. 4, Markham-terrace, Blenheim-street, Chelsea, the plaintiff carrying on there the business of a builder and decorator. These premises were a cottage or small house, and in the rear was a builder's yard with a workshop. The plaintiff's lease was dated June 16, 1900, and he had the premises for a term of 7¾ years from Midsummer, 1900. The particular light obstructed was in the ground floor room used as a painters' shop, &c. The shop consisted of two floors. On the first floor was a carpenter's shop—a well-lighted room—and there was no obstruction of that. The ground floor room had a window in the south wall which was essential for its use as a painters' shop, &c., where the men mixed paints and matched the tints of wall papers. That light was an ancient light. The defendants had built a wall only 12 in. away from the plaintiff's premises on the south side.

In answer to his lordship, the learned counsel said that the wall erected by the defendants was only about 1 ft. away from the window in the plaintiff's painters' shop. The defendants' ground was higher than the plaintiff's, and the top of the defendants' wall was 2 ft. 5 in. above the plaintiff's window.

His lordship remarked that he supposed there was only one issue.

Mr. Upjohn said there would in any event be a question as to what damage the plaintiff had suffered. If Mr. Jenkins established an ancient window, he (Mr. Upjohn) should submit that the plaintiff was only entitled to very small damages. He should ask that after the first witness for the plaintiff was called that all the witnesses on both sides should leave the Court.

Mr. Jenkins said that, of course, he had no objection to make to that proposal.

Continuing, the learned counsel said it would be seen from the plans that the only other light to the painters' shop besides that mentioned was from a door which was partially glazed, on the north side. There was very little light coming from that, because it was very small, and it was obstructed by buildings in the rear. It was rather speculative to say what the defendants' second wall did—which was further off than the one within 12 in. of the plaintiff's premises, and parallel with it—but it was clear that if the nearest wall was not there, there would be some obstruction to the plaintiff's window from the further wall. The defendants had been very concise in their defence. They said that the plaintiff's window was made within the last two years, and got an adjournment of the case on the ground that they had got a witness abroad who was coming to say it was only built within that time. Unless he (Mr. Jenkins) had been very much misdirected, the defendants had been very much misdirected. The history of the premises was this: Until the plaintiff took his lease on June 16, 1900, the property was in the possession, and was owned by, a Mr. Leggett, who died in the year 1899, and it was after his death that the plaintiff took the premises. Mr. Leggett was also a builder and used this yard of his for storing ladders. The plaintiff himself knew Leggett and did business with him, and had been into the premises and into this room. But he fairly said he did not notice how it was lighted, and did not notice that until he took possession. Mr. Leggett did not at first live on the premises, but close by. When he first had the workshop this particular window did not exist—in 1878. Leggett had intended to move into this place and to use this painters' shop as a kitchen and living-room, and his son, who would be called as a witness, himself, in the early part of 1878, in order to make this room suitable for use as a kitchen and living-room, matchboarded the ceiling, put in a range and chimney, and made this window to give some light, and there was to this day the range and the chimney there. He should call Leggett and corroborating witnesses as to this. The learned counsel said it was very important for the plaintiff to have a good light in the painters' shop, and he should call evidence to show that since the obstruction had occurred the place could not be used as a painters' shop, and the plaintiff had to make other arrangements accordingly. The plaintiff had a suite of rooms at Chelsea, which he formerly let for 16s. a week, and instead of letting the rooms he used one of them as a painters' shop. That was inconvenient, and he (Mr. Jenkins) should ask his lordship to give the plaintiff some small amount of damages, even if he granted the injunction. If no injunction was granted he should ask for larger damages.

His lordship said he should have no discretion if the plaintiff proved substantial damage.

Mr. Jenkins submitted that if the plaintiff proved his light was ancient, a mandatory injunction would necessarily follow with regard to the nearest wall. He did not ask for a mandatory injunction with regard to the further wall, because the obstruction was not so great with regard to that wall. He submitted, however, that there was material obstruction from the further wall.

Mr. Upjohn suggested that it would save time if the question of whether the light was ancient or not was discussed first.

His lordship remarked that he could not see how the defendants could deny that there was some obstruction of the light coming to the plaintiff's window by reason of the defendants' nearest wall.

Mr. Upjohn said he would agree that there was some obstruction; but he understood that the window in question could not be used for any purpose of enjoyment. The window was set in a deep embrasure.

Mr. Jenkins then called evidence in support of his case, and in the result his lordship, after having heard some evidence on behalf of the defence, held that the plaintiff's light was ancient, and granted the injunction as prayed with regard to the nearer wall of the defendant's building. He also awarded the plaintiff 23l. 13s. damages.

Judgment accordingly for the plaintiff with costs.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

15,203 of 1902.—R. J. WORRALL: *Fences and Gates and Doors Therefor.*

The door may be formed of a series of bars. The bars are connected together by lazy tongues, which hold them together at a given distance apart or permit them to fold closely together, and thus occupy a reduced space. Or the door may be formed of bars intersecting each other as a lattice work and connected at their intersections pivotally. The intersecting bars may be mounted to outside styles or framework by means or studs working in open slots. The slots may be formed in plates, and the plates mounted upon one or both sides of the style or framework, or the slots may be formed of tongue shape with an extra thickness at the root. The tongue may be secured by its root to the style or framework. Thus while the slot is rigidly fixed to the style or framework the stud is allowed to move freely in the slot, and allow the intersecting bars or lattice to fold so as to be approximately parallel to each other, or to move upon their pivots and form angles with each other. Thus the door is able to expand and contract, and the expanded door may be strengthened by means of crossbars, and may be opened by sliding horizontally or vertically.

15,596 of 1902.—THE BARNSLEY BRITISH CO-OPERATIVE SOCIETY, LTD., and M. E. TUNE: *Ventilator for Extracting Foul Air, Noxious Fumes, and the Like from Churches, Schools, and Other Large Buildings.*

A ventilator consisting of a central chamber, enlarged chamber, cones and winguard suitably arranged, enabling the wind blowing in any direction to cause a suction.

15,606 of 1902.—J. T. SZEK: *Means for Deodorising or Disinfecting Urinals, Stables, and the Like.*

A composition adapted for use as a sanitary and disinfecting material for covering walls, floors, and the like, consisting of a mixture of peat, infusorial earth, a disinfecting liquid containing cresyl compounds and cementitious or other binding material.

15,803 of 1902.—E. H. CUMMINS: *Casement Fasteners.*

In a casement fastener of the V-type the combination of two links, the meeting end of one of these being provided with an elongated slot, and the meeting end of the other with a square orifice. It further consists of the combination of two links and the bolt square where it passes through the square orifice of one of the links and threaded at one extremity to receive a binding.

17,969 of 1902.—A. F. BUDDEN: *Domestic Fireplaces.*

This invention relates to domestic fireplaces, and the objects thereof are to consume the smoke and also to provide a means of using coal or like fuel, or gas, either or both, as the heating means, as the occasion may require. In carrying this invention into effect, the fireclay lump or back of the stove is, from the point above the grate, carried upward and forward at a suitable angle or inclination so as to overhang the grate. Upon the inclined part of the back are mounted a series of vertically or otherwise disposed grids or frames of lattice or open work, formed of cast-iron or other suitable metal, and beneath which grid or frame is arranged a Bunsen or other suitable burner, or several such burners might be so employed. Extending across the back of the fireplace, and communicating with the burners, is a gas-supply pipe, which, in a confined position, is furnished with a cock by the aid of which the gas-supply may be controlled.

19,435 of 1902.—F. W. BROADBENT AND C. E. HOLLIDAY: *Machine for Moulding, Pressing, or Repressing Tiles, Bricks, and such like articles from Plastic or Powdered Substances.*

This invention consists of a machine worked by hand or other power for moulding, pressing, or repressing articles from plastic or powdered substances, more especially quarries and tiles and such like objects from clay. In carrying the invention into effect loose plates are provided, preferably of metal and with or without pattern, to be inserted flatways at right angles to the applied force between the clots, bats, bricks, quarries, tiles, or other such like mass of plastic clay or layers of clay dust, lime, or whatever material may be used, thus separating them one from another, but at the same time allowing the pressure applied to the outer one by screw, lever, or other means to be imparted to them all. Provision is also made for quickly and accurately feeding the die-box with the clay clots and plates, and also for delivering those that have already been pressed.

19,915 of 1902.—A. E. BROWN: *Drying Chambers, or Drying Floors, or the Like, for Drying Bricks, Tiles, Pottery, Terra-cotta, or for the Like Purpose.*

In means for drying bricks, tiles, pottery, terra-cotta, or for the like purpose, the arrangement and combination of flues for obtaining a uniform distribution to the goods to be dried of the heat from waste gas of comparatively low temperature or other products of combustion or any desired temperature or from heated air, such arrangement comprising a longitudinally disposed service flue and a longitudinally disposed collecting flue in combination and acting in conjunction with a series of cross flues each connecting said service and collecting flues with a series of cross flues extending above the ground or paving, supporting same and spaced apart from one another in suchwise as to be adapted to permit sand or other non-combustible material to be filled in between the adjacent sides of said cross-flues, and to be removed therefrom to thereby regulate the extent of the heat surface of said cross flues, said flues being of ample cross-sectional area to permit the free passage there through of large volumes of said hot gases or heated air.

21,168 of 1902.—J. L. A. POLLARD: *Heating Stove.*

A heating stove comprising an ash-pit, surmounted by fire bars and a fire door. This arrangement forming the hearth or fireplace is situated beneath an earthenware or pottery column, formed by elements placed one above the other, and hermetically sealed at their junctions by means of joint rings or packing lodged in grooves provided for that purpose in the ends of the elements. Each of these elements is divided by a vertical earthenware partition wall, which, starting from the hearth, or fireplace, rises as far as the lower end of the last element. This last element terminates the column, which is closed by a plug or cap, also made

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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of earthenware. The whole is held by iron bands. A flue is arranged behind the hearth, and the stove-pipe or chimney is placed on the said flues. The gases from the hearth rise in one of the two compartments of the column, and descends at the back of the partition wall in order to escape into the chimney. Coal, coke, wood, oil, or other suitable fuel can be burnt in the hearth or fireplace.

21,196 of 1902.—J. C. Christensen: *Locks or Fastenings.*

In locks or fastenings of the kind in which the bolt is pushed back by a pressure at right angle with the plane of the door, the bolt is movable in the lock case and provided with a slot and with two pins in combination and acting in conjunction with two bent tubes attached to the lock case, and each of which at one end extends into the slot and over the pins; while the other end of each said tube terminates within the knob of the door, a pin mounted upon a movable press button, the pin being movable inside the tube end, and a series of balls in each said tube, filling the interval between the ends of the pins, so that when one of these is pushed into the tube the other is simultaneously withdrawn and pushed outwardly from same.

23,687 of 1902.—J. R. Mayfield: *Fireplaces.*

This consists of providing a fireplace with a double bottom, one or both bottoms being perforated and adapted to slide relatively to the other or one another; so that by moving one or both, as the case may be, the perforations may be opened and closed, and ashes allowed to fall through or be retained as desired.

24,830 of 1902.—F. W. Adams; *Door-Springs.*

According to the invention a long spiral spring is rotated in a U-shaped groove or recess formed along the centre of the top of the door, the said spring being either partially or wholly enclosed in a casing. Through this spring is passed a rod, the outer end of which carries a nut, against which the end of the spring bears, and by adjusting which the tension of the spring can be regulated. The inner end of the rod is secured to one end of a chain, the other end of which is fastened or pivotted to that part of the hinge which is affixed to the door-post. The inner end of the spring bears against the other half of the hinge, *i.e.*, the part secured to the door, so that it will be seen that the spring tends to hold the door tightly against the door-post.

2,475 of 1903.—W. R. Springer: *Hinges.*

This invention consists in the combination with a casing or frame having a vertical mortise in one side thereof, a door or the like element, an attaching plate countersunk in said mortise, and having a vertical V-shaped socket with dove-tailed side edges, the length of said attaching plate being less than that of said mortise, and a hinge having one leaf attached to the door and the other leaf provided with a V-shaped offset adapted to fit in the socket of said attaching plate, the mortise in which said attaching plate is countersunk, adapting said hinge to be raised with the door to disconnect it offset from the socket of said attaching plate.

3,974 of 1903.—H. N. Haug: *Houses for Drying Fish and the Like.*

This invention consists of a house for drying fish and the like, the combination of a chamber in which the air admitted from without is heated, a drying-room through which the air introduced from the heating chamber through apertures in the floor at one end of the room, pass over the fish at a constant speed, the fish being equally distributed in the room and suspended with its flat side parallel to the direction in which the air is flowing, an exhaust chamber, through which the air is again ejected into the atmosphere.

4,821 of 1903.—R. C. Carpenter: *Apparatus for the Manufacture of Cement.*

This invention relates to apparatus for producing cement, and it relates especially to apparatus for producing cement by the rotary process, in which the heat issuing from the cement kilns is utilised in various ways, such as heating a boiler or economiser or dryer.

15,834 of 1902.—F. S. Plant: *Single or Duplex Gauge for Gauging Bricks and the Like.*

According to this invention the apparatus for gauging bricks and the like consists essentially of a flat piece of iron or other suitable material, preferably about 7½ in. long, 1¼ in. wide, and $\frac{1}{16}$ in. in thickness. A slot is made to thin off an inch of its length, it is then set out in inches and parts of inches, as in the case of the ordinary 2-ft. rule. The stop is inserted through the slot and secured on the other side by means of a wing nut and washer.

19,005 of 1902.—H. L. Doulton: *Flushing Siphons for Sewage and the Like.*

In flushing siphons with two or more outlets, the adoption of ventilating pipes from said outlet for the more ready escape of air. Said ventilating pipe to be entirely separate or joined into one or more pipes.

19,476 of 1902.—R. H. Radford: *Gulleys, Gulley-Traps, and Silt Boxes.*

In gulleys, gulley traps, and silt boxes the arrangement and combination of parts and appliances, by which the lining or tray for catching the mud or silt, and the bell or trap are constructed in one, so that the bell portion of the tray is only slightly higher than the top of the waste pipe, and the bottom of the tray or silt box is considerably below the level of the waste-pipe, thus forming a combined bell trap and tray which can be removed at one operation for cleaning.

27,283 of 1902.—A. G. Boys: *Wood-paving Blocks.*

The said invention consists essentially in making up rectangular blocks of wood, such as are used for roadways and pavements; the said block consists of several small sections cut from waste timber into rectangular blocks of uniform widths and connected together so as to present the end grain uppermost. The said sections are connected together by cutting a dovetail slot along both the longitudinal sides of the block and fit therein a strip of wood so as to bind the whole of the sections together; several wire staples are then driven in, allowing one end of each staple to enter each alternate block, and so clamping and tightening the whole together. In some cases dovetail strips may be used without the staples, or staples without the strips may be used to connect the sections together to form one rectangular block.

6,345 of 1903.—G. Jones: *Fire-escapes.*

A fire-escape which comprises a ladder, of which the sides are chains and the steps are metal bars, and of which the bottom step or bar is of a length which ensures that it will project a considerable distance at each side of the ladder in order that the ladder may be rolled up upon said bar and readily unrolled without entanglement. Means are provided for preventing ladder from turning when suspended, and from unrolling after it is rolled up.

5,323 of 1903.—W. W. Williams: *Drain-pipe.*

The pipe increases in thickness from the spigot end to the back part of the socket, thus making the collar of double the thickness of an ordinary drain-pipe.

7,262 of 1903.—W. Busse: *Perforated Draining and Drying Slate Tiles.*

This invention relates to tiles for draining and drying wood pulp or fibrous or other materials. The object being to replace clay tiles by providing perforated slabs of solid slate of novel construction with conically or roundly perforated orifices performed by mechanical means, either in layers or circular form, and destined to the formation of double bottoms and similar purposes.

5,921 of 1903.—M. H. Rylatt: *Earthenware Pipes and the Like.*

A pipe for drainage and the like purposes, having one or more sockets, in which are formed any suitable number of sloping ribs to guide and support the spigot end of the pipe to be joined to socket or pipe.

11,083 of 1903.—K. Spatz, *nee* Kühler: *Production of Mosaic Work.*

This relates to the production of mosaic work, and consists in the combination of plate glass of any colour and transparency, said plate plate glass being provided in a suitable manner on one of its surfaces with a rough backing, and thereupon cut into small pieces of the required size.

12,636 of 1903.—W. N. Wight: *Concrete Structures.*

The construction of a concrete flooring with a wire fabric embedded in the concrete and suspended between the flooring supports, the fabric being composed of straight wires in the direction transverse to the supports and cross wires at right angles to said straight wires, for spacing the same, and bound thereto at the crossing points.

13,115 of 1903.—H. H. Lake (W. Spangher): *Parquet Flooring.*

In parquet flooring, which consists in providing the pieces or plates of wooden parquet flooring upon the lower face with a layer of asphalt of special composition, adhering, on the one hand, strongly to the wood and, on the other, to the cement constituting the bed of the flooring, this layer of asphalt presenting upon its lower face—for the purpose of increasing its adhesion to the cement—projections or protuberances, obtained by pressing by means of a die, which is applied to the asphalt whilst still hot and soft.

MEETINGS.

August 17 to 22.

Junior Institution of Engineers.—Summer meeting at Sheffield. The proceedings will be opened at the Town Hall at 11 a.m. by the Lord Mayor of Sheffield.

Saturday, August 22.

Northern Architectural Association.—Excursion meeting, Blagdon and Stannington. Members to assemble at the lodge gates of the principal entrance to Blagdon Hall at 3.30 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

July 25.—By Irelands' (at Norwich).

Whitwell, Norfolk.—The Home Farm and Whitwell Tannery, 217 a. 3 r. 22 p., f. and c.	£5,500
Great Witchingham, Norfolk.—Blackwater and Reynold's Farms, 226 a. 3 r. 11 p., f. and c.	3,800
Various enclosures, 34 a. 2 r. 39 p., f. and c.	870
Copyhold cottage and 1 a. 1 r. 33 p.	165
15 freehold and copyhold cottages	870
Themelthorpe, &c., Norfolk.—Old Hall and Heath Farms, 317 a. 0 r. 20 p., f. and c.	4,200

By Spelmans' (at Norwich).

Great Snoring, Norfolk.—Freehold rent charge of 43*l.* 5*s.* 8*d.*	£1,050

July 28.—By Morris, Marshall, & Poole (at Newtown).

Caersws, Montgomery.—The Unicorn Hotel and 1 a. 2 r. 20 p., f., y.r. 50*l.*	1,350
Pendinas, f., y.r. 25*l.*	510
Two freehold fields, 3 a. 2 r. 33 p., y.r. 11*l.*	340
Llanwnog, Montgomery.—Lleast Uchaf Farm, 63 a. 3 r. 12 p., f., y.r. 16*l.*	400

July 30.—By Walton & Lee (at York).

Pickering, &c., Yorks.—The Keldy Castle Estate, 6,843 a. 2 r. 0 p., f. (in one lot)	25,000

By Balls' (at Sudbury).

Cavendish, Suffolk.—Church Farm, 29 a. 1 r. 1 p., f.	800

By Bidwell & Sons (at Ely).

Mildenhall, &c., Suffolk.—Harris Farm, 412 a. 1 r. 5 p., f.	4,750

August 5.—By A. Martin Newcombe.

Barnsbury.—88, Roman-rd. (dairy premises), u.t. 58 yrs., g.r. 6*l.* 10*s.*, y.r. 55*l.*	685
Clapham.—1, Killyon-rd., u.t. 90 yrs., g.r. 8*l.*, e.r. 45*l.*	470

By Pendered & Son (at Wellingborough).

Chelveston, &c., Northants.—Freehold farmhouse and 151 a. 2 r. 23 p.	1,750
Freehold house	175
Freehold close, 10 a. 1 r. 21 p.	210
Irthlingborough, Northants.—Two copyhold closes, 8 a. 3 r. 13 p.	175

August 6.—By H. H. Collier.

Battersea.—266, Lavender Hill, s., u.t. 83 yrs., g.r. 25*l.*, y.r. 85*l.*	1,075
Woking, Surrey.—1, The Terrace, s., f., y.r. 65*l.*	850

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£	s.	d.			
Hard Stocks	1	15	6	per 1,000	alongside, in river.	
Rough Stocks and Grizzles.....	1	12	6	,,	,,	,,
Facing Stocks....	2	12	0	,,	,,	,,
Shippers	2	5	0	,,	,,	,,
Flettons	1	8	6	,,	at railway	depôt
Red Wire Cuts ..	1	12	6	,,	,,	,,
Best Fareham Red	3	12	0	,,	,,	,,
Best Red Pressed Ruabon Facing	5	0	0	,,	,,	,,
Best Blue Pressed Staffordshire ..	4	5	0	,,	,,	,,
Do. Bullnose	4	11	0	,,	,,	,,
Best Stourbridge Fire Bricks	4	8	0	,,	,,	,,
Glazed Bricks.						
Best White and Ivory Glazed Stretchers.....	13	0	0	,,	,,	,,
Headers	12	0	0	,,	,,	,,
Quoins, Bullnose, and Flats.....	17	0	0	,,	,,	,,
Double Stretchers	19	0	0	,,	,,	,,
Double Headers..	16	0	0	,,	,,	,,
One Side and two Ends.....	19	0	0	,,	,,	,,
Two Sides and one End	20	0	0	,,	,,	,,
Splays, Chamfered, Squints.....	20	0	0	,,	,,	,,
Best Dipped Salt Glazed Stretchers and Headers	12	0	0		,,	,,
Quoins, Bullnose, and Flats.....	14	0	0	,,	,,	,,
Double Stretchers	15	0	0	,,	,,	,,
Double Headers..	14	0	0	,,	,,	,,
One Side and two Ends.....	15	0	0	,,	,,	,,
Two Sides and one End	15	0	0	,,	,,	,,
Splays Chamfered, Squints.....	14	0	0	,,	,,	,,
Second Quality White and Dipped Salt Glazed	2	0	0	,,	less than best.	

	s.	d.	
Thames and Pit Sand	6	0	per yard, delivered.
Thames Ballast	6	0	,, ,,
Best Portland Cement	30	0	per ton, delivered.
Best Ground Blue Lias Lime..	20	6	,,

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s 6d. per yard, delivered.
Stourbridge Fire-clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	£	s.	d.	
Bath Stone—delivered on road waggons, Paddington depôt	1	6½	per ft. cube.	
Do. do. delivered on road waggons, Nine Elms depôt	1	8½	,,	,,
Portland Stone (20 ft. average)—				
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2	1	,,	,,
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2	2½	,,	,,

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PRICES CURRENT (*Continued*).

STONE.

	s. d.		
Ancaster in blocks	1 11	per ft. cube, deld	rly. depôt.
Beer in blocks	1 6	,,	,,
Grinshill ,, ...	1 10	,,	,,
Darley Dale in blocks..	2 4	,,	,,
Red Corsehill ,,	2 5	,,	,,
Closeburn Red Freestone	2 0	,,	,,
Red Mansfield ,,	2 4	,,	,,

YORK STONE—*Robin Hood Quality.*

	s. d.		
Scappled random blocks	2 10	per ft. cube, deld.	rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super.	,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,,	,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,,	,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,,	,,
1½ in. to 2 in. ditto, ditto	0 6	,,	,,
BEST HARD YORK— Scappled random blocks	3 0	per ft. cube	,,
6 in. sawn two sides, landings to sizes(under 40 ft. sup.)	2 8	per ft. super.	,,
6 in. Rubbed two sides Ditto	—	,,	,,
3 in. sawn two sides slabs (random sizes)	1 2	,,	,,
2 in. self-faced random flags.....	0 5	,,	,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.	
,, ,, ,, 6 in. sawn both sides landings	2 7	deld. rly. depôt. per ft. super. deld. rly. depôt	
,, ,, ,, 3 in. do.	1 2½	,,	,,

SLATES.

in. in.	£ s. d.	
20 x 10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry. dep.
20 x 12 ,, ,, ,,	..13 17 6	,, ,,
20 x 10 best seconds ,,	12 15 0	,, ,,
20 x 12 ,, ,, ,,	13 10 0	,, ,,
16 x 8 best ,,	7 0 0	,, ,,
20 x 10 best blue Portmadoc ..	12 5 0	,, ,,
16 x 8 best blue Portmadoc	6 5 0	,, ,,
20 x 10 best Eureka unfading green....	15 2 6	,, ,,
20 x 12 ,, ,,	17 8 6	,, ,,
18 x 10 ,, ,,	12 10 0	,, ,,
16 x 8 ,, ,,	10 5 0	,, ,,
20 x 10 permanent green	11 0 0	,, ,,
18 x 10 ,, ,,	9 5 0	,, ,,
16 x 8 ,, ,,	6 10 0	,, ,,

TILES.

	s. d.		
Best plain red roofing tiles..	4 0	per 1,000, at	rly. depôt.
Hip and valley tiles....	3 7	per doz.	,, ,,
Best Broseley tiles	50 0	per 1,000	,, ,,
Do. Ornamental Tiles	52 6	,,	,, ,,
Hip and valley tiles....	4 0	per doz.	,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000	,, ,,
Do. ornamental Do.	60 0	,,	,, ,,
Hip tiles	4 0	per doz.	,, ,,
Valley tiles.....	3 0	,,	,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000	,, ,,
Do. Ornamental Do. 54	6	,,	,, ,,
Hip tiles	4 1	per doz.	,, ,,
Valley tiles.....	3 8	,,	,, ,,
Best "Rosemary" brand plain tiles	48 0	per 1,000	,, ,,
Do. Ornamental Do. 50	0	,,	,, ,,
Hip tiles	4 0	per doz.	,, ,,
Valley tiles	3 8	,,	,, ,,

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	,, ,, ,,
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards— 1½ in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	,,
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

White Sea:	At per standard. £ s. d.	£ s. d.
First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
,, ,, 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0

PRICES CURRENT (*Continued*).

WOOD.

JOINERS' WOOD.

Petersburg—	At per standard. £ s. d.	£ s. d.
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Battens.....	14 10 0	16 0 0
Third yellow deals, 3 in. by 11 in.....	11 0 0	12 10 0
Do. 3 in. by 9 in.	13 10 0	14 0 0
Battens	13 0 0	14 0 0
White Sea and Petersburg :—	10 0 0	11 0 0
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small ,, ,, ...	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
⅜ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	- -

Prepared Flooring—	Per square. £ s. d.	£ s. d.
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
⅝ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
⅝ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered. Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

IRON—	Per ton, in London. £ s. d.	£ s. d.
Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
,, ,, galvanised.....	16 0 0	- - -

(* And upwards, according to size and gauge.)

Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	- - -
,, ,, to 24 g.	10 15 0	- - -
,, ,, to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.....	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality :— Ordinary sizes to 20 g.....	16 0 0	- - -
,, ,, 22 g. and 24 g.	16 10 0	- - -
,, ,, 26 g.....	18 0 0	- - -
Galvanised Corrugated Sheets :— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
,, ,, 22 g. and 24 g.	13 5 0	- - -
,, ,, 26 g.....	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	- - -
,, ,, 22 g. and 24 g.	12 15 0	- - -
,, ,, 26 g.	14 0 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0

(Under 3 in. usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	13 15 0	- - -
Pipe in coils	14 5 0	- - -
Soil pipe	16 15 0	- - -
Compo Pipe	16 15 0	- - -
ZINC—Sheet— Vieille Montagne ..... ton	26 0 0	- - -
Silesian	25 15 0	- - -
COPPER— Strong Sheet ..... per lb.	0 0 10½	- - -
Thin ..... ,,	0 0 11½	- - -
Copper nails ..... ,,	0 0 11	- - -

PRICES CURRENT (*Continued*).

LEAD, &c.

BRASS—	Per ton, in London. £ s. d.	£ s. d.
Strong Sheet..... per lb.	0 0 10	- - -
Thin ,,	0 0 11	- - -
TIN—English Ingots ..... ,,	0 1 4	- - -
SOLDER—Plumbers' ..... ,,	0 0 6	- - -
Tinmen's ..... ,,	0 0 8	- - -
Blowpipe ..... ,,	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths.....	1¾d. ,, ,,
21 oz. thirds	3¼d. ,, ,,
,, fourths.....	2¾d. ,, ,,
26 oz. thirds	3¾d. ,, ,,
,, fourths.....	3¼d. ,, ,,
32 oz. thirds	4¼d. ,, ,,
,, fourths.....	4¼d. ,, ,,
Fluted sheet, 15 oz.	2¾d. ,, ,,
,, 21 oz.	3¼d. ,, ,,
½ Hartley's Rolled Plate	1¾d. ,, ,,
⅝ ,, ,, ,, ...	2d. ,, ,,
¾ ,, ,, ,, ...	2¼d. ,, ,,

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels.. per gallon	0 1 10
,, ,, ,, in drums..... ,,	0 2 2
Boiled ,, ,, in pipes or barrels.. ,,	0 2 1
,, ,, ,, in drums..... ,,	0 2 5
Turpentine, in barrels ..... ,,	0 3 3
,, in drums ..... ,,	0 3 6
Genuine Ground English White Lead per ton	19 10 0
Red Lead, Dry ..... ,,	19 10 0
Best Linseed Oil Putty..... per cwt.	0 8 0
Stockholm Tar..... per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak.....	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches.....	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under.....6s. 0d.
Each additional line.....1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under .....4s. 6d.
Each additional line (about ten words).....0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

FOUR lines (about thirty words) or under .....2s. 6d.
Each additional line (about ten words).....0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*New Hospital	Brighton & Hove Hosp for Women	50*l.*, 30*l.*, and 20*l.*	Nov. 9
*Stone Bridge over Medway at Aylesford	Maidstone Council	100 guineas	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
*Isolation Hospital Buildings	Acton District Council	Council's Surveyor, 242, High-street, Acton, W.	Aug. 18
Surveyor's Materials	Portsmouth Corporation	A. Hellard, Town Hall, Portsmouth	do.
Broken Granite, &c., Barnet	South Mims R.D.C.	G. D. Byfield, 16, High-street, Barnet	do.
Lodge, &c., Woodbridge Hospital, Guildford	The Guardians	E. L. Lunn, Architect, High-street, Guildford	do.
Electricity Buildings, North Shields	Tynemouth Corporation	J. F. Smillie, County Surveyor, Tynemouth	do.
Sewers, &c., Kingston-road	Leatherhead U.D.C.	T. Salkield, Surveyor, Council Offices, Leatherhead	do.
Cart Shed, &c., Miller Park	Preston Corporation	Borough Surveyor, Town Hall, Preston	do.
Bridge Works, Scotland-road	Nelson (Lancs) Corporation	B. Ball, Civil Engineer, Town Hall, Nelson	do.
Shop and Stores, Harnall-lane East	Coventry Co-operative Soc., Ltd.	Harrison & Hattrell, Architects, 23, Hertford-street, Coventry	do.
Six Houses, King Edward's-road, Coventry	do.	do.	do.
Additions to Infirmary	.....	E. Seward, Architect, Cardiff	do.
Lock-up Shops, Cleator Moor, near Hudder-field	.....	J. Berry, Architect, Market-place, Huddersfield	Aug. 19
Organ Chamber, &c., at Parish Church, Llandilofawr	.....	D. Jenkins, Architect, Llandilo	do.
Caretaker's House at Schools	Hemsworth School Board	W. E. Richardson, Architect, Rothwell, Leeds	do.
Cottages, Easter Coltfield, near Elgin, N.B.	.....	Reid & Wittel, Architects, Elgin	do.
Walling round Pier	Gillingham (Kent) U.D.C.	F. C. Boucher, Council Offices, New Brompton	do.
Additions to Schoolroom, Cowbridge-road, Cardiff	.....	Rev. D. T. Evans, 5, Eton-place, Cardiff	do.
Steel Girders (35 tons) Holbeck	Leeds Corporation	City Engineer, Municipal Offices, Leeds	do.
Portland Cement (5,000 tons)	Blackpool Corporation	J. S. Brodie, Borough Engineer, Town Hall, Blackpool	do.
Additions to Schools, Park-road	Barnsley School Board	E. W. Dyson, Architect, 14, Market-hill, Dewsbury	do.
Steel Works, New Bridge-street	Barnsley Town Council	J. H. Taylor, Civil Engineer, Manor House, Barnsley	do.
Wall, &c.	Gillingham U.D.C.	F. S. Boucher, Council Offices, New Brompton	do.
House, Caeran (Wales)	Ms. North's Navigation Collieries Co.	E. W. Burnett & Son, Architects, Tondu	do.
Shelter, &c., in Park	Cleethorpes U.D.C.	E. Rushton, Surveyor, Poplar-road, Cleethorpes	do.
Ten Houses, Whitehall, Woolmer Forest, Hants	Mr. W. White	Rake & Cogswell, Architects, Prudential Buildings, Portsmouth	do.
Road Works at Cemetery, Hulme Hall-road	Manchester Corporation	City Architect, Town Hall, Manchester	do.
Stabling, Black Horse Hotel, Otley	Messrs. W. Whitaker & Co.	H. Chippindale, Architect, Guiseley, near Leeds	do.
Cottages, Kilnaglery, Ireland	Kinsale R.D.C.	J. Murphy, Board Room, Kinsale	do.
Additions to Church, Marsden (Yorks)	.....	J. Kirk & Sons, Architects, Huddersfield	Aug. 20
Six Houses, Hough-lane, Wombwell	Mrs. E. Bashford	A. B. Linford, Architect, Carlton Villa, Wombwell	do.
Fifty Workmen's Dwellings, Public Offices, &c.	Risca (Mon.) U.D.C.	J. Williams, Engineer, Public Hall, Risca	do.
Drainage Works at Harbour Offices	Swansea Harbour Trustees	J. Thomas, Civil Engineer, 32, Fisher-street, Swansea	do.
*Isolation Hospital	Upton-on-Severn (Worcs.) R.D.C.	L. Sheppard & Son, Architects, 51, Foregate-street, Worcester	do.
Additions to Manager's House, Shelley, nr. Huddersfield	Gaslight Co., Ltd.	E. W. Lockwood, Architect, 37, Byron-arcade, Huddersfield	do.
*Painting Works at the Infirmary, &c.	Wandsworth and Clapham Union	Clerk to the Guardians, Union Offices, St. John's Hill, S.W.	do.
Three Shops, Market-street, Milnsbridge, Yorks	.....	J. E. Lunn, Architect, Milnsbridge	Aug. 21
Stoneware Pipes, &c.	Coventry Corporation	J. E. Swindlehurst, Civil Engineer, Coventry	do.
Cast Iron Pipes	do.	do.	do.
Rebuilding St. Mark's Church, Rhymney	The Vicar and Churchwardens	J. L. Smith & Davies, Architects, Aberdare	do.
Alterations to Municipal Buildings	Barrow-in-Furness Corporation	Borough Engineer, Town Hall, Barrow	Aug. 22
Additions to Chapel, Lloyd-street, Llanelly	.....	D. L. Jones, Architect, 12, West End, Llanelly	do.
Broken Limestone, Tredegar (Mon.)	Bedwellty U.D.C.	J. H. Lewis, Civil Engineer, Pengam, via Cardiff	do.
Reservior	Newton-le-Willows U.D.C.	C. Cole, Town Hall, Earlestown, Lancs	do.
Laying Water Main	Leigh (Lancs) Town Council	J. Gibson, Engineer, Leigh, Lancs	do.
*Construction of Room at Public Baths	Paddington Council	E. B. B. Newton, Town Hall, Paddington	do.
Rebuilding Offices, Albion-street, Leeds	.....	T. Wrim & Sons, Architects, 92, Albion-street, Leeds	Aug. 24
Church Works, St. Mary's Church, Builth Wells, Brecon	.....	Selfer Smith, Architect, Builth Wells	do.
Stone Wall, Little Salkeld	Penrith R.D.C.	T. Watson, Surveyor, Kirkeswald	do.
Road Works, Northfields Estate	Stamford Corporation	T. W. Hayward, Civil Engineer, 8, St. Mary's-street, Stamford	do.
Underground Station at Electry. Works, Doughty-rd.	Grimsby Corporation	W. A. Vignoles, Architect, Grimsby	do.
Water-mains, &c.	Llanrwst (Wales) R.D.C.	R. R. Owen, Council Offices, Llanwrst	do.
Water Supply Works, near Swindon	Highworth R.D.C.	F. Bodman, Engineer, 34, Wood-street, Swindon	do.
Schools Forsyth-road, West Jesmond	Newcastle-on-Tyne School Board	C. S. Errington, Architect, Grainger-street, W. Newcastle	do.
Rebuilding Business Premises, Elgin	Mr. W. Ramsay	R. B. Pratt, Architect, Elgin	do.
Widening Aldenham-road, Bushey	Hertfordshire County Council	N. A. Smith, County Surveyor, 41, Parliament-street, S.W.	do.
*Erection of Carnegie Free Library	Montrose Town Council	Morham & Gardner, 29, Hanover-street, Edinburgh	do.
*Infirmary Extensions	Newark Union	A. Marshall, Architect, King-street, Nottingham	do.
*Erection of Seventy Houses, near The Rhyd, Tredegar	United Building Society	W. S. Williams, Architect, Tredegar	do.
Workhouse Buildings, Crookstown, Renfrewshire	.....	MacWhannell & Rogerson, Architects, West Regent-street, Glasgow	Aug. 25
Sewers, &c., Connor-road	Portsmouth Corporation	Borough Engineer, Town Hall, Portsmouth	do.
Sewage Disposal Works	Worcester Corporation	Beesley, Son, & Nichols, Civil Engineers, 11, Victoria-street, S.W.	do.
Granite Road Metal	Farnham U.D.C.	R. W. Cass, Surveyor, Council Offices, Farnham	do.
Water Supply Works	Clutton R.D.C.	W. F. Bird, Civil Engineers, Midsomer Norton, near Bath	do.
*New Branch Post Office, Barry Dock	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	do.
*Enlargement Head Post Office, Birmingham	do.	do.	do.
Infirmary and Laundry	Nuneaton Guardians	H. Quick, Architect, 64, Hertford-street, Coventry	Aug. 26
Additions to Church, Armagh-road, Portadown, Ireland	The Presbyterians	T. Houston, Architect, Wellington-place, Belfast	do.
Sewage Tanks	Burnley Corporation	G. H. Pickles, Civil Engineer, Town Hall, Burnley	do.
*New Drainage, Paving Yards, &c., at Workhouse	St. George's Union	E. T. Hall, Architect, 54, Bedford-square, W.C.	do.
Additions to Workhouse, Gibbet-street	Halifax Guardians	W. C. Williams, Architect, 29, Southgate, Halifax	Aug. 27
Cast Iron Pipes, &c.	Devonport Corporation	Stevenson & Burstal, Engineers, 38, Parliament-street, S.W.	Aug. 29
*Water Tower Pump House, &c.	Ennis Dis. Lunatic Asylum Commit	Clerk to the Asylum, Board Room, Ennis, D.L.A.	Aug. 31
Private Street Works	Kettering U.D.C.	Council's Surveyor, Market-place, Kettering	do.
Public Offices, &c., New Malden	Maldens and Coombe U.D.C.	W. Hope, Architect, Seymour-road, Hampton Wick	do.
Road Materials, &c.	Farnborough U.D.C.	J. E. Hargreaves, Surveyor, Town Hall, Farnborough	do.
Widening Poera Quay	Aberdeen Harbour Commissioners	R. G. Nicol, Engineer, Aberdeen	do.
Sewers, &c., Thames Ditton	Esher U.D.C.	E. A. Everett, Council Offices, Thames Ditton	Sep. 2
Offices, &c. at Town Hall	Bermondsey Borough Council	Council's Surveyor, Town Hall, Spa-road, S.E.	Sep. 3
*New Coastguard Buildings, near Sandown (I. of W.)	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	Sep. 4
*Mercantile Marine Office at Barry Docks	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	do.
*Extensions to Dust Destructor House, &c.	Bermondsey Borough Council	Council's Surveyor, Town Hall, Spa-road, S.E.	Sep. 8
Schools, Penygraig, Wales	Ystradyfodwg School Board	J. Rees, Architect, Hillside Cottage, Pentre	Sep. 14
*New Public Offices, Morgan-street, Pontypridd	U.D.C. of Pontypridd	Clerk to the Council, District Council Offices, Pontypridd	do.
Market House, Assembly Hall, &c.	Wem (Salop) U.D.C.	J. Brown, Architect, 12, Castle-street, Shrewsbury	do.
*New Engine and Boiler Houses at Monument-lane	Birmingham Corporation	J. Mansergh & Sons, 5, Victoria-street, S.W.	Sep. 16
*New Bridge over Thames at Vauxhall	London County Council	Engineer's Department, County Hall, Spring Gardens, S.W.	Oct. 6
House, Lees Hill School, Brampton, Cumberland	The Managers	Rev. T. W. Willis, Lanercost Vicarage, Brampton	No date.
Church, &c., Wimpole Estate, Colchester	.....	Goodey & Cresswell, Architects, Colchester	do.

[See also next page

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Architectural Draughtsman	Aldershot U.D.C.	2l. 10s. per week	Aug. 20
*Teacher of Building Trade Subjects	Limerick Technical Education Com.	130l. per annum	Aug. 24
*Teacher of Plumbing	do.	100l. per annum	do.
*Evening Teacher (Tchnicl. Drawing & Bldng. Constrn.)	Middlesex Education Committee	Not stated	Aug. 29
*Borough Engineer and Surveyor	Croydon Borough Council	800l.	Sep. 1
*Assistant Sanitary Inspector	Willesden U.D.C.	100l.	Sep. 8
*District Surveyor, South Fulham	London County Council	See Advertisement	Sep. 14

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. *Public Appointments*, xvi.

TO CORRESPONDENTS.

W. J. (Below our limit). "Spakesham" (You did not enclose your address with your inquiry). E. & C.—J. R. C.—R. C. & Son (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is undescribed, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BLACKHILL (Durham).—For the erection of road works for the Benfieldside Urban District Council. Mr. Thos. Knox, surveyor, 40, Thomas-street, Blackhill:—

T. J. Turnbull	£123 10 2	G. J. Christopher, Blackhill*	£114 16 6

CARDIFF.—For the construction of an underground convenience, North-road, for the Corporation. Mr. W. Harpur, C.E., Town Hall, Cardiff. Quantities by Engineer:—

F. Bond	£3,450 0 0	W. T. Symonds	£3,276 4 5
Knox & Wells	3,344 18 1	Turner & Sons	3,247 16 1
D. W. Davies	3,340 0 0	Allan & Son*	3,089 0 8

[All of Cardiff.]

CARDIFF.—For the erection of a lodge at sanatorium, Canton, for the Corporation. Mr. W. Harpur, C.E., Town Hall, Cardiff. Quantities by engineer:—

G. Burgess	£563 15 1	Blacker Bros.	£488 0 0
Symonds & Co.	501 13 8	Knox & Wells	424 3 0
W. T. Morgan	490 0 0	F. Bond*	410 0 0

[All of Cardiff.]

DEWSBURY.—For additions to mills, Savile Town, for the Cut End Mill Co. Messrs. C. H. Marriott, Son, & Shaw, architects, Church-street-chambers, Dewsbury:—

Masonry.—Hiram Hirst, Dewsbury*	£182 9 0
Joinery.—H. Ingham, Thornhill Cross, near Dewsbury*	184 8 7
Ironfounder.—F. Firth, Dewsbury*	180 0 0
Slating.—Brear & Son, Dewsbury*	40 0 0
Plumbing.—Knowles & Hemmingway, Dewsbury*	35 15 0

EXMOUTH.—For the erection of schoolroom and classrooms at Southlands School, Fairfield, Exmouth, for the Misses Vinter. Mr. Walter B. Coles, architect, 31, Bath-road, Exeter. Quantities by Mr. Vincent Cattermole Brown, Paignton:—

A. Hayman	£729 16 6	W. Perry	£670 0 0
Crews & Son	702 0 0	F. Grace	642 6 7
T. Abell	687 1 9	Cooper & Son*	593 5 6

[All of Exmouth.]

HATCHAM.—For alterations to printing works, Hatcham, S.E. Mr. Delmé G. Mootham, architect, Effingham House, Arundel-street, Strand, W.C.:—

Asphalting.—Salter & Co.	£79 19 6
Granite Paving.—William Downs	228 18 0
Dilapidations.—William Downs	82 0 0
Iron Fencing.—Tower, Tower, & Co.	19 10 0
Wood-Block Flooring.—Andrews & Co.	165 12 6
Iron Doors.—Lift and Hoist Co.	33 0 0
Electrical Work.—Maryed & Place	112 16 0

LEAMINGTON.—For the supply of 4,500 tons road-stone, for the Corporation:—

	Per ton.
Clee Hill Dhu Stone Co.	11 7
Judkins, Tuttle Hill Quarries	8 6

LICHFIELD (Staffs.).—For additions to workhouse, for the Guardians. Mr. D. C. Marks, architect, St. Mary's Chambers, Lichfield:—

Wood & Son	£964 12 0	W. Hopkins	£795 0 0
Smith & Sons	882 4 4	Lowe & Sons, Burton-on-Trent*	785 0 0
A. Walmesley	848 0 0		
W. H. James	810 0 0		

LLANRIEG.—For new dwelling-houses at Llanrieg, for Mr. W. G. Roberts, Carnarvon. Mr. Rowland Lloyd Jones, architect, 14, Market-street, Carnarvon:—

	Seven Houses.	Three Houses.	Repairs to four old Houses.
	£	£	£
W. & R. Jones	1,950	—	—
Jones Bros.	1,610	—	834
W. D. Williams	1,500	—	—
W. Roberts & R. E. Jones	1,399	—	784
W. & O. Pritchard	—	670	760
Roberts & Williams	—	618	740
H. Jones	1,281	—	—
W. J. Griffith, Carmel, Groeslon, R.S.O.	1,250	—	*660

MAELTRYFAN.—For new Independent chapel at Maeltryfan, near Carmel. Mr. R. Lloyd Jones, architect, 14, Market-street, Carnarvon:—

	Chapel and Schoolroom.	Chapel only.
Jones Bros.	£1,765	£1,327
W. J. Griffith	1,750	1,320
W. Owen & S. Roberts	1,511	1,177
W. & R. Jones	1,510	1,160
Jones & Son, Rhostryfan	1,450	*1,150

MERTHYR (Wales).—For the construction of a river wall, Troedyrhiw sewage farm, for the Committee. Mr. T. F. Harvey, Engineer, Town Hall, Merthyr:—
J. Sutherland, Abercynon* £576

NETHER EDGE (Sheffield).—For sundry additions and alterations to Guzerat House, Nether Edge-road and Glen-road, for Mr. E. Wells Smith. Messrs. Hall & Fenton, architects and surveyors, 14, St. James-row, Sheffield. Quantities by architects:—

A. Andrews	£500 5	Powell & Sons	£389 0
Maston & Son	475 10	Wilkinson & Sons	359 0
E. & W. Oxley	409 0	T. Margerison, Church-street, Dronfield*	355 0
H. White	403 10		
J. S. Teanby	398 5		

OADBY (Leicestershire).—For the construction of sewers, &c., for Blaby R.D.C. Mr. J. Turner, Surveyor, Glen Parva, near Leicester:—

A. Jewell	£3,245	King & Riley	£2,275
A. Barry	2,875	Stimson & Rolleston	1,809
Hutchinson & Son	2,558	J. Holmes, Leicester*	1,683
C. Chamberlain	2,550	H. Mason	1,668
G. Philbrick	2,521	W. Mattock	1,635

OLD LENTON (Nottingham).—For erection of new ropery works, situate in Spring-close, Old Lenton, for Messrs. W. Coates & Sons. Mr. Fred. C. Martin, architect, Angel-row, Nottingham:—

Dennett & Ingle	£4,150	T. H. Harper	£3,900
Maule & Co.	4,030	J. H. Vickers, Ltd.	3,885
F. Messom	4,000	Williamson & Co., Nottingham*	3,870
J. Wright	3,968		

PAIGNTON.—For the erection of proposed cottage flats, Merritt-road, Paignton, for Mr. W. M. G. Singer, C.C. Mr. W. G. Coulldrey, architect, Paignton. Quantities by Mr. Vincent Cattermole Brown, Paignton:—

E. Westlake	£5,116 0	C. & R. E. Drew	£4,992 15
G. Webber	5,096 10	Webber & Sons‡	4,916 0
Harris & Sons	5,035 0		

[All of Paignton.]

‡ Accepted subject to modifications.

PONTLOTTYN (South Wales).—For alterations and additions to business premises, The Square, Pontlottyn, for Messrs. H. Woodley & Co., Cardiff. Mr. D. Pugh-Jones, architect, Queen's-chambers, Cardiff:—
Couzens & Co., Riverside Works, Cardiff* £715

REIGATE.—For additions to electric lighting station, Wray Common-road, for the Town Council. Mr. F. T. Clayton, C.E., Municipal Buildings, Reigate. Quantities by engineer:—

Elsey & Sons	£2,226 14 10	Nightingale & Sons	2,023 0 0
Saunders Jeal	2,220 0 0		

[All of Reigate.]

ST. ALBANS.—New warehouse for Messrs. Ryder & Son. Mr. Percival C. Blow, architect, 7, London-road, St. Albans:—

Miskin & Son	£3,545 0	W. Sharp, St. Albans*	£3,104 0
E. Dunham	3,492 0		
J. Bushell	3,445 15		

ST. ALBANS.—Rebuilding warehouse for Messrs. Cooper, Box, & Co., Ltd. Mr. Percival C. Blow, architect, 7, London-road, St. Albans:—

Boff Bros.	£2,075	Warton & Dunstall, Bedford†	£1,930
E. Dunham	1,978		
Miskin & Son	1,974		

ST. ALBANS.—Enlargement for Messrs. Watson & Co. Mr. Percival C. Blow, architect, 7, London-road, St. Albans:—

J. Bushell	£349 15	W. Sharp, St. Albans*	£330 0

ST. NEOTS.—For additions to infirmary, Union Workhouse, St. Neots, Hunts. Mr. S. Inskip Ladds, architect, Huntingdon. Quantities by Messrs. A. Boxall & Son, 8, Adam-street, Adelphi, W.C.:—

Kerridge & Shaw	£2,053 15	W. Howard	£2,259 0
F. Giddings	2,642 0	W. Wade	2,165 0
Willmott & Sons	2,626 0	Wrycroft & Sons, St. Neots†	2,135 10
Page & Son	2,335 0		
F. Wellham	2,310 0		

SEABROOK (Kent).—For the erection of a police-station and hall, for the Kent County Council. Mr. F. W. Ruck, County Surveyor, 86, Week-street, Maidstone:—

Trethowan & Brest	£1,750 0 0
F. W. & J. Clark	1,595 10 0
B. E. Nightingale	1,360 0 0
J. Gosby	1,347 12 1
Goodwin & Jeffery	1,332 0 0
Castle & Son	1,300 14 3
Pearce & Sons	1,240 0 0
A. Dyke	1,238 15 0
R. Avard	1,238 0 0
W. W. Martin	1,222 0 0
Howland & Son	1,212 4 10
Wallis & Sons	1,167 0 0
Smith & Son	1,099 0 0

STOCKPORT.—For the erection of sewering, Athens-street, for the Corporation. Mr. John Atkinson, C.E., St. Petersgate, Stockport:—

R. H. Rogers	£278 9 2	P. D. Hayes, Old-road*	£168 7 0
W. H. Ena	179 15 10		

STOKE-ON-TRENT.—For the erection of an isolation hospital, for the Cheadle Rural District Council. Mr. F. T. Inskip, Surveyor, Brook House, Cheadle:—

	Water Supply.
Bridgett & Hand	£1,851 £130
W. Alcock, Cheadle, Staffs*	2,055 112
J. Bagnall	2,066 220
J. Pattison	2,140 130
Surveyor's estimate	2,000 120

TUNBRIDGE WELLS.—For paving, &c., Newton-road, for the Town Council. Mr. W. H. Maxwell, C.E., Town Hall, Tunbridge Wells:—

A. C. Soan	£827 17 6
Windsor & Co.	754 16 9
Crates & Son	720 0 0
T. Hallett	692 9 5
Free & Sons	690 13 4
T. G. Challans	659 5 6
Ellis & Co.	600 1 0
Arnold & Sons	570 8 4
J. Jarvis, Tunbridge Wells*	568 4 10

WAKEFIELD.—For alterations at sewage works, Agbrigg, for the Sandal Magna Urban District Council. Mr. F. Massie, Surveyor, Tetley House, Wakefield:—

Flower Bros.	£431 0 6	T. & G. Wilson	£247 7 6
Egan & Sons	394 6 2	John Armitage, Cutwood*	232 10 0
Higgins & Pashley	339 1 6		

WALSALL.—For additions to workhouse, Pleck-road, for the Guardians. Mr. H. E. Lavender, architect, Bridge-street, Walsall. Quantities by architect:—

Linsday Jones	£9,255	Kendrick & Son	£8,310
Dallow & Son	8,750	G. H. Marshall	8,261
W. Wistance	8,739	T. Tildesley	8,249
T. Hardy	8,580	Willcock & Co.	8,120
J. Mallin	8,579	W. Hopkins	7,990
D. Roberts	8,550	Harvey Gibbs, Kings Heath*	7,979
T. Hughes	8,410	R. Harris	7,930
Guest & Son	8,400		

[*See also next page.*

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LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following lists of tenders. Mr. T. J. Bailey is the Board's Architect :—

DUNCOMBE-ROAD SCHOOL.—Exterior painting :—

	£		£
McCormick & Sons	222	Chinchen & Co.	193
Bate Bros.	220	G. Kirby	187
Grover & Son	196	F. W. Harris	179
C. & W. Hunnings	196	Stevens Bros.	174
Wall & Co.	195	Marchant & Hirst*	167

HEBER-ROAD SCHOOL.—Exterior painting :—

	£		£
F. & H. F. Higgs	279	J. F. Ford	169
Mitchell & Son	264	G. Kemp	158
J. & C. Bowyer	217	Maxwell Bros.*	149

HONEYWELL-ROAD SCHOOL.—Exterior painting :—

	£		£
J. & M. Patrick	364 0	W. Hornett	229 0
Dowsett & Jenkins	261 0	E. B. Tucker	225 0
General Builders, Ltd.	247 0	Rice & Son	203 0
Johnson & Co., Ltd.	235 0	E. Flood*	152 10

KNAPP-ROAD SCHOOL.—Exterior painting :—

	£		£
Gibb & Co.	180 0	A. W. Derby	110 0
J. F. Holliday	159 0	G. Barker	104 10
A. J. Sheffield	144 0	Haydon & Sons*	101 0
Vigor & Co.	112 0		

MANTUA-STREET SCHOOL.—Exterior painting :—

	£		£
Macey & Sons, Ltd.	159 0	E. Triggs	139 0
Holloway Bros., London, Ltd.	148 10	R. S. Ronald	135 0
R. A. Jewell	140 0	Rice & Son*	133 0

MIDWAY-PLACE SCHOOL.—Exterior painting :—

	£		£
J. & M. Patrick	227 0	Johnson & Co.	158 0
Lathey Bros.	168 0	H. Groves*	139 0
Sayer & Son	168 10		

NUNHEAD-PASSAGE SCHOOL.—Exterior painting :—

	£		£
J. F. Ford	208	W. Hooper	155
W. V. Goad	186	Sayer & Son	153
F. & H. F. Higgs	160	Garrett & Son*	152
Maxwell Bros., Ltd.	155		

OLD WOOLWICH-ROAD SCHOOL.—Exterior painting :—

	£		£
Hayter & Son	175 0	H. Groves	144 0
C. G. Jones	150 5	Lathey Bros.	137 0
W. Banks	145 10	Proctor & Son*	112 0

RATHFERN-ROAD SCHOOL.—Exterior painting :—

	£		£
Hayter & Son	225 0	C. G. Jones	169 10
F. & H. F. Higgs	215 0	W. Banks	160 0
M. E. Allen	209 7	G. Kemp	127 0
J. & C. Bowyer	196 0	H. Groves*	122 0

RUSHMORE-ROAD SCHOOL.—Exterior painting :—

	£		£
G. Wales	251 0	Shurmur & Sons, Ltd.	160 0
J. Stewart	226 0	F. Bull	149 14
Barrett & Power	170 0	Silk & Son	142 10
Corfield & Co.	166 6	Woolaston Bros.	135 0
H. Runham Brown	163 0	A. Porter*	126 0

SCRUTTON-STREET SCHOOL.—Exterior painting :—

	£		£
G. Wales	207 0	Wilmott & Son	149 0
Barrett & Power	181 0	H. Runham Brown	143 10
Corfield & Co.	163 14	W. Chappell	135 0
Silk & Son	136 0	Haydon & Sons*	134 10

SETTLES-STREET SCHOOL.—Exterior painting :—

	£		£
J. F. Holliday	279 10 0	Gavin Bros.	199 5 0
Johnson & Co.	272 0 0	J. Haydon & Sons	196 0 0
D. Gibb & Co.	225 0 0	G. Barker*	179 0 0
Vigor & Co.	215 12 6		

WENLOCK ROAD SCHOOL.—Exterior painting :—

	£		£
Belcher & Co., Ltd.	301 0 0	Gavin Bros.	233 16 3
Grover & Son	298 0 0	Lathey Bros.	231 0 0
McCormick & Sons	288 0 0	Johnson & Co.	216 0 0
		Haydon & Sons*	195 0 0

WOOLMORE-STREET SCHOOL.—Exterior painting :—

	£		£
J. F. Holliday	179 0 0	Vigor & Co.	130 0 0
D. Gibb & Co.	175 0 0	A. W. Derby*	110 0 0
A. J. Sheffield	167 0 0		

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PARTNERSHIP.—Builder and Decorator at the West End, recently established, with small, high-class connexion, requires thoroughly practical Man as PARTNER. Must be able to introduce business. Small capital only required.—Box 236, Office of "The Builder."

LONDON COUNTY COUNCIL.

LONDON BUILDING ACT, 1894,
DISTRICT SURVEYORS.

The London County Council is about to appoint a DISTRICT SURVEYOR under the London Building Act, 1894, for the district of South Fulham, and is prepared to receive APPLICATIONS from duly qualified persons who may desire to become candidates for the Appointment.

The average amount of the fees received in the district during the past three years is 802l (gross), and the amount received during the year 1902 was 697l (gross).

Applications upon forms to be obtained at the County Hall, must be addressed to "The Clerk of the London County Council, County Hall, Spring gardens, S.W." and be delivered at this office not later than TEN o'clock a.m. on MONDAY, the 14th day of SEPTEMBER, 1903.

Every candidate must hold the certificate granted by the Royal Institute of British Architects, under Section 140 of the London Building Act, 1894, that he is competent to perform the duties of a District Surveyor, and any candidate who has not previously made application for a similar appointment must forward such certificate with his application.

Applicants must not be less than twenty-eight nor more than fifty years of age, and satisfactory evidence of age must accompany the applications. Every candidate must also send with his application a declaration, signed by him, that he is willing to accept the office under the conditions laid down by the Council.

Any application which does not comply in every respect with the terms of this advertisement will not be considered by the Council.

The forms of application and of declaration above referred to may be obtained on application at the department of the Clerk of the Council, County Hall.

Candidates may be required to attend at the County Hall, Spring-gardens, on a date of which notice will be given to them. Personal canvassing by candidates of members of the Council is strictly prohibited.

G. L. GOMME,
Clerk of the Council.

County Hall,
Spring gardens.
August 13th, 1903.

COUNTY BOROUGH OF LIMERICK.

TECHNICAL EDUCATION COMMITTEE.

The above Committee require the SERVICES of the undermentioned TEACHERS at the Municipal Technical School, Limerick:—

1. TEACHER of subjects relating to BUILDING TRADES, including Manual Instruction (Wood-work), Carpentry and Joinery, and Building Construction. The duties also include classes in Experimental Science at the Day Technical School for Boys.

Salary 130l. per annum.

2. TEACHER OF PLUMBING.—A thoroughly practical man required to teach the Theory and Practice of Plumbing, and also to take Hygiene Classes.

Salary 100l. per annum.

Applications, accompanied by copies of recent testimonials, must be lodged with the undersigned not later than MONDAY, AUGUST 24th, and the selected candidates will be required to commence duties on SEPTEMBER 14th.

The whole time of the Teachers to be at the disposal of the Committee.

JAMES QUICK,
Principal and Organising Secretary.

Municipal Technical Institute,
Limerick.

MIDDLESEX EDUCATION COMMITTEE.

SOUTHALL DIVISION.

WANTED, a TEACHER to take evening classes in TECHNICAL DRAWING and BUILDING CONSTRUCTION at Southall during the session 1903-4.

Applications, stating qualifications and salary required per evening (two hours), to be addressed to R. E. GOUT, Guildhall, Westminster, and be delivered not later than SATURDAY, the 29th AUGUST, 1903.

ALDERSHOT URBAN DISTRICT COUNCIL.

TO ARCHITECTURAL DRAUGHTSMAN.

The above Council are prepared to receive APPLICATIONS from Architectural Draughtsmen, preference will be given to those with a knowledge of school planning.

The Appointment will be a temporary one extending for about six months.

Salary, 50s. per week.

Applications, with copies of testimonials, to be forwarded to the undersigned, not later than TEN a.m. on THURSDAY, 20th instant.

NELSON F. DENNIS, A.M.I.C.E.
Engineer and Surveyor.

Council Offices,
Aldershot.

COUNTY BOROUGH OF CROYDON.

APPOINTMENT OF BOROUGH ENGINEER AND SURVEYOR.

The Council of the County Borough of Croydon are prepared to receive APPLICATIONS for the APPOINTMENT of BOROUGH ENGINEER and SURVEYOR of the said Borough.

The salary will commence at 800l., increasing by annual increments of 50l. to a maximum of 1,000l. per annum, with assistants, clerks, and offices provided.

The gentleman appointed will not be allowed to carry on private practice, but must devote the whole of his time to the duties of the office, and will be required to reside within the Borough.

Applicants must be members of the Institute of Civil Engineers, experienced Municipal Engineers and Surveyors, and have had experience in Sewage Disposal Works, Parliamentary Work, Water Works Engineering, and control of Highways. Preference will be given to applicants having experience in the construction and laying out of Electrical Tramways.

The gentleman appointed will also be required to act as Architect and Valuer of the Council, and generally to undertake the construction and extension of existing works of the various departments of the Council.

Applications, stating the age and qualifications of the applicant and the time when he will be prepared to enter upon the duties of the Office, accompanied by copies (not originals) of not less than three, nor more than four, testimonials of recent date, to be sent addressed to the Town Clerk, Town Hall, Croydon, and endorsed "Borough Engineer," on or before TUESDAY, the 1st day of SEPTEMBER, 1903.

Detailed information of the duties may be obtained from me.

Canvassing members of the Council will disqualify applicants.

By order,
F. C. LLOYD,
Town Clerk.

Town Hall,
Croydon.
July 30, 1903.

MERCHANT TAYLORS' CO.—A VACANCY will shortly occur in the office of ARCHITECT and SURVEYOR to the Company by the resignation of the present architect. Candidates must be between 30 and 45 years of age on November 19th, 1903.—Further particulars on application to the CLERK Merchant Taylors' Hall, 30, Threadneedle-street, E.C.

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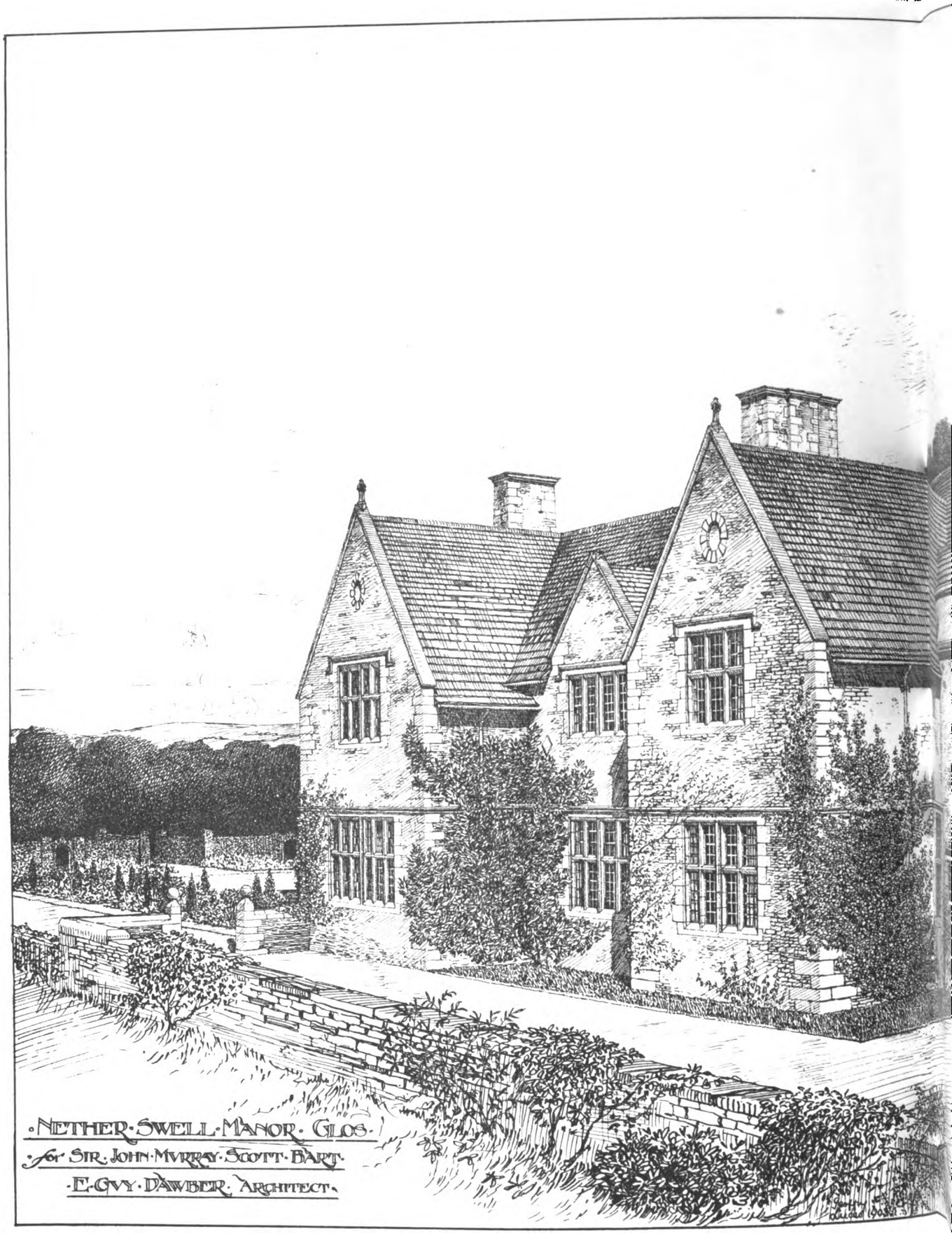

NETHER SWELL MANOR GLOS.
FOR SIR JOHN MURRAY SCOTT BART.
E. GUY DAWBER ARCHITECT.

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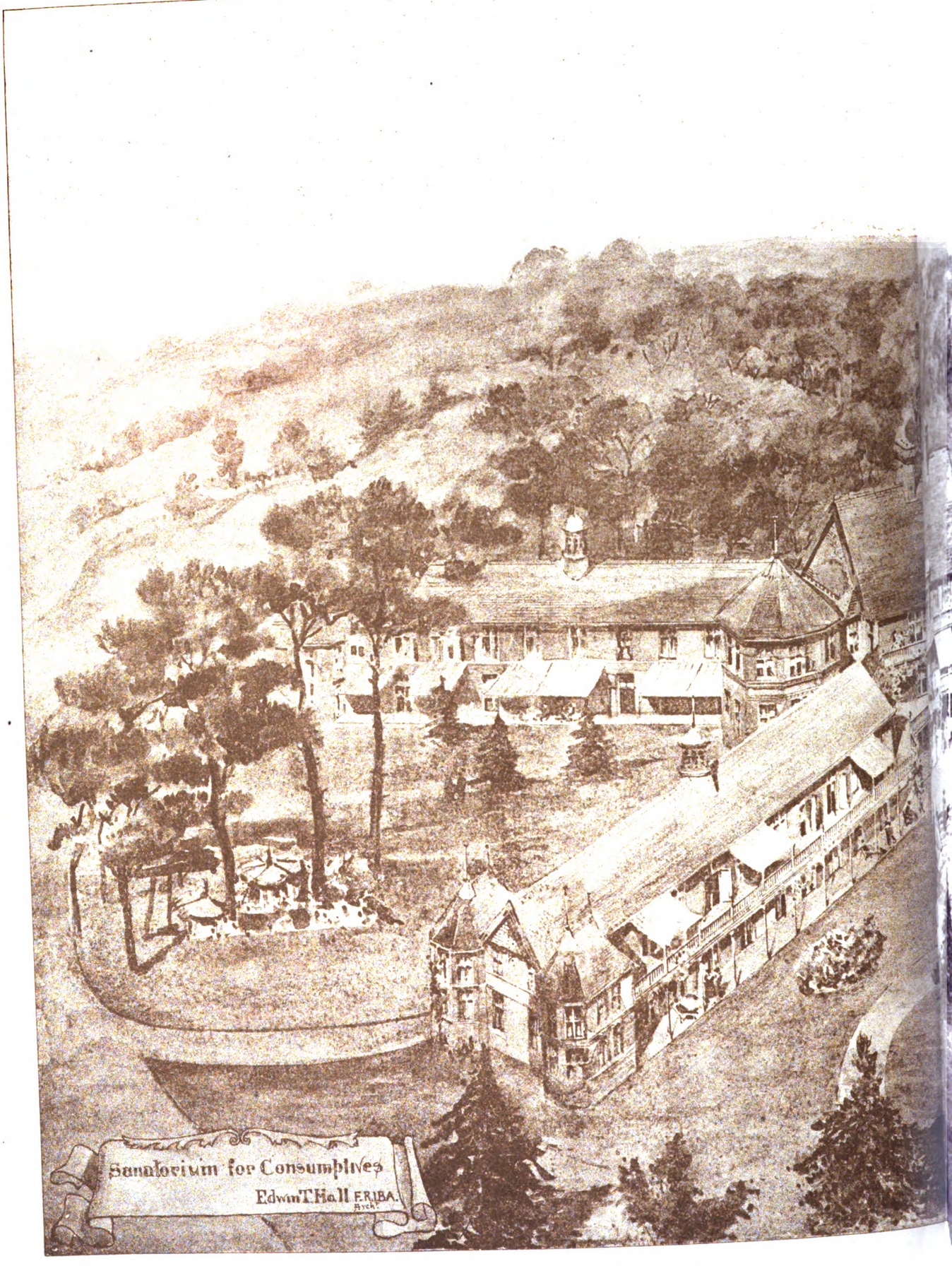

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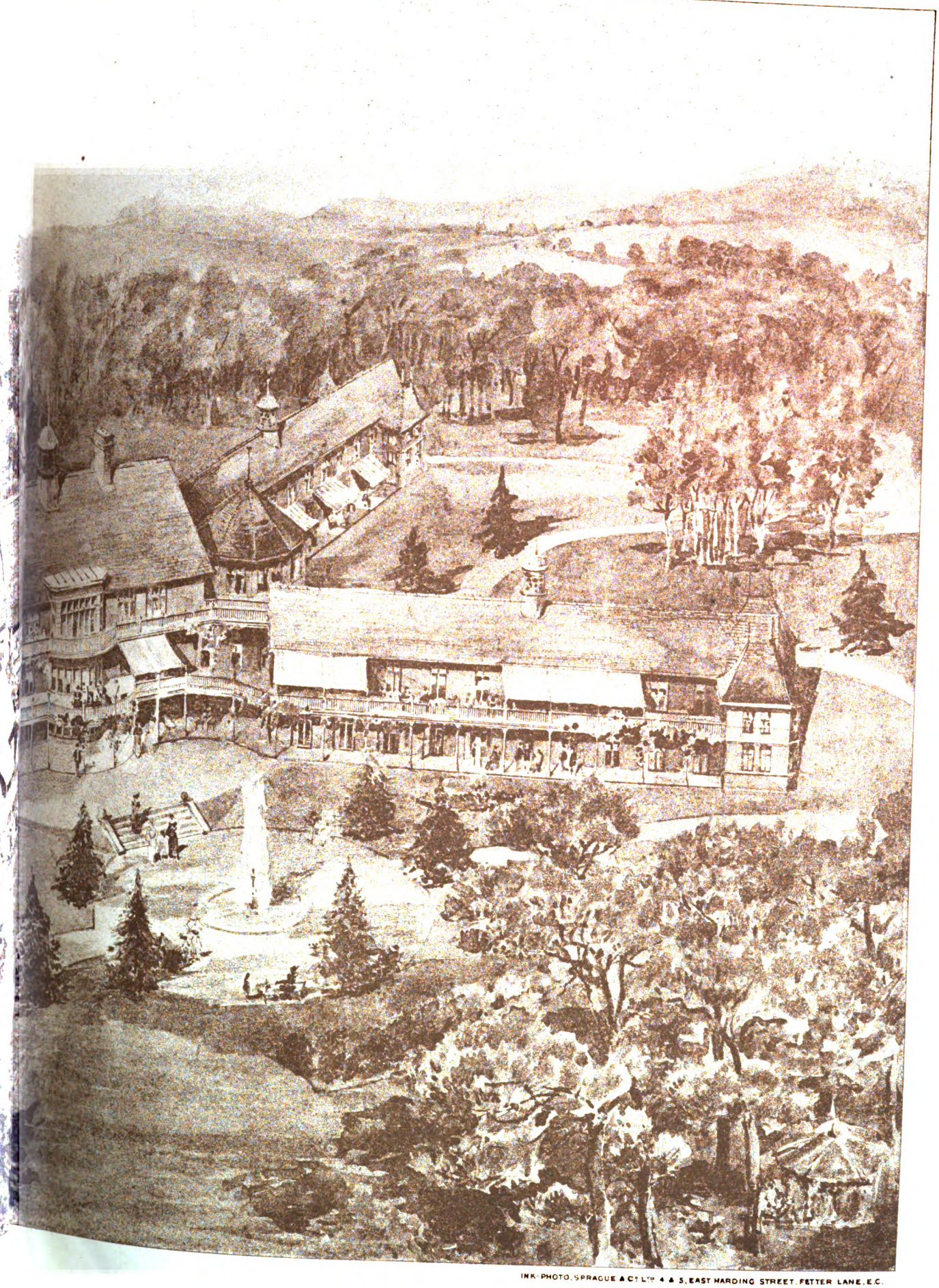

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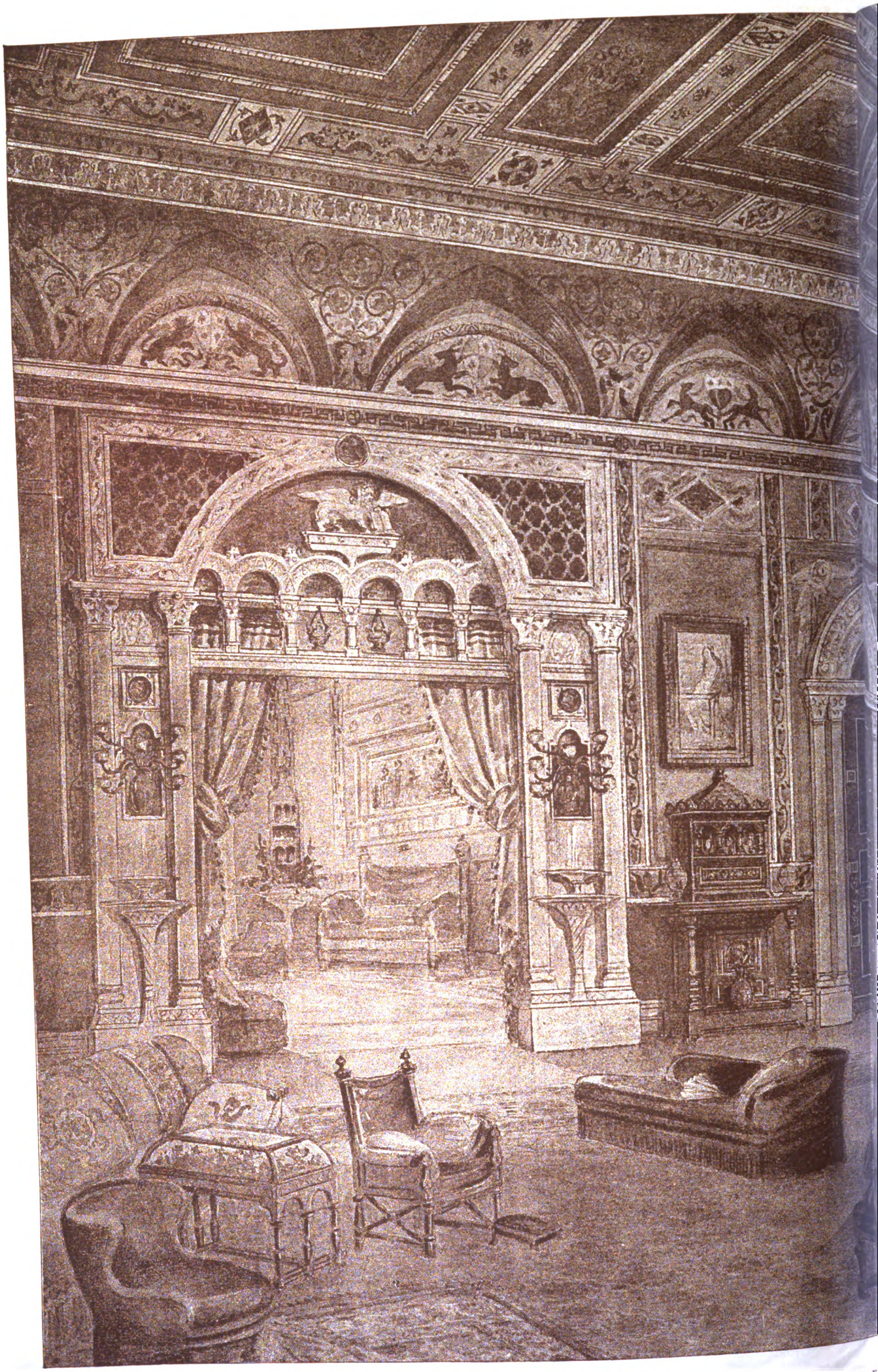

DESIGN FOR DRAWING-ROOM DECORATION (

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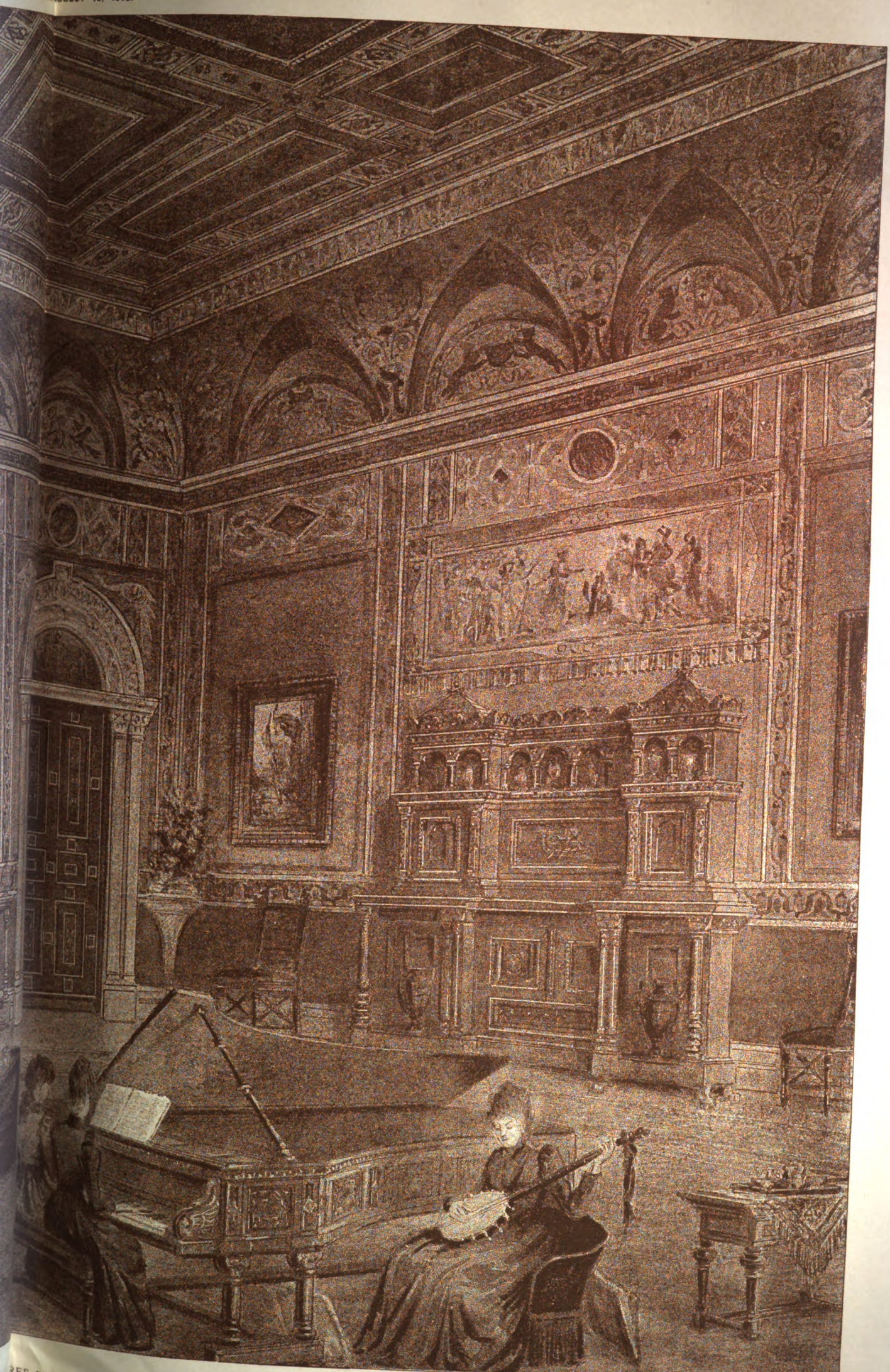

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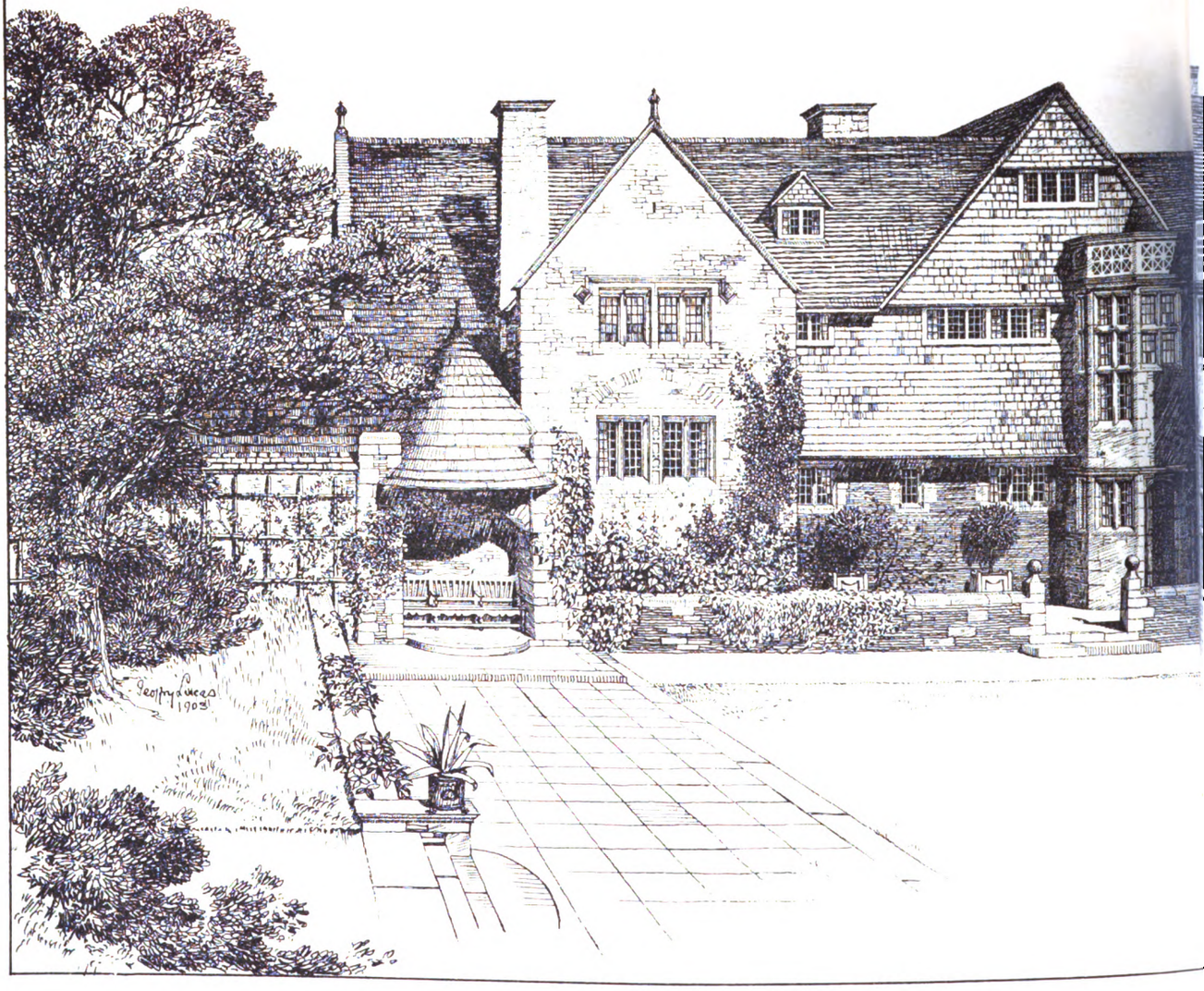

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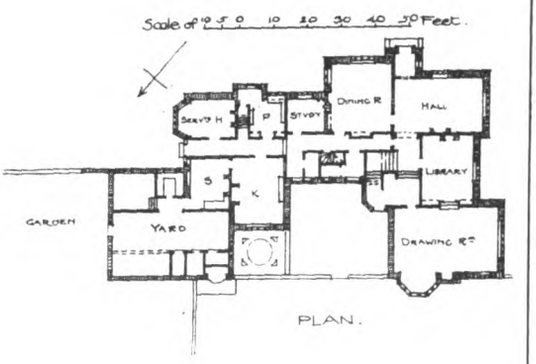

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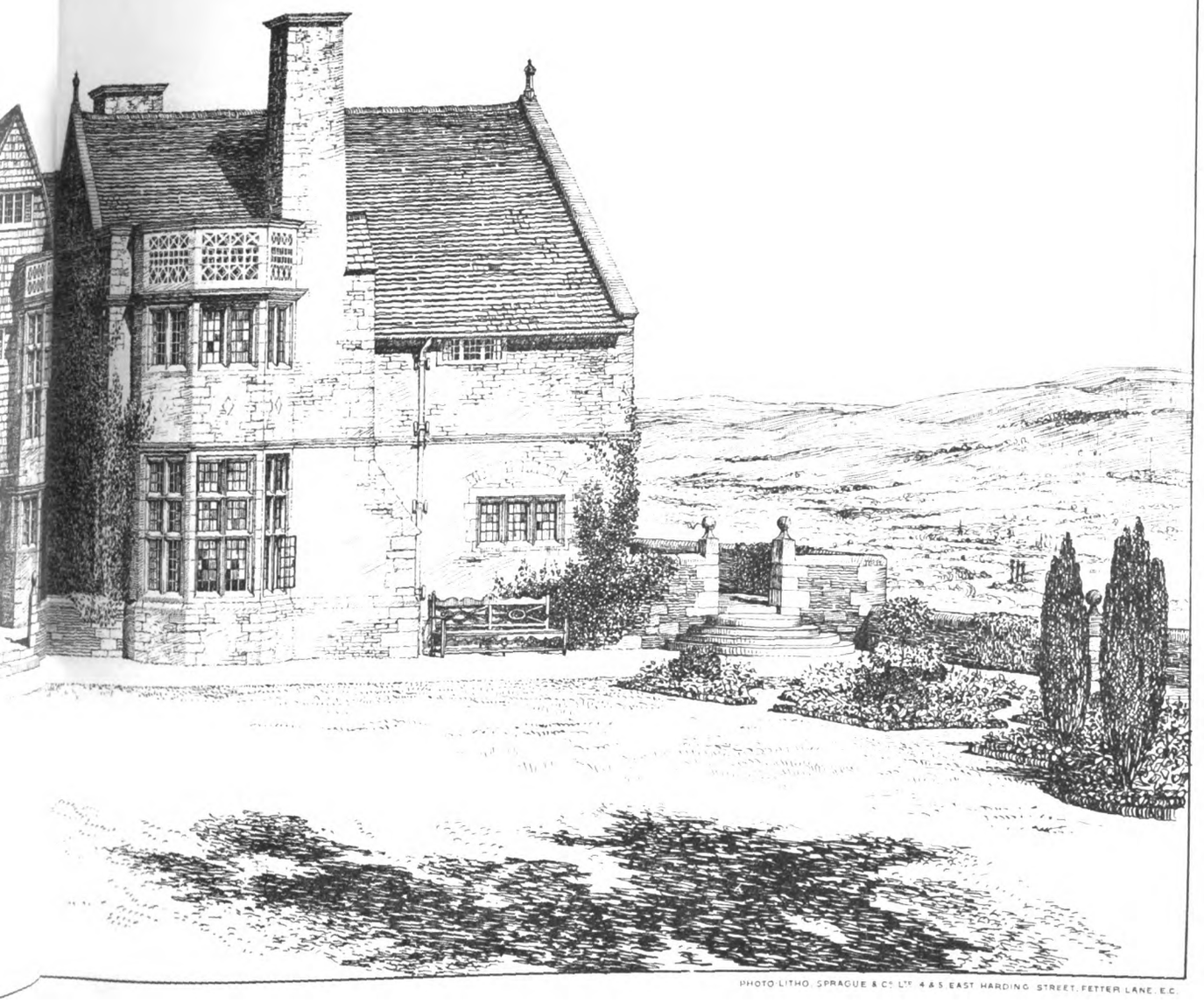

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The Builder.

VOL. LXXXV.—No. 3159. AUGUST 22, 1903.

ILLUSTRATIONS.

The British Linen Company Bank, Limited, Threadneedle-street, E.C. ..... Mr. J. Macvicar Anderson, F.R.I.B.A., Architect.
Manchester and Salford Skin Hospital ..... Messrs. T. Worthington & Son, Architects.
Premises, Nos. 71 and 72, Strand, and 15, 16, and 17, Adam-street, W.C. ..... Mr. Ernest Runtz, Architect.

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Apulia.

THE south-eastern region of Italy, where the energetic Prime Minister, Signor Lanardelli, has recently been investigating the miserable condition of affairs (in some cases exploring the district in a bullock-cart), seems cut off from the rest of the peninsula in a curious manner by differences in race, manners and customs, and to some extent in the matter of language. In art the province of Apulia has always been widely distinguished from the more favoured north and west of Italy, and chiefly by the absence of that remarkable sense of the finer æsthetic character which seems a part of the Tuscan nature.

The mountain ranges which extend southwards of Rome divide the Neapolitans proper of the Mediterranean shore, with their imported tastes for the arts and luxuries of life, from their more indolent and squalid neighbours on the Adriatic. Naples and its adjacent district probably owes all that it possesses of an artistic character to the influence of Rome and the powerful foreign races which have successively tyrannised over the mixed population of the largest city of the Mediterranean. But the luxury of the capital has scarcely penetrated into the outlying districts of Apulia, the Basilicata, or Calabria. In Classic times Apulia formed part of the vast area known as Magna Grecia, and at the present day a very remarkable similarity still survives in many respects between the far south of Italy, Greece and the Archipelago, and Cyprus. For centuries this extensive area of the Eastern Mediterranean has been occupied by a race which is popularly described as "Greek," but which has in reality very little claim to be descended from the ancient Hellenes. The language of the ancients survives in the modern "Romaic," owing to the singular conservative nature of Levantine Christianity, but beyond that tie with a remote past very little else remains from classic times. Under the *ægis* of a common religion opposed to Mohammedanism on the one hand and the vigorous Christianity of the West on the other, the strange mixture of Albanians, Sclavonians, Anatolians, and Eastern Neapolitans seems to have adopted a common language and a common form of art during the Dark and Middle Ages.

To a student of the history of architecture the chiefly interesting feature of this district is the presence of a distinctly "Gothic" or pointed arch style which prevailed during the thirteenth and fourteenth centuries—the period of the contemporary "Gothic" of Western Europe—and may be said still to survive in certain places.

Architecture in Apulia of the centuries immediately preceding the thirteenth can hardly be studied in any surviving examples with the exception of those of a purely ecclesiastical sort. Few, if any, domestic or civic edifices remain of an early period north of the Alps—and even in Italy they are extremely rare. During the long artistic interregnum between the ancient world of classic times and the revival of the arts and sciences in the early Middle Ages, a singular disregard for the domestic arts and luxuries of life seems to have prevailed. Such few traces as we possess of the architecture of the dark ages are usually in the form of church buildings, with little pretension to design, bedizened with very meretricious and often meaningless ornament. The contemporary feudal castles have little about them to suggest an architectural style. In Apulia the Romanesque castles and churches resemble those of other countries, and the latter are only remarkable for their large numbers.

With the advent of the thirteenth century the invigorating influence of the pointed arch style made itself felt all over the civilised world, and Apulia was not behind the rest of Europe in displaying a particular development of the fashionable art. This particular development may, perhaps, be classified as a section of the pointed-arch or "Gothic" style common to Magna Grecia and the Levant.

The Gothic art of Cyprus is being exhaustively described and illustrated in a magnificent French publication, the third volume of which is still in the press.* The remarkable development of "Gothic" under the Lusignan kings in this eastern island may perhaps be attributed to influences which erected Cyprus into a species of bulwark against the Mohammedan encroachment of the period, and induced the Cypriots, for obvious reasons, to adopt a style so specially characteristic of western civilisation. In the Morea and the ancient Dukedom of Athens the once-flourishing principalities founded by northern adventurers are in a similar manner still recorded by innumerable "Gothic" monuments, and the influence of the style may be detected even in modern days. But in Apulia the style is still more at home, although its palmiest days were doubtless at a time when the harbours of Brindisi, Bari, or Taranto were crowded with shipping and transports for the crusading armies of Europe.

The local variations in the great all-pervading pointed arch style of mediæval Europe depended chiefly on climate, and still more on the building materials at hand. In Apulia—as all over the South of Italy—architecture has been very much handicapped by the wretched character of the local stone and the absence of brickwork. *Tufa* is almost the only building stone procurable, and, although good enough for mere walling, is, from its rough and uneven texture, unsuitable for any artistic expression in carving or moulding. Not until the days of Michelangelo and the pseudo-Classic school did such materials play any part in architectural designs as "rustications" or other more or less meretricious aids to a ponderous magnificence. The Southern Italians of the middle ages built their houses, castles, and churches in the prevailing "Gothic" style, but always with the intention of covering up the masonry with gypsum and limewhite both inside and out. The climate admits of such a system, and the local materials oblige it; for decorations they relied upon imported marble or stone, and still more upon the inevitable brush-work of the mural painter.

The style of the Gothic buildings of Apulia—ecclesiastical and secular—clearly belongs to the Tuscan school of Italian art. This is remarkable considering the immense influence of Venice, not only on the opposite coast of the Adriatic, but in the comparatively far-distant Morea, Crete, and Cyprus. To pass over from the Dalmatian coast of the Adriatic, with its quaint old Venetian cities of Sebenico, Spalatro, Ragusa, &c., to the opposite side (in places visible with the naked eye from one side to the other) affords

* "L'Architecture du Moyen Age au Chypre." Par M. Enlart.

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a remarkable contrast in every characteristic. The narrow *cullè*, the ogee-headed windows opening on to little marble balconies, which meet the eye at every point in the crowded intricacies of a Venetian town; the slender campanili, crowned with the short conical spire of the lagunes, are nowhere to be seen in Apulia. On the contrary, the wide straggling streets of an Apulian town lined by low flat-roofed houses, with little or no architectural pretensions; the comparatively low church towers, built in stories of width diminishing with their height; the all-pervading presence of whitewashed plaster, impress the architectural student with a truly Levantine aspect. At the same time, the tall narrow churches with wooden roofs and deeply splayed windows, the wide segmental arches over doorways and in cloistered arcade, are distinctively Tuscan, and more reminiscent of S. Croce, Florence, than anything to be found in Venice. This striking contrast between the two sides of the Adriatic may be attributed partly to the greater frequency of earthquakes in South Italy, necessitating a one, or, at most, two-storied mode of building; but the presence of the Tuscan details of architecture can only be due to the immigration of northern masons, possibly accompanying such materials as were imported for decorative purposes. The spread of the Franciscan Order, which seems to have so greatly influenced the growth of the Gothic style during the thirteenth century in other parts of Italy, must also have had a share in introducing the northern character. As has been shown in a previous article in the *Builder* on Franciscan Architecture (September 27, 1902), the evolution of the "Gothic" style is intimately associated with the foundation of the great Orders of Friars, and in Naples itself one of the largest of Friars' churches ever built (Santa Chiara) is still *en évidence*. This immense edifice was unfortunately too much transformed during the sixteenth century with plaster and painted decorations to allow of its mediæval character to survive or its vast proportions to be appreciated at the present time.

The "Gothic" churches of Apulia are but little known, and the subject invites an extensive monograph such as M. Enlart has so ably carried out for the cognate architecture of Cyprus. At the same time, some of M. Enlart's arguments for a purely French origin of the Cyprus style would, perhaps, receive modifications if the mediæval art of the far south of Italy had received that attention which it certainly merits. For instance, the church of S. Domenico, Taranto, a building of the usual Tuscan plan, with short aisleless-nave side chapels and wooden roofs, has an interesting façade, the great doorway of which is almost identical in detail with the west front of the cathedral of Famagusta, Cyprus. The same richly moulded arch is covered by the same elaborately carved dripstone ornamented with large acanthus leaves. The way in which the plinths and mouldings are twisted into steps and rectangular panellings also betrays a kindred masoncraft. The Taranto example only differs from the Cyprus churches in having a somewhat older and more decayed appearance. Another example of the Tuscan plan and method of construction carried out with the proportions and details characteristic of Cyprus is the Abbey of S. Maria della Guistizia, a twelfth-century building situated a short distance to the west of Taranto. The Church of S. Paolo, Brindisi, exhibits a similar combination of Eastern and Western "Gothic;" the tall lancet windows of the Tuscan wood-roofed church have traceries and mouldings suggestive of Cyprus, and its internal proportions would harmonise with such details if it were ceiled with the Cypriote stone vaulting.

The domestic building of Apulia is much more distinctly classified as Levantine than the churches. The flat-roofed houses are usually, in part, constructed with the domical vault of the East in which the arris, or "Suk," as it is called in Syria, of the vaulting, rises much higher than the line of curvature against the walls—and forms, in fact, a species of four-sided dome. In the older buildings this method of construction seems to have been adopted for both stories of the ordinarily low built houses. Comparatively small vaulted rooms are a natural result of such construction, and the most characteristic feature of Apulian towns is the small mediæval house, the lower story used as a

Characteristic Street House of an Apulian Town.

shop or entrance, the upper vaulted room towards the street having a front wall formed of a wide arched recess, which forms also a partial cover to a balcony carried on moulded corbels.

Palaces or imposing buildings are comparatively rare in Apulian towns, the mediæval art of the northern cities fostered by aristocratic families or civic institutions is nowhere represented. On the contrary, the towns are made up of small traders' houses clustering under the shadow of an inevitable castle, the representative stronghold of a more or less alien government.

Castles are, indeed, the very commonest features of the Apulian landscapes. Hardly an horizon comes into view on which some ruined fortalice does not appear to remind the modern traveller of a romantic past, when this country would seem to have been the very centre of warlike enterprise, and the much fortified frontier between East and West. The splendid triangular fortress of Oria, the home of the famous Doria family, is one of the most beautiful of mediæval castles, as it stands proudly predominating the watershed between the Adriatic and the Gulf of Taranto. The castles built by Emperor Frederick II. have a special interest, and several of them are particularly well preserved, and of a later date those remodelled by the Emperor Charles V. are of the greatest importance in the history of military architecture.

LEAD-POISONING AND WATER SUPPLY.

ONE of the most valuable inquiries the Local Government Board has ever undertaken is that relating to lead-poisoning induced by the quality of the water supplied to some of the large cities and towns in Lancashire and Yorkshire, a full Report* on which is now before us. The book is the result of most careful investigation in the field and laboratory, and the work has proved very fruitful in new discoveries, though much old matter is, of necessity, incorporated. The inquiry was more particularly directed to moorland waters. Some years ago it was discovered, when dealing with the water-supply to Sheffield, that the problem of the relationship between the conditions of a gathering ground and the lead dissolving property of its water called for consideration of a number of biological, as well as of chemical, questions, and this Report deals with both those aspects of the matter. The results of laboratory experiments made to determine the varying conditions under which a water may retain or lose its ability to dissolve lead, will be published in a separate volume; and we are promised that that volume will also contain records of experiments with bacteria derived from peat, lead erosion, &c.

The investigators have confirmed the view that it is the power to dissolve the lead of water pipes, whether new or old, which renders a moorland water a potential source of danger to the consumer, and the present volume deals almost wholly with plumbo-solvency. The first part contains records of sustained observations, made at the moorland gathering area selected at Burnmoor, forming part of the Bentham waterworks; and the second part records the results obtained when the experience of Burnmoor was applied to the moorland gathering grounds of twenty-three waterworks in Lancashire and Yorkshire, most of which are large sources of supply under the control of public authorities.

The records published in the first part of the book establish on a broad basis of observation that the factor essential to the possession by a water of plumbo-solvent properties, is acidity, and that the degree of acidity and of corresponding plumbo-solvent ability is determined by the presence of peat on the gathering area, and by the conditions under which the drainage of the peat gains access to the supply. But the ratio between the degree of acidity and the degree of plumbo-solvent ability is not necessarily the same for all peaty waters. Other observations at Burnmoor show that certain spring waters may habitually possess power to neutralise the acid of peaty water, and when two springs come together the mixed waters may under such circumstances remain without action upon lead.

* "Supplement to the Thirtieth Annual Report of the Local Government Board, in continuation of the Report of the Medical Officer for 1900-01." London: Eyre & Spottiswoode. 1903.

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That section treating of the "Differential examination at weekly intervals and over a prolonged period, of waters of diverse sort from one and the same moorland gathering ground," is, on the whole, perhaps, the most valuable part of the book. It deals specially with the results of submitting severally to frequent comparative tests waters which, when combined together at a distance from their common moorland gathering ground, constitute a public water supply. We have already alluded, in broad outline, to some of the results obtained. One of the important problems intended to be solved by this mode of investigation was as to how far diversity of the ability of moorland waters to dissolve lead is associated with season of the year, and is at the same time parallel to observed differences in their chemical and bacterial characters. Burnmoor, near Settle, was selected for the experiments chiefly because the West Riding of Yorkshire had for long been associated with a special incidence of lead poisoning, due to moorland water-supply. The water from Burnmoor was credited with the possession from time to time of an extreme degree of acidity, and it was also believed to act, on occasion, vigorously on lead. These experiments, however, prove that the sum of the various waters which mixed together from the general supply to Bentham, showed little or no evidence of possessing such injurious properties, although certain of the contributory waters were conspicuously acid, and possessed plumbo-solvent ability in a very marked manner.

The Report describes the method of investigation on the ground at some length, but we will not enter into that. A small meteorological station was erected on the gathering area, and a laboratory established at Settle. The nature of the chemical experiments carried out is also explained, and several tables recording the results of the chemical examinations are appended. Some of the columns are very significant. One column, for instance, relating to the colour of the waters as collected for examination states "pale straw," "pale green," "grey," "blue," and so on, so that in regard to the majority of the samples a strong suspicion must have attached to them even before they were submitted to chemical investigation. Another column deals with turbidity, and we see such records as "hazy," "distinct," and "great" occurring. The residue, when present, appears to be chiefly moss.

Weekly records of the rainfall, flow of streams, and the temperature of the soil were taken on the gathering ground, but they do not seem to have been of much use in the inquiry, and it is observed that "weekly meteorological records confined to one spot were hardly sufficient." In regard to the influence of the season of the year, the Burnmoor experiments indicate that acidity and plumbo-solvency are apt to be at their maximum in the late summer and autumn, but the question of season is, necessarily, complicated by the rainfall, inasmuch as the manner of distribution of the rain over the gathering ground in any particular year is hardly likely to be exactly repeated in any subsequent year. Moorland waters alone, which are commonly a mixture of surface peaty water and spring water, are not, however, unfrequently neutral during the summer months, and acid during autumn, winter, and spring. This is believed to result from the circumstance that during summer the neutral spring water relative to the acid surface water is usually at its maximum, and that during the rest of the year these conditions are commonly reversed. The most acid condition of moorland waters, it is remarked, has been encountered during a storm following a period of drought, and when the first "washings" of the peat were being carried into the supply, which is what one might have anticipated.

Practically all the experiments detailed in the first section of the book were carried out by Dr. Houston, and a further series were subsequently made at Bentham reservoir. The principal objects of these latter were to examine the water in the reservoir itself. In addition to minute chemical investigations, the water in the reservoir and the inflow water were subjected to bacteriological tests, as also were peat pool water and peat soil. The additional chemical experiments do not seem to have added much to the experience previously gained, but during the whole period of observation, which extended over some months, the water in the reservoir was proved to have no solvent action upon lead.

With regard to the bacteriological experiments during the prosecution of the work, much was learnt. Some tables are given showing results, but the summary is the most interesting part of this section of the book. The net result has been to afford "presumptive evidence of the strongest kind that the antecedent cause of the acidity and plumbo-solvent ability of a moorland water is the vital action of particular species of bacteria in moist peat soil." That conclusion is not only very useful from a water-supply point of view, but is of considerable philosophical interest also. This part concludes with a number of plates of diagrams illustrating various experiments carried out during the progress of the work.

The second part of the book, dealing with the results of surveys of moorland gathering grounds in Lancashire and Yorkshire, is also an important contribution to our knowledge of certain water-supply problems. The waterworks of which surveys were made are as follows :—

1. Ashton-under-Lyne, Stalybridge, and Dukinfield (District).
2. Bacup Corporation.
3. Barnsley Corporation.
4. Barrow-in-Furness Corporation.
5. Batley Corporation.
6. Blackburn Corporation.
7. Bolton Corporation.
8. Bradford Corporation.
9. Burnley Corporation.
10. Colne (Lancs) Waterworks.
11. Dewsbury and Heckmondwike Water Board.
12. Halifax Corporation.
13. Huddersfield Corporation.
14. Keighley Corporation.
15. Leeds Corporation.
16. Morley Corporation.
17. Nelson Corporation.
18. Oldham Corporation.
19. Preston Corporation.
20. Rochdale Corporation.
21. Sheffield Corporation.
22. Shipley (Eldwick) Waterworks.
23. Wakefield Corporation.

The results are classified in regard to each survey as follows :—General information is first given on the source of the water supply and a description of the waterworks, which is followed by : (*a*) On the character of the gathering ground, (*b*) on conditions found to exist on the gathering ground at the time of the inspection, and (*c*) on the results yielded by the chemical examination of the waters in reference to the observed characters of the gathering ground.

Each survey Report is accompanied by a map, which materially assists the reader in studying the various problems raised. In these maps the uniform plan is adopted of colouring the streams, reservoirs, &c., red or blue, according to whether the chemical reaction ascertained was acid or neutral. The distribution of peat is shown by a brown tint.

Particulars are given as to the methods adopted to determine the plumbo-solvency of the various waters collected, as well as the proof of acidity, reaction, and hardness. In some of the experiments peat was removed from various gathering grounds and placed in the laboratory under conditions resembling as closely as possible those on the moors as regards the relation of the peat to the rainfall. Thus, artificial peat pools were constructed, and neutral water was filtered through peat both continuously and intermittently. Dr. Houston remarks that the results were all alike in one respect, and showed that a small amount of peat can render acid a relatively large bulk of neutral water. We cannot, however, allude to all the methods adopted, nor are we able to describe the results of the visits to the various waterworks.

Amongst the conclusions arrived at, other than those already given, are that moorland gathering grounds are usually rich in peat, and that the history of epidemics of lead poisoning due to water supply—at all events in the North of England—clearly shows that the towns which have suffered in the past derived their water supply from moorland sources. The "conclusions," however, are so numerous that the book must be consulted thoroughly to appreciate them.

The surveys of the waterworks mentioned were chiefly made some time since, as the investigation has taken some years to carry out. Some of the results have been published before, and in at least one case, that relating to the water supply to Bolton, the Local Government Board felt it their duty to call the attention of the Corporation to the state of affairs which existed, as a result of the knowledge obtained from Dr. Houston's inquiry. Extra precautions were, of course, immediately taken by the Corporation. Extra precautions have also been adopted by the authorities of other waterworks since that official's visit.

The Medical Officer, in his summary of the whole Report, gives some advice as to how far it is possible to prevent moorland water from dissolving lead, though we do not see much that is new in his observations. The question that should first be asked, he remarks, is whether specially acid water can be altogether excluded from the supply—for example, by eliminating the drainage of special peaty areas, or by providing "leaping weirs," contrivances which ensure that the first washings from the peat, after a period of drought, are automatically rejected. In the case of a water supply habitually acid, Dr. Houston says that the neutralisation may, perhaps, be most satisfactorily effected by ordinary sand filtration, with the addition of some neutralising material (such as a thin coating of lime on the

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surface of the sand, with limestone underneath the sand) to the filter, and the subsequent addition of a trace of sodium carbonate to the neutral filtered water. Frequent examinations to test the effects of this or any other treatment of the water should be made.

With all this we cordially agree; it is, however, one of the most difficult problems the water engineer has before him altogether to eliminate fragments of peat, and it is doubtful whether ordinary sand filtration is sufficient for the purpose. The acid water would be neutralised, and some of the peat would, of course, be removed in filtering, but the water may still remain slightly discoloured. We are not unmindful, though, that the chief object of this Government inquiry was to deal with what connexion there may be between water supplies and lead poisoning, and the book does not treat exhaustively on various methods of filtration and their effects. This object has been attained by most painstaking investigation spread over many years, and the Medical Officer and Dr. Houston are to be warmly congratulated on the remarkable results of their labours, which cannot fail to be of the greatest service to all those who have to deal practically with moorland water supplies.

NOTES.

The British Association.

IT is now possible to give a few particulars concerning the forthcoming British Association meeting to be held at Southport, commencing September 9. The President, Sir Norman Lockyer, is expected in his opening address to prove by statistics, which he has been for some time engaged in collecting, that our industries and national life generally are suffering very seriously from the neglect of science in education. Of course, we do not know the details he proposes to give to substantiate his point, but we can all admit the truth of the general statement so far as higher education in some of its branches (especially technical) is concerned. He is to say that our modern universities are not properly equipped, that we have depended too much on private enterprise, the result being that we are behind both the United States and Germany. The President thinks that a very large expenditure, which should be borne by the State, and which he is said to place at 20,000,000*l.*, is necessary before we can hope to be efficient or to be able to compete successfully with the countries named in the highest aspects of scientific education. He will also say that the State should endow research. We will not comment on these schemes now, as we have not the full text of the address before us, but the President is evidently going to make out a strong case for the teaching of the practical aspects of science in universities. From what we can learn, the Southport meeting should be a success.

The Workmen's Compensation Acts.

THE House of Lords have given a decision in the case of Fenton *v.* J. Thorley & Co., Ltd., of much importance to all employers of labour, under the Workmen's Compensation Act. A man whilst unscrewing a press used in making oil cake ruptured himself owing to his having to exert some extra effort on account of the press sticking a little. The Court of Appeal, following a decision of that Court in 1900 (Hensey *v.* White), when the facts were very similar, decided against the man's claim, on the ground that this was not injury by accident. The House of Lords has now reversed this decision, holding that the man was entitled to compensation. The cases on this important question have hitherto been decided in such a manner that great uncertainty in the law has existed; thus in Boardman *v.* Scott, where a man in his ordinary duty was removing a beam from a loom and strained himself whilst hitching it on to his shoulder, the Court of Appeal held him entitled to compensation under the Act, whilst in Roper *v.* Greenwood, where a woman most seriously injured herself whilst lifting boxes rather heavier than those she was in the habit of lifting, the plaintiff was held to be disentitled to compensation, the distinction drawn between the two cases being that in the latter case the woman had complained beforehand that the boxes were too heavy, from which the Court drew the deduction that there was no "accident," since there was nothing fortuitous or unexpected in what had occurred. This case is now also overruled and all such subtle distinctions have been swept away. The House of Lords have defined an "accident" to be an untoward event or unlooked-for mishap not expected or designed, and further have held that the mere fact of a workman suffering injury out of and in the course of his employment primâ facie entitles him to compensation, and that the onus is thus laid upon his employer to exempt himself from liability by showing that the injury was sustained by reason of some other cause—for instance, ill health. With the question of whether only the immediate cause is to be regarded, or whether rather the efficient cause might not be considered under the Act, we dealt in our issue for June 28, 1902, and the House of Lords have now decided the matter in accordance with the view we then expressed; the efficient cause, or *causa causus*, is to be sought in determining the origin of the accident or injury.

By-laws and Magisterial Discretion.

THE Law Reports contain this month an important decision, in the case of Salt *v.* Scott Hall on the discretion vested in justices in enforcing the by-laws of Rural District Councils. The appellant had built a bungalow, which was not erected in compliance with a by-law which prohibited the erection of any new building without walls of brick, stone, or other hard and incombustible materials, mortared or cemented together. The foundations were stone, the chimney and breastings brick, the roof slate and the rest of the building wood. The bungalow was an isolated building 200 yards from any house. The by-law was properly made and confirmed by the Local Government Board in accordance with the Public Health Acts. It was contended, however, that it was void since it gave no discretionary powers to the justices, and the justices adopted this view. The Divisional Court have held that the by-law was valid, but that Section 16 of the Summary Jurisdiction Act, 1879, under which proceedings were taken, gave the justices a discretion, and they had the power either to inflict a nominal penalty or even to dismiss the summons altogether. This decision seems exactly to meet the Eynsford case of Mr. Till's cottage which was so much discussed last year both in these columns and in the Press generally, and we cannot but think that in that case the justices cannot have been aware that they possessed any such discretion. The wooden huts, or rather hutches, in which the fruit pickers of Kent are temporarily housed during several months of the year, are a scandal to civilisation, and, if we remember rightly, it was Mr. Till's wish to provide more suitable accommodation and to erect good wooden cottages. How it is that the present miserable huts continue to be used in these days of strict sanitary and building supervision, we do not attempt to explain, but this subject is one which urgently calls for thorough investigation.

Nottingham Castle.

THE Castle Museum Committee of the Corporation of Nottingham have resolved to ask for a loan of 10,000*l.* for carrying out a restoration of the Castle lodge (which has been in a serious state of dilapidation during several years past), the repair of the boundary-walls, the building of a new estate office for the Duke of Newcastle's agent, the laying out of the gardens to the south-east, and other works. In the *Builder* of May 23 last we illustrated Mr. T. G. Jackson's designs for an adaptation of the gateway to purposes of the Museum, together with a view of the gateway in its present condition. The gateway consists in part of a mere shell, the other part being the estate office. The Castle, on the Castle Hill, was built by William Cavendish, first Duke of Newcastle, in 1670-6, after the Classic style; having been afterwards sub-divided into separate tenements it was sacked and burned in 1831 by a band of Reform Bill rioters. The structure continued in a state of ruin until its restoration by the Corporation, who hold the castle and grounds from the Duke of Newcastle, as a Museum of Decorative, Industrial, and Pictorial Art, at a cost of 30,000*l.* The various collections comprise some 500 designs and drawings by T. Stothard, R.A., and a fine collection of Wedgwood ware—both given by the late Mr. Felix Joseph; some paintings, including views of Edinburgh, Frankfort, Nuremberg, and Rome, by G. Jones, R.A., and bequeathed by his widow; and Lord Savile's collection of classical antiquities. The gateway and some earthworks constitute remains of the fortress originally erected by William I. on the site of a more ancient stronghold that stood on the summit of a bold eminence rising above the river Lene, a tributary of the Trent. The castle was strengthened and enlarged in the reigns of Edward IV. and Richard III., and dismantled during the Commonwealth. The Duke of Newcastle, having bought the property from the Duke of Buckingham, pulled down the ruins for the re-building we have mentioned.

Hydraulic Dredging with Rotary Cutters.

IN a paper recently read before the Institution of Civil Engineers, Mr. Apjohn described his experience in excavating clay by means of hydraulic dredgers having rotary cutters fitted to the nozzles of the suction pipes. As the material was of silty character, it was believed that it would be readily broken up by the cutters, but this was

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not found to be the case. In the loamy soil first encountered the cutters answered well, but on arriving at the clay the blades became clogged, and the amount of clay in the water discharged was very small. After some experiments a new form of cutter was made with narrow spiral knives, but this device was not particularly successful. From the experience detailed in the paper we learn that, while the efficiency of the cutter depends upon the form of the blades, the angle at which they are set, and on their spacing, it is difficult to determine the best form for adoption without the aid of exhaustive experiments, such as have not been conducted up to the present time.

Tasmanian Hardwood Timbers.

THE Tasmanian Government is doing its best to bring the qualities of the timbers of Tasmania to the notice of users of hard wood in Great Britain. A year since an official Report on them was issued, and now the Agent-General sends us a supplementary pamphlet giving the opinions of several Tasmanian officials who have had to deal with the hard woods of the country for many years. The Engineer-in-Chief of the Department of Public Works says that native-grown "blue gum" and "stringy bark" have been used for general constructive works from the earliest times, and with satisfactory results. Railway sleepers of these woods last on the average about fifteen years, though the life of the wood is, of course, dependent in a great measure on the rainfall, which varies very considerably in different parts of the country. Other reports follow much in the same strain. All those who make the reports agree that the two varieties of hard woods mentioned are amongst the best in Tasmania; and some are of opinion that the "blue gum" has a longer life than "stingy bark." Both the woods have stood well as piles in tidal waters, for bridges and the like, and some of the piles are a hundred feet in length. Judging from the experience of Tasmanian engineers and surveyors, these timbers are well worthy of the consideration of users of hardwood in this country.

Raising Water by Compressed Air.

IN a paper read at the annual meeting of the British Association of Waterworks Engineers, Mr. W. H. Maxwell described the air-lift pumping plant that was installed at Tunbridge Wells about three years ago. This plant has been raising water from depths varying between 98 ft. and 118 ft., and appears to have given every satisfaction. Few systems have come more rapidly into general use than that in which compressed air is employed for raising water; and it is, perhaps, a natural consequence that theory is somewhat behind practice. The simplicity of the apparatus required, and of the laws by which its operation is governed, seems to suggest no theoretical difficulty; but the fact remains that the more the system is examined the more elusive are the solutions of the problems presented. Experimental data are badly wanted upon various points before it will be possible for schemes to be prepared in such a manner that economical and otherwise satisfactory results may be reasonably assured. Although economy of operation does not appear to be one of the primary recommendations of the air-lift, there are various circumstances under which its application may be more than justified. For temporary use in well-testing or boring, and for permanent use in cases where water is derived from sandy beds, the absence of valves in contact with the water is a distinctly advantageous feature. The fact that 80 per cent. more water can be raised by this than by any other system, from a boring of given diameter, is another great advantage, and so is the fact that an air-lift plant of moderate capacity can be installed far more expeditiously than ordinary pumps. The system is certainly of great interest, and deserves the most careful investigation from engineers and others interested in water supplies.

The Panama Canal.

A NEW difficulty has arisen in the way of the Isthmian Canal scheme, owing to the rejection of the Treaty by the Senate of the Colombian Parliament. Advocates of the Panama route have had to contend with opposition from politicians who believed the Nicaraguan Canal preferable from a patriotic point of view, and from politicians who merely represented trading interests. They also had to combat the view that the last-named route was the more practicable, and finally it was a tedious operation to persuade the Panama Co. to enter into an agreement for the sale of their property at a reasonable price. The present hitch may probably be regarded as nothing more than an episode, for it is unlikely that a work of such importance to the world can be definitely prohibited by a small American Republic. If the decision now arrived at by the Senate should be confirmed by the Lower House of the Colombian Parliament, it is not unlikely that the United States may discover a remedy for such action in some application of that most convenient theory commonly known as the Monroe Doctrine.

The Coal Commission.

FROM the first Report of the Royal Commission on Coal Supplies it appears that inquiry has so far been confined to the depths practically attainable in mining, to the minimum thickness of workable seams, and to waste in working. As the inquiry is not yet complete, the Commissioners make no recommendations as a result of the evidence already taken, but some preliminary conclusions are justified by the matter contained in the Report. It seems to be clear that beyond a depth of 3,000 ft. the increasing temperature of the earth may seriously increase the difficulties of mining, and it is doubtful whether so great a depth as 4,000 ft. will be generally attainable. At low levels the earth pressure may become a serious obstacle to work in certain localities, and it may sometimes prove to be the case that thick seams of coal cannot be worked owing to their great depth below the surface. Thin seams can only be worked with profit when near the surface or when associated with easily worked materials. Consequently, in estimating the national wealth, so far as coal is concerned, we should not take into account the total amount existing beneath the surface, but the quantity that is practically realisable. When the Commission was appointed we said that we did not see the use of it, as experts already knew what available coal there was in the country, so far as it was possible for any one to know. The first instalment of the Report of the Commission amply justifies our prognostication. The evidence which has been laid before the Commission has been given by some of the leading authorities on the subject in Great Britain, and will, so far as detail is concerned, be better capable of being digested when all the facts have been published, which will not be for some time to come. A great deal has been made of the large supplies of coal which are supposed to be hidden by newer strata, and for years these hidden seams have been flourished before us as though it was quite certain they existed. The cautious geologist, however, will not have much to do with many of them. The majority probably do exist, but we want more proof of their actual occurrence. If the work of the Commission were to be extended so as to enable them to put down several bore-holes at likely places, we could understand that much useful work could be accomplished. There is no probability of their being able to do that, and our coal supply will have to be much shorter than it is at present before Government would sanction the sinking of bore-holes at the public expense. The most useful part of the Commissioners' work, so far as it appears in this instalment, is the careful ascertaining of what coal there is in sight, how far it is available, and what is the maximum depth to which coal can be worked. Particulars such as these, however, should be in the hands of the authorities of the Home Office already, through the medium of the Inspectors of Mines.

The Royal Academy Schools.

THE removal of the age limit for students to the Royal Academy schools, which comes into force next January, must be of interest to a good many architectural students. The comparatively small attendance at the architectural school has not, of course, been entirely due to the limit of age which until now has been in force. The examination is not a light one. It is no easy matter to have to draw out accurately to scale any one of the five Orders from memory in two hours; and the standard for finished drawings is fairly high. The finished works, if passed, admit a student as a probationer, but if he then fails to pass a somewhat tedious examination, he has to do a fresh lot of finished drawings to become a probationer again. But, when admitted, the three or five years' course of study has great advantages. The visitors who give courses of individual instruction in design are architect members of the Academy, whose criticism cannot fail to be a lifelong benefit and pleasure to look back upon. The prizes offered are numerous, though, under the new regulations, no one over the age of twenty-eight may compete for them. The travelling studentships are the most valuable offered in the profession, though, owing to the limited number of students, the competition is not so keen as at the Institute, and perhaps, as a rule, the work is not of so high a quality for the same reason. We hope the numbers may be increased, for, although the Academy cannot claim to foster architecture, we think that the schools for advanced students offer greater advantages than any other.

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THE BRITISH ARCHÆOLOGICAL ASSOCIATION.

THE sixtieth annual Congress of this Association commenced on Monday, August 10, at Sheffield, under the presidency of Mr. R. E. Leader, B.A. It is thirty years this month since the previous visit of the Association to this city—then town, now incorporated city—of Sheffield, and only very few of the members at that time present now survive, Mr. W. de Gray Birch, the hon. treasurer, being the only Associate present at both meetings.

At three o'clock the members and visitors met at the Town Hall, where they were welcomed by the Lord Mayor (chairman) and the members of the Local Committee. The President having acknowledged the cordial welcome of the Lord Mayor and Committee, a move was made to the parish church, where they were received by Archdeacon Eyre, who conducted them to the church burgesses room to view the original charter granted to the burgesses by Queen Mary. It is in a fine state of preservation, and attached to it is the Queen's seal. The church was briefly described by Mr. J. R. Wigfull, A.R.I.B.A., one of the local hon. Secs., who said there was but little of the ancient structure now remaining, the chief portion being some stones in the wall on the south side, the whole building having been practically pulled down and rebuilt. The church was originally built in the early part of the twelfth century, and probably by Walter de Lovetot, the founder of the Priory of Worksop. The stones alluded to as the only remains of this church, were discovered during the restorations of 1878 and 1880. The tower piers and the inner lining of the walls of the east end are all the remains left of the succeeding church, and they are of the date of the fifteenth century. Mr. Wigfull illustrated his remarks by a careful plan and several old engravings. The Shrewsbury monuments, in the chapel on the south side of the chancel, are the only features of archæological interest, and are very fine examples of their style, particularly the altar tomb with marble recumbent effigies of the fourth Earl of Shrewsbury and his two wives. This chapel was erected by George, the fourth Earl of Shrewsbury, probably, shortly after the death of his first wife Ann, a daughter of William Lord Hastings, about 1520. George, the fourth Earl, died July 26, 1538, and the inscription upon the tomb is incorrect, as the second wife is buried at Erith in Kent. Against the south wall is the monument of the sixth Earl, who was the custodian of Mary Queen of Scots, and the inscription upon it is from the pen of Fox the martyrologist. The Earl died in 1590. The monument in the centre of the chapel bears the arms of George, the sixth Earl, and his first wife Gertrude Manners, and the sides bear the arms of their four sons. The late Mr. Samuel Mitchell, who had seen the accounts, said this monument was "the work of Rosigmond the Burgundian, in the year 1584-5, and that he was paid 20*l.* for it by George, sixth Earl of Salop." The church registers date from 1560. Leaving the church the party proceeded in carriages to inspect the remains of Manor Lodge, under the guidance of Mr. T. Winder, the Suveyor to the Duke of Norfolk's Yorkshire and Derbyshire estates, who had had reopened the excavation made thirty years ago which disclosed the foundations of one of the octagonal towers which once flanked the entrance gate. Mr. Winder read an interesting paper upon Sheffield Manor, from which we learn that 'The Lodge," the Manor Lodge or Manor Castle (by which latter name it is now locally known) was the country mansion to which the Earls of Shrewsbury retired from time to time when the sanitary conditions of Sheffield Castle rendered a removal desirable. Thus Shrewsbury writes:—"I thought to remove this Queen to my Lodge for five or six days to cleanse her chamber, being kept very uncleanly." No remains of the Castle of Sheffield exist, but it was situated at the confluence of the rivers Sheaf and Don, and extended to Lady's Bridge, and probably to Castle Folds, Exchange-street, and Waingate, a site now occupied by warehouses and the station, hotel, and other buildings belonging to the Great Central Railway Co. The Castle is described in the Charter of Henry III., by which Thomas de Furnival was empowered to make a firm and embattled castle as "his Manor House at Sheffield," and the buildings now known as the "Manor" are at a somewhat later date described as the "Manor Farm." The Manor Lodge was situated in the centre of Sheffield Park. This park is now partly built over; the remainder is laid out for agricultural uses. The park contained about 2,462 acres, and as early as the time of King Stephen, was probably a conserve for deer. When the mansion was deserted, the stock of deer decayed, but even in 1637 there were still 1,000 fallow deer and 200 "deer of antler." in it. The park was famous for its long, straight avenue of walnut trees, which led from the gate of the park next the town to the principal entrance of the manor, and for its numerous and immense oak trees. The manor house is reputed to have been built by George, the fourth Earl of Shrewsbury, at the commencement of the sixteenth century, probably prior to 1516. It was maintained for some forty or fifty years after the destruction of Sheffield Castle during the Civil Wars, but in 1706 was dismantled by Thomas, Duke of Norfolk, since when it has been allowed to fall into almost irreparable ruin.

The main entrance to the court is said to have been situated between two octagonal towers on the western front, where a noble flight of steps led to the door which opened into the great gallery. This was the "faire gallerye" at the end of which, we learn from George Cavendish, the gentleman-usher to Wolsey, was "a goodlie tower with lodgings where my lord was lodged," and that it was large enough when divided by a "travers of sarcenett," "which was drawn across it," to accommodate the Earl of Shrewsbury at one end and the great cardinal at the other, during the time of his visit of sixteen or eighteen days from November 8, 1530, when on his way to London, which place he never reached, dying, as history relates, at the Abbey of St. Mary, at Leicester. The only other event of historical importance connected with the manor is the detention here of Mary Queen of Scots, for whose safe keeping it is related George, Earl of Shrewsbury, in 1577, erected a separate building, now known as Manor Lodge. It stands at some little distance from the west front of the ruins of the Manor House, and takes the form of a square three-storied building. The members wended their way up the spiral stone staircase to the two chambers—one the guard-room, the other the apartment occupied by the unfortunate Queen, which has an elaborately panelled and decorated plaster ceiling and a richly-carved over-mantel and fireplace. Leaving behind them the memories connected with the past history of Sheffield Manor, the party returned to the hotel to dinner, and to prepare for the evening reception at the Town Hall.

At 8.30 the Lord Mayor and Lady Mayoress entertained the members of the Congress, and a large party who had been invited to meet them, at a conversazione at the Town Hall, and during the evening the President, Mr. R. E. Leader, B.A., delivered his inaugural address. The President said that, during the thirty years which had passed since the previous visit of the Association, the place had seen great changes. From a town of some 200,000 inhabitants, it had developed into a city of over 450,000. Its central streets had been reconstructed almost beyond recognition, and the remorseless extension of its boundaries had been accompanied by a lamentable sacrifice of beautiful surroundings and the submerging of many old landmarks. In a lengthy and carefully-prepared and very interesting address, of which we can only give a very brief summary, Mr. Leader dealt with the history of Hallamshire, saying that it was with true archæological instinct that Mr. Hunter, the historian, made his great work the history of Hallamshire, and not the history of Sheffield. Its topography is the key to its history; the slopes that rise from the confluence of the Sheaf and the Don, buttressed by a rampart of hills and wild moorland, and girdled with primeval forests, remote on the only accessible side from the great tide of life, formed an ideal place of settlement when might was right, and, in consequence, the part played by Sheffield in the events of national history has been but small. The clash of arms has only twice been heard within its borders. As an obscure episode, in the Barons' wars, De Furnival's Castle was burnt in 1266, if it were indeed a castle. There is no doubt, however, as to the reality of the castle which in 1644 was besieged by and surrendered to the Parliamentary forces. These two events, said Mr. Leader, so far from impugning the demonstration of the teaching of the seclusion of Sheffield, strengthen it distinctly, because the intrusive castle, not the town, was in both cases the object of attack. The hostile forces turned out of their way to reduce a structure which, though militarily obscure and unimportant, might be troublesome. The imprisonment here, for fourteen years out of eighteen, of Mary Queen of Scots was undoubtedly owing to its seclusion. It combined the publicity which made attempts at rescue hopeless, with the obscurity engendering forgetfulness. "Out of sight, out of mind," was Elizabeth's hope. The nestling retirement of situation once more stood Sheffield in good stead when, in 1745, Prince Charles Edward passed south with his rugged following. Although heralded by frenzied stories of bloody atrocities marking their path, the unkempt rabble passed on their way without turning aside into Hallamshire, and, apart from any "moral and intellectual damage" caused by the raid, the loss suffered by Sheffield may be appraised at 7*d.*, the amount of the fee paid to the bellman when sent round by the Cutlers' Company to recall the Corporation to a meeting, put off "on account of the rebels being near us." No opportunity for conviviality was ever lost, and in a few months Culloden afforded legitimate excuse for rejoicings at The Cock, accompanied by an expenditure of 1*s.* 7*d.* for beadles' cockades and of 3*d.* for tobacco pipes. Thus Sheffield emerged from the crisis cheaply and without the inconvenience which more obtrusive towns had to undergo. The cutlery manufacture, for which Sheffield is so famous, dates from 1340.

Tuesday, August 11.

Members and friends were off betimes by the 9.12 train from the Great Central, Victoria Station, to Worksop, which was reached about 9.45, whence carriages were taken to Blyth for the inspection of the grand Norman church, of which a good description and history was given by Dr. John Stokes, Hon. Local Treasurer. Blyth is situated on the border line of Nottingnamshire and Yorkshire, and is a pleasant old-world village of little importance, though of ancient parentage, for it is mentioned in Domesday. The church was founded in 1088 by Roger de Busli, and the Norman arcade, with triforium and clearstory, are of grand proportions. In 1287, a dispute having arisen between the parishioners and the monks of the Benedictine Monastery of St. Mary, Blyth, a cell of St. Trinité, Rouen, the south aisle was enlarged and became the parish church, and a wall of partition was erected to separate the rest of the church to the use of the monks. The nave was originally much longer, and remains of the foundations of the apsidal end may yet be traced. On the walls of the nave some tracings of painted decoration of the twelfth century still remain. Some good late fifteenth century screenwork remains in the south aisle, still used as the parish church, the chancel screen being vaulted, the lower panels painted with figures of saints, representing St. Barbara, St. Stephen, St. Euphemia, St. Edmund, and St. Ursula. The tower at the west end is about 70 ft. high, and was added in the fourteenth century. In the chancel is the much mutilated effigy, said to be of the founder of the church, Roger de Busei, but of a much later date, and probably commemorating a crusader. Two old collecting boxes of oak, dated 1601, are preserved in the church.

Resuming the carriages, the party returned to Worksop, and proceeded to view the church, which, after the vicar had given some particulars of the manor, Mr. Charles Lynam, F.S.A., described. The nave and side aisles are all that now remain of the richly-endowed church of the Monastery of the Canons regular of St. Augustine of Worksop, which was founded in 1102 by William de Lovetot, and dedicated to SS. Mary and Cuthbert. The monastery was dissolved in 1539, being the second of the larger monasteries to fall under the ban of the king. It was founded for fifteen canons. With the aid of a capital block plan, Mr. Lynam pointed out the situation of the church and conventual buildings in relation to the river, which here, as in other cases, was the determining factor in the choice of the position, and here necessitated the buildings being placed on the north side. The church was both parochial and conventual. The founder placed the canons in a church which was existing at the time of his intention, in 1103, to found the monastery, but the actual foundation seems to have been de-

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ferred, as the date of the charter is between 1123-1139, and Mr. Lynam considered the date of the building to be later than the earlier one assigned to it. Worksop Priory Church is so well known to architects and readers of the *Builder* that to descant upon its architecture seems unnecessary.

It was a cruciform church of large dimensions, with central and western towers; the latter only remains, and was so grand and imposing that Henry VIII. considered it to be suitable for the cathedral of one of his proposed new dioceses. An unusual feature in the interior is that the clearstory windows are not over the arches, but partly over the walling and piers of the nave. Having inspected the ruins of the beautiful Early English Lady-chapel, which was attached to the east side of the south transept, and erected probably about 1240, the party proceeded to the gatehouse, a very picturesque and fine example of a priory gatehouse. From its size and internal arrangement of hall and chambers on the upper floor, it probably served as the guest-house for ordinary travellers. The period of its erection is within the first quarter of the fourteenth century. Near the gateway are the steps and part of the shaft of the old market cross at which, in olden times, the King's proclamations were wont to be made; and it is said that, in the days of the Commonwealth, banns of marriage were announced from the steps of this cross. After luncheon the carriages were again in requisition for the drive to Steetley to inspect the beautiful little chapel of Transitional Norman architecture. The Rector of Whitwell, Rev. Canon Mason, in whose parish Steetley now is, although formerly it was a separate parish, described the building, and gave some interesting particulars of its early and recent history, for until 1880 it had been allowed to lie roofless and uncared for. The chapel consists of nave, chancel, and sacrarium, with apsidal end. The chancel arch is well proportioned, in two orders, and is richly decorated with chevron and other ornaments, and a broad moulded label having an escalloped margin filled with small cones. The capitals of the shafts on the north side are carved, and represent the contest between St. George and the Dragon; those on the south side are much plainer, being simply escalloped. The inner side of this arch is simply moulded, without ornament. The arch of the sacrarium and the vaulting ribs of the apse are less enriched, while the capitals of the shafts of the arch and first rib are richly carved with foliage, the other rib and cap are only escalloped. The date of this charming little building may be attributed to the middle of the twelfth century. Some remains of colour are visible on the ornamentation of the ribs of the apse. Barlborough Hall was the next place on the day's programme, a charming Elizabethan manor house, but little touched in the way of restoration, and in admirable preservation. The hall was described by Mr. J. R. Wigfull. The hall was built in 1583-4, by Francis Rodes, a Justice of the Common Pleas, and is inhabited now by a descendant, in Miss de Rodes, to whose courtesy the party was much indebted for permission to view the house and its beautiful gardens. The house is square in plan and somewhat resembles Bolsover; the rooms are but little modernised and are full of ancient furniture, rare cabinets, and antiquities, paintings, and other works of art of great value. The carved stone mantel in the drawing room is a fine piece of work with figures representing Francis Rodes, his two wives and other ladies. The fire back to the grate is dated 1616 with the initials I.R., and was put in by John Rodes the son. In the dining-room is another handsomely carved overmantel dated 1697. The library is small, but, in it are exhibited some valuable MSS. and autographs of Henry VIII., Bess of Hardwick, Elizabeth, with date 1586, Devonshire, 1671, and others. Leaving this interesting old house with regret, the party proceeded to Kiveton Station for train to Sheffield. It was so late when the members reached Sheffield, tired and hungry, that the evening meeting was abandoned.

Wednesday, August 12.

The archæologists left the hotel about 10 a.m. in carriages for Beauchief Abbey, which was described by Dr. John Stokes. Beauchief has suffered greatly from spoil and ruin, and the western tower, with a small portion of the nave, are about all that now remain. The tower was fitted up with high pews of different shapes and sizes, and used as a church, about 1632, and it remains in the same condition now. The tower, which is large and massive in character, was built early in the thirteenth century, but the great window, now blocked up, and the bold projecting buttresses were additions in the following century. No remains of the conventual buildings exist above ground, but they were situated to the south of the church. The abbey belonged to the Premonstratensian Canons, and was founded in 1172 by Robert FitzRanulph, who was one of those concerned in the assassination of Thomas à Becket, and in expiation of his share in that deed, founded this abbey, and dedicated it to the saint. This was one of the small abbeys whose revenues were under 200*l.* per annum, so it was dissolved in 1536.

Chesterfield was next visited, where the fine church, with the celebrated crooked spire, was described by Mr. R. T. Gratton. The church was built in 1350, and the foundation stone was laid by Edward the Black Prince in the presence of the King, Edward III. Mr. Gratton pointed out the chief features of the building. Of the church, if one existed, in Norman times no trace remains, and there is no mention of Chesterfield in Domesday; but, according to Dr. Cox, "one must have been erected almost immediately after the conclusion of that survey, for William Rufus, who died in the year 1100, gave the church of Chesterfield, together with its chapels, to the Dean and Chapter of Lincoln." The oldest portions of the present church are to be seen in the transepts, where are remains of Early English work, but the greatest portion of the fabric now remaining must belong to the Decorated period and can scarcely be earlier than 1350. There are numerous monuments in the church, many of which have been removed from their original positions, probably about 1688, as they are reversed in position, facing west instead of east, which was the pre-Reformation position for all monuments except clerics, which, said, Mr. Gratton, were placed facing west (and presumably they were so buried) the idea being that they should face their flocks on rising at the Last Day. The lines of the old roof are clearly defined on the east wall of the tower. The church contains much old woodwork in screens and reredos of the Perpendicular period, and there is a handsomely-carved black oak pulpit of about the period of James I. Preserved in the church is a large iron-bound chest at the east end of the south aisle, probably of sixteenth century date, and a fine font, carved, with circular bowl, and of the Norman period. After luncheon, Winfield Manor was visited, being described by Mr. J. B. Mitchell-Withers. This extensive and most interesting manor-house is now a complete ruin, but its plan, in the main, is quite easily decipherable. The building formed two courts, the principal apartments being situated in the inner court. The first court faced the south, the other the north. The entrance to the outer court was by an arched gateway on the east side. The building was probably erected about 1441-3, and was built by Lord Cromwell, Lord Treasurer to Henry VI., and in the carved coat of arms over the gateway are a number of purses representing his office of Treasurer of the Exchequer. Beneath the great hall, and of the same dimensions, but divided by two rows of octagonal columns which support a groined and vaulted roof, is a large apartment, fairly well lighted, and connected by broad stone stairs and passages with the upper floor. What was the use of this apartment is uncertain. It appears to have been of the same date as the superstructure, and has been thought by some to have been the chapel, particularly as the chapel has not been satisfactorily located; but it seems to be more likely, from its ease of access from other parts, that it was a second hall, for the use of the retainers of the household of those of the many guests of the noble owner of the mansion. The hall was not completed by Lord Cromwell, as he sold it to John, second Earl of Shrewsbury, in whose papers are many references to payments for the construction of the building, and in the possession of the Earls of Shrewsbury the hall continued until 1616, when it passed, after some family negociation, into the possession of the Earl of Pembroke. The chief event in the history of Winfield Manor is the captivity of Mary Queen of Scots, who passed a great part of her imprisonment of nineteen years at Winfield and Sheffield. Nothing now remains of the buildings which were occupied by the Queen and her retinue, but foundations on the west side of the inner court are said to indicate the position they occupied. During the Civil War Winfield was taken by storm by the Royalists, but, later on, was recaptured by the Parliamentarians, and was under a Decree of Parliament, dated June 23, 1646, dismantled and reduced to the ruin we now see. There are some charming bits of architectural detail to be met with about the ruins, and the whole grouping of the buildings must have been most picturesque. As this was a long day, and members could not return to Sheffield until late, no evening meeting had been arranged for.

Thursday, August 13.

Leaving the Royal Victoria Hotel in carriages about 9.45, members and visitors drove to Wincobank Hill and devoted some two hours to an exploration of the pre-Roman camp there situated. By direction of the Museum Committee and under the personal superintendence of Mr. E. Howarth, F.R.A.S., F.Z.S., the curator, and one of the local hon. secs. of the Congress, explorations have been made recently, and cuttings through the earth banks and into the central mound were open for the inspection of the archæologists. After a somewhat steep climb up the hill, from which a fine view of the surrounding country on one side, and the smoking furnaces and chimney-shafts of the many iron and steel works of Sheffield on the other side, was obtained, Mr. Howarth described the investigations that had been made and the results that had been obtained. He said it would be almost impossible at present to assign an authentic date to the rampart which surrounded the natural mound. It was, however, a stone rampart and not an earthen one. In the section which had been cut through for the inspection of the members of the Congress, it was plainly seen that the stones forming it had been placed in layers of varying sizes and thicknesses, but without mortar of any kind. The bottom of the rampart had been made smooth, and the stones piled up with regularity, sloping upwards at an angle of about 45 deg. The outer rampart, which extended on all sides but the north, was of earth. On the north the natural slope of the hill is much steeper, and, presumably, a rampart was not considered necessary. The camp was oval in formation, 150 yards by 120 yards, and it had four chief entrances. Many burnt stones and much charred wood had been met with in the excavations. It does not appear to have been an occupied camp, but a camp of refuge in sudden danger. The camp was no doubt for some time held by the Romans, and pieces of Roman pottery had been met with, but it bore no resemblance to a Roman camp, and must have been constructed by an earlier people. Jet had been found, which was often used by the Britons, and a few pieces of flint had been met with, and as flint was not natural to the site it must have been brought there by people who used flint. Mr. J. C. Gould considered the date of the camp to go back at least 500 years before the invasion of the Romans. Celts, he said, usually fixed upon a hill which was more or less flat-topped; this was a ridged hill, and from his experience he was led to believe that a camp with a "hog back" was earlier than one flat-topped. They had an illustration of that in Mam Tor. With regard to the preservation of the camp from further encroachments and injury, it was resolved to appeal to the Duke of Norfolk, the owner of the property, that steps might be taken for its protection. Leaving Wincobank, a short drive brought the party to Ecclesfield, where the fine old church, known locally as the "Minster of the Moors," was described by the President, Mr. R. E. Leader. Domesday does not mention a church at Ecclesfield, and no traces of a Saxon or Norman church have been met with, but, a little later, about 1141, one of the Lovetots, who founded the church at Sheffield and the priory at Worksop, founded a church here; it has, however, entirely disappeared. In the reign of Henry I. a church must have existed, as another of the family of de Lovetot bestowed it with lands upon the Abbey of St. Wandrille in Normandy. Towards the end of the twelfth century the monks of St. Wandrille erected a priory and placed some of their order in it. In 1310 the Archbishop of York ordained that the monks should present the vicar of Ecclesfield,

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and an uninterrupted line of vicars has ever since been continued to the present day. There are only a few trifling remains of the Early English church. At the suppression of the alien priories this church was transferred to the monastery of St. Anne, at Coventry, and the chancel was built by the monks of that establishment. The church is almost wholly of the Perpendicular period, with a lofty tower. Some remains of the buildings of St. Wandrille's Priory remain, and have been converted into a curate's house; they are of late date. In 1386, the estates were farmed out amongst the inhabitants of the village. Richard Dodsworth visited the church in 1680, and was much impressed by its stateliness and the painted glass then in the windows. It was he who called the church the "Minster of the Moors," a name it has ever since retained. The plan of the church is precisely the same as that of Sheffield Parish Church, of the fifteenth century, before the alterations, as was pointed out by Mr. Wigfull. In the south chapel there is a very fine monument with recumbent effigy of a Sir Thomas Wentworth. The church is rich in carved woodwork in the chancel screen, choir stalls with returned ends, and bench ends terminated with curious little figures in attitudes of adoration. There are also screens to north and south aisles of fifteenth-century work of good character. In the north aisle is preserved an ancient chest of great size, iron bound, and having four locks. At the west end of the south aisle is preserved the portion of the stem of an early cross set on a base stone which has the socket of a second cross beside it. The cross is seemingly pre-Norman. In the churchyard are some interesting monuments, including one to the memory of Dr. Scott, in whose arms Nelson died at Trafalgar. Joseph Hunter, the historian of Hallamshire, is also buried there.

From Ecclesfield the members returned to Sheffield to luncheon, and in the afternoon were entertained at a garden party at Queen's Tower by Mr. Samuel Roberts, M.P., D.L., M.A., and Mrs. Roberts.

The evening meeting was held at the Weston Park Museum, where Mr. E. Howarth, the Curator, and some members of the Committee, received the party. Mr. Howarth described the celebrated Bateman Collection of antiquities and other objects of local interest. During the evening a paper was read by Dr. Birch for the author, Mr. W. J. Nichols, upon his discoveries in the caves and dene-holes at Chislehurst, in Kent. The paper was illustrated by many beautiful large-sized photographs.

Friday, August 14.

The weather, which had hitherto been fine, changed to-day, and it was in heavy rain that the members of the Congress set out in carriages, about 10 o'clock, for a long driving day. Carbrook Hall, in the outskirts of Sheffield, was the first place visited. It is now used as a licensed house, and is full of quaint carving and panelled ceilings. Mr. Wigfull, in describing it, said it was the property of the Bright family, and was built in the early part of the seventeenth century by Stephen Bright. One of the sons of the family had been Governor of Sheffield Manor and a Colonel in the army. Rotherham was next reached, and the fine church of All Saints was described by Mr. E. Isle Hubbard. There was probably a church here in Saxon times, as Rotherham was a manor before Domesday, but there are no evidences remaining. That there was a church in Norman times they had knowledge from the foundations discovered at the restoration in 1873, and from the remains of masonry of that period of grey magnesian limestone in capitals and bases. The tower was older than the nave, and showed the water tabling marking the pitch of an earlier roof. The chancel inclines slightly to the south. The clearstory windows are additions of the sixteenth century, and at that time the chancel was lengthened. The old Norman bases of the piers are seen below the floor, openings having been made in the flooring for the purpose. In one or two instances inverted capitals of that period have been used as the bases of the present diamond-shaped piers of late sixteenth century date. In the south chapel there are some richly-carved stalls. The tower is vaulted with fan-vaulting, which is an unusual feature in this part of the country. Archbishop Rotherham, who died in 1500, largely contributed towards the building of the church, and many bequests to the town were also made by him. An interesting fresco once existed over the western arch of the tower, but was unfortunately destroyed, not, however, before an accurate copy in colour had been made of it, which Mr. Hubbard exhibited. An old Norman font, much decayed, is preserved in the south chapel. The church registers date from 1541. Leaving the church, a brief visit was paid to the ancient Bridge Chapel, which was originally dedicated to Our Lady for the safety of persons crossing the bridge. This Bridge Chapel is one of three existing in England, and is one of the most interesting archæological features of Rotherham. The party next proceeded to Roche Abbey, and it was intended to have taken lunch in the Abbey grounds, but the inclement weather prevented all but a cursory glance at and hasty perambulation of the ruins between the heavy showers. The Rev. H. J. Dukinfield Astley, hon. editorial secretary, described the plan of the Abbey under the shelter of the gateway, and deferred his paper upon its history until the evening. From Roche, the members drove on to Laughten-en-le-Morthen, and visited the interesting old church with undoubted Saxon doorway on the north side, and other remains of the church which existed on this site in Saxon times. The Rev. Thomas Rigby, the Vicar, described the building, and gave some account of the history of the parish. In the December number of the volume of the *Journal* of this Association for 1874 will be found a long and reliable article on Laughten-en-le-Morthen by the late Rev. John Stacye, M.A. The church is dedicated to All Saints, and the registers date from 1547. The ancient altar stone with the five consecration crosses is preserved at the east end of the south aisle, together with an incised cross slab of early date. The rain having ceased for awhile, the ancient earthworks were inspected under the guidance of Mr. I. C. Gould, who gave some particulars of their construction and use, reserving further description until the evening, when he was to read a paper dealing with the subject. A little after four o'clock the party resumed the carriages for the return to Sheffield. At the evening meeting at the Town Hall the following papers were read, viz., "Roche Abbey," by the Rev. H. J. Dukinfield Astley, M.A., and "Early Defensive Works near Sheffield," by Mr. I. C. Gould. This was the concluding business of the Congress, and the usual votes of thanks to the authorities and all who had assisted to make the Congress successful were duly passed.

Saturday, August 15.

The early part of the day only was given to the proceedings of the Congress, as many members had to return to their homes. In pouring rain the party, reduced in numbers considerably, drove to Bradfield, and visited the ancient church and a curious watch-house adjacent to it. There are several indications of Norman and Early English work in the church, but the edifice is, in the main, of the Perpendicular period. The nave arcade presents a rather peculiar appearance, as on the north side the columns are circular, and on the south octagonal, and none of the piers have capitals, the arches resting on the piers in a very awkward manner. The watch-house is interesting, and has an embattled parapet, but has been modernised. The rain, which commenced again with increased vigour, prevented more than a brief, hurried visit to Bailey Hill, the ancient earthwork behind the church, which Mr. Gould was to have explained. The wind also blew with the force of a gale, rendering out-of-doors speaking inaudible. The return to Sheffield was made in about an hour, and the members dispersed after having had a very successful congress.

THE CHURCH AND CHURCHYARD OF ST. ANNE, SOHO.

AT a sitting of the Consistory Court of London in St. Paul's Cathedral last month, Dr. Tristram, K.C., Chancellor of the Diocese, granted a faculty to sanction an agreement made between the rector and churchwardens and the Council of the City of Westminster. As successors to the Strand District Board of Works the Council took over a lease of the churchyard and its management as a public garden, granted by the rector and churchwardens for a term of twenty-one years from March 25, 1892. Many years ago a vestry, mortuary, and caretaker's house were built at the east end of the churchyard. The City Council relinquished their claim to those buildings provided that the Consistory Court would sanction the granting to them by the rector and churchwardens of a lease for 999 years of a portion of the ground. The Vestry approved of that arrangement at their meeting held on June 12, and it is now confirmed by the Consistory Court. The faculty will provide also for the delimitation of a part of the ground for the enlargement, if hereafter found to be necessary, of the church at the west end, and for the vesting of the existing vestry, mortuary, and caretaker's residence in the rector and parishioners for purposes of the church and the conduct of parochial business. The settlement thus arrived at is satisfactory to all parties concerned, and costly litigation has been avoided. The churchyard, about three-quarters of an acre in extent, having been closed against further burials by an Order in Council of August 8, 1853, was laid out as a public recreation ground by the Metropolitan Public Gardens Association, and opened on June 27, 1892. In the autumn of 1900 the Consistory Court issued a faculty to authorise the conveyance to the Strand District Board of Works for 490*l.* of a strip of the ground, 155 ft. long and tapering from 9 ft. 4 in. to 7 ft. 4 in. in width, for the widening of Wardour-street and the building of a new west wall with steps and gates on that side. The church was built of brick on a site in Kemp's field—the ascription of the design to Wren is without accredited authority—for a parish taken out of that of St. Martin-in-the-Fields and named in compliment to the Princess Anne of Denmark. A stone on the west face, north side, of the tower records the completion of the structure in 1686. The former tower, as depicted in the view by B. Cole engraved for Maitland's "History of London," 1756, had four angle vases and carried an ogee-shaped eight-sided cupola which supported an open octagonal lantern surmounted with a concaved base bearing a bulbous-shaped spire and finial. Those portions were taken down in June, 1800. An Act passed on May 28, 1802 (42 Geo. III., c. 72), provided for the raising of 6,000*l.* by way of annuities to defray the expense of rebuilding the tower and of new vestry rooms, watch-house and engine-house at the east end, in Dean-street, the vaults, and various repairs. S. P. Cockerell carried out the work in 1802-3; and to him perhaps is due the present singular spire, somewhat after the Dutch style, having a copper globe for the dial-plates of the clock. The design, however, is attributed, but not authoritatively, to Henry Hakewill the elder. Sir Arthur Blomfield superintended the recent restoration of the fabric of the church. Hazlitt's tombstone is on the south side, and just above it is the monument carrying an urn which Walpole set up and inscribed in memory of Theodore, King of Corsica, who died in the parish on December 11, 1756, a few days after his release from King's Bench prison. John Wright, an oilman in Compton-street, Soho, saved the King's remains from a pauper's burial and interred them in the churchyard. There, too, was buried in 1816 David Williams, founder of the Literary Fund, which originated in a meeting at which Benjamin Franklin was present, of a small club at the Prince of Wales's, since Limmer's, tavern, in Conduit-street, Hanover-square, in 1773. The Crace Collection contains another view by B. Cole, 1754, showing the church as seen from the north, and W. Pearson's drawing, 1810, of the west front.

COMPETITIONS.

FREE LIBRARY, HEYWOOD.—The Heywood Town Council have extended the time for the drawings to be sent in in this competition, advertised in our issues for August 1 and 8, from September 14 to October 1.

LIBRARY, BRIDGETON, GLASGOW.—The designs by Mr. J. R. Rhind, architect, Inverness, have been accepted for the library to be erected in Bridgeton.

THE INTERNATIONAL SOCIETY OF SCULPTORS, PAINTERS, AND GRAVERS.—The International Society of Sculptors, Painters, and Gravers shipped from Liverpool to Philadelphia last week the collection of works by its members, numbering about 100, for exhibition in the various American academies, and galleries, including Philadelphia, Pittsburg, Chicago, Boston, Detroit, &c.; and the collection will be shown in the St. Louis Museum during the Exhibition next year.

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Lych Gate, Bramham. Messrs. Bromet & Thorman, Architects.

BRAMHAM LYCHGATE.

THE new lychgate given by the Right Hon. J. L. Wharton, M.P., to Bramham Church is made out of very massive oak framing, with delicate tracery panels, and rich carving on limestone walls, and roofed with red tiles. It was designed by Messrs. Bromet & Thorman, Tadcaster; Mr. R. Hedley, of Newcastle, did the woodwork; and Mr. A. Thompson, of Sherburn, the masonry, &c.

A brass plate inside bears the following inscription:—"Hanc Portam in Memoriam Eorum quos vivos amavit et in spe bona futuri posuit J. L. Wharton, A.D. 1902."

TEST OF A CONCRETE-STEEL FLOOR.

A PRACTICAL illustration of the suitability of concrete-steel for warehouse buildings is afforded by a floor recently completed under the "Hennebique" system at Messrs. Whitbread & Co.'s storage depôt in Tottenham. The floor in question has been constructed in an extension of a previously existing warehouse, and covers an area measuring 123 ft. 2 in. by 25 ft. 7 in. The new building comprises a basement and three floors, the ground floor being that to which we now direct attention. Support for the main beams is furnished by the brick walls of the building, and as the inner or south wall is only 14 in. thick, a continuous beam, or lintel, of concrete-steel has been inserted below the ends of the main beams, for the purpose of distributing the load equally over the entire length of the brickwork. Blocks of stone are let into the outer walls to perform a similar duty on a less extended scale. The lintel is 14 in. wide by 10 in. high, and includes three pairs of $\frac{7}{8}$ in. diameter tension bars, three bars being near the upper surface and three near the lower surface, each pair of bars being joined vertically by "stirrups" of steel, 2 in. wide, the thickness varying from No. 12 to No. 15 S.W.G., according to requirement. The

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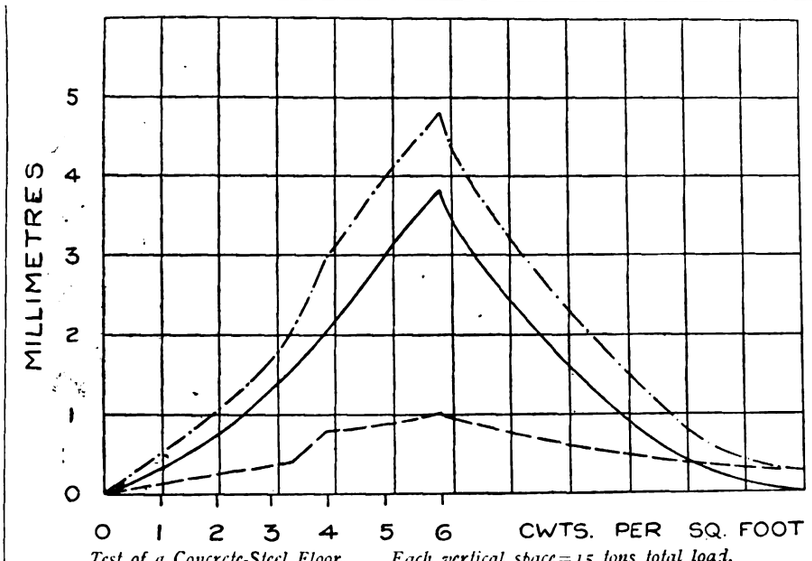

Test of a Concrete-Steel Floor. Each vertical space = 15 tons total load.

stirrups are for the purpose of resisting shear, and the lintel is further strengthened by ½ in. diameter transverse rods. The main floor beams, spaced 11 ft. 3 in. centre to centre, are 14 in. wide, and project 22 in. below the underside of the floor, which is 5 in. thick and finished on top with cement paving 1½ in. thick. As the floor is continuous in every direction, it practically constitutes an upper flange for the whole of the beams. The steel reinforcement in the beams consists of four pairs of 1⅜-in. diameter bars in the tension area, stirrups being placed round each pair and continued to the upper portion for withstanding shearing stress. Above each beam, and embedded in the floor slab, is a series of $\frac{5}{8}$-in. diameter rods, 5 ft. long, and spaced 12 in. apart, for the transmission of stress, so as to avoid any element of weakness at the junction between the beams and the remainder of the floor. The floor joists, spaced 5 ft. 3 in. centre to centre, extend from beam to beam, and measure 5 in. wide by 9 in. deep, below the underside of the floor, the steel reinforcement consisting of two 1-in. bars in the tension area, with stirrups as before mentioned. The floor slab is suitably reinforced, and the steel generally is so disposed that the several elements of the floor are combined to form a single structure. The floor has a clear span of 25 ft. 7 in. between the walls, and no supporting columns are employed.

These are the main features of the floor recently completed, of which one complete bay of 288 sq. ft. area was tested on July 30.

The floor was calculated for a superimposed load of 4 cwts. per square foot, therefore the normal test load was 57 tons 12 cwts. The test was conducted in the following manner:—Instruments for the measurement of deflection were fixed in position below one of the main beams, one instrument at each end, 1 ft. away from the wall to indicate compression of the supports, and one instrument at the centre to show the maximum deflection of the beam. At 11.25 a.m. loading of the floor was commenced, the weight being distributed along the axis of the beam until the calculated superimposed load of 4 cwts. per square foot was reached. Readings were taken for increments of load up to fifty tons, and again when the load was equal to 4 cwts. per square foot. The total deflection for the normal load, measured in millimetres, was 2·9 mm. at the centre, the average of the deflection of the piers being 0·85 mm., giving a real deflection of the beam of 2·05 mm. or $\frac{1}{3800}$ of the span. An additional load of 2 cwts. per square foot was then imposed, and further records were taken. The total load of 86·7 tons, equal to 6 cwts. per square foot, was completed at 3 p.m. and allowed to remain in position for one hour, when the total deflection was found to be 4·8 mm., the average of the deflections of the piers being 1 mm., thus giving a real deflection of the beam of 3·8 mm., equal to $\frac{1}{2052}$ of the span.

At 4 p.m. the removal of the load was commenced. This operation was finished by 5.25 p.m., when the deflection was 0·35 mm. at the centre, 0·65 mm. at the north pier, and 0·05 mm. at the south pier, or an average of 0·35 mm. deflection at the supports, showing that at that time the deformation was entirely elastic. At 7.25 p.m., two hours after the removal of the load, the readings were:—Centre, 0·3 mm.; north pier, 0·6 mm.; south pier, 0·0 mm. It was therefore evident that the beam had entirely recovered its original form, and, further, that there was no permanent deformation of the support strengthened by the concrete-steel lintel. No cracks or fissures were observed during the course of the tests.

In the diagram which we reproduce is shown the history of the test from beginning to end. The top curve gives the total deflection as read from the centre instrument, the bottom curve indicates the average deflection of the supports, and the middle curve represents the actual deflection of the beam itself. The vertical lines in the diagram intersect the curves at intervals of 15 tons total load on the bay of 288 sq. ft, but for convenient reference we have also shown the load in cwts. up to the maximum of 6 cwts. per square foot.

It may be interesting to mention that the front wall of the new storehouse at Tottenham is supported by a concrete-steel beam or lintel extending in a single span from side to side of the building, the weight carried by this lintel being about 95 tons. Its chief dimensions are 25 ft. 7 in. span, by 18 in. deep, by 16 in. wide. There are four pairs of 1¼-in. diameter bars in the compression area, and four pairs of 1¾-in. bars in the tension area, with stirrups 2 in. wide by 12 S.W.G. for affording resistance to shear.

The concrete used throughout the work described is of the following proportions: cement, 6 cwts.; sand, 0·5 cubic yard; screened gravel, 1·0 cubic yard; making 31 cubic feet of concrete in position after ramming. We learn from the architect, Mr. Arthur Dixon, that the cost of the floor was practically the same as that of an adjoining floor of similar area, but made in the ordinary way with concrete carried by steel beams and joists. The architect believes that a considerable saving will be effected in respect of maintenance, as the concrete-steel will require no painting or cleaning as is always necessary in the case of exposed steelwork. The floor was constructed by Messrs. Cubitt & Co., of London, in accordance with the designs prepared by the architect and Mr. Mouchel, engineer to the Hennebique Company. We learn that a similar test will probably be conducted upon the adjoining steel-supported floor, and we hope to be able to give our readers the results so obtained for the purpose of comparison with the records now presented.

INDUSTRIAL SCHOOL, BLACKBROOK.—On the 16th inst. Dr. Whiteside, Roman Catholic Bishop of Liverpool, laid the memorial stone of a new industrial schools for girls, which is being erected at a cost of 10,000*l.*, at Blackbrook, near St. Helens. The building will be of red brick and Runcorn stone, and will accommodate between 120 and 150 girls. The contractors are Messrs. Roberts & Robertson, of Liverpool, and the architects Messrs. Pugin & Pugin, of London and Liverpool.

WARMING AND VENTILATING OF PUBLIC SCHOOLS.*

To deal broadly with the subject, we may divide it into three groups or sections, subdividing these for further elucidation as may be necessary: (*a*) small schools; (*b*) medium-sized schools; (*c*) large schools.

In dealing with small schools, say up to 400 accommodation, it is found difficult, on the score of initial cost as well as permanent up-keep, to instal a system of warming and ventilating that would satisfy the most exacting, but a simple form of warming and ventilating may be carried out that would give much better results than is often practised at the present time. Low-pressure hot water or low-pressure steam may be used as the heating medium with radiators fixed on the external walls, preferably under a window remote from the seating accommodation, the radiators being supplied with fresh air passing through a louvred grating fixed on the internal walls, with a handle arrangement fixed thereto for the teacher to operate, thus admitting more or less fresh air as desired.

The ventilation (or extraction) may be by flues built in the walls in the most suitable positions, rising upwards and discharging into the outer atmosphere, or descending into a common horizontal duct which communicates with a vertical shaft. The latter plan is preferable, however, because it has been found by practical experience that "siphonage" goes on when numbers of flues go upwards and discharge into the outer air. Practical knowledge and experience have proved that such flues often act in a contrary direction, allowing the air to come into the rooms instead of performing their proper function as outlets.

In large schools where the numbers of children vary from 800 and upwards, and the classrooms become congested at times by the large numbers of children assembled for special purposes, the author has come to the conclusion that nothing short of mechanical warming and ventilating will suffice to keep the air in a healthful condition. Taking the best air as we find it, having three to four volumes of CO_2 in 10,000 volumes, it has been the aim of the author to get as near this standard as possible; and whilst it is not practicable to obtain it in many of our industrial cities and towns, it has been possible to keep down the CO_2 to 6 and 1 volumes per 10,000. This is good practice, but our aim should be to do more where the initial cost and maintenance are not considered a vital matter. In passing, the author wishes to compliment the Bradford School Board upon its militant policy in respect to good warming and ventilating. The time is not far distant, if it has not already been reached, when the results of this vigorous policy will be manifest in those who have the good fortune to be housed and educated in some of the schools of the city referred to.

The standard volume of air should be, according to the author's experience, not less than 1,700 cubic ft. of air per child per hour, and the maximum need not be greater than 2,000 cubic ft. The speed of the incoming air should not exceed a velocity of 5 ft. per second on an average over an inlet grating. This may seem to be a considerable requirement, but it is easily to be obtained by insisting upon having large air ducts, vertical flues, and inlets into the rooms of ample area, and large fans to run evenly and slowly. These desiderata must be at the foundation of any good system of warming and ventilating, and without them failures will be many and obvious.

The air inlet should be of ample size, and its location should be determined with a view to obtaining the air supply from the best and purest source near the school buildings. It should lead up to a filter, the design of which may be left to the engineer, as there are several good forms in the market at the present moment. The author has used jute and coke, with a water spray attached, to clean the air as it is passing into the school buildings; but the spray should be used with judgment, as it is likely, if used freely, to make the air too humid, and many medical men and scientists object to the incoming air being overcharged with moisture. It is not always realised that in this country the air has sufficient humidity in itself, and seldom requires moisture added to it

* Part of a paper by Mr. D. M. Nesbit, M.Inst.M.E., read on the 8th ult. at the Conference on Hygiene and Public Health in connexion with the Sanitary Institute Congress at Bradford.

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unless it is being heated. During winter months, when the air must be warmed, it should be moistened, after passing through the steam batteries, by means of a jet of steam or water fixed just behind the heating surface. In installations where the heating agent is high-pressure steam, or high-pressure water, however, it is necessary to add moisture, as the air in its normal state, passing over highly heated surfaces, such as steam at 20 lbs., 30 lbs., and 40 lbs. working pressure (temp. 259 deg., 274 deg., 287 deg. Fahr. respectively), loses much of its vitality, and may be said to be burnt. The author does not use steam at such pressures, but adopts the maximum pressure on the boiler of 5 lbs., which is equal to 228 deg. Fahr., and frequently steam at o lb. to ½ lb. and 1 lb. not exceeded is used, and a perfect circulation is obtained.

To effect this ideal system, much care and thought must be given to the design of the apparatus, and large boilers, pipes of large internal diameter, and heating surfaces of ample power must be used to obtain the best results. These requirements may somewhat militate against the scheme at first sight, but when all things are considered, and when the maintenance is taken into account, the disadvantages of first cost are far outweighed by the easy working and permanent up-keep of such an installation. The leading ducts should not be less than 6 ft. to 6 ft. 6 in. high to allow the management, the teachers, and caretaker to walk in them freely. This also enables the ducts to be kept scrupulously clean, and regular inspection would prevent the use of the ducts for the storage of lumber, and be a security against the thoughtless deposit therein of rubbish, the presence of which must vitiate the air—possibilities which, as the experience of the author has shown, are by no means remote, but easily averted. The vertical fresh-air flues should be so arranged as to be easily "get-at-able" from the bottom, finally discharging into the classrooms about 8 ft. to 9 ft. above the floor line.

The ducts and vertical flues should have smooth surfaces, so as to give as little resistance to the inflowing air as possible, and prevent the lodgment of dust particles or other deleterious matter upon excrescences or irregularities. The ducts ought to be lime-washed at least once a year, preferably during the school's summer vacation. The fans should be of the open-blade type, as they are easily kept in order, and cost much less to run. It is, indeed, a matter of astonishment, as in instances afforded in this city, how such large volumes of air can be moved at such small cost. The cost of running a fan 10 ft. in diameter at ninety revolutions per minute, delivering 2,115,000 cubic ft. of air per hour, is only 1·3 pence per hour. This is equal to providing the children with 1,540 cubic ft. of air each per hour. The boiler recommended by the author for this class of work is the "Cornish" or "Lancashire" type of steam-boiler, without cross tubes, but having a good grate surface, so as readily to form steam of *low* pressure, as it must not be *forgotten that it is not pressure of steam* that is required quickly, but *volume*.

The ventilation or extraction of the vitiated air of a school containing, say, 1,500 children, each having 2 000 cubic ft. of air per hour provided for them, equals in the aggregate 3,000,000 cubic ft. of air per hour, and weighs 60,000 lbs.—or nearly 27 tons weight of air—to be dealt with every hour the school is in session, and obviously presents in itself no mean problem. Several plans have been tried, and the "Vacuous System" has given very good results. It is all that is needed where the vertical extract shaft can be made of sufficient sectional area to deal with such huge volumes of vitiated air; but where the area of the shafts is small or restricted, then some help must be given them in order to obtain the desired result.

This may be done in several ways:—(1) By means of a cast-iron flue pipe conveying the gases from the boiler, as already described; (2) by having some heat, either by steam or hot water, at the base of the shaft; (3) by having a fan fixed near the bottom, or even at the top, of the vertical shaft to draw the air along the ducts and discharge it into the upcast shaft.

The latter plan, although more costly to operate, is, to the author's mind, the best, as it ensures positive extraction, and because an exact output can be determined upon and obtained any day and at all seasons of the year. It also has this advantage, that if anything goes wrong with the Plenum fan, the ventilation would still be going on in a modified form until such time as the fan for propelling the fresh air into the building could be put into proper action again.

The fans may be driven by steam, by a gas-engine, or by electric motors; but wherever electricity is possible it is to be recommended, as there is no noise from the motor, the speed can be regulated to suit the working conditions required, and there are no disagreeable smells to be got rid of as in the case of gas or steam engines.

THE INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

THE eleventh International Congress of Hygiene and Demography meets at Brussels on September 2. It was twenty-five years ago that the first of these Congresses assembled there, and since then, the Congress has met at Paris, during the Universal Exhibitions of 1878 and 1900, Turin, Geneva, The Hague, Vienna, London, Buda-Pest, and Madrid. Most of the European and some American and Asiatic Governments send official delegates to attend these congresses, and there are generally leading sanitary reformers present from twenty-five to thirty different nations. Indeed, of late, notably at Buda-Pest and at Madrid, there were far too many members. It appears that this time only twelve to fifteen hundred members are expected, whereas on former occasions there have been more than three thousand.

The Congress consists of two divisions, that of Hygiene and that of Demography, or vital statistics. The division of Hygiene has seven sections, and there will also be a sanitary exhibition. The sections are:—1. Bacteriology in its relation to sanitation. 2. Chemistry in relation to food supply, &c. 3. Technical sanitation: the sciences of the engineer and the architect as applied to hygiene. 4. Professional and industrial hygiene. 5. The hygiene of transport or travelling. 6. Administrative hygiene, prophylaxy, workmen's dwellings, and the hygiene of childhood. 7. Colonial hygiene. It is, therefore, the third sections which the architects present are most likely to attend. Lieutenant-General Docteur, Inspector-General of Fortifications, is the President of this section. The Vice-Presidents are M. Hellemens, architect, and a member of the Brussels Superior Council of Public Hygiene; M. E. Putzey's, Chief Engineer of the town of Bruxelles; and Dr. de Vancleroy, Honorary Professor of Hygiene at the Military School at Brussels, are the Vice-Presidents of the Third Section. M. Hachez, engineer, Inspector of Roads and Watercourses; M. Vandervin, Principal Engineer of the Brussels Ponts et Chaussées; and M. Walin, Principal Engineer of the Liège Ponts et Chaussés, are the three secretaries of the Section. Reports are being prepared for this Section by technicians selected for the purpose from all nationalities, and will constitute the basis of the discussions to be held. Six such Reports are announced for the Third Section. The first deals with the bacterial treatment of sewage; the second with the combined and separate system drainage; the third with gathering grou for water supply; the fourth with the hygiene of public thoroughfares, on which Mr. Roechling, C.E., of Leicester, is reporter; and the fifth question is on the progress realised during the last twenty years in the warming and ventilating of public and private buildings. The reporters on this, the fifth, question are M. Etienne Herscher-Geneste, engineer, of Paris; Herr Pfützner, engineer and director of the works of Rietschel & Henneberg, at Dresden; and Professor van Rysselberghe, of the Ghent University. As considerable progress has been accomplished in respect to warming and ventilating on the Continent, this Report and the discussion to follow promises to be of considerable practical interest. The sixth question is also especially interesting to architects. It is a report on the general hygienic rules to be observed in the distribution, airation, and decoration of the interior of dwelling-houses. The reporters are M. Louis Bonnier, architect, of Paris, and Herr Christian Nussbaum, Professor at the Superior Technical School of Hanover. The choice of reporters shows the thoroughly international character of these congresses, and all who are interested in public health questions, whether as medical men, architects, engineers, public administrators, are welcome. The subscription for membership is 1*l.*, or 25 francs, which should be sent to Monsieur J. Sterckx, Chef de Bureau au Ministère de l'Agriculture Trésorier du Congrès, 3, Rue Beyært, Bruxelles. The Congress is under the patronage of the King, the Honorary Presidency of Prince Albert, and the effective Presidency of M. E. Beco, Secretary-General of the Ministry of Agriculture and Chief Director of the Sanitary Services of the Kingdom of Belgium. Professor and Doctor Felix Putzeys, 1, Rue Forgeur, Liège, is the general secretary of the Congress. Needless to say, there will be numerous excursions to different parts of Belgium, and the members of the Congress, together with their families, will enjoy many facilities of visiting places of interest on special and advantageous terms.

A DEFENCE OF THE DISCONNECTING TRAP.*

THE model by-laws issued by the Local Government Board in 1877 contained a clause which really gave legal birth to the disconnecting trap. During the last quarter of a century this trap has been upon its trial, and it is the purpose of this short paper to demonstrate that the trap has more than fulfilled the object for which it was designed. There was a time when in the popular mind sanitation simply meant the insertion of traps here, there, and everywhere. In recent years a reaction has set in, and now we find responsible men even advocating the entire abolition of the disconnecting trap. The reason for this change of front is apparent when the question of sewer ventilation is discussed, for it is sought to ventilate the sewers through the house drains.

In defending the disconnecting trap we must, firstly, ascertain the necessity of disconnexion, and secondly, whether the traps in use adequately fulfil the purpose for which they are required. The object of disconnexion is to prevent sewer air obtaining access to the house-drain air, because, and this is the main point, sewer air may be laden with sewer gas and disease germs. In the modern house drain it is impossible for gas to be generated, and is it fair to the householder that the air from the sewers should circulate through his drains, and bring with it possible dangers which have been manufactured in the sewers themselves? The house drain can be made non-dangerous, can be well ventilated and thoroughly flushed; and when the householder has done this surely his duty is ended. The sewer likewise should be made perfect, and be well ventilated by the local authority, and should not be the means of communicating foul air, whether laden with disease germs or not, to each house which adds its quota to the sewer.

It must be granted that the disconnecting trap makes the ventilation of the sewers a greater necessity than if the sewer air were allowed to circulate through the house drains; but on the other hand, the municipal engineer can better regulate the air of the sewers if all householders' openings into the sewer are trapped.

If the disconnecting trap be omitted, the householder runs a greater risk from the openings in his drainage system. Every unsealed opening would give an outlet for possible sewer air and gas, whereas if a trap were in use it would only be the air from the drain itself which would be able to find an outlet at the unsealed opening. The position of the disconnecting trap is important, and should be as near the sewer as possible to avoid a stagnant length of drain between the trap and the sewer. A trap offers some impediment to the flow of the sewage, and it would be well if the by-laws enforced the provision of a manhole in conjunction with every disconnecting trap. By this means occasional blockages could readily be removed, although it is generally found that the blockage has been caused by something that ought never to have got in the drain.

The modern trap, as perfected by years of trial, fulfils its purpose well, and if properly fixed offers little impediment to the flow of the sewage. Against all the disadvantages that can be urged the householder has the satisfaction of knowing that he is in no danger

* Abstract of a paper by Mr. William Ransom, Assistant Surveyor to the Corporation of Worcester, read before the Conference of Engineers and Surveyors in connexion with the recent Congress at Bradford of the Sanitary Institute.

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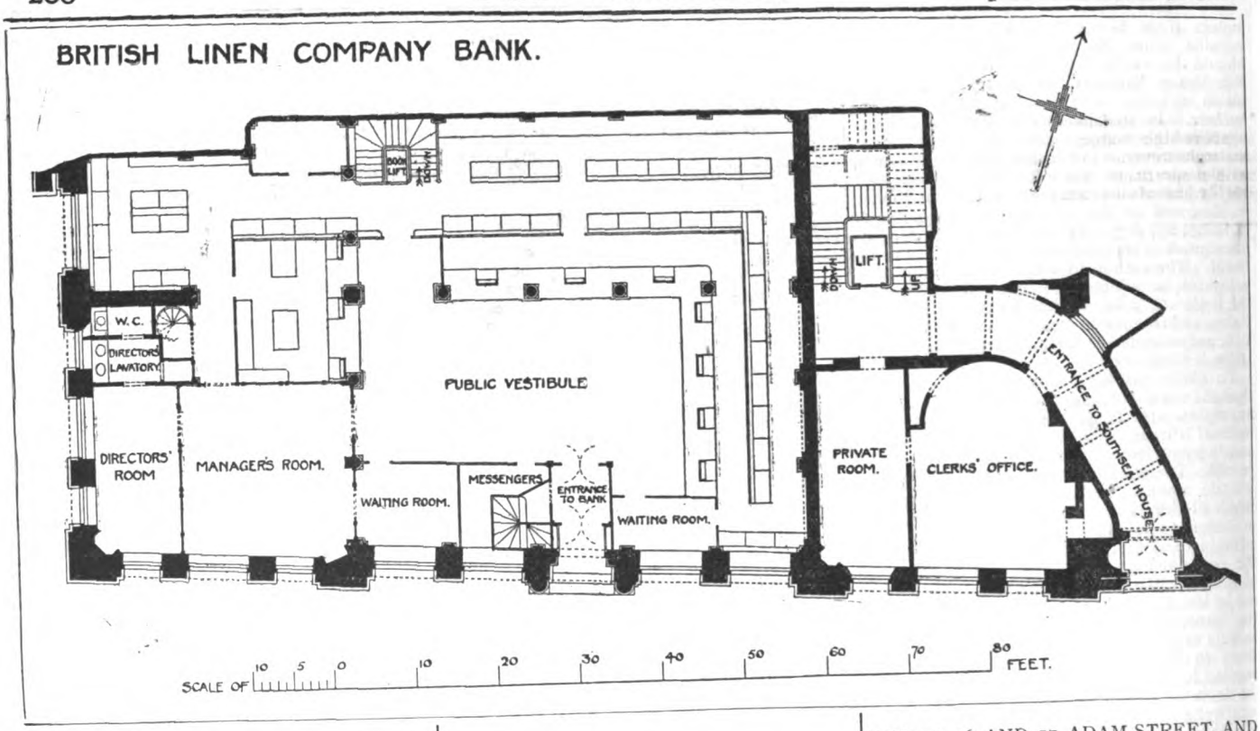


of inhaling dangerous sewer gases, and if the drain be properly used the disconnecting trap need never become blocked.

Illustrations.

THE BRITISH LINEN COMPANY BANK.

THE new London premises of this old-established Scottish bank have been erected in Threadneedle-street on the site of what in recent years was known as "The Baltic," but what formerly was the celebrated "South Sea House," the freehold of which was purchased by the bank.

Nearly the whole of the ground and basement floors are occupied by the bank, with the central entrance in Threadneedle-street. The three upper floors are let as offices, with a separate entrance at the east end of the front, which in deference to the past has been designated "South Sea House." The sculpture over this entrance has a history of its own. It was designed in the early part of last century by a sculptor named Bacon for the South Sea House, who refused—so is the tale—to pay him the price he asked, and rather than part with it at their valuation he put it up on the south wall of his studio in Newman-street (now occupied by Messrs. Burke & Co.), where it remained until last year. Quite casually, I one day happened to observe it, and on learning its history I purchased it, through the courtesy of Mr. Burke, for the bank, and erected it where it now is—the very spot it was designed to occupy about a hundred years since. The general contractors for the building were Messrs. Ashby & Horner, and the clerk of works was Mr. J. A. Spooner.

J. MACVICAR ANDERSON.

MANCHESTER AND SALFORD HOSPITAL FOR SKIN DISEASES.

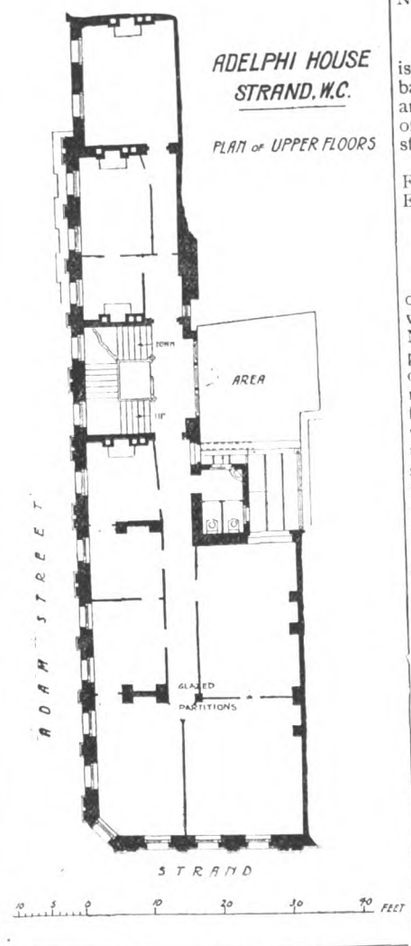
THIS design, by Messrs. Thomas & Percy Worthington, was placed first in the competition recently held for the building.

The front towards Quay-street forms the official entrance and approach to the Board-room, &c.; but all patients enter from the forecourt in Byrom-street.

The second floor contains three pavilion wards for men, women, and children, with the necessary accessories, and the nurses have their home on the Quay-street front. The kitchens and servants are on the top floor.

The hospital, however, deals principally with outpatients who come for consultation or for systematic electrical treatment by Finsen lamp, Röntgen rays, &c., and, therefore, the main part of the ground floor is appropriated to outpatients, and contains waiting hall for two hundred persons, with attached consultation and examination rooms, special baths, dispensary, &c., and on the first floor is the department for electrical treatment, and large rooms for Finsen lamp and Röntgen rays, together with necessary accessory rooms and sanitary arrangements.

The basement, which forms a ground floor opening into a central court approached through a sloping cartway from Quay-street, contains stores, laundry, heating apparatus, &c. and is connected to each floor by lift and direct service stair running from top to bottom of building. The building is designed to be carried out in brick and stone.



NOS. 15, 16, AND 17, ADAM-STREET, AND NOS. 71 AND 72, STRAND.

THIS property has recently been rebuilt and is now known as "Adelphi House." The basement and ground floors are used as shops and the upper floors are divided into suites of offices. The building is faced with Portland stone; the floors are of fire-resisting materials.

The contractors were Messrs. Patman & Fotheringham, and the architect was Mr. Ernest Runtz.

SMOKE ABATEMENT.*

IN an address delivered by me to the Society of Chemical Industry in July, 1899, an attempt was made to present the whole question of the National Fuel Bill in its relations to smoke prevention. As this paper is accessible to any one who is interested in the subject, it is not necessary to repeat the figures there given and the arguments based on them; but, for convenient reference, a table is annexed in which the figures of coal-consumption are given in a succinct form. These figures have been recently brought up to the year 1902 for the use of the Royal Commission on Coal Supplies, and will, no doubt, be published in due course.

The leading types of by-product coke-ovens and the various forms of gas-producer have been frequently described and discussed before the engineering and technical societies. The large gas-engine and the economic possibilities of its use with blast-furnace and producer-gas have also been fully brought under the notice of engineers and manufacturers, who are now awaiting with interest the results of large installations which have been started, or are in course of erection. If these installations in any degree justify the estimates and expectations of their performance, and if it is shown that electricity can be produced in bulk at a cost of 0·1d. to 0·2d. per kilowatt-hour, with a capital expenditure for gas-producers, gas-engines, and dynamos, of 16*l.* to 18*l.* per kilowatt, even the least sanguine among us must realise that a new era in fuel-consumption has set in.

Not only are power-gas and the large gas-engine on their trial, but the replacement of coal-firing by gas-firing is in the same position. From results which are in my possession it seems not improbable that the economical firing of steam-boilers with washed gas will be firmly established during the present year. The use of washed gas in iron and steel making is also receiving the most careful attention, and the results of large installations for this purpose will soon be available. The amount of coal which is involved in these departments of consumption is between

* A paper by Mr. G. T. Beilby, A.M.Inst.C.E., read in June before Section VI. (Waterworks, Sewerage, and Gas-works) of the Engineering Conference of the Institution of Civil Engineers.

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80 million and 100 million tons per annum, and it is estimated that one-third of this may be saved if the new departures are even moderately successful. When it is added that these new developments, without exception, involve the absolutely smokeless consumption of coal, it becomes evident that the time is near when the nation, if it chooses, may abolish industrial smoke. These new developments have raised a number of interesting and important questions, the adequate discussion of which would occupy not one sitting of the Congress, but many. It is evident, therefore, that the present discussion must be mainly confined to the central question: What steps can be taken to hasten the abolition of the smoke nuisance? The answer to this as regards industry has practically been given above. The means for bringing about the revolution are already in the hands of the engineer, and it will be for him to show to the users of power and heat how substantial is the prize which awaits the enterprising manufacturer.

The problem of domestic smoke is in a less hopeful position. The consumption of coal in domestic fires is about 36 million tons per annum. This huge consumption is so completely spread over the whole nation that it may safely be said that there is not one individual in the population of 40 millions who is not directly interested in it. It is this fact which makes the domestic problem in many respects harder to solve than the industrial. To the manufacturer we can hold out as an inducement to make an end of his smoke the hope of a handsome premium in the shape of savings on his bill for fuel and power; but for the householder there is no such premium. True, the saving in the cost of cleaning and redecorating the house and the reduction in the laundry bill would represent no small amount for the average family, but at present the means whereby these desirable savings may be effected are somewhat vague and uncertain, and are supposed to involve a serious initial outlay. If the direct inducement for the householder to abolish his smoke is insufficient to overcome his inertia and conservatism, it is clear that pressure must in some way be applied from outside. The following are three ways in which this might be done—by a great and permanent rise in the price of coal; by prosecution and fining; and by the imposition of a tax on the burning of smoke-producing fuels. As to the first, there is no likelihood that the price of coal will rise to a point which would compel the householder radically to alter the whole practice of domestic heating; it may, therefore, be dismissed without consideration. For the second method, that of legal conviction, there is little that is favourable to be said. One effect of the extension of this method from the industrial to the domestic department would be to direct increasing attention to all sorts of patent grates and other nostrums, and to divert it from the broad fundamental proposition, namely, *that bituminous coal cannot be uniformly and systematically burned in open fires without smoke.* I am well aware that there are good grates as well as bad, and that wonderful efficiency and economy can be secured by the skilful designing and setting of domestic grates; but there are two permanent conditions which make it improbable that any large measure of success will be obtained in this direction. These are the irregularity in the quality of the coal consumed and the dependence of the performance of any grate on the skill and judgment of the person who fires it. The domestic grate is at the mercy of a larger and more varied selection of incompetent stokers than any other coal-consuming appliance!

We are driven, therefore, to the third means of applying the necessary pressure, namely, the imposition of a tax on the consumption of smoke-producing fuels. I venture to suggest that a chimney-tax might be so applied as to stimulate and encourage the widest and most radical improvement in domestic heating. Tax every chimney which is sufficiently wide to vent the products from the burning of raw coal, and leave free all those which are too small to do this. This would at once place a premium on the use of smokeless fuel, as gas and coke can be satisfactorily burnt with very narrow chimneys. The production of these forms of fuel would be enormously stimulated, and the devising of appliances for their combustion would be encouraged. The architect and the engineer would have a new and fruitful field for their ingenuity and skill, and their trained efforts would in a short time greatly advance our practical knowledge of the subject.

At present the 9-in. chimney holds absolute sway, and a house built without its full complement of these chimneys is looked on as abnormal and outside of the ordinary practice of those who buy and sell or who lend money on house property. The builder, therefore, declines to build houses which are really adapted for smokeless firing by gas or coke, with the result that these fuels have never had a chance of showing at their best. If there is a really serious intention of dealing with the question of domestic smoke, I believe it must be somewhat on the lines here indicated.

Appendix.—Coal Output and Consumption.

Taking the coal output of the United Kingdom at the round figure of 220 million tons, and the exports as 60 million tons, there remains for home consumption 160 million tons; of this it is estimated that:—

About 78 million tons is consumed for the production of power for industrial purposes.

About 46 million tons is consumed for the production of heat for industrial purposes.

About 36 million tons is consumed for the production of heat for domestic purposes.

Taking the first two items more in detail, it is estimated that for the production of power:—

Railways consume	12 to 14 millions.
Coasting steamers	6 „ 8 „
Factories	40 „ 45 „
Mines	10 „ 12 „

For the production of heat for industrial purposes:—

Blast furnaces consume	16 to 18 millions.
Steel and iron works	10 „ 12 „
Other metals	1 „ 2 „
Chemical, glass, potteries, and cement	4 „ 6 „
Gasworks	14 „ 15 „

Thirty-six million tons of coal is burned in about eight million inhabited houses.

At the rate of two working chimneys per house a tax of 1s. per chimney would yield 800,000*l.*

TRADE CATALOGUES.

WE have received from the General Electric Company of Queen Victoria-street, copies of their newly-published lists, comprising "Witton" continuous current motors (P. 1,023), July Progress Sheet (No. 1,035), and the "Little Geeko" telephone (K. 1,036). In 1902 the General Electric Company opened new works at Witton, where they have devoted much attention to standardising their well-known "Witton" Motors. These motors are now obtainable to suit all classes of users, the range in size and voltage being considerable. Great care is taken in the construction of the commutator, the insulation being of specially prepared mica. The different parts are all lettered, and, being interchangeable, they can be replaced readily and cheaply. The "Little Geeko" Telephone is the result of an attempt on the part of the General Electric Co. to compete with the influx of cheap foreign telephones. It is of extremely simple construction, well made, and neat, and is designed to be readily attached to existing electric bell systems. The progress sheet contains particulars of some of their latest designs in fittings (fixtures) for the electric light. The "Utility" lamp-holder can be used for many different purposes. It can easily be fitted for a reading lamp on a table or desk, or for a piano. In the August "Progress Leaflet," we notice that reductions have been made in the prices of main-switches and cut-outs for electric wiring. The Company also list some novel accessories for tramway working. The "Acme" patent splicing sleeve is a very simple and efficient invention, by means of which a thoroughly good joint in a trolly wire can be made in a few minutes. It will be appreciated by tramway engineers.

The Pearson Fire Alarm Co., of King William-street, have sent us a prospectus of their automatic fire-alarm system. They place several fusible metal strips, or thermostats, at various points of the building to be protected. These are connected electrically to a recording board at a Pearson central office, or sometimes, when permission is obtained, directly to the offices of the fire brigade. When any of the fusible strips melt an automatic signal is received at the central office, which is generally very close to a fire-station, and so the brigade is at once notified. The company's inspectors pay regular visits to all installations under their charge, and make private tests of efficiency.

Mr. Percy Pitman, of Ledbury, sends us his new lists of Pelton water wheel motors, suitable for any pressure or fall of water. High pressure wheels are made to work from hydraulic power mains, and low pressure wheels suitable for use with water from ordinary supply mains. In these wheels the water issuing from a round nozzle strikes the centre bifurcation and is deflected equally to both sides, thus acting entirely by impulse.

Messrs. George Howson & Sons, Ltd., of Eastwood Sanitary Works, Hanley, send us their catalogue of fireclay and earthenware sanitary fittings and accessories. The catalogue contains about 200 pages, and is printed on good paper and fully illustrated by means of process blocks. The fittings include lavatories, baths, water-closets, urinals, and sinks. Enamelled fireclay appears to be the specialty of the firm, a large variety of lavatories, sinks, and urinals in this ware being shown, and also a number of baths. Particular mention may be made of the stall urinals. Some of the waste and overflow fittings for the baths, lavatories, and sinks are of good types, but the seventeen pages devoted to cast-iron lavatory stands contain some very ugly specimens of the founder's "art." Complete prices are given, and the catalogue is certain to prove useful to architects and builders.

Correspondence.

THE ST. LOUIS EXHIBITION AND AMERICAN ARTISTS RESIDING ABROAD.

SIR,—Professor Halsey C. Ives, Chief of the Art Department of the International Exhibition to be held in St. Louis next year, has appointed Messrs. James McNeill Whistler, Chairman; Edwin A. Abbey, J. McLure Hamilton, and John S. Sargent, with Mr. Joseph Pennell as Honorary Secretary, to act as a Committee of Selection for the United Kingdom, and as a jury to decide upon the works submitted to them by American artists living and working in this country.

By the regretted death of Mr. Whistler the Committee is deprived of an invaluable member, whose advice and assistance had been most useful in the earlier stages of their work.

American artists residing in the United Kingdom are therefore informed that a regulation has been adopted by the Art Authorities of the Exhibition to the effect that "American artists residing in a foreign country will be admitted only as exhibitors in the United States Section."

Further information will be supplied upon application to the Honorary Secretary, at 14, Buckingham-street, Strand, W.C.

GEORGE F. PARKER, Commissioner.

Sanctuary House, Westminster.

A CROYDON APPOINTMENT.

SIR,—In your issue for August 15, an advertisement appeared from the County Borough of Croydon for the appointment of a Borough Engineer and Surveyor.

After stating that applicants must be members of the "Institute" of Civil Engineers, experienced municipal engineers and surveyors, and have had experience in sewage disposal works, Parliamentary work, water works engineering, and control of highways, and that preference will be given to one with knowledge of electrical tramways, the advertisement winds up by stating that the gentleman appointed would also be required to act as architect and valuer of the Council.

Now, I consider that the representative architectural body should make a protest in this case, and in any case where a public body requires an engineer and surveyor to encroach upon an architect's duties.

Surely Borough Engineers and Surveyors have quite enough to do to carry on their own work properly without taking on architecture as well.

August 17, 1903. SILEX.

"TACKY" PAINT.

SIR,—It is not difficult to account for the trouble which "Tar Brush" (see your issue for August 8) has with his paint. In every probability it arises from the use of too much driers. This is an error very commonly made. A painter puts into a mixing of oil paint "plenty of driers" in the belief that he is ensuring an increased hardness of finish, while

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as a matter of fact, he is actually courting the very disaster described by your correspondent.

Linseed oil, of course, dries or hardens by absorbing oxygen from the atmosphere. Driers contain a surplus of oxygen and so bring about a quickening of oxidation. But if the process be hastened beyond a natural limit, the result is a hardening of the oil on the surface only, leaving the paint beneath soft. The deceptive hardening after a few weeks becomes softened by the soft oil underneath it, and hence we hear of "tacky paint."

If "Tar Brush" will take care not to use more than 2 oz. of driers to the pound of linseed oil, or 1 oz. when the base of the paint is white lead, and if he will allow plenty of time for the work to dry, he will not be further troubled with tacky paint. If quick drying is absolutely necessary, he should—excepting in the priming coat, use no oil at all but only gold size and turps. The paint will then soon dry hard and flat, and can be varnished as a finishing coat.

ARTHUR S. JENNINGS,
Editor of the *Decorator*.

The Student's Column.

CONCRETE-STEEL.—VIII.

THE THEORY OF BEAM DESIGN.

WE have now sufficient data relative to the adherence, expansion, and proportionate elasticity of concrete and steel to enable us to form some idea of the principles governing concrete-steel design. Although published records afford evidence of the fact that concrete acquires greatly increased strength when combined with steel, a very usual practice is to allow nothing for the value of the concrete in the tension area of a beam, so far as concerns resistance to flexure. It is known that the concrete is in tension, and as the value of every element in a structure should be determined and properly taken into account, this method of dealing with concrete below the neutral axis is not satisfactory from the theoretical standpoint.

A correct theory of concrete-steel should offer a rational explanation of the relative work done by each material, and it should provide for utilisation of the augmented strength of the concrete up to the maximum permissible limit. Similarly it should take into account the increased compressive strength of reinforced concrete above the neutral axis. At the present time knowledge is inadequate for the establishment of a theory to which no objection might be taken, and many engineers prefer to wait for confirmation of the remarkable results that have been arrived at within recent years before setting aside rules that have been found satisfactory and safe in actual practice.

If the value of the concrete in tension be omitted from calculation, the proportions adopted may certainly be much poorer than would otherwise be desirable for the lower portion of the beam; but, on the other hand, the concrete in the upper portion should be of superior quality, for the purpose of affording high resistance to compression.

In the case of a steel beam, where resistance to tension and compression is of equal value, the neutral axis must pass through the centre of gravity of the section. This is not necessarily so in a beam of simple concrete, for the position of the neutral axis may be affected by the fact that the compressive strength of the material is ten times greater than its tensile strength. The usual assumption that the cross section of a beam remains plane after bending is only approximately true, and variations in the proportionality of stress and strain affect the form of stress diagrams, so that instead of being bounded by straight lines, the figures representing stresses are of more or less curved outline. As stress increases, the neutral axis may move away from the axis through the centre of gravity of the section, and if the law of variation of stress and strain were known, there would be tangible data for the exact computation of the actual stresses at the outside fibres of beams. The ordinary rule, $f = \frac{3}{4} \cdot Wl \div bd^2$, does not attempt to differentiate between stress at the upper and lower fibres, and the results obtained are only true upon the assumption that the neutral axis passes through the centre of gravity of the section. Therefore, for materials in which the relations of stress and strain vary under tension and compression, it gives values that are too high for one kind of stress and too low for the other. When dealing with beams of concrete-steel, where, in addition to differences in the resistance of concrete to tension and compression, we have to consider the effects due to the quantity and disposition of the steel, the formula is of no assistance.

Consequently, some alternative method of calculation becomes essential, and for the purpose of providing a basis for the establishment of some simple rules, we will inquire what is the probable position of the neutral axis in a beam, where compressive stress is not limited by the low tensile resistance of the material.

Let x and y represent the distances of the top and bottom surfaces from the neutral axis, and d the total depth of the beam, the axes of compression and tension passing through the centres of gravity of the upper and lower stress areas, that is, two-thirds of the distance between the neutral axis and the extreme fibres.

Then the resistance of the compression area will be $10x \times 0{\cdot}66x = 6{\cdot}6x^2$; and the resistance of the tension area will be $y \times 0{\cdot}66y = 0{\cdot}66y^2$. If these are equal, $6{\cdot}6x^2 = 0{\cdot}66y^2$, or $10x^2 = y^2$. But as $x + y = d$, it follows that $x + x\sqrt{10} = d$. Hence $x = d \div (3{\cdot}16 + 1) = d \div 4{\cdot}16$, and $y = d - (d \div 4{\cdot}16)$.

Thus the proportionate depths of x and y should be $0{\cdot}24\,d$ and $0{\cdot}76\,d$ respectively.

By adding steel in the tension area to such an extent that the resistance of steel + concrete is ten times greater than the resistance of concrete in the compression area, we have the result $x^2 = 10y^2$, and the proportionate depths of x and y should be $0{\cdot}76\,d$ and $0{\cdot}24\,d$.

In one case the neutral axis is near the top of the beam, and in the other near the bottom. Between these extremes any required variation may be effected by adjusting the relative resistance of the materials in the compression and tension areas, and the inference is that the position of the neutral axis in a concrete-steel beam depends largely upon the proportions of concrete and steel, and upon the disposition of the steel with respect to the neutral axis.

From the foregoing it is clear the height of the neutral axis may be calculated for any beam after these details have been settled, or that the proportions of concrete and steel may be adapted to any chosen position for the neutral axis.

Bending moment developed in any beam must always be resisted and held in equilibrium by the moment of resistance of the section. Therefore, in every case the bending moment must be equal to the moment of resistance; or $M = R$.

For a uniformly distributed load on a beam of the length l, supported at each end, $M = Wl \div 8$, and from the general expression for the moment of resistance, $R = f\,I \div h$, we get

$$R = f.bh.\tfrac{2}{3}h$$

where f = unit fibre stress at the distance h from the neutral axis; b = breadth of the section; and h = distance of the extreme fibres from the neutral axis.

As $M = R$, the following rules are deducible from the equation:—

$$\frac{Wl}{8} \times \frac{1}{fbh.\frac{2}{3}h} = 0.$$

Whence

$$f = \frac{Wl}{5{\cdot}3bh^2}, \text{ and } W = \frac{5{\cdot}3fbh^2}{l}.$$

As the total stress has to be calculated per square inch on the steel, and not for the whole tension area, the quantity $bh = 1$.

Consequently we have for the steel reinforcement

$$f = \frac{Wl}{5{\cdot}3h}, \text{ and } W = \frac{5{\cdot}3fh}{l}.$$

The following examples will serve to illustrate the manner in which these rules may be used for proportioning beams to suit any given conditions of loading and span. We have in each case taken a uniformly distributed load, but loads of different character can easily be dealt with by variation of the rules in accordance with the expression indicating the value of the corresponding bending moment.

The average fibre stresses assumed are:—15,000 lbs. per square inch for steel; 500 lbs. per square inch for concrete in compression; and 50 lbs. per square inch for concrete in tension.

Each example refers to the case of a beam 12 in. deep, with a clear span of 100 in. between the supports, and carrying a uniformly distributed load of 4,000 lbs., which includes the weight of the beam itself. The object is to find the required sectional areas of steel and concrete.

Example 1.—In the first place, we will assume the neutral axis at 7 in. above the bottom of the beam. The various measurements of height will, therefore, be in the proportions indicated in fig. 13, the height of the steel

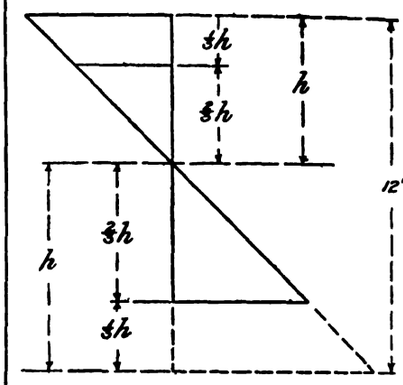

FIG. 13

above the bottom of the beam being $\frac{1}{3}h$, and, as the value of the concrete is not included in this calculation, the area below the steel is shown by broken lines. The total stress per square inch of steel will be

$$f = \frac{W\,l}{5{\cdot}3\,h} = \frac{4{\cdot}000 \times 100}{5{\cdot}3 \times 7} = 10{,}714{\cdot}28 \text{ lbs.}$$

The stress per square inch of steel being limited to 15 000 lbs., the requisite area is $10{,}714{\cdot}25 \div 15{,}000 = 0{\cdot}71$ sq. in.

The width of concrete section in the compression area can be found by a modification of the formula $f = \frac{Wl}{5{\cdot}3\,bh^2}$.

Thus:

$$b = \frac{Wl}{5{\cdot}3fh^2} = \frac{4{\cdot}000 \times 100}{5{\cdot}3 \times 500 \times 5^2} = 6 \text{ in.}$$

The dimensions of the beam will consequently be 12 in. deep by 6 in. wide = 72 sq. in., and the steel may be divided into two or more bars placed along the axis of tension, 4.6 in. below the neutral axis.

To prove the accuracy of these proportions, the resistance of each area may be calculated by the equation—

$$R = f \cdot bh \cdot \tfrac{2}{3}h.$$

For the steel—

$R = 10{,}714{\cdot}28 \times 1 \times (\frac{2}{3} \times 7) = 50{,}000$ inch pounds.

For concrete—

$R = 500 \times (6 \times 5) \times (\frac{2}{3} \times 5) = 50{,}000$ inch pounds.

Therefore the moments of the internal forces are in equilibrium, and as $M = 400{,}000 \div 8 = 50{,}000$ inch lbs., the condition $M = R$ is satisfied.

We will now see what alterations might be made on account of the resistance possessed by the concrete in tension.

The dimensions of the compression area may remain the same as already found, because the resistance of concrete + steel is exactly the same as the resistance furnished by the sectional area of steel.

Calculating the proportion of the load carried by the concrete for a stress of 50 lbs. per square inch, we have

$$W = \frac{5{\cdot}3\,f\,b\,h^2}{l} = \frac{78{,}400}{100} = 784 \text{ lbs.}$$

Consequently the stress to be carried by the steel is 8,614·25 lbs., and the area becomes 0·57 sq. in., the reduction representing a saving of about 10 per cent.

Example 2.—In the next place, while assuming the neutral axis at 7 in. above the bottom of the beam, we will fix the axis of tension for the steel at 2 in. from the bottom. The rule $f = \frac{W\,l}{5{\cdot}3\,h}$ will not apply to this case, and it must be modified in the manner following:—

$$f = \frac{W\,l}{8\,(h - x)}.$$

Here x is the distance between the centre of the reinforcement and the bottom of the beam.

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The total stress per square inch of steel is now

$$f = \frac{4{,}000 \times 100}{8\,(7-2)} = 10{,}000 \text{ lbs.}$$

Consequently, the required sectional area is $10{,}000 \div 15{,}000 = 0{\cdot}66$ sq. in., while the cross-section of the concrete remains 72 sq. in. Economy is, therefore, seen to be secured by increasing the leverage of internal force in the tension area.

Allowing for the resistance of concrete in the tension area as before, the net area of steel becomes 0·53 sq. in.

Example 3.—Further economy would be attained if the neutral axis were 1 in. higher, that is, 8 in. above the bottom of the beam. Keeping the reinforcement at 2 in. from the bottom, we have for steel in tension

$$f = \frac{4{,}000 \times 100}{8\,(8-2)} = 8{,}333 \text{ lbs.}$$

This is equal to a sectional area of $8{,}333 \div 15{,}000 = 0{\cdot}55$ sq. in. For concrete in compression the required width is

$$b = \frac{Wl}{5{\cdot}3fh^2} = \frac{4{,}000 \times 100}{5{\cdot}3 \times 500 \times 4^2} = 9{\cdot}375 \text{ in.}$$

Therefore, the compression area measures $4 \times 9{\cdot}375 = 37{\cdot}5$ sq. in., but the tension area need not be wider than 4·3 in., giving a section of $4{\cdot}3 \times 8 = 34{\cdot}4$ sq. in., and making a total area of concrete for the beam of, say, 72 sq. in. These dimensions would give a T-shape to the beam, and if incorporated in a floor, the wide flanges would practically cost nothing, as they would form part of the floor panelling.

Allowing for the resistance of 34·4 sq. in. of concrete in the tension area, the net area of steel becomes 0·44 sq. in.

Example 4.—If preferred, a uniform width of 6 in. can be given to the beam by incorporating steel bars in the compression area.

Keeping the neutral axis, as in the previous example, at 8 in. above the bottom of the beam, the sectional area of steel in tension will again be 0·55 sq. in., or allowing for the assistance furnished by the concrete, the area will be reduced to 0·41 sq. in.

The total stress in the compression area is

$$f = \frac{4{,}000 \times 100}{5{\cdot}3h} = \frac{400{,}000}{5{\cdot}3 \times 4} = 18{,}750 \text{ lbs.}$$

of which the concrete takes 12,000 lbs., leaving 6,750 lbs. for the steel. Consequently, the sectional area of the latter must be $6{,}750 \div 15{,}000 = 0{\cdot}45$ sq. in.

Before summarising and comparing the chief results afforded by the foregoing examples, we will calculate the proportions of a beam made of simple concrete. The load and span are to be the same as those in previous examples. The strength of the beam is necessarily limited by the tensile resistance of the material, and although concrete in compression may be capable of withstanding a stress of 500 lbs. per square inch, we cannot allow more than 50 lbs. per square inch to be developed in the compression area. This condition evidently agrees with the assumption of a central position for the neutral axis.

Example 5.—In the first place, we will calculate the stress for the dimensions, 12 in. deep by 6 in. wide.

For the conditions stated we find the stress to be

$$f = \frac{4{,}000 \times 100}{5{\cdot}3 \times 6 \times 6^2} = 347{\cdot}2 \text{ lbs. per square inch.}$$

(*a*)—As this is much beyond our limit, we must ascertain the dimensions necessary for complying with the unit stress of 50 lbs. Keeping to the depth of 12 in., we get

$$b = \frac{Wl}{5{\cdot}3fh^2} = \frac{4{,}000 \times 100}{5{\cdot}3 \times 50 \times 6^2} = 41{\cdot}66 \text{ in.}$$

(*b*)—But we may make the beam deeper with great advantage. If a section be adopted in which the depth $= 2h$, we have for one-half of the total area

$$bh^2 = b^2 = \frac{4{,}000 \times 100}{5{\cdot}3 \times 50} = 1{,}500 \text{ sq. in.}$$

and as $b = \sqrt[3]{1500} = 11{\cdot}447$ in., the final dimensions of the beam are $b = 11{\cdot}447$ in., and $d = 22{\cdot}894$ in., practically 12 in. wide by 24 in. deep.

(*c*)—If a square section be preferred, we obtain

$$2\,(bh^2) = b_1^3 = \frac{4{,}000 \times 100}{(5{\cdot}3 \times 50) \div 4} = 6{,}000 \text{ sq. in.}$$

and $b_1 = \sqrt[3]{6000} = 18{\cdot}171$ in., and the section is practically 18 in. square.

The above calculations may be verified by using the ordinary formulas, which, in this instance, are perfectly suitable.

Table XXI. is a summary of the results obtained in the foregoing calculations, and it will be observed that considerable advantage follows the higher position of the neutral axis and the lower position of the steel reinforcement. It is further noticeable that much less advantage is derived from the incorporation of steel in the compression area than in the tension area. This is quite natural, because the steel in tension has the effect of utilising an excess of compressive strength in the concrete that would otherwise be wasted, whereas steel in compression merely counterbalances the strength of steel added in the tension area. Nevertheless, the employment of steel in this manner is very frequently necessary, and it enables the designer to carry out work that would otherwise be impracticable. The saving to be effected by allowing for the strength of concrete in tension is small, but the influence of the strength so contributed ought always to be taken into account, whether any reduction in the area of steel be made or not.

Table XXI.—Concrete-Steel Beams Compared with a Simple Concrete Beam.
(Load, 4,000 lbs. Span, 100 in.)

Material.	Dimensions.		Height of Neutral Axis.	Height of Steel Axis.	Area of Steel.
	b	*d*			
	In.	In.	In.	In.	Sq. In.
Concrete-Steel.	6	12	7	2½	0·71
,,	6	12	7	2	0·66
,,	9·37* / 4·37†	12	8	2	0·55
,,	6	12	8	2	0·55† / 0·45*
Simple Concrete.	41·6	12	—	—	—
	12	24	—	—	—
	18	18	—	—	—

* Compression † Tension.

OBITUARY.

MR. WM. WILKINSON.—The death took place on Sunday, the 16th, at 31, Port-street, Southport, aged seventy-five, of Mr. William Wilkinson, who was for many years President of the Southport Master Builders' Association. He was a native of Tealby, Lincolnshire, and came to Southport forty years ago. He built the Mornington-road Wesleyan Church, the Chapel-street Congregational Church, and many other structures in the town and district.

GENERAL BUILDING NEWS.

CHURCH, BALLYMAHON, IRELAND.—The foundation-stone of the new Church of St. Matthew has just been laid at Ballymahon. The new church will be Gothic in style and will consist of a nave, transepts, sanctuary, and choir. The nave will be nearly 90 ft. in length, with a width of 30 ft., and the transepts are 77 ft. across and nearly 27 ft. wide. At the front elevation of the new church, and facing to the west, is a tower, rising to the height of 120 ft. Provision is made for a pitch-pine organ gallery and a nuns' choir. The chancel arch will consist of Irish granite; the walls are to be of lime stone, provided from the local quarries of Mount Cashel, Ross, and Tullamore. The plans were prepared by Mr. T. F. M'Namara, and the builder is Mr. Patrick Kelly, Longford.

CHURCH ROOM, ST. GEORGE'S CHURCH, LLANDUDNO.—The new church room in connexion with St. George's Church, Llandudno, erected in memory of Dr. B. Williams, J.P., Morannedd, was dedicated recently by the Venerable Archdeacon Morgan, M.A. The new room, which has been added to the north side of the church, is connected by means of a passage with the chancel, and has been built in harmony with the design of the church. The building has been erected by Mr. Thomas Jones from the designs of Mr. Edwin Turner, under whose supervision the work has been carried out. The chancel has been refitted with oak stalls and a clergy desk. These have also been executed by Mr. Jones from the designs of the architect.

PUBLIC SCHOOL, FAULDHOUSE, LINLITHGOW.—The School Board for the parish of Whitburn have recently erected a new school at Fauldhouse. The new school has been placed in the front of the present playground, and contains twelve class-rooms two halls (lower and upper), and will have accommodation for 634 scholars, made up as follows:—Boys, 208; girls and infants, 426. The architect is Mr. J. Graham Fairley, Edinburgh, and the contractors are Messrs. Wilson & Wallace, West Calder, and Messrs. Wm. Fairley & Son, joiners, West Calder.

CO-OPERATIVE STORES, RUSHDEN.—New drapery stores and co-operative hall have been erected on the east side of High-street, Rushden, by the Co-operative Society. The building has been erected from plans prepared by Messrs. Cooper & Williams, Kettering and Rushden. Mr. C. E. Bayes, of Rushden, was the contractor, Messrs. Whittington & Tomlin did the carpenter and joiners' work, and Mr. George Fountain was entrusted with the plumbing. The iron work was supplied by Mr. H. T. Billson, of Kettering, and Mr. J. E. Smith, of Higham Ferrers, fitted the heating apparatus.

CHURCH OF ST. JOHN, SOUTHALL GREEN.—The vicar and churchwardens of this church (erected in 1836, with accommodation for 360 persons) have obtained from the Consistory Court of London a faculty to authorise an enlargement of the fabric upon a portion of the churchyard. The proposed enlargement will constitute in effect a rebuilding of the church on the existing site and the western portion of the burial ground, for a congregation of 800, but without any interference with the services during the work. The estimated cost of the new structure is 8,000*l.*, and that of the fittings and re-interment of the disturbed human remains is 2,000*l.*

THE NATIONAL MEMORIAL TO QUEEN VICTORIA.—The work of preparing the site for the National Memorial to Queen Victoria is now actively proceeding, and Messrs. Mowlem & Co., the contractors, have undertaken to complete it by the end of November. In the original architectural design, as prepared by Mr. Aston Webb, it was proposed to make external carriage roads round Mr. Brock's memorial, but in order that the necessary encroachment upon St. James's Park may be curtailed as much as possible, these avenues have now been abandoned, and it has been decided that all kinds of traffic shall pass, as at present, in front of Buckingham Palace. A concrete retaining wall is being built across the end of the lake, absorbing only a small portion of the water area.

BUSINESS PREMISES, HULL.—Messrs. B. L. Wells & Son, auctioneers, have just removed into new premises in Manor-street, Hull. The buildings, which have been erected from the designs of Messrs. Brodrick, Lowther, & Walker, architects, Hull and Bridlington, are English Renaissance in style. The contractors were Messrs. G. Jackson & Son, Witham, Hull.

CHURCH HALL, HASWELL.—On Saturday last the foundation stone of the church hall about to be erected at Haswell was laid by Colonel Rowland Burdon, of Castle Eden. The building is to consist of a hall 55 ft. by 27 ft., with committee and retiring rooms, also rooms for the caretaker in connexion with the adjacent parish church, the new building being built on the vacant land at the east end of the church. It is to be built of brick with stone dressings; the roof over the hall will have curved timber trusses with boarded barrel ceiling. Mr. R. Wade, of High Moorsley, Hetton-le-Hole, is the contractor, who will erect the building from the design prepared by Mr. George Fox, London, W.C.

BOARD SCHOOL, HALIFAX.—A new Board School, erected by the Halifax School Board in Battinson-road, at a cost, including the site and furnishing, of 29,500*l.*, was opened on the 17th inst. The building comprises a mixed department and an infants' department, and provides accommodation for 1,000 children. The heating and ventilation are on the Plenum system. Associated with it are a cooking-kitchen, manual instruction room, and a swimming-bath, 41 ft. by 21 ft. The architects were Messrs. C. F. L. Horsfall & Son.

CO-OPERATIVE SOCIETY STORES, BATLEY, YORKSHIRE.—A new branch of the local co-operative society, situated in New-street, Batley, was opened recently. The architect for the work was Mr. S. B. Buckley.

EXTENSION OF BLAIRS COLLEGE, ABERDEEN.—The building work in connexion with the additions to Blairs College has now been completed, and when all the internal arrangements have been attended to the place will be opened. The new buildings complete three sides of a square, being connected at the south-west end with the old establishment. The extensions have been carried out at a cost of over 33,000*l.*, from the designs of Mr. R. G. Wilson, architect, of Aberdeen. A feature of the new building is the high square tower on the north front, surmounted by four turrets. It is beneath this tower that the main entrance is placed. Above the Roman arched doorway are three panels, on which representative coats-of-arms have been carved. In the keystone of the arch of the portico are the arms of the late Pope, Leo XIII. On the right hand side of these are the arms of Mr. Menzies of Pitfodels, the donor of the estate of Blairs, on which the college is erected; and on the left are the arms of Bishop Chisholm, as registered by the Scottish Lyon King-at-Arms. Farther up the tower is a shield with a carved representation of the Papal keys crossed, and still farther up there is a monogram of a crowned M., representing St. Mary's College—the name of the establishment now nearing completion. The college is built of grey granite, and the builder was Mr. James King, Aberdeen. From the main entrance beneath the tower the first floor is reached by a short flight of white marble steps from the entrance hall. The doorway is of teak wood. The entrance-hall has a panelled ceiling and dado of pitch pine, with pilasters at the corners. This woodwork, as also all the carpentry work in the new buildings, has been carried out by the staff of Mr. John Henderson.

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At the left hand side of the entrance hall are the reception and waiting rooms, a cloakroom for the students, and one of the entrances to the sacristy, and on the opposite side of the passage a linen room, where there is a special receptacle for the clothing of each student. A flight of steps leads to the cloister, from which access is obtained to the chapel with its altar of white Carrara marble, its carved oak stalls, its organ built by Mr. E. M. Lawton, Aberdeen, and its stained-glass windows To the right hand side of the entrance hall a lobby leads to the classrooms on the west side of the building, while to the south of the west wing is a recreation hall. By a flight of pitch pine stairs one reaches the upper floor, where is the library, with walls and ceiling of pitch pine richly carved, and gallery with balustrade, the gallery being reached by a spiral staircase at the south-west corner. A dining-room for the professors is provided. A passage connects this part of the building with what has already been in use as the professors' apartments and with the picture gallery. On the third floor, occupying the two wings to the east and west, are the students' dormitories, arranged on the modern cubicle system. A room specially set apart on the top story has been designated the infirmary. On the ground floor the principal apartment is a refectory, or dining-hall, some 80 ft. in length by 32 ft. in breadth. It lies almost due north and south, with six windows on the east side, and a similar number of lesser lights on the west. The floor is laid with ornamental red tiles. There are two entrances from the lobby, one at the north and the other at the south end. Adjoining this dining-hall are the kitchen and other culinary departments, including a scullery and store-room and pantry accommodation. A lift is also provided in this department, connecting it with the upstair floors. The dormitory accommodation for the servants of the house is also on the cubicle system. A hall above the kitchen apartments is provided with a couple of fireplaces, in addition to the hot-water circulation. A bathroom and other accommodation adjoins this apartment. The accommodation for the servants is arranged in a separate two-story block at the south-east end of the establishment, with the kitchen, scullery, servants'-hall, &c., on the ground floor and the dormitory above. Immediately over the entrance portico there is an oratory. Here an altar will be erected, and the three double windows at the north, east, and west sides will be filled with cathedral leaded glass. From the belfry in the tower the old bell of the college is to be hung. A new and complete system of heating has been carried out by Messrs. Mackenzie & Moncur, Edinburgh, on the hot-water low-pressure system. The whole of the college buildings, as well as the chapel, has been dealt with, requiring the placing of some sixty radiators and between 6,000 ft. and 7,000 ft. of piping. Two large Cornish boilers, about 10 ft. in length, have been fitted in for supplying the hot-water. In addition to the heating there is also a special hot-water circulation from a special boiler in the sunk floor of the centre block, the hot water being utilised for the purpose of supplying the baths of the college. The old study-hall of the institution is to be utilised as a power-house for the generation of the electric light. The electric-lighting arrangements have been placed in the hands of Claud Hamilton, Ltd., Aberdeen. They are being carried out under the supervision of Mr. P. W. Smith, manager of the Aberdeen branch of the firm. Within the new building the wires for the electric lighting have all been fitted by Mr. Botting, electrical engineer, Aberdeen. The contractors, in addition to those mentioned, were:—Messrs. James Bannochie & Sons, Aberdeen, plasterers; Mr. Edward Copland, painter; Messrs. Thom & Strachan, plumbers; and Messrs. James Bannochie & Sons, ironmongers. Mr. Copland is the contractor for the fitting-in of the leaded glass-tinted windows.—Compiled from the *Aberdeen Journal*.

KINDERGARTEN FOR THE BLIND, HARBORNE, BIRMINGHAM.—A boarding-school is in course of erection at Harborne in connexion with the General Institution for the Blind, Edgbaston. The residential school will accommodate forty children, and will cost about 17,500*l*. A site has been secured on the Court Oak-road, with a frontage to Woodville-road. The building will be of brown brick, with red brick bands and white Grinshill stone dressings, and the roof will be tiled. The main entrance faces Woodville-road, in a slightly projecting bay, with plain columns and pilasters. The Court Oak-road front will have a gable end with quoins. This part of the building will contain two dormitories, and the other two dormitories will be lighted by one wide dormer window in the centre. On the ground floor there will be three classrooms, two playrooms, four music-rooms, dining-room, kitchen, scullery, pantry, and larder, rooms for the mistresses and matron, a small dispensary, cloak-rooms, bootrooms, airing-room, and the usual offices. There will be a couple of porches leading from the playrooms to the playgrounds on the Court Oak-road side. The upper story will be divided into four dormitories, mistresses' and servants' bedrooms, linen, wardrobe and sewing rooms, bathrooms and lavatories. There will also be an isolated wing for sick children, a room for convalescents, and a nurses' room, with separate staircase and entrance. The architects are Messrs. J. A Chatwin & Son, of Birmingham, and Messrs. Collins & Godfrey, of Tewkesbury, are the builders.

THE COSSHAM MEMORIAL HOSPITAL, KINGSWOOD, GLOUCESTERSHIRE.—By the invitation of the Lord Mayor of Bristol (Alderman Sir R. H. Symes), the first meeting of the trustees appointed by the court for the carrying out of the testamentary wishes of the late Mr. Handel Cossham, M.P. for Bristol East, was held on the 6th inst. The scheme involves an expenditure of 23,300*l*. for building and furnishing, and the remainder of the money left by the testator, 80,000*l*., is to form an endowment for the charity. The object of the latter is to erect, establish, and maintain a general hospital for the treatment and relief of sick and injured persons of both sexes. The designs and plans for the proposed hospital, by Mr. F. Bligh Bond, have already been passed by the Court of Chancery. The site is on the top of Kingswood Hill, and the building will face south and west.

WORKHOUSE, WOLVERHAMPTON. — The new workhouse at New Cross, Wednesfield, about two miles from Wolverhampton, is to be opened on September 24. A plot of land containing 50½ acres at New Cross was purchased for 11,128*l*., and Mr. Arthur Marshall, of Nottingham, was engaged to prepare plans for the new building. The contract for their erection was entrusted to Messrs. Fish & Son, of Nottingham, the tender amounting to 156,870*l*. Of the 50½ acres, six and a-half acres have been covered with buildings, which have been designed on the block principle, and will provide accommodation for 1,246 inmates, twenty nurses, and sixty other officers. The total number of buildings is thirty-one, of which the chief are the administrative section, comprising eight blocks which are connected on the ground floor by enclosed corridors, the roofs providing means of communication between the upper wards. In the centre of this collection of buildings is the residence for the master and matron, the assistant master, clerks, chaplain, and other members of the staff. There is a dining-hall capable of seating 800 people; adjoining are the kitchens, sculleries, and stores, while abutting upon the central block are three-story buildings for each sex, a nursery, and quarters for sixteen married couples. At the rear of this block is the infirmary, with space reserved for extensions, and there are provided quarters for the medical officer and nurses. Three blocks will be utilised for males and the same number for females, and contiguous are the dispensary, operating and consulting rooms, and a lying-in ward. Still further to the rear is another block designed for the use of the imbeciles, separate quarters being provided for the epileptic patients. Two hospitals for special diseases and an isolation hospital are placed still further to the rear of the main buildings. A nurse's home has been erected to accommodate forty. A laundry, workshops for blacksmiths, tailors, tinners, carpenters, mat-makers, and wood-choppers, with the labour-master's house near by, have been provided. The whole of the buildings will be lighted by electricity, which will be supplied from a power-station situated near the centre of the grounds. Two entrances have been made from the Wednesfield-road. Near the main entrance are the porter's lodge and the boardroom and offices, and adjoining the other entrance is the casual ward. As a large area of the ground will be cultivated by the paupers, there has been in connexion with this section of the work a farm building erected, together with piggeries, stables, and other outbuildings. Conduits for carrying the gas and water pipes and the electric lighting mains have been placed around all the buildings. In the infirmary pavilions the floors are waterproof, being composed of concrete and steel joists supported on steel girders. Mr. W. Smith is the clerk of the works.

FOREIGN.

AUSTRIA-HUNGARY.—Canal works are very much to the fore just now in Austria, and the water authorities of Vienna are projecting the construction of a ship canal, presumably from the Danube. They have advertised for schemes from engineers, to which large premiums are attached, and the competition is international. The plans are to be sent in by March 31, 1904.——The town authorities of Laibach are about to erect an imposing monument to the Emperor Francis Joseph, and have invited designs from Slavonic and Croatian artists.

SOUTH AFRICA.—The boom which has taken place in building, and the high prices of building materials, lend especial interest to the Interim Report of the Building Stones Commission recently issued. Not only in the great centres, such as Pretoria and Johannesburg, but in almost every settled district of the Transvaal, Natal, and Orange River Colony, building is being pushed forward at a pace which is only limited by the supplies. It is estimated that there is a market to-day for 1,500,000*l*. sterling of flooring and ceiling boards, doors and sashes, brick, stone, and structural iron-work. The Commission appointed by the High Commissioner consists of Dr. G. Corstophine and Mr. W. Anderson. Their commission applies to Cape Colony, Natal, the Transvaal, and Orange River Colony. The Interim Report furnished gives results of inspections in Cape Colony and Orange River Colony, with the quarries of Bloemfontein and the country around the Platberg at Ladybrand. They report that a good supply exists in the Stormberg district, which needs opening up in selected localities, instead of the plan hitherto pursued of taking haphazard from the surface. The stone is a species of hard freestone of a "very satisfactory texture." At East London the Commission report "an abundance of stone of superior quality," while Queen's Town yields a supply of "really good sandstone," obtainable in large blocks free of stain or flaw, and unaffected by exposure to climate. Abundance of good stone is also reported at Bloemfontein, but discrimination is necessary in selection. At Ladybrand, the Commission states, "the whole of the upper portion of the mountain consists of sandstone in massive beds. Under the sandstone are layers of shale, which weather out readily, so that huge blocks of the overlying rock break off and roll down the slope of the hill. The present quarrying at Ladybrand consists simply in breaking up these blocks. The stone around the town has been largely utilised, and the quality has been proved by, in some cases, thirty years' exposure." So far as investigations have gone, there is shown to be plenty of stone awaiting capital and judgment to put it on the market.—*Commercial Intelligence.*

UNITED STATES.—A professional dispute amongst engineers has arisen in New York as to whether it is better to use eye-bar cables or wire cables for the suspending members of a bridge. The structure in question is the proposed suspension bridge over the East River. The Mayor appointed a commission of experts to examine the points at issue, and that body has reported in favour of eye-bar cables.—— The Boston Park Commissioners have issued regulations prohibiting advertising of any kind within any park under their jurisdiction, and further that no sign, poster, or advertisement, except signs not larger than 3 ft. by 4 ft., and relating only to the selling or letting of the premises on which the sign is placed, and signs not exceeding 15 in. in width, relating to business conducted on the premises, is to be displayed on any land within the Commissioners' jurisdiction. —— The New York State School of Forestry has apparently come to an end. Dr. Fernow, who was chief, is well known as an authority on the forest timbers of the United States.——Mr. Thomas D. Evans, one of the best-known architects in Western Pennsylvania, has recently died. He designed many of the principal buildings in and about Pittsburgh, and was for some time President of the Pittsburgh Chapter of the American Institute of Architects.——The Massachusetts School of Design, which is connected with the Massachusetts Institute of Technology, has been united with the School of Drawing and Painting of the Boston Museum of Fine-Arts.

SWITZERLAND. — A large monument is to be erected in Berne by the International Postal authorities there. Designs are invited from architects and sculptors in all parts of the world, and a premium of 15,000 fr. is offered. The competition closes on September 15, which does not leave much time for the preparation of the sketches asked for.

GERMANY.—A tablet which has been placed in the English church at Homburg in memory of the late Empress Frederick was unveiled on the 16th inst. by the British Ambassador. The tablet consists of a marble slab, on which is a bas-relief of the late Empress in bronze. The sculptor was Herr Wilhelm Orthe.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Messrs. G. R. McKenzie & Co., Ltd., cabinet, joinery, and parquet flooring manufacturers, have removed their offices and works to larger premises at Queen's-road Station, Battersea, S.W.

METROPOLITAN DISTRICT RAILWAY.—The report which was adopted at the last half-yearly meeting held on the 6th instant, states that the works for the electrification of the line (under the superintendence of Mr. James R. Chapman, chief engineer and manager of the Underground Electric Railways of London, Ltd.) are steadily proceeding, with the employment of about 1,000 labourers, but that rapid progress cannot be made, inasmuch as most of the work can be carried out only in the night-time. The new generating-station at Lot's-road, Chelsea, is well advanced, and 40 miles—or three-fifths of the total—of ducts have been laid beneath the public roads from Chelsea to Earl's-court. The rolling stock, which is now being ordered for the entire District Railway in all its branches, will provide a carrying capacity for from 100,000,000 to 120,000,000 passengers per annum, or about twice as many as the present numbers. A service of four electrically-propelled trains is running upon the Ealing and Harrow line, and the Company's engineers contemplate the establishment of a five minutes' service from Wimbledon, Richmond, Hounslow, Harrow, and Ealing, and, by means of the new installation, of a similar increase in the number of trains on the Whitechapel and Bow line. The Company carry from 45 millions to 50 millions upon their lines during the year, nearly 11 millions of whom belong to the working classes, paying greatly reduced fares and the Directors intimate that they

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may soon find it expedient to seek for statutory powers to enable them to charge a uniform fare of 2d. without distinction of employment or profession, place of booking, or time of day.

TINTERN ABBEY.—Some interesting discoveries have been made during the recent operations for the preservation of the ruins of Tintern Abbey which, on the recent sale of the Duke of Beaufort's estates, were acquired by the Crown. An elaborate system of drainage has been revealed and a staircase for the use of the lay-brethren is disclosed. The old cottage is now demolished, and its removal brings to light portions of the original gateway and some windows that had been blocked-in by the erection of the cottage.

LONDON PUBLIC MUSEUMS AND GALLERIES.—In reply to a question put in the House, the Chancellor of the Exchequer stated a few days ago that the gross sums voted in Class IV. of the Civil Service Estimates, 1902-3, for these services were (items merged in more general sub-heads and not separable excepted):—Victoria and Albert and Bethnal Green Museums, 66,994*l.*; Geological Museum, 3,558*l.*; British Museum, 128,729*l.*; Natural History Museum, 49,051*l.*; National Gallery, 18,600*l.*; National Portrait Gallery, 5,541*l.*; and the Wallace Collection, Hertford House, 9,066*l.*

THE SANITARY INSTITUTE.—Details of the thirty-sixth course of lectures and demonstrations for sanitary officers, arranged by the Sanitary Institute, have been printed. The course from September to November comprises the following lectures:—Part 1: Four lectures on Elementary Physics and Chemistry in relation to Water, Soil, Air, and Ventilation, and Meteorology. Twenty-one lectures on (*a*) Public Health Statutes; Orders, Memoranda, and Model By-laws of the Local Government Board and the By-laws in Force in the Administrative County of London; (*b*) The Practical Duties of a Sanitary Inspector, *e.g.*, Drawing up Notices as to Sanitary Defects, Drain-testing, Disinfection, Methods of Inspection, Note-taking, Reporting, and Elementary Statistics; (*c*) Municipal Hygiene or Hygiene of Communities, including Prevention and Abatement of Nuisances, Sanitary Defects in and about Buildings, and their Remedies, Water Supplies, Sanitary Appliances, Drainage, Refuse Removal and Disposal, Offensive Trades, Disinfection; (*d*) Building Construction in its Sanitary Relations, Local Physical Conditions. Measurement and drawing plans to scale. Inspections and Demonstrations are arranged in connexion with the lectures, and include visits to various premises. Part 2 comprises seven lectures on Meat and Food Inspection, including taking of samples of Water, Food, and drugs for Analysis. Practical Demonstrations of Meat Inspection are given. The Lectures will include the subjects scheduled for the examinations of the Institute and the Sanitary Inspectors' Examination Board (formed by the Sanitary Institute and other bodies). The fee for Part 1 is 2*l.* 12*s.* 6*d.*; for Part 2 1*l.* 1*s.* 0*d.* or the complete course, 3*l.* 3*s.* 0*d.*

FIRE TESTS.—The British Fire Prevention Committee's operations for the summer season were completed last week with two tests at the Testing Station in Bayswater, when some armoured wood doors and an armoured concrete floor were under examination. Regarding the armoured door test, this was with tinned steel-clad armoured doors constructed in Manchester, one being a sliding door and one a hinged door, and they were tested for a duration of 1½ hours under a severe fire of gradually-increasing temperature, the highest temperature being over 1,800 deg. Fahr. The sliding door offered substantial resistance against fire. The floor test was with a composite floor of fine concrete strengthened by steel bands, and constructed by a Swiss firm. The floor was subjected to a test of 1¾ hours under a severe fire at a gradually increasing temperature to 1,800 deg. Fahrenheit, when the floor collapsed. Of other tests now in the report stage is a test with another pair of similar armoured doors. Further, with a floor of Australian Karri wood and with a thin partition by a Dutch firm. All the reports will be issued in due course. In framing the reports an innovation will, no doubt, be found, inasmuch as the metric system will henceforward be applied in the committee's reports as well as our own system of weights and measures, this being in accordance with a resolution arrived at at the International Fire Prevention Congress, requesting all reports of different countries to adopt the metric system as well as their local system of measurement and weight.

STEEL CHIMNEY STACKS.—In a recent number of the *Engineering Record* some simple rules are given for calculating the rivet spacing in the horizontal joints of self-supporting steel stacks and for determining the strains upon the anchor rods of these and similar structures. For the calculation of rivet spacing the stress per circumferential inch of section may be found by the equation $S = \frac{6P}{A}L^2$. Here P = pressure per vertical foot of stack, A = $\pi \times$ radius^2, and L = distance of the section from the top of the stack. If to S be added the proportionate dead load for the weight of the structure above the section considered, division of the value of one rivet by this sum will give the required spacing in inches. To ascertain the anchor strains, the imaginary strain K on one circumferential inch of the circle on which the anchor rods are fixed may be found thus:—K = M ÷ A, where M is the bending moment and A is the area of the circle above mentioned. The maximum value of K so obtained multiplied by the length of arc between the anchors will give approximately the wind reaction on one rod.

RUBBER FOR BUILDING PURPOSES.—Writing in a recent issue of the *Agricultural Bulletin of the Straits and Federated Malay States*, Mr. Ridley mentions that the Jelutong tree (*Dyera costulata*) is one of the biggest trees of the Malay Peninsula, attaining a height of over 200 ft. It belongs to the order Apocynaceæ, ane is allied to Alstonia. Its chief use appears to be for making a water-proofing mixture used in the walls, floors, and roofs of houses; and this use, which is of comparatively recent date, appears to be the cause of the very large demand for it of recent years. It is used also in making all sorts of cheap rubber goods, especially rubber shoes, when mixed with other materials.

NEW SPANISH CEMENT INDUSTRY.—In an official communication just received at the Foreign Office from Mr. J. F. Roberts, British Consul-General for the district of Barcelona, it is mentioned that during the past year a most important industry, new to that country, was started. The Compania General d'Asfaltos y Portland, has been formed, with an initial capital of 100,000*l.* fully paid up, the capital supplied being entirely Spanish. The object is the working of an extensive mineral zone comprising asphalte, cement, lignite coal, and petroleum. The machinery for making the cement was purchased in the United States at a cost of nearly 40,000*l.*; the pipe line that is expected to produce 1,000 horse-power to drive the machinery is also American, and will be about two miles in length; the force will be supplied by an important waterfall on the River Zlobregat, the water-power being carried to the property by steel tubes on hydraulic wheels of the Pelton type. It is estimated that at the commencement an output of 30,000 tons of Portland cement will be effected yearly, but the plant is constructed to produce 500 barrels of the highest grade cement per day. The property is situated at Poblade Lillet, in the extreme north of the Principality of Catalonia, at the foot of the Pyrenees, at thirty-five kilometres from the station of Ripoll, and a great deal of money has had to be spent in constructing temporary roads and bridges from the mines to the nearest railway station, and a high-power locomobile is being used to haul the machinery over these roads; later on it is hoped to establish the railway line right up to the mines. The whole plant—a three-kiln one—is being built by American engineers.

CEMENT NOTES.—The British Vice-Consul at Malmö reports the establishment of new cement works at Klagshamn, Sweden.——From Formosa we learn that cement has disappeared as a separate item from the returns of imports from foreign countries, and the cement which now appears in the table is all imported from Japan, and has risen in value from 5,512*l.* in 1901 to 19,233*l.* in 1902.——In Grenoble, France, there are four cement firms, employing 2,000 hands, and producing annually 180,000 tons, of a total value of 200,000*l.*, the price charged being from 12*s.* to 1*l.* 10*s.* per ton, according to quality. There seems no reason (in the opinion of Mr. Lewis, the British Vice-Consul) why the production should not develop considerably, owing to the facilities offered by the use of water power for working and other purposes.

ARBITRATION CASE.—For the purposes of the Thames Embankment Extension Scheme the London County Council acquired property in Millbank-street and Church-street, Westminster, belonging to the Fawcett's Settlement Trustees. Recently the latter brought a claim for compensation in respect of the property acquired, and the inquiry was heard at Westminster before Mr. J. H. Clutton, as sole arbitrator. Counsel for the trustees put the claim at 5,500*l.*, while expert witnesses for the Council put the value at 4,000*l.* to 4,200*l.* The arbitrator has issued his award, in which he gives the sum of 4,485*l.* to the claimants.

PUBLIC CLOCK, BOURTON-ON-THE-WATER, GLOUCESTERSHIRE.—A large clock has just been erected on the Public Hall here by Messrs. John Smith & Sons, Derby. It has been made to the designs of Lord Grimthorpe.

CHARTRES CATHEDRAL.—The Paris Correspondent of the *Daily News* writes:—The north steeple of the Cathedral at Chartres has latterly shown signs of decay, several crevices having appeared suddenly, and the sudden collapse of this unique piece of twelfth-century architecture was feared. The Government architects have taken in hand its restoration; a wooden scaffolding—boarded round—has been built round the tower, which now presents an unwonted appearance, somewhat like the Tower of Pisa. The erection of the scaffolding, which was very dangerous, on account of risk of giddiness, has been completed in three weeks without accident. It will not be removed for several months.

WHAT IS THE CHEAPEST PAINT?—In the issue of the *Decorator* (an illustrated monthly journal) for August 22 is an interesting article by Mr. J. Cruickshank Smith, B.Sc., F.C.S., on this subject, from which we take the following concluding paragraphs:—"The following table, which I have compiled from data which may be regarded as fairly reliable, indicates how an engineer can figure out for himself what is the comparative economic value on a twenty years' basis of various anti-corrosive paints that may be brought under his notice. The cost of labour of application is not included; obviously the charge on this account will increase rapidly the greater the number of renewals that may be necessary. *Covering Capacity.*—Calculated from the figures given by Mr. G. H. Hurst that 10 lbs. of the following paints cover on metal—White lead, 648 sq. ft.; zinc white, 1,134 sq. ft.; red lead, 477 sq. ft.; red oxide, 870 sq. ft. *Durability.*—The relative figures are those currently accepted by British and American engineers. *Cost.*—This is estimated at what is probably a maximum figure for the very best materials in large quantities. The paints here mentioned are understood to be supplied ready for the brush, and to be made with special reference to the purpose for which they are to be used:—

—	White Lead.	Zinc White.	Red Lead.	Red Oxide.
Covering capacity in sq. yds. per cwt.	806	1,411	594	1,083
Price per cwt. in shillings	32*s.*	36*s.*	32*s.*	28*s.*
Cost (in shillings) per 100 sq. ft.	·44	·28	·60	·28
Times painted in 20 years	5	5	3	7
Cost in shillings per 100 sq. ft. for 20 years	2·20	1·40	1·80	1·96
Relative economic value on 20 years' basis, the highest value being represented by 100	64	100	77	71

Let us suppose that in the above table the figure under zinc white representing the number of renewals necessary in twenty years be written seven instead of five, then the cost per 100 sq. ft. for twenty years will be 1·96 in place of 1·40, and the economic value of zinc paint will be brought down under that of red lead, and equal to that of red oxide; yet between the prime cost of materials in the case of red oxide and zinc white there is on our assumed price a difference of 8*s.* per cwt. This shows the fallacy of laying undue stress on the cost of the paint. One other point suggests itself in connexion with the comparison of the economic value of paints, and that is, how is it possible in practice to wait for, say, twenty years before an estimate can be formed as to the comparative merits of different protective materials? Of course, an opinion has to be formed after a comparatively short interval, say three or six months, but the trained eye of a person who has intelligently studied the subject practically can in the great majority of cases detect signs of wear and tear long before the paint has actually perished. In such matters it is after all not the skilful engineer or the erudite chemist who makes a bee-line for truth, but the man with observant eye and logical mind."

THE DEMOLITION OF BUILDINGS WITHIN THE CITY.—The great nuisance arising from the demolition of buildings in the City without proper protection to the public has been the subject of an inquiry by the Streets Committee of the City Corporation, whose members have been assisted with suggestions by the Royal Institute of British Architects, the Surveyors' Institution, and the Institute of Builders. The result has been the formulation of new by-laws, under which it is insisted that in the future, before any demolition takes place, all windows and other openings in the external walls shall be close boarded. Canvas or boarded screens, mats, and other suitable appliances must be used whenever required, and so placed as to reduce the nuisance arising from the escape of dust. Rubbish, lime, or mortar must not be shot or allowed to fall from floor to floor into any basement within 20 ft. of the public way between 10 a.m. and 6 p.m., except on Saturdays, when it will be permitted after 3 p.m. Further, no materials arising from the demolition of buildings shall be basketed, wheeled, or loaded into carts, or carted away between 10 a.m. and 6 p.m., except on Saturdays, unless proper provision has been made for the protection of the public from dust. Any person who commits a breach of the new by-laws will be liable to a fine of 5*l.* for each breach.

HOUSES IN THE UNITED KINGDOM.—According to a return prepared by the Treasury at the instance of Mr. Gibson Bowles, M.P., for the information of Parliament, it appears that the profits arising from houses in the United Kingdom, as shown by the returns made under Schedule A of the Income Tax, amounted in 1861 to 61,924,178*l.*, in 1871 to 87,721,110*l.*, in 1881 to 120,877,195*l.*, in 1891 to 143,140,177*l.*, and in 1901 to 184,572,687*l.*

CAPITAL AND LABOUR.

SUNDERLAND JOINERS' DISPUTE.—A ballot was taken on the 14th inst. among the Sunderland joiners on the question as to whether they would, as suggested at the conference convened by the Mayor in the Town Hall last Friday, submit the dispute to a Board of Trade arbitration. The result of the

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ballot is as follows:—For arbitration, 105; against, 203. The employers met in the afternoon and considered the position, having in view the result of the men's ballot, and re-affirmed their willingness to submit to arbitration.

EMPLOYMENT IN THE BUILDING TRADES.—According to the *Labour Gazette* for August, employment in the building trades continues moderate, and shows little change as compared with either a month or a year ago. The percentage of unemployed trade-union members among carpenters and joiners was 3·3 at the end of July, compared with 3·4 at the end of June, and 2·0 a year ago. The percentage for plumbers was 0·7 at the end of July, as compared with 7·6 in June, and 0·5 in July, 1902. Employment with bricklayers is reported as fair, and better than a month ago. It is about the same as a year ago. With masons it is fair, and about the same as a month ago, but rather worse than a year ago. Employment with carpenters and joiners is fair, and about the same as a month and a year ago. With painters employment is moderate, and not so good as a month or a year ago. Employment with plasterers is dull.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

16,502 of 1902.—W. PEPPER: *A Combination Knocker, Letter Plate, and Bell Pull.*

This consists of the combination of a letter plate for attachment to doors and having a slot for the insertion of letters, a knocker which serves also as a cover for the said slot, a bell-pull operating a near or distant bell, and a frame or frames for holding and exhibiting cards or plates bearing names or other information.

16,738 of 1902.—J. D. KELLY, D. P. FISHER, and N. V. G. WIX: *Method of and Means for Ventilating Halls, Theatres, and other Places of Public Resort.*

This relates to means of ventilation, consisting in introducing into buildings a large number of separate currents of compressed air that may be reduced or increased in temperature before being introduced according to the requirements of the case, or, if desired may be perfumed.

20,863 of 1902.—A. VAN HOOYDONK: *Means or Apparatus for Attaching Electric Sconces and the Like to Walls, Ceilings, and other Places.*

The method of attaching electric sconces and the like to walls and other places which consists in fixing a socket having suitable contact pieces into the wall or other places and forming the end of the sconce or the like (or a separate fitting to each which the sconce or the like is attached) in such a manner that it may be readily attached to the said socket and make electric contact with the contact pieces therein and be readily detached therefrom.

3,419 of 1903.—A. HART: *Ventilating Window.*

A window having removable horizontally hung upper and lower sashes and means for opening and closing them, side frames or wings being also provided, which can be entirely removed, folded back, or held at right angles to the window frame to prevent draughts.

12,374 of 1903.—J. A. G. POWER: *Water-closet Seat Protectors.*

A detachable cover for water-closet seats, consisting of an expansible frame and a fabric cover retained in position upon the frame and upon the seat by the frame.

12,642 of 1903.—F. C. WRIGHT: *Screens for Windows, Doors, and the Like.*

A screen comprising a top bar having the lower portion of one side bevelled to form an opening, side bars connected to said top bar, a cross supporting strip having the extremities thereof secured to the side bar adjacent to the bevelled portion of the top bar, screen material passing around the said supporting bar, sleeves interposed between the supporting strip and the lower portion of the top bar, and nails driven through the supporting strip and sleeves and into the top bar.

13,236 of 1903.—J. OATES: *Machine for Trimming or Cutting-off Edges of Wall Decorations.*

This machine is intended to trim off the selvedge or raw edge of decorative materials in the nature of wall-paper, and is especially adapted for operating on materials stronger or heavier than ordinary wall-paper, such as lincrusta, anaglypta, and the like relief decorations. It consists of a main driving shaft rotated by a hand wheel, feed rollers and vaulting discs, adjustable guides being also provided.

13,771 of 1903.—J. A. K. MCGREGOR and LOCKERBIE & WILKINSON, LTD.: *Door Furniture.*

Door furniture characterised by a knob loosely mounted upon a secured spindle, and having a slot with winged grooves butting against a nut having a similar slot and winged grooves, and which is adjustably screwed on to the spindle, in combination with a staple having wing flanges which respectively take into the said slot and grooves.

13,817 of 1903.—C. HERMANSEN: *Fire-Grates.*

In open fire-grates the arrangement of doors provided in such a manner that while retaining the appearance of open fire such grates may be used as ordinary stoves, in combination with a movable grate travelling in groves, said grate, when the stove is to be used as an open fire-grate, being adapted to be lowered down in front of the fixed grate, and when the fireplace is to be used as a closed stove, is raised above the fixed grate and held in position by means of pins adapted to engage with downwardly-inclined notches in the grooves.

13,828 of 1903.—R. BARTHOLOMÄUS: *Flushing Cisterns.*

A flushing cistern for water-closets and the like, in which pistons adapted to be operated by the pressure of water supplied from the main are arranged in a cylinder, and connected to two pistons of smaller cross section, which are arranged in cylinders connected to the tank, so that when operated the pistons force the water from the cylinders with a pressure inversely proportional to the difference of cross-section between the pistons, the said water being discharged to the water-closets through a multi-way distributing cock, whereupon the spigot of the said cock is rotated so that water from the main acts on the pistons and causes the pistons to be moved towards each other, so that the water between the said pistons is then discharged through the cock to the closet.

14,003 of 1903.—J. C. MCMAHON: *Window Frame and Sash.*

The combination of a window frame, sashes movable in the frame and provided with grooves in their edges, and metal strips provided with one or more pair of guide ribs, the portions of the strips intermediate of the members of each pair being swelled out.

14,018 of 1903.—W. W. BENSON: *Couplings for Pipes, Conduits, and the Like.*

A coupling having a collar for engaging the ends of conduits, conductors, or the like, a ring having an edge adapted to bite into said conductor and faces that are initially of conical form, and a flanged sleeve for engaging said ring, and forcing it against said collar and into said conductor.

16,665 of 1902.—G. E. NEWTON, J. W. SOAR, H. DICKENSON, and D. MITCHELL: *Composition for Use in the Manufacture of Imitation Marble, Stone, or the Like.*

In the manufacture of imitation marble, stone, or the like, a composition consisting of burnt fireclay or china clay, spar, quartz, gypsum, marble chippings, broken earthenware or porcelain, granite, or like material, or any of them ground into powder, magnesite or Venetian cement, chloride of magnesia, and water, and with or without colouring matter.

18,270 of 1902.—W. H. HAMMOND and R. G. FOTHERBY: *Manhole or Inspection Chamber Covers for Drains, Sewers, and the Like.*

The invention relates to manhole or inspection chamber covers for drains, sewers, and the like. The object of the invention is to make a manhole cover, or inspection cover, absolutely air, gas, and watertight. To obtain this object, an inclined plane is introduced beneath the ordinary water grooves and cover as now attached to manhole covers and the like, on the inside of the frame, on which rests a separate plate surrounded with a bead or packing of asbestos, lead, rubber, or other suitable material, the packing resting on the aforesaid inclined plane. By means of the weight of the aforesaid plate, an air, gas, or watertight joint is thus secured. If necessary, a screw or screws may be provided in the cover, to put extra pressure on the lower plate.

18,953 of 1902.—H. PASSOW: *Process for Producing Cement.*

The process of producing cement consisting in obtaining a mixture of the vitreous product and the pumiceous product of cooled slag, so that such products shall both be present in substantial and preferably about equal quantities.

20,661 of 1902.—M. KUKL: *Construction of Floors or Pavements, Walls and Ceilings.*

The method of making floors and the like, which consists in adding oil to a floor mass, such as a mortar, stone, or cement mixture, to form a plastic mass, producing a continuous surface on a suitable ground, smoothing the mass thus spread, and letting it dry.

4,441 of 1903.—P. STEVENS: *Manufacture of Parquet Floors.*

The manufacture and laying down of inlaid floors or parquet floors upon panels or dead floorings of tar and metal or wood laths, by means of an adhesive substance having a basis of tar.

19,474 of 1902.—R. STANLEY: *Manufacture of Earthenware Sanitary Pipes, Cable Conduits, Ridge Tiles, and other like Objects.*

This invention relates to the manufacture of pipes or conduits and also ridge tiles, roofing tiles, and other like objects from semi-dry clay-dust or other material whereby they are subjected to end pressure. The moulded articles are delivered downwardly, and the actual pressure is needed only at one end of the mould, the opposite end pressure being obtained by moving the mould and top plunger simultaneously towards the stationary plunger. The pressed articles by this plan are delivered down from one side (*e.g.*, the shell) of the mould together with the other side (*e.g.*, the core), and the latter then drawn out of or away from the article, which is left standing on the top of the bottom plunger.

* All these applications are in the stage on which opposition to the grant of Patents upon them can be made.

MEETINGS.

SATURDAY, AUGUST 22.

Northern Architectural Association.—Excursion meeting, Blagdon and Stannington. Members to assemble at the lodge gates of the principal entrance to Blagdon Hall at 3.30 p.m.

SATURDAY, AUGUST 29.

Incorporated British Institute of Certified Carpenters. Visit to the Vauxhall Bridge Works. 3 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 5.—By SURRIDGE & SON (at Braintree).

Bocking, Essex.—The Garrett Farm, 182 a. 3 r. 3 p., f.	£3,050
Shop, tenement, and 1 a. 0 r. 9 p., f.	450
Eleven freehold cottage tenements	1,175
Sunnyfields and 15½ a., f.	1,650
Sloughhouse Farm, 45 a. 3 r. 33 p., f.	600
Gosfield, Essex.—Pear Tree Farm, 89 a. 1 r. 39 p., f.	2,000

August 6.—By WYATT & SON (at Chichester).

Oving, Sussex.—High Kettle Farm, 15 a. 0 r. 37 p., f.	825
The Withies Farm, 40 a. 2 r. 37 p., f.	1,050
Three freehold fields, 30 a. 1 r. 30 p.	1,220
Chichester.—80, East-st. and 20, North Pallant, s., f., y.r. 110*l.*	4,050
14, North-st., s., f., y.r. 30*l.*	650
Chapel-st., the freehold store, y.r. 8*l.*	220

By BEADEL, WOOD, & Co. (at Great Holland).

Great Holland, Essex.—Barnard's or Beckwith's Farm, 40 a. 2 r. 10 p., f., y.r. 45*l.*	1,170

By WHITFIELD & SONS (at Knockin).

Knockin, Salop.—The Heath Farm, 132 a. 3 r. 26 p., f.	2,550

By WILLIAM WESTON (at Uxbridge).

Yiewsley, Middsx.—Horton-rd., freehold building land (late Great Western Cement Works), area 3 a. 29 p.	970

August 7.—By THORNBORROW & Co. (at Penrith).

Penrith, Cumberland.—Crown-sq., f. veterinary's premises	1,500
Wordsworth-st., plot of land, area 1,078 yds., f.	189

August 8.—By FAREBROTHER, ELLIS, & Co. (at York).

Bramham, Yorks.—Tenter Hill, two cottages and 2 a. 2 r. 1 p., f.	300
Three enclosures, 14 a. 1 r. 15 p., f.	1,070
Myrtle Cottage, f., y.r. 5*l.* 5s.	180
Manor Farm, 70 a. 3 r. 20 p., f.	2,250
Little Habton, Yorks.—Newnsham or Can-ings, 6 a. 3 r. 28 p., f., y.r. 15*l.*	370
Habton Grange Farm, 88. 2 r. 9 p., f., y.r. 115*l.*	3,000
Habton House Farm, 168 a. 2 r. 19 p., f., y.r. 150*l.*	4,200
Butterwick, Yorks.—Bridge House Farm, 44 a. 0 r. 1 p., f., y.r. 47*l.*	1,300
Butterwick Farm, 392 a. 3 r. 25 p., f., y.r. 448*l.*	10,000
South Holme Farm, 72 a. 3 r. 19 p., f., y.r. 80*l.*	2,025
Cass's Farm, 75 a. 1r. 32 p. f., y.r. 70*l.*	1,900
Four enclosures, 27 a. 0 r. 23 p., f., y.r. 25*l.*	600
Muscoates, Yorks.—Sunley Court Farm, 137 a. 3 r. 23 p., f., y.r. 145*l.*	4,000
Trowbridge Farm, 168 a. 1 r. 22 p., f., y.r. 127*l.* 9s.	4,000
Enclosure of meadow land, 10 a. 0 r. 30 p., f., y.r. 7*l.*	200
Rye Dale, right of hay crop on 15 acres of meadow land	185

By WILLSON & PHILLIPS (at Southend-on-Sea).

Rayleigh, Essex.—Holly Trees Farm, 47 a., f., y.r. 150*l.*	2,550
Bull-la., freehold pasture land, 3¾ a., y.r. 20*l.*	375
High-st., Globe and Rose Villas, y.r. 46*l.*	730
Down Hall-rd., the Pantile meadows, 9¼ a., f.	560
Rochford, Essex.—High-st., freehold butcher's shop and outbuildings, y.r. 35*l.*	760
Southend, Essex.—27, Cliff Town-rd., s., f., y.r. 50*l.*	1,220
Cliff Town-rd., freehold s. (toilet saloon), y.r. 70*l.*	1,220

August 10.—By THORNBORROW & Co. (at Carlisle).

High Hesketh, Cumberland.—Copyhold farm, 57 a. 0 r. 26 p., p.	2,445
Low Hesketh, Cumberland.—Copyhold farm, 8 a. 0 r. 18 p.	480

By JOHN D. WOOD & Co. (at Cirencester).

South Cerney, Glos.—Barston House and 1 a. 2 r. 35 p., f., p.	1,050
Walnut Tree Farm, 71 a. 2 r. 26 p., f.	2,000

August 13.—By BEADEL, WOOD, & Co.

Thorpe-le-Soken, Essex.—Freehold and copyhold occupation, 5 a. 0 r. 27 p., y.r. 20*l.*	250

By NEWBON, EDWARDS, & SHEPHARD.

Cricklewood.—4A and 6, Melrose-av., u.t. 97 yrs., g.r. 17*l.*, e.r. 45*l.*, and y.r. 42*l.*	850
Hackney.—104, Amhurst-rd., u.t. 63 yrs., g.r. 7*l.*, e.r. 45*l.*	465
Holloway.—54, 56, and 58, Andover-rd., f., y.r. 100*l.* 2s.	1,040
26 to 52 (even), Andover-rd., u.t. 49 yrs., g.r. 70*l.*, y.r. 486*l.* 4s. (in lots)	3,075
Islington.—26, Finsbury-st., f., w.r. 78*l.*	700
Isleworth.—16, Loring-rd., f., e.r. 26*l.*	215
Leytonstone.—90, Wallwood-rd., f., y.r. 30*l.*	435

By STIMSON & SONS.

Birchington, Kent.—Shakespeare-rd., freehold building land, 1 a. 2 r. 32 p.	850
Brentford, Middlesex.—The Ham, three railway arches, u.t. 55 yrs., g.r. 1s., g.r. 25*l.*	150
Battersea.—32 and 34, Park-gr., u.t 61¼ yrs., g.r. 12*l.*, y.r. 48*l.*	390
Canning Town.—252, Barking-rd., f., y.r. 100*l.*	2,675
Tucker-st., f.g.r.'s, 80*l.* 10s., reversion in 62 yrs.	2,740

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Forest Gate.—126, 157, and 159, Halley-rd., f., w.r. 70*l.* 4*s.* £760
Haverstock Hill.—8, Queen's-cres., u.t. 46½ yrs., g.r. 8*l.*, y.r. 40*l.* 350

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

'*,*' Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 15 6	per 1,000 alongside, in river
Rough Stocks and Grizzles.....	1 12 6	" " "
Facing Stocks....	2 18 0	" " "
Shippers	2 5 0	" " "
Flettons	1 8 6	" at railway depôt
Red Wire Cuts ..	1 12 6	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6	0 per yard, delivered.
Thames Ballast	6	0 " "
Best Portland Cement	30	0 per ton, delivered.
Best Ground Blue Lias Lime..	20	6 " "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s cd. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1	6½ per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1	8½ " "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2	1 " "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2	2½ " "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer in blocks	1 6	" "
Grinshill " ...	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks 6 in. wan two sides landings to sizes (under 40 ft. super.)	2 10	per ft. cube, deld. rly. depôt.
6 in. Rubbed two sides Ditto, Ditto	2 3	per foot super. "
3 in. Sawn two sides slabs (random sizes)..	2 6	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 11½	" "
2½ in. to 2 in. ditto, ditto	0 7½	" "
BEST HARD YORK—	0 6	" "
Scappled random blocks 6 in. wan two sides, landings to sizes (under 40 ft. sup.)	3 0	per ft. cube "
	2 8	per ft. super. "

PRICES CURRENT (*Continued*).

STONE.

	s. d.	
BEST HARD YORK—		
6 in. Rubbed two sides		
Ditto	—	per ft. super deld. rly. depot.
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry. dep.
20×12 " " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc ..	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green....	15 2 6	" "
20×12 " "	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do. 60	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do. 54	6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do. 50	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
⅞ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard. £ s. d.	£ s. d.
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ...	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6

PRICES CURRENT (*Continued*).

WOOD.

JOINERS' WOOD.	At per standard. £ s. d.	£ s. d.
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
⅞ in. do. do.	0 0 6½	. . .
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	. .

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
⅞ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
⅞ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
" " galvanised.....	16 0 0	. .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	. . .
" " to 24 g.	10 15 0	. . .
" " to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:— Ordinary sizes to 20 g.....	16 0 0	. . .
" " 22 g. and 24 g.	16 10 0	. . .
" " 26 g.....	18 0 0	. . .
Galvanised Corrugated Sheets:— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	. . .
" " 22 g. and 24 g.	12 15 0	. . .
" " 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	13 15 0	. . .
Pipe in coils	14 5 0	. . .
Soil pipe	16 15 0	. . .
Compo Pipe	16 15 0	. . .
ZINC—Sheet— Vieille Montagne ..... ton	26 0 0	. . .
Silesian	25 15 0	. . .
COPPER— Strong Sheet ..... per lb.	0 0 10½	. . .
Thin ..... "	0 0 11½	. . .
Copper nails ..... "	0 0 11	. . .
BRASS— Strong Sheet..... per lb.	0 0 10	. . .
Thin "	0 0 11	. . .
TIN—English Ingots ..... "	0 1 4	. . .
SOLDER—Plumbers' ..... "	0 0 6	. . .
Tinmen's ..... "	0 0 8	. . .
Blowpipe ..... "	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths.....	1⅞d. " "
21 oz. thirds	3¼d. " "
" fourths.....	2⅝d. " "
26 oz. thirds	3⅝d. " "
" fourths.....	3¼d. " "
32 oz. thirds	4¼d. " "
" fourths.....	4⅛d. " "
Fluted sheet, 15 oz.	2⅝d. " "
" 21 oz.	3⅜d. " "
⅛ Hartley's Rolled Plate	1⅝d. " "
⅛ " " "	2d. " "
⅛ " " "	2½d. " "

[*See also page 215.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Sewage Disposal of Saltwood	Elham R.D.C.	30 guineas	Oct. 7
*New Hospital	Brighton & Hove Hosp. for Women	50*l.*, 30*l.*, and 20*l.*	Nov. 9

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Twenty-six Cottages, Bedlington, Northumberland	The Coal Company	—. Weeks, Esq., Bedlington	Aug. 25
Additions to North Public School	Peterhead Burgh School Board	A. Clyne, Architect, 123½, Union-street, Aberdeen	do.
Water Main (18½ miles)	Cheltenham Corporation	J. S. Pickering, Water Engineer, Cheltenham	do.
Infirmary and Laundry	Nuneaton Guardians	H. Quick, Architect, 64, Hertford-street, Coventry	do.
Paving, &c., Frensham-road	Farnham U.D.C.	R. W. Cass, Surveyor, South-street, Farnham	do.
Sewerage Works, South Main-road	Alnwick U.D.C.	G. Wilson, Surveyor, Green Bat, Alnwick	do.
School, Fort William, N.B.	.....	L. & J. Falconer, Architects, Fort William	do.
Bridge Abutment, &c., Ilkley	Wharfedale Estate Co., Ltd.	J. B. Fraser, Architect, 8, Park-square, Leeds	Aug. 26
Additions to Club Premises, Cork	.....	W. H. Hill & Son, Architects, 28, South Mall, Cork	do.
Sewerage Works, Rigby-road	Blackpool Corporation	J. S. Brodie, Borough Engineer, Blackpool	do.
Sewerage Works	Dursley R.D.C.	J. G. Wenden, Council Offices, Dursley	do.
Sewerage Works, &c., Slate-lane	Audenshaw (Lancs) U.D.C.	J. P. Wilkinson, Engineer, 301, Cathedral-street, Manchester	do.
Water Supply Works, Blairbine, Lochgilphead	Argyll Lunacy Board	Warren & Stuart, Engineers, 94, Hope-street, Glasgow	do.
Inn, Blaenangwent, Abertillery, Mon	Messrs. Webb Bros. & Co.	R. L. Roberts, Architect, Abercarn	Aug. 27
House and Shop, Queen-street, Amble	.....	E. D. Richardson, 7, Gibson-street, Amble	do.
Warehouse, &c., King-street, Halifax	.....	Jackson & Fox, Architects, Halifax	do.
Additions to Workhouse, Gibbet-street	Halifax Guardians	W. C. Williams, Architect, 29, Southgate, Halifax	do.
School and House, Goldthorpe	Bolton-upon-Dearne School Board	R. Higginbottom, Architect, Thurnscoe, Rotherham	do.
House, High-street, Treorky, Wales	Mr. J. J. Thomas	W. D. Morgan, Architect, Victoria Chambers, Pentre, Glam.	Aug. 28
Road Works, Gotre Fawr-road	Swansea R.D.C.	G. P. Thomas, Surveyor, Forest Fach, Swansea	do.
Two Villas, Sedbergh, near Kendal	Mr. G. Sedgwick	S. Shaw, Architect, Highgate, Kendal	do.
Works at Chapel, Dowlais, Wales	The Trustees	A. O. Evans, Architect, Pontypridd	Aug. 29
Cycle Works, St. Lawrence Gate, Drogheda	Mr. P. J. Fulham	F. H. Tallan, Architect, 356, Kildare-street, Dublin	do.
Road Works, Angel-road	Harrow-on-the-Hill U.D.C.	J. P. Bennetts, Engineer, Council Offices, Harrow	do.
Hall, Castle-Acre, Swaffham, Norfolk	The Oddfellows	Jas. Spencer, Swaffham, Norfolk	do.
Well Sinking near Bedford	Kempston U.D.C.	Beesley & Co., Civil Engineer, Victoria-street, S.W.	do.
Cast Iron Pipes	Devonport Corporation	Stevenson & Burstal, Engineers, 38, Parliament-street, S.W.	do.
Hotel, Sennen Cove, Land's End, Cornwall	.....	H. White, Architect, Penzance	Aug. 31
Twenty-nine Houses, Rowles-square, Rhymney	The Victoria Building Club	J. L. Smith & Davies, Architects, Aberdare	do.
Rebuilding part of Church, Salcombe (Devon)	.....	The Vicar, the Vicarage, Salcombe	do.
Sewage Disposal Works	Aylesbury U.D.C.	G. Chatterton, Civil Engineer, 6, The Sanctuary, S.W.	do.
Schools, &c., Burton-in-Lonsdale	The Wesleyans Trustees	R. Richardson, Halfway House, Cautsfield, Kirkby Lonsdale	do.
Twelve Cottages, Dee Basin-road	Chester Corporation	J. H. Dickson, Town Hall, Chester	do.
Station Works, Essie Station	Caledonian Railway Co.	J. Blackburn, 302, Buchanan-street, Glasgow	do.
Council Offices	Whickham (Durham) U.D.C.	J. B. Renton, Surveyor, Whickham	do.
Pipe Laying, &c. (45 tons) Haslemere	Hambledon R.D.C.	R. B. Grantham & Son, 20, Northumberland-avenue, W.C.	do.
Water Supply Works, Ennis (Ireland)	Lunacy Committee	F. O. Connor, Civil Engineer, Asylum, Ennis	do.
Undergound Conveniences, North-street	Guildford Town Council	C. G. Mason, Civil Engineer, Tunis Gate, Guildford	do.
Hotel, Turnberry (N.B.)	Glasgow & S.W.R. Co.	J. Miller, Architect, 15, Blythewood-square, Glasgow	do.
*Painting and Repairs at Infirmary, Bow-road	City of London Union	Clerk to the Guardians, 61, Bartholomew-close, E.C.	do.
*Congregational Church, High-street, Dover	Church Building Committee	Cresswell & Newman, 54, Castle-street, Dover	do.
Private Street Works	Kettering U.D.C.	Council's Surveyor, Market-place, Kettering	Sep. 1
Concrete Paving, &c., Needham Market, Suffolk	Trustees of the late Mr. F. Wright	H. Miller, Civil Engineer, 16, Museum-street, Ipswich	do.
Paving Works, &c., Belford-terrace, North Shields	Tynemouth Corporation	J. F. Smillie, Borough Surveyor, Tynemouth	do.
Granite Macadam, Preston	Lancs County Council	W. H. Schofield, Civil Engineer, Council Offices, Preston	do.
Twelve Houses, Margery-street, Carlisle	Mr. W. Johnstone	Johnstone Bros., Architects, 39, Lowther-street, Carlisle	do.
Three Cottages, Sigford, near Ashburton	Mrs. Seaman	A. Warren, Architect, Buckfastleigh	do.
Granite Road Metal	Dunstable Town Council	G. Simcox, Borough Surveyor, Town Hall, Dunstable	do.
Car Sheds, Osmaston-road	Derby Corporation	J. Ward, Civil Engineer, Babington-lane, Derby	Sep. 2
Wall, &c.	Easington Guardians	Farthing & Dunn, Architects, Shakespeare Chambers, Newcastle	do.
Offices and Boundary Wall, Skircoat-road	Halifax Corporation	J. Lord, Civil Engineer, Town Hall, Halifax	do.
*Fire Resisting Works, &c., Fountain Hospital, Tooting	Metropolitan Asylums Board	T. W. Aldwinckle & Son, 29, Denman-street, London Bridge, S.E.	Sep. 4
*Alterations to Hot Water Supply Apparatus, N.E. Hosp.	do.	Office of the Board, Embankment, E.C.	do.
Additions to Town Hall	Batley Corporation	W. Hanstock & Son, Architects, Batley	do.
*New Coastguard Buildings, near Sandown (I. of W.)	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	Sep. 5
*Sanitary Work, Relaying Floors, &c., Darenth Asylum	Metropolitan Asylums Board	Engineer to the Board, Office of the Board, Embankment, E.C.	Sep. 7
*Paving Half Moon-lane with Asphalt	Borough of Camberwell	Borough Engineer, Town Hall, Peckham-road, S.E.	Sep. 8
Road Works	Barking (Essex) U.D.C.	C. F. Dawson, Surveyor, Public Offices, Barking	do.
Additions to Workhouse	Cannock (Staffs) Guardians	Ashton Veall, Architect, 84, Darlington-street, Wolverhampton	Sep. 11
*Wooden Bandstd., &c., Bricklields Gardens, Limehouse	London County Council	Archs. Dprtmnt., Genrl. Constrctnl. Sectn., 15, Pall Mall East, S.W.	Sep. 16
*Sewage Collecting Tank, &c. (212, Fort Cumberland)	Borough of Portsmouth	Borough Engineer's Office, Town Hall, Portsmouth	do.
Engine and Boiler House, Monument-lane, Egbaston	Birmingham Corporation	Mansergh & Sons, Civil Engineers, 5, Victoria-street, S.W.	No date.
House, Myrtle-grove Estate, Bingley (Yorks)	.....	E. H. Parkinson, Architect, Old Bank Chambers, Bradford	do.
Whinstone Road Metal, &c., near Huddersfield	.....	A. Graham & Sons, Huddersfield	do.
Villa Residence, Newland, Hull	.....	J. M. Dossor, Architect, 2, Manor-street, Hull	do.
Works at the Black Lion Inn, Main-street, Keswick	.....	Jennings Bros., Ltd., Castle Brewery, Cockermouth	do.
Infirmary Buildings, Longtleet	.....	H. F. J. Barnes, Architect, Poole, Dorset	do.
Shop, &c.	Poole Guardians	Jabez Wright, Architect, Macclesfield	do.
Additions to School, Meanwood-road, Leeds	Macclesfield Provident Soc., Ltd.	W. S. Braithwaite, Architect, Leeds	do.
Reseating Wesleyan Chapel, Church-lane, Pudsey	Education Committee	Danby & Simpson, Architects, 10, Park-row, Leeds	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Clerk of Works	Chelmsford Town Council	Not stated	Aug. 31
*Clerk of Works	Branksome U.D.C.	2*l.* 10*s.* per week	Sep. 1
*Four Clerks of Works	Hornsey District Council	3*l.* per week	Sep. 7
*Clerk of Works	Cumberlnd & Westmorlnd Jnt. Asy.	Not stated	do.
*Draughtsman	H.M. Dockyard, Sheerness	Not stated	No date.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. *Public Appointments*, xvi.

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PRICES CURRENT (*Continued*).

OILS, &c.

		£	s.	d.
Raw Linseed Oil in pipes or barrels..	per gallon	0	1	10
,, ,, ,, in drums.....	,,	0	2	2
Boiled ,, ,, in pipes or barrels..	,,	0	2	1
,, ,, ,, in drums.....	,,	0	2	5
Turpentine, in barrels	,,	0	3	3
,, in drums	,,	0	3	6
Genuine Ground English White Lead	per ton	19	10	0
Red Lead, Dry	,,	19	10	0
Best Linseed Oil Putty.....	per cwt.	0	8	0
Stockholm Tar.....	per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak.....	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for Seats of Churches.....	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal	0	18	0
Extra Pale French Oil	1	1	0
Eggshell Flatting Varnish	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
Wrench and Brush Polish	0	10	0

TO CORRESPONDENTS.

J. S. M.—J. C. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 15s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 15s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post.*

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each: also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under.....6s. 0d.
Each additional line.....1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under .....4s. 6d.
Each additional line (about ten words).....0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

FOUR lines (about thirty words) or under .....2s. 6d.
Each additional line (about ten words).....0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed* to the Office, Catherine-street, Covent Garden, W.C. *Free of charge.* Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ABERDEEN.—For the construction of main sewerage works, for the Town Council. Mr. W. Dyack, C.E., 41½, Union-street, Aberdeen:—

P. Tawse, contractor, Terry, Aberdeen*.... £5,542 10 1

AMERSHAM.—For the erection of cottages, for Mr. G. Joiner. Mr. John Parrish, architect and surveyor, Richmond-villas, Hoe-street, Walthamstow:—

G. Darlington, Amersham £900

CARDIFF.—For the erection of a Wesleyan church, Birchgrove, Whitchurch. Mr. Edwin Seward, architect, Cardiff:—

	£	s.	d.
G. Hallett	1,130	0	0
G. Griffiths	1,125	0	0
Ransome	1,099	4	8
Beams & Nephew.....	1,095	0	0
Lattey & Co.	1,092	0	0
Knox & Wells	1,017	0	0
S. Gunter	980	0	0
C. H. Hockridge.....	962	13	4
S. Hanson, Llanishen, near Cardiff*	950	10	0
Evans Bros.	950	0	0

CHATHAM.—For the supply of flints, &c., for the Corporation. Mr. Charles Day, Borough Surveyor, Town Hall, Chatham:—

Supply of Kentish Rag Headers.—150 tons at Corporation Depot.

Constable & Co., Ltd., 10s. 6d. per ton.
Bensted & Son, Maidstone,* 17s. 4d. per ton.

Flints.—165 cubic yds. at Rochester-street, Chatham.

R. D. Batchelor, 3s. 9d. per cubic yard, wash-mill flints.
T. Smitherman, Chatham,* 4s. 11d. per cubic yard, surface-picked flints.

150 cubic yds. at Victoria-road, Chatham.

R. D. Batchelor, 3s. 6d. per cubic yard, wash-mill flints.
T. Smitherman, Chatham,* 4s. 9d. per cubic yard, surface-picked flints.

CHERITON (Kent).—For asphalting, &c., Stanley-road, for the Urban District Council. Mr. Chas. Vawser, Surveyor, Public Offices, Cheriton. Quantities by Surveyor:—

Binsted & Son, Maidstone..... £173 2

DALTON-IN-FURNESS.—For the completion of the Carnegie Free Library, for the Urban District Council. Mr. W. Richardson, Surveyor, Council Offices, Dalton-in-Furness:—

Tyson & Sons....	£3,486	18	
Clark & Robinson	3,150	0	
Ashburner, Ltd., Dalton-in-Furness*.....	£2,903	0	
Thoms & Sons ..	2,752	18	

DONCASTER.—For the execution of sewerage works, Balby, for the Balby-with-Hexthorpe Urban District Council. Mr. Geo. Gledhill, surveyor, 1, High-road, Balby, Doncaster:—

	£	s.	d.
G. Ellis	197	17	
Geo. Gledhill	170	0	
F. & E. Fox, Balby*	160	17	

GATESHEAD.—For rebuilding the Causey House, Sheriff Hill, for Messrs. H. Emmerson & Sons. Mr. L. H. Armour, architect, 16, West-street, Gateshead:—

Veitch & Sons	£1,561	19	5	Ross & Son ..	£1,434	12	2
W. C. Tyrie..	1,557	15	3	John Milne ..	1,429	9	6
T. & J. White	1,551	0	0	H. & B. Arkless	1,417	0	0
Hymers & Co.	1,550	0	0	George Bain, Dunstan* ..	1,367	11	0
D. D. Hall ..	1,498	7	0				
John Craven..	1,457	13	9				
Ravin & Hitcham ..	1,452	13	0				

GORDON (N.B.).—For the erection of schoolmaster's house, Gordon, Berwickshire. Mr. T. R. Atkinson, architect, Earlston, N.B.:—

Contract No. 1.—Excavating, Masonry, and Walling.

Bruce & Sons ..	£505	0	0
Wood.....	458	0	0
Mabin & Son ..	447	5	3
W. Linton	437	10	0
Rodger & Sons	£427	16	3
A. Smeaton, Greenlaw* ..	339	11	0

Contract No. 2.—Carpentry and Joinery.

C. Brodie	£425		
Brown & Son	375		
W. Kerr	295		
Carfrae	269		
Riddle & Sons.....	£263		
J. Watson	262		
J. Hunter, Gordon* ..	252		

Contract No. 3.—Slating.

McLaren & Sons	£48	17	0
A. Hilson	44	10	0
E. Speirs.....	39	2	0
R. Murdison	£37	0	0
T. B. Murdison, Earlston*	29	10	0

Contract No. 4.—Plumbing.

J. Jardine	£76	4	5
R. Murdison	63	0	0
B. Ruthven	£67	0	0
T. B. Murdison	65	0	0

Contract No. 5.—Plastering.

A. Clapperton	£54	10	
E. Speirs	53	12	
A. Hilson, Allanton*.....	£48	15	

Contract No. 6.—Painting and Glazing.

S. Fisher.....	£32	15	6
Wilson.....	25	11	0
J. Broomfield, Greenlaw*	£20	6	10

GRIMSBY.—For the widening of Brighowgate, the extension of Haven Bridge, and widening Old Dock-road, for the Town Council. Mr. H. Gilbert Whyatt, Engineer, Town Hall, Grimsby. Quantities by Engineer:—

Brighowgate.

Gilbert & Kirton	£992	0	0
J. R. Waterman	958	16	3
Hewins & Goodhand	927	0	0
G. W. Brown..	£918	5	†
H. Good	901	2	11
W. Burkitt, Hull*.....	868	6	7

Haven Bridge and Old Dock road.

H. Good	£1,673	4	
Gilbert & Kirton	1,257	10	
J. R. Waterman	1,217	0	
Hewins & Goodhand, Grimsby*	£1,180	10	

HITCHIN.—For the supply and delivery of broken granite (1,800 tons) and broken ironstone slag for the Urban District Council. Mr. A. T. Blood, Surveyor, Council Offices, Hitchin:—

The Enderby & Stoney Stanton Granite Co., Leicester	2 in. broken granite 10s. 5d. per ton. 1½ in. broken granite 10s. 11d. per ton.
Phipps' Exors. Hunsbury Hill Ironworks, Northampton.....	6s. 5d. slag per ton.

HULL.—For the erection of a park-keeper's lodge, East Park, for the Corporation. Mr. J. H. Hirst, architect, Town Hall, Hull:—

T. Goates.....	£503	15	0
Amalgamated Builders Ltd.	503	2	0
G. F. Blackburn	498	8	0
F. Singleton....	492	0	0
J. H. Fenwick .	438	0	0
J. R. Woods ..	£477	11	4
F. Arnott	454	9	0
Simpson & Son, Woodcock-st., Hull*.....	454	0	0

KEIGHLEY.—For the erection of an engine-house and shed, Airside Mills, Cononley. Messrs. J. Haggas & Son, architects, North-street, Keighley:—

Masonry.—W. Smith .....
Joinery.—J. Greenwood.....
Slating.—W. Thornton .....
Plastering.—F. Davy.....
Plumbing.—A. Bage .....
} £399 13 6

[All of Keighley.]

LONDON.—For the erection of workshop, Columbia-road, Bethnal Green, for Mr. Hottenbach. Mr. John Parrish, architect and surveyor, Richmond-villas, Hoe-street, Walthamstow:—

A. Edwards, Cambridge-road..... £230

MAESYCWMMER (Wales).—For improvements to two chapels, for the Trustees. Mr. E. Jones, architect and surveyor, Porth. Quantities by architect:—

Paul & Sons, Thompson-street, Barry Dock, Glam., S.W.* £303 8 4

MALMESBURY (Wilts).—For additions to water-supply works, for the Corporation. Mr. J. W. Restler, Engineer, Southwark and Vauxhall Water Co., Southwark Bridge-road:—

Hayward & Tyler‡	£972	0	
Grover & Co.	900	0	
Tilke & Smith	709	10	
Excelsior Engineering Co.	668	0	
Carson & Toone ..	£622	0	
Mather & Son, Wellingborough*	529	0	

‡ Exclusive of labour for enlarging tank.

MERTHYR TYDFIL.—For rebuilding 105 and 106, High-street, Merthyr. Mr. C. M. Davies, architect, 112, High-street, Merthyr:—

John Williams ..	£2,997	8	
John Jenkins	2,952	0	
Lloyd & Tape ..	2,880	0	
Lewis Davies....	2,850	0	
Evan Jones, 1, Aeron-terrace, Dowlais*.....	£2,650	0	

PERSHORE.—For the construction of storm-water drain, &c., for the Worcestershire County Council. Mr. J. H. Garrett, County Road Surveyor, Shire Hall, Worcester:—

Nicholas Bros...	£249	8	0
Panter & Sons..	210	15	2
T. Walker.....	208	0	0
J. W. Smith....	204	11	6
W. Nicholas ..	£198	15	0
J. Coombe, Worcester - road, Pershore* ..	197	10	0

RAMSBOTTOM (Lancs).—For the execution of road works, Hardy and six other streets, for the Urban District Council. Mr. T. H. Bell, Surveyor, Council Offices, Ramsbottom. Quantities by Surveyor:—

Chadwick Bros, Blackburn* £219

[Labour only. Materials supplied by Council.]

RAMSGATE.—For the supply of granite kerbs and setts, for the Town Council. Mr. T. G. Taylor, Borough Engineer, Town Hall, Ramsgate:—

	Kerb. £	s.	d.		Setts. £	s.	d.
Mountsorrell Co.....	1	8½	....		2	2	3
J. Freeman.....	1	2	....		1	10	0
A. & F. Manuelle.....	1	1½	....		1	7	5
Hughes & Co.	1	3	....		1	2	0
Blichfeldt & Co.	1	1½	....		1	9	0
W. Wilson	1	4	....		1	6	10
Brunton & Son	0	11½	....		1	4	0
Goodchild & Co.	1	3½	....		1	12	0
,, ,, ...	1	1½	....		1	7	9
Burgess & Co.	1	8	....		1	9	6
Watson & Co.	1	2	....		1	15	0
Goldie & Co	1	2	....		1	5	6
International Co.	1	8	....		1	11	9
J. Brunton	1	2½	....		1	11	0
Sommerfeld & Mead	1	2½	....		1	11	0
J. H. Scanlan.....	1	5	....		1	5	0
Gordon & Son.....	1	1	....		1	9	6
Brookes, Ltd.....	1	1½	....		1	4	0
Road Maintenance Co. ..	1	1½	....			—	
Trickett & Son	1	2	....		1	7	6
H. L. Cooper.....	1	2	....		1	9	6
Griffiths & Co.....	1	2	....		1	9	6
Van Praagh & Co.*	1	0¾	....		1	6	3

[*See also next page.*

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ST. NEOTS.—For the supply of granite road metal, kerbing, &c., for the Urban District Council. Mr. John Edey, surveyor, South-street, St. Neots, Hunts :—

	s. d.	
Ellis & Everard, Burdon Hill	11 6	Ton for 2½ in. broken granite.
Gumbey & Co., Sutton Bridge....	10 3	Ton for 2 in. Stoney Stanton ditto.
Groby Granite Co., Groby, near Leicester.....	10 6	Ton for 1½ in. Groby ditto.

Quantity—500 tons from each.

Van Praagh & Co., 6, East India Avenue	1 3	Foot lineal for 1,000 of 6 in. by 12 in. granite kerb.

[All the above delivered at St. Neots Station.]

SHREWSBURY.—For the erection of a covered cattle sale ring, for the Corporation. Mr. W. Chapple Eddowes, Borough Surveyor, The Square, Shrewsbury :—

E. H. Nicholas	£1,280 0 0	Jno. Gethin ..	£1,037 0 0
Geo. Bullock..	1,093 0 0	Morris & Sons	1,020 0 0
Hadley & Son.	1,086 11 8	H. Price, Shrewsbury*	996 0 0
A. G. Roberts.	1,053 19 0		

[Borough Surveyor's estimate, £1,000]

SUNDERLAND.—For the erection of vicarage, St Mary's, Tyne Dock, for the Rev. L. P. Williams. Messrs. J. Potts & Son, architects, 57, John-street, Sunderland. Quantities by architects :—

R. Storey	£2,100 10	W. Hall	£1,960 0
J. Young.....	2,100 0	J. Armitage	1,950 0
Robertson	2,000 0	W. D. Allison ..	1,909 8
W. B. Cooper....	1,997 10	S. Sheriff, South Shields	1,869 11
J. B. Stott	1,980 0		

THORNTON HEATH.—For new drainage and sanitary works at Nos. 14 and 16, Quadrant-road, and Nos. 16 and 18, Elliott-road. Mr. E. H. Dance, architect and surveyor, 185, Victoria-street, S.W. :—

J. Westbrook.....	£152 5	H. Bacon*.....	£122 9
Kemp & Son	130 5		

TONBRIDGE (Kent).—For the supply of 1,200 tons granite road metal, for the Urban District Council. Mr. W. L. Bradley, C.E., Tonbridge Castle :—

		Per ton. s. d.
C. M. Manuelle, London	2 in.	14 6
	1½ in.	14 9
	½ in.	13 0

WITHAM (Essex).—For the erection of an engine-house, &c., for the Urban District Council. Mr. F. S. Courtney, engineer, 25, Victoria-street, S.W. :—

Wm. Brown	£2,550	T. Hutchison	£1,958
Windsor & Co.....	2,306	Ernest West, Chelmsford*	1,850
Smith & Son.....	2,025		
Richards & Son	2,007		

WOODHALL SPA (Lincs.).—For the execution of sewerage works, for the Urban District Council. Mr. Ernest Bolton, Surveyor, Woodhall Spa, Lincs. :—

F. Steadman..	£3,555 5 0	F. M. Harrison, Lincoln*	£1,994 4 3
E. T. Edwards	2,526 15 6	Roberts & Co.	1,483 4 0
Vickers & Co.	2,350 0 0	Spokes & Sons	1,438 0 0
The Oak Building Co.....	2028 18 11		

WOODHALL SPA.—For sewerage works, for the Woodhall Spa Urban District Council. Mr. Ernest E. T. Bolton, C.E., Surveyor, Council Chambers, Woodhall Spa. Quantities by Mr. MacBriar, Lincoln :—

F. Steadman	£3,555 5 0	J. M. Harrison, Lincoln*	£1,994 4 3
E. J. Edwards	2,526 15 6	Roberts & Co.	1,483 4 0
Vickers & Co.	2,350 0 0	Spraker & Sons	1,438 0 0
Oak Building Co.	2,028 18 11		

WORTHING.—For the erection of fire brigade station, cottages, &c., High-street, for the Corporation. Mr. Frank Roberts, Borough Surveyor, Municipal Offices, Worthing. Quantities by Borough Surveyor :—

F. Farnfield ..	£3,864 12 5	W. W. Sandell	£2,603 2 0
Bostel Bros. ..	2,925 0 0	Sattin & Evershed.....	2,548 0 0
Potter Bros. ..	2,791 0 0	Rowland Bros., East-street, Horsham* ..	2,309 0 0
Longley & Co.	2,739 0 0		
Cook & Sons..	2,679 0 0		
W. Sandell ..	2,617 10 0		

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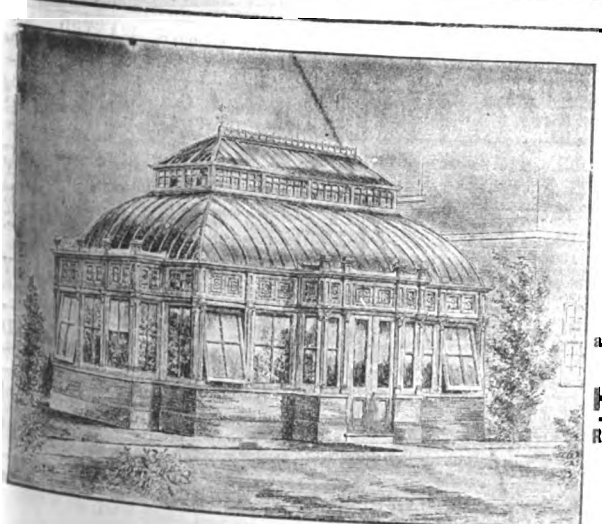

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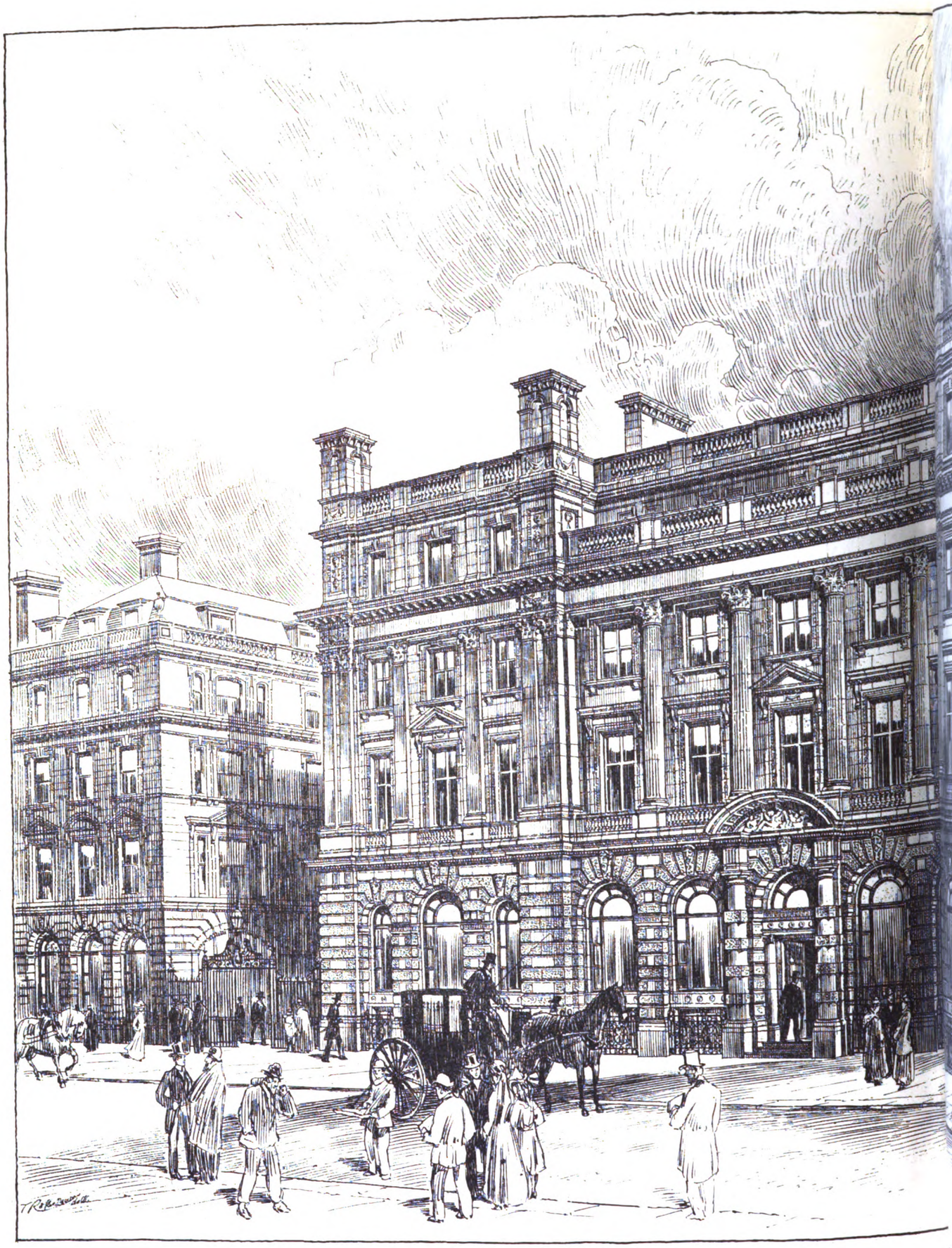

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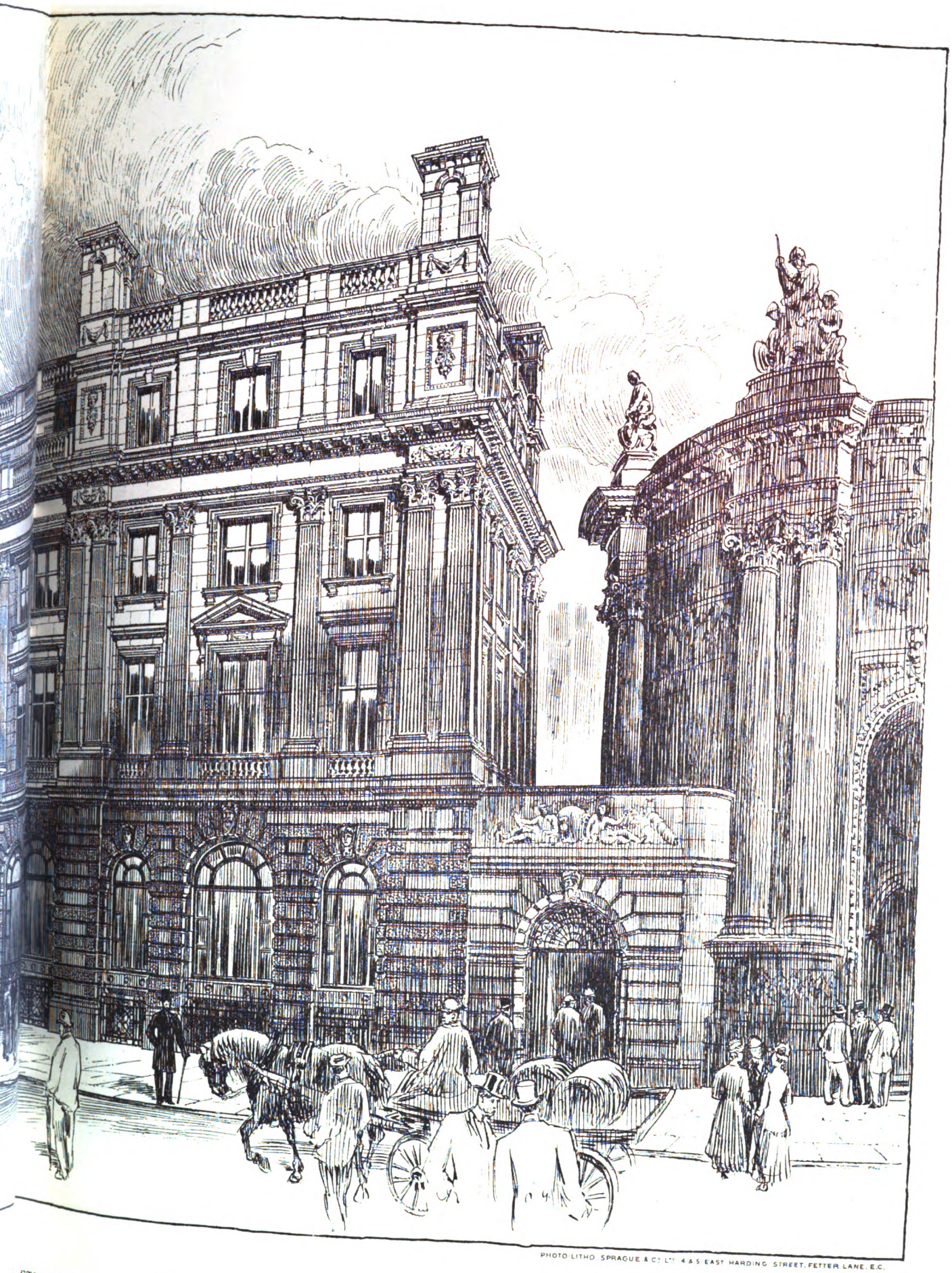

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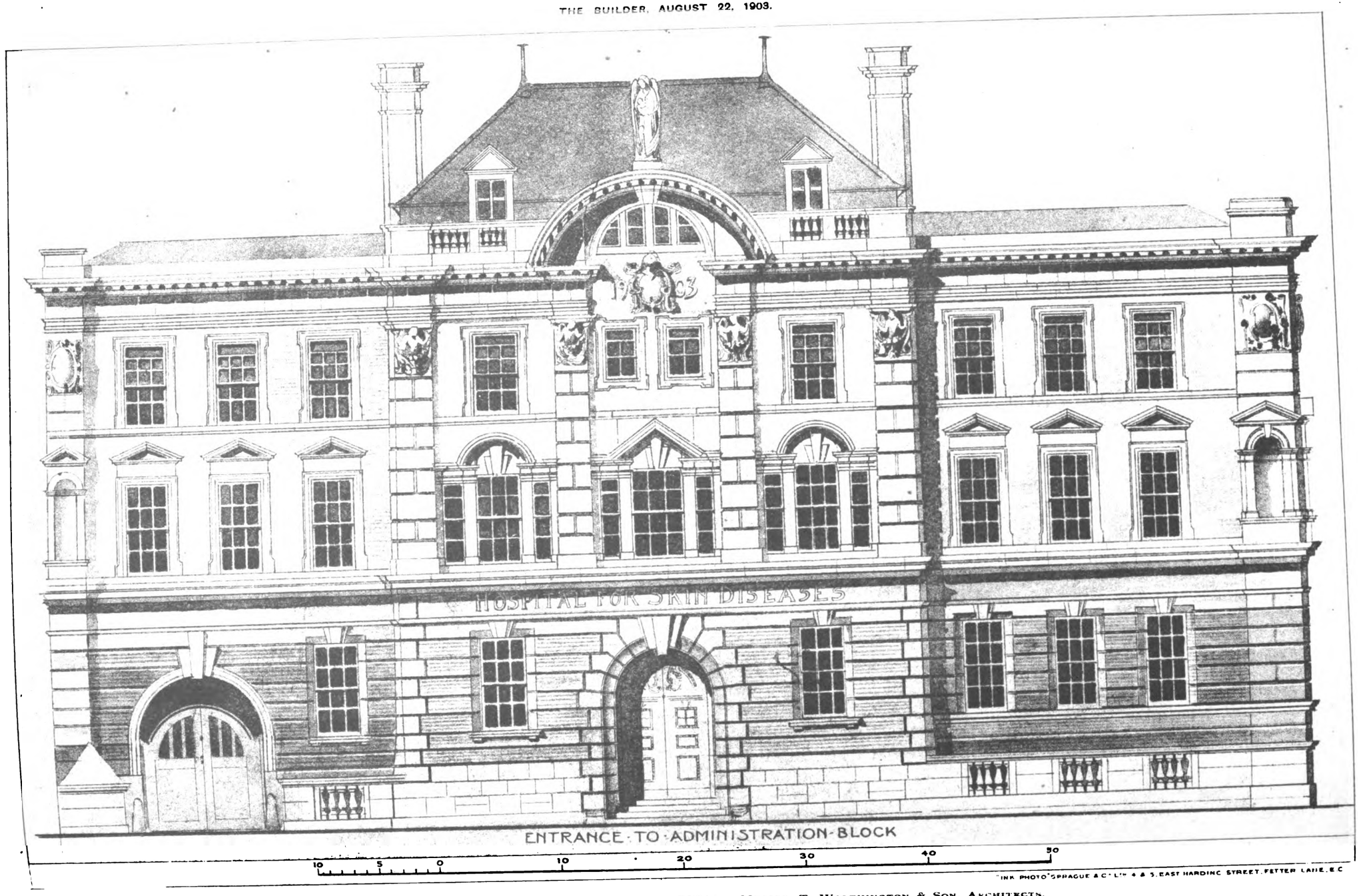

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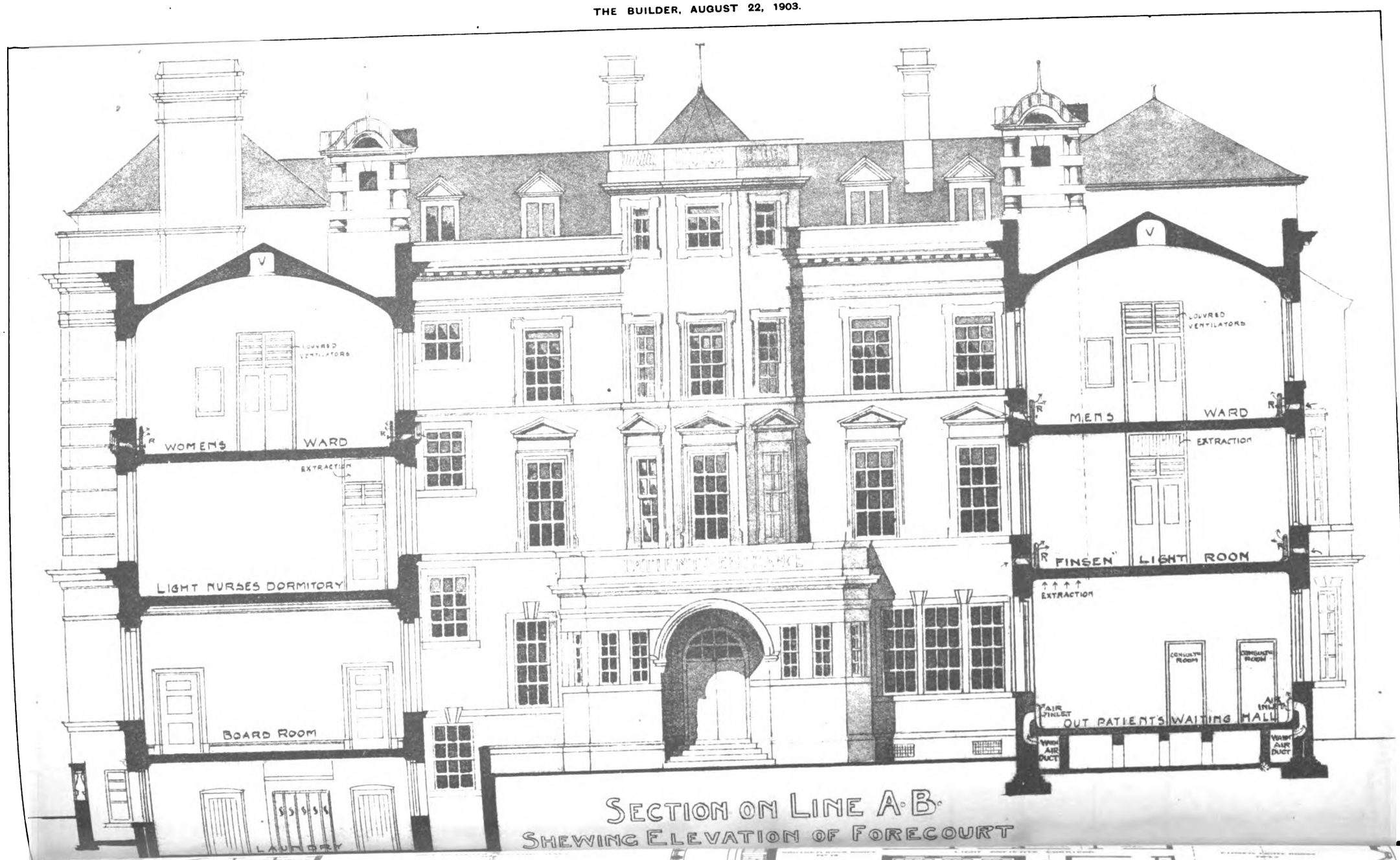

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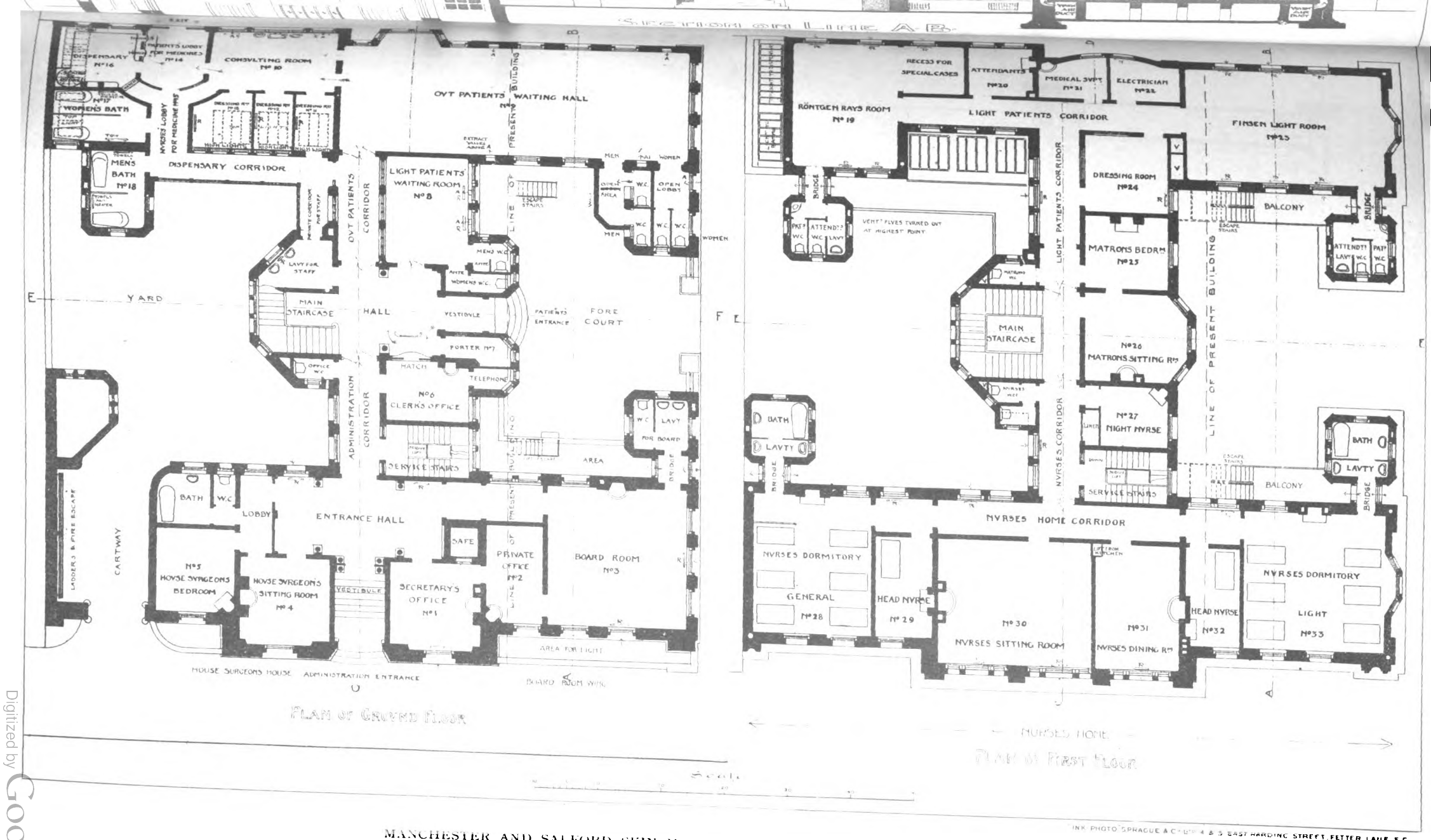

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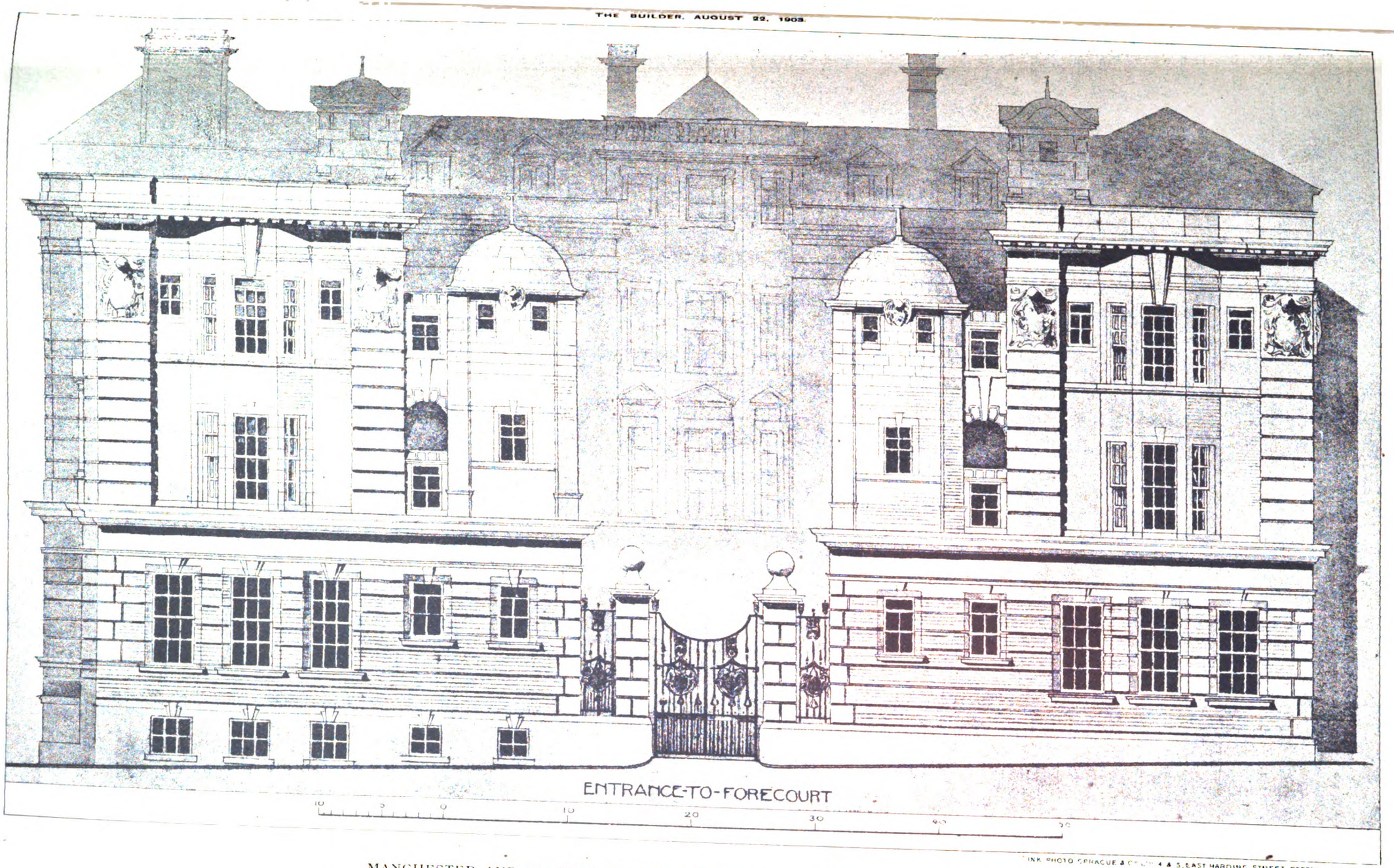

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The Builder.

VOL. LXXXV.—No. 3160. AUGUST 29, 1903.

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"High Garth," Headingley, Leeds ..... Messrs. Bedford & Kitson, Architects.
Cottage, Port Erin, Isle of Man ..... " " "
Houses at Colorado Springs, U.S.A. ..... Mr. T. Maclaren, A.R.I.B.A., Architect.
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The Flexure of Beams.

PRACTICALLY no new light has been thrown on the application of laws governing the flexure of beams for many years past, and treatment of the subject in text-books has become conventional. Many points are perfectly clear and are satisfactorily expounded; others are obscure and are disposed of with more or less indeterminate generalities. So it happens that the designer has frequently to rely upon experience, either his own or that of other people. The lateral resistance of beams is a part of the general subject that is not considered so fully or so precisely as it should be. It is true that the similarity of the failure of a beam by buckling to the failure of a long column has not passed unnoticed, but there has hitherto been no definite attempt to connect the two methods of failure by mathematical reasoning. This connecting link has now been furnished by a recent work,* wherein the author shows that by means of an extended series of experiments he has succeeded in establishing the fact that beams of considerable length fail by buckling after the manner of long columns. More than this, he was enabled to establish an equation showing that Euler's formula is essentially the basis for long beams as well as for long columns; and, further, he determined the limits within which beams fail, as indicated by the usual rules, and beyond which they fail by buckling.

After many unsuccessful attempts to solve analytically a familiar question in flexure, and being desirous of acquiring reliable experience, Mr. Guy undertook several series of experiments, the first of which is described in the present treatise. To use his own words, "He was thus fortunate in discovering some laws which had escaped investigation, and which will be found of the greatest utility."

In these experiments the author employed as beams strips of white pine carefully selected and free from imperfections. The plan adopted in his first tests was to place a beam horizontally on supports, loading it at the centre and increasing the load until the beam gave way by transverse rupture. Thus was obtained the variation of the load corresponding to variation of the length. Next, beams of equal height but of different thicknesses were tested in a similar manner, and the results showed the variation of load for different thicknesses. Finally, beams of the original thickness but of different heights were tested as before, and the result gave variation of load for different heights. Careful comparison of the results served to demonstrate the following laws:—

1. *The load is inversely proportional to the square of the span.*—Thus, if P and P_1 are the different loads applied to one beam, the distances between the supports being respectively L and L_1, the result is that $(P \div P_1) = (L_1^2 \div L^2)$.

2. *The load is directly proportional to the cube of the thickness of the beam.*—Thus, two beams of the same length L, between supports, and of the same height h, but of different thicknesses b, and b_1, will warp under the respective loads P, and P_1. Thus: $(P \div P_1) = (b^3 \div b_1^3)$.

3. *The load is directly proportional to the height of the beam.*—Two beams of the thickness b, and the same length L, between supports, but having different heights h and h_1, will warp under the respective loads P and P_1. Therefore: $(P \div P_1) = (h \div h_1)$.

As $b^3 h \div 12$ represents the least moment of inertia (I) of the section, it is evident that laws (2) and (3) may be combined and stated thus: $(P \div P_1) = (b^3 h \div b_1^3 h_1) = (12 \div b_1^3 h_1)$ $(b^3 h \div 12) = I \div I_1$, showing that the load is directly proportional to the least moment of inertia of the section. Consideration of the three equations indicates that the load is directly proportional to the least moment of inertia of the section and inversely proportional to the length. For two beams of uniform section $(PL^2 \div P_1 L_1^2) = (I \div I_1)$, and for one beam subjected to different loads; $(PL^2 \div P_1 L_1^2) = (I \div I_1) = 1$. Hence $PL^2 = P_1 L_1^2$ and is a constant. In this conclusion we have an important point, because if for a certain length L, it is found that a load P causes the beam to fail laterally, the deflecting load P, corresponding to any length L, may be determined by the equation $P_1 = PL^2 \div L_1^2$. This deduction is said to have been fully confirmed by the experiments, which show that for any given length there is a corresponding load which causes the lateral bending; the product PL^2, being always a constant irrespective of the moment of inertia or shape of the section. There is also a certain value of P, at which the beam is just as likely to buckle as to break transversely, that is when $PL = PL^2 \div L$. A result observed during one series of the experiments was that while the parabolic curve due to bending lies in a vertical plane, the curve due to buckling is S-shaped and lies in a horizontal plane, but in short beams requiring a heavy load to cause buckling, the lateral curve forms the arc of a circle. Moreover, with beams of I and T sections, the S-curve is difficult to obtain. When the double curve is manifested it appears to be possible to further increase the load by about one-half before the elastic equilibrium of the beam is destroyed. Mr. Guy attributes this increase of strength to the new shape assumed by the beam, and he adds:—"This explains why the recorded loads for the plain rectangular-sectioned beams are so much in excess, relatively, of those applied on the I beams." The peculiarity of rectangular beams in this respect has been discussed by many writers, but no one has hitherto formed an intelligible or satisfactory theory, and the explanation now offered appears to be a reasonable one.

The symbol f, representing the modulus of transverse rupture, is commonly applied to denote the transverse strength of beams, but its value does not coincide either with the tensile or the compressive strength of the material, and varies with the form of the cross section. At the present time the value of f is determined solely by experiment, but if Mr. Guy's theory should prove to be correct, as certainly appears probable, the value in question may be calculated for every case, and an obscure point will be finally cleared up.

In another series of experiments, the author supported a beam in such a manner that the ends were free to move under the action of the load, while in the first case the ends were held on the supports by friction due to the load. He then found the beam gave way by buckling, but the resultant curve, lying horizontally, was in the form of a circular arc. This points to the similarity of effects between those produced in a beam by direct bending and those due to an axial.

* "Experiments on the Flexure of Beams." By Albert E. Guy. New York: D. Van Nostrand Co. 1903.

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thrust causing lateral bending in a column. Referring to Euler's well-known formula, $P=n^2\pi^2EI \div L^2$, Mr. Guy remarks, "If for a bar of uniform section we vary the load or the length without changing the mode of application of the load, the quantity ($n^2\pi^2E$) becomes a constant, and we have the formula $P = \text{constant} \times I \div L^2$, which is identical with our formula found from the experiments on flexure." Recognising the fact that the load is applied axially in one case, and transversely in the other, Mr. Guy properly says that the terms (n^2 π^2) have to be modified by a coefficient, the nature of which he next endeavours to determine. Before launching into purely mathematical analysis, he thought it would be logical to ascertain experimentally the degree of similarity between the laws of the elastic equilibrium of a beam subjected to flexure and the theoretical laws of Euler governing the equilibrium of a column. Consequently, a third set of experiments was undertaken on specimens held at one end and loaded at the other, the load in each case acting vertically. Bars were tested in the following positions: (1) horizontal, (2) 30 deg. with the horizon, (3) vertical with axial load. From the tabular statement of results under conditions (1) and (2) it is quite clear that the product of PL^2 is practically a constant quantity, and Mr. Guy's first law is sufficiently verified, although, as he himself admits, the second and third are not conclusively established. The next experiments made were directed to tests of the bars in the vertical position under ideal conditions, and the three laws were entirely verified, the results being almost identical with those indicated in the formula—$PL^2 = \frac{\pi^2}{4} EI$. Such a result is extremely interesting as affording a practical verification of Euler's theory. Tests upon the bars at 45 deg. and 60 deg. with the horizon had been intended, but were deferred owing to some difficulties experienced. Experiments afterwards made with a bar placed at an angle of 60 deg., and their repetition on several bars, incidentally established the noteworthy fact that if the loaded end of a bar were prevented from turning about its axis it would carry a greater load than if the end were free to oscillate. Further demonstration of this fact is to be found in a test upon a bar fixed as a horizontal cantilever and loaded at the end. Just before buckling the bar was longitudinally straight, but vertically bent. With an increase of load the compression part buckled and became curved; the bar was thrown to one side, and the two lower edges became unequally strained. The curve assumed by the upper edges was less abrupt, and it follows, therefore, that the bar was actually twisted. Hence any force which can prevent such twisting must necessarily increase the capacity of a cantilever. This incidental result directly proves the fact—overlooked by many architects and structural engineers, and only mentioned in one textbook to our knowledge—that the actual resistance of a member depends very greatly upon the rigidity of the adjoining members with which it is connected. The capacity of a given member for performing its legitimate duty may be diminished by severe and totally unexpected stresses, owing to the flexure of adjoining members, and conversely its capacity may be increased. This point is of much importance in structural work of all kinds; its neglect inevitably brings about unsuspected weakness where strength is most necessary, whereas its recognition affords valuable aid to the designer by enabling him to add materially to the elastic equilibrium of his work.

Pursuing his experiments further Mr. Guy devised a method of suspending the load so that the bars could deviate or twist freely, and tests were thus made in four positions:—horizontal, and at angles of 30 deg., 45 deg., and 60 deg. with the horizon, with the result that they were found to give way by buckling under exactly the same loads that caused lateral collapse in the vertical position. This is another remarkable fact brought to light by the author's investigation.

Assuming the correctness of Euler's law for columns and of the assumption that this also governs the flexure of beams, the reason why a bar buckles under load when held vertically, horizontally, or in any intermediate position is demonstrated by the author on these lines. The vertical force $P=P (L \cos a) + (P \sin a)$, the first component acting perpendicularly to the length, the second acting axially on the solid. Since the load applied is equal to that which buckled the same solid of length L, in the vertical as in the horizontal position, it is evident that the effect produced is due to the joint effort of the two components. Hence $PL^2 (\sin^2 a + \cos^2 a = \text{constant}$.

But $\sin^2 a + \cos^2 a = 1$; hence $PL^2 =$ constant for any position between the vertical and the horizontal, above the latter. Conversely, when the angle is below the horizontal the tensile force constituting one component of P tends to prevent buckling, and the greater the angle the less is the tendency of the bar to buckle. In the first experiments made upon beams supported at the ends the load was attached in such a manner that the centre of the beam was forced to remain in a vertical plane, preventing it from twisting, causing the double curvature to which reference has been made, and thereby increasing the static stability of the system. Hence, as the author remarks, the case resembles somewhat "that of a vertical column held at the base and sustaining at the top an axial load guided vertically." A fresh series of tests were subsequently made with the improved method of suspending the load giving the bar entire freedom to deviate or twist. The results are stated to have been convincing and the three laws to have been almost perfectly verified. The author gives tables showing the results obtained with timber beams of rectangular, I and T section, and makes the remark that he could add a large number of others, but that being satisfied for himself that the laws advanced in his memoir have been verified, he "would prefer to see the matter taken up by competent investigators, having at their disposal perfect testing apparatus, and who would confirm his own work, or indicate necessary modifications of the formulas given here."

Mr. Guy's experiments were conducted with specimens of small sizes, permitting the selection of almost perfect material and with apparatus conforming closely to theoretical requirements. In this manner three laws governing the elastic equilibrium of solids have been elucidated. That they are sufficiently in agreement with experimental results, and that they confirm, and are at the same time confirmed by, the purely mathematical investigations of Euler are facts that will certainly commend them to the consideration of all who are interested in the flexure of beams. The first law of the elastic equilibrium of solids is worthy of note. It indicates that a beam will buckle if the load be such that PL^2 is a constant. Not less suggestive is the deduction from the angular tests, that the components of one force are capable of uniting in one common effort to destroy the condition of equilibrium.

Towards the end of the work some examples are given showing a simple method of designing beams so as to comply with the usual requirements of strength and rigidity, and to provide against failure by lateral collapse. This method serves to make clear some points often treated in a vague and indeterminate fashion. For instance, in the case of a I beam with solid web, although the sectional area of the flanges may be calculated, the width and thickness producing the required area are generally arrived at by assumptions. Again, with regard to the thickness of the web, passages occur in text-books to the effect that "if made too thin the web will have little stiffness, and will be liable to bulge with compressive stresses," and that "it will be found necessary to introduce vertical stiffeners to keep the web straight, and to give lateral rigidity to the girder." But we have not observed any attempt to calculate the proportions necessary for resisting compressive stresses in solid webs, or for ensuring lateral rigidity. In the case of small beams of *I* section, the mode of procedure usually advocated is to calculate the required moment of resistance and then to select from some standard table of beams a section complying with requirements. This method may be very convenient in practice, but is obviously imperfect in theory. In the solution of a similar problem, the process adopted by the author is as follows:—First, the height of a beam is ascertained by a rule based on the laws governing deflection. The bending moment, the required greatest moment of inertia, and the required moment of resistance are then computed. Next, the area of the section is calculated by considering height in connexion with the moment of inertia. The thickness of the web is calculated with due regard to safety against buckling; the distance between the flanges is next ascertained, giving the required thickness, and the total flange width is then found. All these values and dimensions are readily calculable by the formulas deduced by the author, and when they are established, the requirements of strength and rigidity are fulfilled; but it remains to calculate the least moment of inertia of the section as determined, and to compare it with that necessary for insuring safety against buckling. The moment of inertia is therefore calculated with respect to the vertical axis of the section, and the value of I required to insure security against lateral collapse is derived from the equation

$$PL^2 = \frac{\pi^2}{4} EI,$$

Employing a factor of safety of 2, the rule finally becomes $I = 8PL^2 \div \pi^2 E$. If the least moment of inertia should prove to be ample, the problem is completely solved. On the other hand, if slightly deficient, the flanges may be widened a little to provide the necessary lateral resistance.

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Beams of uniform strength are easily calculated when of rectangular section, but if of I or T section, they usually involve somewhat tedious work. Mr. Guy proposes to reduce this by adopting the principle of considering the beam as if it were divided into a number of longitudinal parts, each of which is treated as an element and made of uniform strength—the sum of the elements will then be of uniform strength.

It may be noted in conclusion that the author does not differentiate between the terms "beam" and "cantilever" as usual in this country. This, of course, is a matter of detail which does not interfere with the application of his principles. Another detail to which objection may be taken is the unnecessarily grotesque manner in which many words are misspelt, and another still more objectionable is that several printer's errors are to be found in the equations intended to elucidate the author's theories.

We have referred at some length to this investigation and its resulting formulas because they appear to mark a new departure of some importance, and to make clear points that have hitherto been obscure.

NOTES.

Radium and Helium.

THE "mysteries of radium" still absorb the attention of a portion of the scientific world, and we feel quite sure that they will do so for some time to come. The latest phase is the connexion between radium and helium, if such exists. The paper just published in the "Proceedings of the Royal Society," by Sir William and Lady Huggins, is sufficiently ambiguous to warrant some comment on the circumstance that the spectrum photographed may not be the spectrum of helium at all, but merely the well-known band spectrum of nitrogen. A lingering affection for the view put forth in the earlier part of the paper may be noted in the remark that with a new sample of radium bromide, and long exposure, indications of helium may yet be forthcoming. That, however, seems somewhat speculative. It is known that radium ozonises the oxygen of the air, and the concomitant production of an oxide of nitrogen cannot be wondered at. The chief point, however, is this, that radium does not generate helium by the break-up of its own molecules. It is quite clear from these recent investigations that much more experimental work of a practical, and not of a theoretical, character will have to be carried out before we shall fully understand the relationship between radium and helium, and it seems to be certain that the spectroscope alone is unable to afford the most reliable clues. Underlying all this there is the possibility that with a more definite understanding of these rare elements many physical and chemical experiments having a practical bearing—especially in regard to "fatigue" in metals, including girders and so forth—will be much better appreciated by professional men.

The Metropolitan District Railway.

THE long-delayed "electrification" of the Metropolitan District Railway is at last being proceeded with, as a contract for all the District Company's new trains has been placed by Mr. Yerkes with the British Thomson Houston Company. The system adopted is the "multiple unit train control," and is practically identical with that now in use on the Central London Railway and on the elevated railways of New York and Boston. It will be remembered that the Central London changed over to this system on account of the vibrations caused in buildings directly over their tube by the heavy locomotives formerly used. The recent catastrophe in Paris has naturally turned public attention to possible dangers arising from fire in underground tubes, and there can be no doubt that a separate locomotive with iron framework is not so likely to communicate fire to the passengers' carriages as electrical apparatus carried on the carriages themselves. Still, Mr. Parshall's recent letter to the *Times* describing the arrangements of the cables, motors, &c., on the Central London shows that dangers arising from electrical fires at least have been reduced to a minimum. The electrical apparatus is separated from the passenger part of the car by a fireproof steel partition. The efficiency of this arrangement was tested by allowing all the apparatus in a train to burn itself out, and it was found that no damage was done to the passengers' compartments. No such safeguard is in use on the Paris Metropolitan, and their system is not that known as the "multiple unit train control." There will be three motor-cars on each District train, which will be controlled by a single driver. If the driver for any reason becomes incapacitated and fails to hold the driving lever firmly, then the train automatically stops. This method of control has also been adopted by the Newcastle lines of the North-Eastern Railway and the Great Northern and City Railway.

The County Council Tramways.

SINCE our recent "Note" with regard to the dangerous conditions to which passengers on the upper decks of cars were subject at Clapham and Balham railway bridges, we learn that steps have been taken to afford more efficient warning to the public. The under surfaces of the bridges were already ceiled with timber painted white, and timbers have now been added so as to project some 6 ft. from the sides of each bridge. Across the ends of these, horizontal rails are fixed from which short pieces of chain are hung. The rails are at a sufficient height to clear the heads of persons who may thoughtlessly stand up when approaching either bridge, but the chains are low enough to serve as an efficient reminder that it would be wise to sit down. The further precaution has been taken of stopping cars on both sets of metals in front of the bridges to set down and take up passengers. Consequently the cars pass under the bridges at slow rates of speed and there is very little risk of injury even to thoughtless members of the public.

Trolley Lines without Rails.

ELECTRICIANS have been very interested recently in the question of electric trolley omnibuses, and the results of two years' working of this system of locomotion in the Biela valley, near Dresden, have proved very satisfactory. The omnibuses collect current from two trolley wires by means of contact shoes instead of wheels at the end of two trolley poles, but in other respects the working is very similar to ordinary tramcars. The overhead equipment, however, is much simpler, as there are no "frogs" or crossings provided. The trolley poles are sufficiently long to allow a deviation of 10 ft. on either side of the wires, and when two omnibuses meet the conductor of one of them simply lifts the two trolley poles from the wires until the other passes. It is found that the friction coefficient is about double that of a vehicle on rails, but the increased cost of the working is only about 25 per cent. greater than that of a tramcar system, as the weight of the car per passenger is considerably greater in the second case. The capital cost of an omnibus line, apart from the power-station, is only about a quarter that of a tramline, and it can be operated in narrow streets, where rails would be practically out of the question. Several of these lines are being constructed on the Continent, and it is anticipated that they will prove very useful for the conveyance of goods, as each factory can run out, when necessary, wires to the trolleys, and thus enable the electric motor-cars to deliver the goods at its doors, and thus save the expense of transhipment. In the Dresden line the route has a continuous gradient of 2½ per cent., but the roads are good. Some recent tests show that the cars can mount gradients as steep as 1 in 10.

A Safety Lock for Passenger Lifts.

IN spite of the fact that most lift-makers now supply their apparatus with safety devices of various kinds, there are numerous lifts at work in London and elsewhere which are not furnished with appliances for the adequate protection of the public. One fertile source of accidents is to be found in the absence of reliable safeguards to prevent the door of a lift-well from being opened until the cage is in a proper position. A new form of the Hollins-Amendt locking gear, which has recently been adopted at the Great Eastern Railway Hotel, is one of the most ingenious arrangements of the kind. The electric interlocking apparatus brought out by the patentees some time ago has now been supplemented by a purely mechanical system, which can be applied to any existing lift by an ordinary carpenter, and at a very moderate expenditure The principle involved is very similar to that governing the operation of railway-signalling mechanism, and the great recommendation of the locking gear is that until any one of the lift doors—which has been opened to admit passengers—has been closed and locked, it is impossible for the cage to be started. Conversely, until the cage has been stopped at its destination, the door at that point cannot be opened. Briefly described, the contrivance consists of a grip-lock inside the lift to engage the rope regulating the motive power, and a similar lock on the door of the lift-well at each floor. One key regulates both locks, and unless it is in either the door or the grip, the lift cannot be used. When all the doors are locked, the attendant can take the key from the last door he has secured and release the grip, but he cannot again obtain the key until the grip is once more locked on the rope. Consequently, none of the doors can be left either open or unlocked unless the cage is there ready for passengers. The only drawback appears to be that, as a spare key is kept inside the lift for emergencies, the unauthorised use of

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this key might leave a loophole for accidents. But this is a somewhat remote contingency.

Indian Irrigation.

IT is satisfactory to find from the Report of the Irrigation Commission appointed by the Indian Government that a vigorous policy is recommended for the purpose of extending and developing the natural resources of the country. The Commissioners propose a total expenditure of more than 40,000,000*l.*, extended over a period of twenty years, on protective works, and they recommend the allocation of about 500,000*l.* annually to provide for loans on private irrigation works, and for free grants on unproductive protection works. Among schemes of engineering works considered in the Report, the most extensive is one relating to the diversion of surplus waters from the Jhelum into the Chenab, and from the latter into the Ravi, with the object of irrigating the lower Bari Doab, thus leaving to the Beas and the Sutlej the irrigation of the desert regions on the southern borders of the Punjab. Of the total sum mentioned above only 20,000,000*l.* will be directly productive; but there is no doubt that the whole of the works to be executed will be of great benefit to the country, and that they will materially increase its power of resisting famine.

Trades' Training Schools, Carpenters' Company.

THE Report of the judges on the work done at the Trades' Training Schools of the Worshipful Companies of Carpenters, Joiners, Painter Stainers, Plasterers, Tylers, Bricklayers, and Wheelwrights testifies to the sound technical training obtainable at these schools. The attendance and evident activity among the students, as shown by Mr. Phillip Fletcher's Report, is proof of the great benefit such teaching confers upon our crafts and the appreciation of it by our craftsmen. The Report is a full record of the work carried out in the schools, and is illustrated by photographs of some of the work executed. One of the most interesting sections is the carpentry classes, which show a model of the centring for Waterloo Bridge; a groin and a model of Hampton Court roof truss in oak, besides other roof trusses and elementary work in jointing. It is to be regretted that the work of the schools suffers from lack of motor-power and machinery, which are such necessary adjuncts to a modern workshop, and the management would do well to supply this want as soon as possible so that the education may be kept more on the lines of the actual practice of the student. That technical education is the only practical way of raising the standard of the crafts under the present condition of our workshops there is no doubt, and the closer the teaching of the school is to the practice of the workshop the more satisfactory will be the result. The trades suffer much from the crowds of incompetent and careless workmen whose interest in their work is confined to pay day, and whose training has done nothing to raise in their minds a sense of the dignity of their work. Without the stimulating influence of the school there is little hope of improving this condition, and the more complete our education the greater will be the interest and the practical benefit derived therefrom.

University College, London.

THE increasing demand for the establishment of a sound basis of architectural education in our Universities is evidenced by the prospectus of the University College, London. It is prefaced by a concise note from Professor Simpson in which he lays down the advantages to the student of a preliminary course of architectural study before entering an office, where the education in the most vital details of his profession is too often wanting. Professor Simpson writes:—"The advantages of a preliminary course are briefly these: 1. The training is systematic and continuous. 2. All details of construction, some of which in an office are often omitted because they are taken for granted by both architect and builder, are fully worked out and explained. 3. The student has to think for himself from the first, and not merely to interpret the thought of others, and yet he receives far more personal supervision than can ever be given by a busy architect in practice. 4. The saving in time is considerable, as none is wasted over drawings and tracings which the student does not understand. 5. It tests his fitness for work, and weeds out the unfit. The architectural course at University College is framed, in the first place, to provide a systematic training in the practical and æsthetic sides of architecture and in subjects closely allied to it; and, in the second, to encourage students to continue their general education, and so bring them into touch with other students in other departments who are pursuing different courses of study." This latter, as a leader to the many-sided nature of practising architecture, has been too often underestimated in the hitherto self-imposed curriculum of the architectural student, who realises only in his more mature days the want of a broader education. The syllabus provides a three years' certificate course, including special matriculation examination and full architectural course, and students not wishing to take the certificate course can attend merely the architectural and drawing from the antique classes, devoting their whole time to these. The second and third years include training in all the branches of the "practical and æsthetic sides of architecture." Classes in planning and design, and outdoor visits to buildings of interest, are also included. Such a course of study will go far towards the abolition of the pupilage system, which has so little to recommend it. After completing his course the student can enter an office as improver for one or two years, with advantage to himself and his employer, and with a groundwork upon which to build according to his natural talents. Altogether, the syllabus is a hopeful sign of the more serious consideration which the study of architecture is now finding with educational bodies, and is a distinct progression towards a more healthy and living interest in the minds of the public. Professor Simpson will deliver the inaugural lecture (subject, "Architectural Evolution") on Wednesday, October 7, at 5 p.m., Mr. Aston Webb, R.A., in the chair.

BRITISH VARNISHES IN ITALY.—H.M. Consul at Rome, in a Report on the trade of Central Italy, states that British varnishes are generally preferred in Italy to all others. The imports of varnishes into Rome from the United Kingdom in 1902 were valued at 107*l.*, as against 125*l.* in the preceding year

THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

PORTMADOC, the rendezvous of the Cambrian Archæological Association during the week commencing the 17th inst., is an uninteresting little seaport town situated in the northern portion of the crescent formed by the beautiful bay of Cardigan. In itself it possesses no attraction for the antiquary; its very existence, indeed, dating only from the commencement of the last century, when the enterprise of a wealthy Englishman named Madocks founded both it and its satellite village, Tremadoc, upon land which he reclaimed by the construction of an embankment across an intrusive arm of the sea. The port forms the natural outlet for the product of the important slate quarries of the Festiniog district. The town is not only the most convenient centre for excursions into Snowdonia, but has also lying around it, and within easy distance, a number of interesting objects of antiquity. Prior to the conquest of Wales by Edward I. A.D. 1282, the district formed the commot of Eivionydd, and the name long survived as an administrative division of Edward's newly-created county of Carnarvon. It continued intensely Welsh in sentiment, whilst its sequestered position between the giants of the Snowdon range and the Western sea tended to perpetuate the primitive customs of its inhabitants. In no part of Wales was the tribal system more deeply rooted, and nowhere else were the constant disputes of clan with clan more frequent and more ruthlessly conducted. Sir John Wynne, of Gwydir (died A.D. 1626), who himself relates the circumstance in his valuable "History of the Gwydir Family," states that an ancestor of his, having removed from his patrimonial district of Eivionydd to that of Nantconwy, then swarming with thieves and bondmen, explained his action by saying that he should find elbow room in that vast country among the bondmen, and that he had rather fight with outlaws and thieves than with his own blood and kindred, for quoth he, "If I live in mine house in Evioneth I must either kill mine owne kinsmen orlbe killed by them." The annals of such a country and such a people could not fail to be rich in all the elements of romance, though the gloomy and austere religious convictions which Wales adopted some century and a half ago have reduced its modern life and imagination to as grey a shade as that of its rocks.

On Tuesday, the 18th inst., the excursions commenced with a visit to Penmorfa Church, now situated several miles from the sea, but formerly, as its name indicates, a little village at the head of a marsh that upon occasions of high tides was covered by water. The church brought before the visitors a type of edifice of which they saw many examples during the course of the following days. Although itself modern, having been erected in 1698, its builders had adhered to the Mediæval type developed locally, and to which the edifice then replaced had no doubt also conformed. Consisting of only a single chamber, with no structural division marking the chancel from the nave, Penmorfa Church possesses no claim upon the consideration of the ecclesiastical antiquary, save in so far as it affords an example and marks a survival of the typical church of the purely Welsh districts of Eivionydd and Lleyn. That an ecclesiastical building of some sort existed at Penmorfa in very early times, the dedication to St. Beuno, which has been retained by the subsequent edifices, is fair evidence. And what can be proved to have taken place in other parts of Wales is doubtless true of the course of development at Penmorfa. Within the century after the conquest by Edward I. the ancient church, probably the very one erected by the exertions, or to perpetuate the memory of, St. Beuno, was replaced by a building which, however small and mean according to modern standards, was, without doubt, a great artistic and ritual advance upon its predecessor. The reconstruction of 1698 followed the lines, probably the very foundations, of the mediæval church, but the only object said to have been retained is a fragment of stained glass now placed in the lower portion of the west window. This fragment is usually regarded as representing Meredydd ap Ievan ap Robert, the ancestor of the Wynnes of Gwydir, but is really a half-length figure of an ecclesiastic with mitre and staff, and is no doubt intended for St. Beuno. It is possible that other fragments of glass may have existed even down to 1842, when

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certain alterations were made for a small guide-book compiled by one of the local secretaries for the edification and instruction of the visitors observes that "in the western window (formerly a doorway) are some fragments of glass removed from the southern portion of the eastern window in 1842. These fragments are what remain of portraits of Meredydd ab Ievan ab Robert, of Gesail Gyvarch, and Margaret Maurice his third wife in a kneeling posture, with the inscription below of—Orate pro Meredyt ap Evan ap Robert et Margerta (*sic*) verch Maurice uxor ejus qui hanc fenestram fecerunt." A portion of this inscription has been preserved and placed beneath the ecclesiastical half-length figure already alluded to, but bits of the glass have unfortunately been reversed. Meredydd ap Ievan died in 1525, which gives an outside date for the glass, and there can be little doubt that it is of the close of the fifteenth century. The church contains the tombs of Sir William Maurice of Clenennau, who is said to have suggested as an addition to the title of "King" James I. the words "of Great Britain"; and of his son-in-law, Sir John Owen, one of the ablest Royalist commanders during the Civil War. The latter was captured in 1648, condemned to be executed, but was pardoned and permitted to retire to his Welsh estates, where he died in 1666. The present Lord Harlech is the surviving representative of the ancient Welsh house of Clenennau. The western end of the church is crowned by a small single bell gable terminating in a cross. In the space at the intersection of the arms of this tiny cross is a carved head, no doubt intended for St. Beuno, and this, with a few other stones which have been worked into the existing walls, appear to be the sole vestiges of the mediæval structure. There is a modern dial, with a beautiful Welsh poetic motto. Near Penmorfa is a place called Llidiart Ysbytty (the gate of the hospitium) which has yielded large quantities of what are said to have been Roman bricks, but are more probably bricks made by the deserted Britons to the best of their endeavours after the Roman manner. The site is undoubtedly one that was occupied in very early times, but there are no traces of Roman use or residence, and no records of the foundation of a hospice. The next call was at Gesail Gyvarch, once the residence of Robert ap Meredydd, grandfather to the Meredydd commemorated in Penmorfa church. This is a spot that well illustrates the continuity of Welsh history from a time long prior to written documents, for here was discovered in 1881 an inscribed stone which reads, "Fili Cunalipi Cunaci (hic) iacit . . . . . Beccuri," and dates, without doubt, from within the period of the Roman occupation, or from the years immediately succeeding it. The stone marked the burial-place, or was erected in commemoration, of a great Goidelic chief who died in the struggle against the aggressive and advancing Brython. Later, Gesail (the nook—of Cyvarch) formed portion of the tribal lands of the Welsh princes of Gwynedd (Anglesey, Carnarvon, and part of Merioneth). On the gradual adoption of the modern system of land-holding, Gesail became the patrimony of Robert ap Meredydd. During the Glendower troubles this Robert veered from the English side to that of the Welsh patriot, but not until Owen had adopted his usual persuasive method of burning his opponent's house about his ears; all of which is quite historical, for Robert received a pardon in the 10th year of Henry IV. for his enforced defection. Robert's son Ievan sided with the Lancastrian party in the Wars of the Roses, and Ievan's son, Meredydd, constructed the east window of Penmorfa church. It was this Meredydd who moved his residence to the quieter but less aristocratic neighbourhood of Nantconwy, because he neither desired to murder or be murdered by his kinsmen. The present house of Gesail Gyvarch is an example of the common type of farmhouse belonging to, or occupied by, the better class of Welsh farmer, and bears few external or internal traces of its former eminence. A short distance away, amongst other more modern outbuildings, is an old cowhouse, on the lintel of which the date and initials $\frac{A : L :}{1767}$ are discernible. The initial are those of Miss Anna Lloyd, the lineal descendant of Meredydd ap Ievan, upon whose death in 1784, unmarried, the estate of Gesail passed away from the family to whom it had so long belonged. Clennenau, or Clenneney, another ancient house in the immediate neighbourhood, was not visited. It is now completely ruinated and defaced, but it is said that some remains of a large room, supposed to be the fencing-room, and also the walls of the domestic chapel are traceable. Upon the farm of Ystum Cegid, once the residence of another branch of the great sept of Meredydd ap Howel, is a fine cromlech, which was visited by the party and described by Professor J. E. Lloyd, of the Bangor University College. It was at one time much more extensive than it is at present, and at the period of the traveller Pennant's visit to it in 1810 was of the type of those structures called by French archæologists *souterrains*. Its present perfect condition of capstone and supporters is due to "restoration" by the present Lord Harlech. The local name for the cromlech is Coetan Arthur, Arthur's stone, which leads to the remark that the connexion of these exposed sepulchral chambers with the name of the great Brythonic hero must not be taken to mark his presence during life, and certainly not his dwelling-place in death, at any of the spots where he is now commemorated. At Dolbenmaen is a fine mound which is mentioned in one of the earliest romances of the Cymric people, that of Math ap Mathonwy, to be found in Lady Charlotte Guest's edition of "The Mabinogion." The mound was described in the programme as a tumulus, but there does not appear to be good reason for regarding it as sepulchral. It was surrounded by a clearly defined moat, from the bottom of which the mound rises to a height of about 30 ft. Its circumference inside the moat is about 350 ft. No traces of a base-court or of any external defences are discernible. Connected with these mounds there exists throughout Wales traditionary stories of buried treasures, with the result, in many instances, that the mounds have been subjected to irreparable injury. About a century ago the earth at the summit of the Dolbenmaen mound was scooped out so as to form a cock-pit, and a little later a shaft was driven downwards through its centre in the hunt after a hoard of gold. Notwithstanding this usage, it still remains a good example of these interesting objects. Dolbenmaen Church is small, with no structural division to mark off the nave from the chancel. A common wooden bowl serves for the font. There is a small single bell-cote over the western gable surmounted by a cross, but, unlike that at Penmorfa, this is plain. The windows are all modern, small, and mean. The registers date from 1683, and contain a curious entry, made by the parson of the time, of the local festivities connected with the passing through Wales of King George IV. on his way to Ireland in 1821. After luncheon, which was partaken of at Brynkir Hall, upon the invitation of Mr. R. M. Greaves, a drive was taken to Llystyn Gwyn Farm, situated about a mile north-east of Brynkir Station on the London and North-Western Railway between Carnarvon and Afonwen. The farmer here had long had an eye upon a large stone which stuck out of one of his hedges in an obtrusive and inconvenient manner. Last year he determined to remove it, and on doing so found it bore an inscription. The stone, as exposed, measures about 3 ft. by 3 ft. 6 in., and is evidently only the upper portion of what was originally a tall standing stone. The lettering is confined to one corner, the first line, which is the longest, having been started at about a foot from the left-hand edge. The farmer luckily mentioned the circumstance to a gentleman of the neighbourhood, who at once saw that a find had been made of considerable epigraphic importance. Professor Rhys, of Oxford, visited the stone, and subsequently submitted his views upon the inscription to the Society of Antiquaries in a paper which has not yet been published. The reading proves, like many another instance of Welsh inscriptions, to be easy enough, except at one point, where a serious difficulty arises. The lettering runs :—

ICORIFILIV?
POTENTI
NI

The crux is the final letter of the first line. This letter, whatever it may be finally resolved to be, comes to quite the right-hand angle of the stone. Of course, were it an unmistakable capital S, or even what is called a minuscule s (that is, a tall-standing s of the black-letter type form), the inscription would present no difficulty. The reading would be *Icori* (or, perhaps, *[H]ic Ori) filius Potentini.* Mr. Romilly Allen, F.S.A., in the last part of "Archæologia Cambrensis," judging only from a photograph of the stone which appears in the same publication, regards the debatable letter as a minuscule s, and reads the whole as *Icori Filius Potentini.* With this view of the same letter, the Bishop of Bristol agrees, regarding the entire inscription as (*the memorial*) *of Icorius* (? *Icorus*). (*He was*) *the son of Potentinus.* Potentinus, observes Bishop Browne, was at Caerleon, *temp.* Valerian and Gallienus, 253-260 A.D., but he does not think the minuscule or the outlandish grammar can suit so early a date as, say, 300 A.D. Professor Rhys, on the other hand, sees no possibility of reading the questionable letter as an S of any kind. He regards the inscription as commemorative of a Goidelic chief, translated by a Goidel into Latin, and he finds the parallel of Potentinus in the Irish name Ceithernach, which comes from mediæval Irish *cethern* or *ceithern*, in Welsh, *cadarn*, "potens, strong, able-bodied," literally "fit for war." He suggests the first line as standing for *(H)ic Ori filiu(s) F(ili) Potentini*, there being two short lateral strokes attached to an unmistakably straight vertical stroke, thus making the letter an F. The last three words he regards as the equivalent in Irish of *Mac Meic Ceithernaich*, or "McCeithernaigh's son," and as to the construction of the entire epitaph he conjectures "with great diffidence" its meaning to be "Here is the burial place of Ore, son of [Mac] Ceithernaigh." None of the party being provided with rubbing materials, verification of the doubtful point was confined to that questionable medium, the naked eye; but we believe one of the visitors contemplates returning to the stone at an early day for the purpose of endeavouring to settle the uncertainties that at present exist. A new subject of interest was, however, exploited by some of the visitors, who believed they discovered ogam markings upon that angle of the stone at which the lines of Roman letters terminated. This, though not impossible, is hardly probable, since the custom of writing in ogam characters was almost unknown in North Wales, where only one ogam inscription has been hitherto found. On the other hand, it has to be admitted that a region which must have remained strongly Goidelic for centuries after the Roman period is just the district in which inscriptions in ogam might be looked for. Added to this is the fact that there certainly are marks upon the edge of the Llystyn Gwyn stone that are identical with certain ogam vowels and consonants. The urgent necessity for further examination of the stone is therefore apparent. After a brief halt at Rhoslan to inspect another cromlech, the party made for Llanystumdwy. The church of this pretty village has been enlarged and restored to such purpose as to make it practically a good and interesting specimen of modern church building. The original western end has been retained. About 5 ft. from the ground it commences to batter out ungracefully in successive steps, and above this point it presents the appearance of a heavy buttress, which is continued up to a double bell-cote. Above the batter is a modern window of two lights, but it is impossible to say whether it occupies the position of a predecessor. The vicar, the archdeacon of Merioneth, was unable to be present, so that the task of uttering a few appropriate remarks was undertaken by Sir Hugh Nanney. The next call of the party was made at Criccieth, where a minor Edwardian castle crowns a small detached hill upon the edge of the sea. Tradition has it that the present ruins occupy the site of a much earlier British post, but the idea has no foundation in anything now existing, and is somewhat discounted by the fact that a neighbouring hill is called Dinas to this day. A brief paper upon the castle was read by Mr. William George, who dealt with the few historical incidents with which it is known to have been associated; but no attempt was made to describe the architectural features of the fortress. The lost opportunity is all the more to be regretted inasmuch as Criccieth is one of the few Welsh castles that did not come within the range of the late Mr. G. T. Clark's labours. It was so grievously mutilated at the close of the Civil War of Charles I., and the exigencies of a modern watering-place have necessitated such changes in its surroundings, that it is difficult to make out its original plan. So much, however, is clear, that it consisted of an inner court, defended on the north-eastern or landward side by two drum-towers after

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the plan of Harlech, and that, as at the latter castle, the principal apartments must have been placed in the strong gatehouse. The inner courtyard is small and of peculiar shape, the curtain-walls following the irregular course of the hill. The outer defences consisted of a wall running round the hill at a lower level. On the westward and southward sides were towers which commanded the approach by sea from those several directions, and from one of them a steep path led to the sea. These defences have almost entirely perished, and those on the landward side are only to be made out with great difficulty. There must have been a drawbridge, with probably a horn-work or barbican for its defence, but no remains exist of anything of the sort. The problem must have resembled that which was presented to the architect at Conway, but here there was no question of linking the castle to the town walls, as Criccieth does not appear to have been circumvallated. It is much to be regretted that Mr. George had not prosecuted his researches at the Public Record Office, where documents may still exist that would help towards the scientific reconstruction of an interesting military work of our great castle-building king. The sole feature of interest about Criccieth Church is that of its dedication to St. Catharine. In the *Valor Ecclesiasticus* of Henry VIII. the church is described as that of "the martyr," and at one of the evening meetings of the Association some hazardous conjectures were made in reference to the particular martyr here commemorated, and upon the unusual dedication to St. Catharine. To add to the confusion resulting from these guesses it may be observed that at no very great distance from Criccieth, but beyond the bounds of the parish, and even of the ancient commot of Eivionydd, is a Cil ferthyr, the "church of the martyr." Here, again, the name of the martyred saint is not appended, but the fact that the word *cil* is used instead of *llan* proves the great antiquity of this latter foundation, and also leads to the conclusion that there existed at a very early period some saint of strictly local influence whose death must have occurred under more than usually tragic circumstances, which led to his invocation within a circumscribed area as "the martyr" *par excellence*. Tea was partaken of at Ystumllyn, by the kindness of Colonel Lloyd Jones Evans, whose property it is. The present house dates from the earlier half of the seventeenth century, but it occupies the site, and may have incorporated a small portion of the walls, of an earlier historic house. The hall and the chambers above are the oldest parts of the mansion, and the narrow external round-headed door is still fastened by an enormous oaken beam which runs athwart the entrance into two sockets within the walls. The arms of Collwyn ap Tangno, a mythic chieftain of Eivionydd, and of Owen Gwynedd, an historic prince of Gwynedd, are carved upon the immense oaken chimney-piece. Two heavy Jacobean bedsteads still bear some rather fine tapestry hangings, which, it is pity, show marks of neglect. The portraits appear to be of that order of artistic excellence which may be denominated "mixed," but one or two rise into decided merit.

On Wednesday the party traversed the estuaries of Traeth mawr and Traeth bach, thus crossing from the county of Carnarvon to that of Merioneth. The principal item in the day's programme was the Castle of Harlech, but *en route* visitors called at a charming residence called Glyn Cowarch, one of the seats of Lord Harlech. The house had originally been built four-square around a central courtyard, but time has robbed it completely of two sides, and has much curtailed the dimensions of the other two. It must have been a house of unusual size and dignity for so remote and poor a district, but the subsequent ruin of the Welsh gentry in the Civil War—"for them there was no restoration," says a highly competent authority—probably led to the deliberate mutilation of the residence. The surviving buildings consist of the gateway, and of the main portion of the residence facing the entrance. The date of 1646 is carved in the spandrels of the principal doorway. This, no doubt, represents the exact date of the building, though in England the architectural details would have been assigned to a period half a century earlier. The house has also been re-roofed at no very distant time, for a handsome corbel table, which may have carried a light balustrading, is now obscured by modern guttering. A rather small but nicely proportioned Early Tudor doorway leads into a fine hall, on the right of which is the dining-room. This room contains several portraits of the Restoration period of fair merit, and a poorly executed fireplace. A doorway, leading from the hall into what is no doubt the domestic offices, has been made out of a handsome oak screen of the same age as the house itself. The work is too heavy for its present situation and purpose, but it must have presented a noble appearance when entire and in its proper position. An oak chair of the early eighteenth century, now in the hall, is an unusually fine example of wood-carving, but, while far surpassing the other examples of carving in beauty and delicacy of work, is devoid of those characteristics of strength and solidity that mark the local wood-carver's art of that period. The entrance gateway, though unmistakably Tudor, looks as though it were the last portion of the house to have been built. At present its height is altogether out of proportion to its breadth, and, considering the graceful proportions of the other existing side, the suggestion already made of the lopping off of some of its original features is rendered more probable. At Harlech the party was met by Mr. W. R. M. Wynne, the present constable of the castle, and the Lord-Lieutenant of the county of Merioneth. Mr. Wynne, in a brief paper, recalled the stirring scenes of history in which it had played a part. Harlech Castle has been described by the late Mr. G. T. Clark, who in this instance had the advantage of combining with his own unrivalled knowledge of castellated architecture the equally profound historical learning of his friend, the late Mr. W. W. E. Wynne, of Peniarth, its then constable. "Harlech," to adopt Mr. Clark's words, "is a concentric castle of the Edwardian type, and of that type a simple and excellent example. It is composed of a central four-sided ward contained within four lofty curtains, and capped at each angle by a drum-tower of three-quarter projection. In the centre of the landward or eastern side is the great gatehouse; opposite to which, built against the curtain, are the remains of the hall and domestic buildings, and contiguous to them, against the north side, is the chapel." The residential portion of the castle was within the gatehouse, which is of unusual size and importance, differing in this respect from the other great military buildings erected by Edward I. for the complete subjugation of North Wales, Criccieth alone excepted. On the inner side of this gatehouse the rooms were large and well-lighted. On its eastern or entrance side, the chambers are smaller. Above the entrance passage is a small chapel or oratory, lighted from a plain pointed window, placed immediately over the gateway. The hall was originally planned to occupy the first floor of the great gateway and overlooked the inner courtyard. It must have been a room of noble proportions, running entirely across the entrance passage, and having doorways leading into the north and south turrets, which rose at the inner angles of the gateway. Later, but not later than the reign of Edward II., the rapid pacification of the country may have inspired the idea of moving the hall against the western curtain, the wall of which was pierced for a row of windows enjoying a magnificent prospect across the sea, at that period lapping the rocks at the foot of the castle. Of this hall no structural details now exist. A small room, conjectured by Mr. Clark with much probability to have been a withdrawing room, occupied the angle of the north-western tower, and, beyond this, on the northern curtain wall, was placed the chapel, the chapel in the gatehouse having probably been deserted at the same time as the original hall. Mr. Clark observes that the character of the masonry throughout is exceedingly rough, as though hastily executed. "It is rubble, and some of it very poor rubble indeed. The towers are of far better work than the curtains. The stones are larger, and their interstices filled in with more care. The ashlar is very good, but is sparingly used, and confined to the dressings, window-cases, chimney-hoods, and heads, and a few of the more important doorways. The ordinary doors are mere openings to the walls, without rebates or chamfer, with shouldered heads of a rude character; and the sewer-openings, seen under the garderobes, have merely long stones for lintels." The same authority is of opinion that the building, while of one period, shows appearances of alterations and additions effected during construction, and he infers therefrom that King Edward visited the castle when the works were far advanced, but prior to the completion of the north, south, and west curtains, which have been thickened and raised beyond the original intention. This conjecture accounts plausibly for several puzzling alterations of the first design, and may be the correct explanation of their adoption; but the public records of the reign do not bear out the view that King Edward I. visited Harlech at a period when the work upon the Castle was drawing to a close. The fortress does not seem to have encountered serious attack from its completion to the days of the wars of the Roses, when it was held for the Lancastrian party. Margaret of Anjou took refuge here in the year 1460, after the disastrous fight of Northampton, and eight years later the castle was beseiged by Sir Richard Herbert. Its defender was Dafydd ap Ivan ap Einion, who, upon being summoned to surrender, retorted that he had formerly held a castle in France until all the old women in Wales had heard of the exploit, and was now determined to hold Harlech until all the old women in France were informed in their turn. The result of this siege was probably disastrous to the fabric, for a survey of about the middle of the sixteenth century returns the north-western (or armourers') tower, the south-western (or Bronwen's) tower, and the south-eastern (or Mortimer's) tower as being in utter ruin. Perhaps at this time the angle towers were deserted for the rooms in the great gateway, as some of the windows in the latter have Perpendicular mouldings, and the survey referred to shows this portion of the castle to have been in daily use. Later, it degenerated into the county gaol. It stood out for a short time for the unfortunate Charles I., but it could have presented but a feeble resistance, as its garrison only consisted of twenty-eight men-at-arms.

After luncheon, which was provided by the President and served in the ancient courtyard of the castle, the party moved off to Llanfair Church. Giraldus Cambrensis mentions it as one at which Archbishop Baldwin and himself stayed for a night during their celebrated journey in the year 1189. The present building is certainly not that which Giraldus saw. It has been very much restored, but externally it is probably much the same as it was in the fourteenth century. It is the usual small building of a single chamber, without structural division between chancel and nave, and with the regular little bellcote at the western end. Internally, the only feature of interest is the rood screen, though this is very dilapidated, and without its tracery at its southern termination. Its only purpose was to mark off the chancel from the nave, and may have occasioned its retention to the present day. The principal timbers no doubt suffered from the damp and humid air, for they appear to have been restored in early Georgian times. The east window has been recently erected to the memory of Archdeacon Prys, the first translator of the Psalms into Welsh, and another modern window commemorates a former vicar of the church, the celebrated Welsh writer, Elis Wyn. Next came a long drive to the farmhouse of Dolwreiddiog, and an arduous walk to the head of Cwm Bychan for the purpose of examining what are known as "the Roman Steps." Running north and south for a distance of fifteen miles, from Traeth Bach to the river Mawddach, is a range of high and precipitous mountains, which attain their greatest altitude at the back of the town of Harlech, and having few practicable passes across from the sea coast to the parallel vale of the river Eden. At the head of the latter delightful valley stands the fortified post of Heriri Mons. A well accredited road, used and improved by the Romans, ran along the Eden valley, and it has been conjectured that that great people would certainly establish communication with the sea coast through one of the few possible passes in the range referred to. Now Cwm Bychan is one of those passes. Ever ascending throughout the cwm, or pass, runs a track which eventually leads to a break in the hills; and, having attained to the top of the pass, it drops easily and gently down to the banks of the Eden, where it joins the broad and direct road to Heriri Mons. The pathway is here and there paved in a rough, but unquestionably artificial, manner, but it is difficult to believe that the Roman engineers would ever have remained satisfied with the rough methods here adopted. They would certainly not have suffered the gaps

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which exist between the paved intervals, but would have made a continuous causeway; and even had they adopted a previously existing British trackway, they would probably have widened and improved it so as to render it available for the passage of wheeled vehicles. As it is, there can be little doubt that the pathway dates from mediæval times, and may have been called into existence when the clans residing on both sides of the mountain range were brought into more or less real subjection to a single chieftain. While, therefore, it may be impossible to claim for the paved pathway up Cwm Bychan the hoar antiquity of the Roman period, this remarkable example of mediæval methods of intercommunication in a difficult country should upon no account be missed by the antiquary visiting the neighbourhood. He will find not his least reward for the toil which he will have to encounter in the magnificent scenery around him. In some respects the pass of Cwm Bychan resembles the wonderful Schoellenen gorge in Switzerland, but the Welsh example has the advantage of solitude which invests it with a sense of desolation that is almost unsupportable. On the return journey the small church of Llanbedr was visited for the purpose of examining a stone now standing outside against the north wall, close to the western end of the church. The stone bears a peculiar spiral ornament, consisting of increasingly larger circles starting from a centre. It was discovered about half a century ago on the mountains above Harlech laying amidst the *débris* of a rude hut circle, of which there are a number in the district. The stone was assigned to the bronze age by Mr. Romilly Allen, F.S.A., who briefly described its peculiarity. Spiral ornament of the bronze age, he observed, did not occur upon metal work in this country, but was found on sculptured stones in the north of England, and on bronze articles on the Continent, as well as on articles of the Mycenean civilisation in Greece. The church of Llanbedr has been restored. The only part of the earlier edifice is the west end. Though, like most of the country churches of Gwynedd, it consists only of chancel and nave, it differs externally from many of its neighbours in having the chancel lower than the nave. Two small houses on either side of the entrance gate are worthy of attention. One bears signs of antiquity in its immensely thick walls of dry masonry, and the character and size of the beams and other woodwork show that it was never intended for a mere cottage. A writer in "Archæologia Cambrensis" (4th series, vol. 14, p. 468) thinks it may have been the parsonage, "and a superior one, too." Llandanwg Church, the mother church of the chartered town of Harlech, was down upon the programme for a possible visit, but its inaccessible situation upon the seashore below Pensarn rendered the journey impossible within the time at the disposal of the party. The church had long been roofless and deserted, notwithstanding that it was said to contain some fine mural frescoes. An appeal for funds to repair the roof so as to exclude the worst of the weather was issued about thirty years ago, but nothing effectual resulted, and it was not until many years later that the desolate edifice was made watertight at the cost of the late Mr. Samuel Pope, Q.C. But the mischief had been done, and it is said that the fine wall paintings have entirely disappeared. The party did not get back to their hostels until nine o'clock.

The third day's excursion, the *pièce de resistance* of which was the examination of the great British fortress of Tre'r Ceiri, was completely spoiled by the heavy and continuous rain. It rained when the party left Portmadoc at nine o'clock; it rained when they straggled back at seven in the evening; and it rained without a moment's cessation during the intermediate hours. Added to this that rain had fallen heavily in the course of the preceding nights, though the days had been gloriously fine, and it will be imagined that Tre'r Ceiri, standing as it does over 1,600 ft. above sea level, and covered on its lower slopes by thick bracken, and its upper rendered difficult by the sheets of large stones which are strewn around, was practically inaccessible. A dense mist, also, completely hid the upper third of the mountain. This was all the more provoking, since excavations into the hut circles which crowd the interior of the enclosure have recently been conducted by the Rev. S. Baring-Gould and Mr. R. Burnard, F.S.A., and both those gentlemen were present for the purpose of explaining on the spot the manner in which the excavatory work had been done, and the exact position of the finds which had rewarded their labours. Notwithstanding, a few ardent souls, amongst them half-a-dozen ladies, faced the task with that dogged persistence and determination to "get there" that has carried modern Britons into many awkward places. But it has to be admitted that the great majority whiled away the time that had been allotted to the camp at the top of the mountain by doing the church of Llanaelhaiarn at the bottom with a completeness that had not been displayed towards any other object on the previous days of the meeting, and that the present example hardly warranted. The church consists of nave, chancel, and north and south transepts. Sir Stephen Glynne, who visited the church in 1848, describes the latter as being "awkwardly tacked on, according to the Welsh fashion; not opening originally by arches, but merely wooden piers, and extending very near to the east end." Improvements have been effected during the half-century, and while, of course, Sir Stephen Glynne's criticism, so far as it is directed towards the structural arrangement of the transepts, continues good, the transeptal openings have been improved. Much also has been done internally to the chancel, including the raising of the floor about 18 in., thus making an already low chancel still lower. An ugly arch has been thrown across the chancel opening. The church has retained its original ground plan, and externally its most pleasing feature is the triple light window at the east end. Though its rudeness and absence of detail make it possible to assign it to any architectural period, there is about it a sense of fitness and of proportion that point almost with certainty to the Early English style, though it must not be forgotten that chronologically this period should be dated quite half a century later than corresponding English examples. The western end is pierced by a square-headed opening, and crowned by the usual little bell-cote. There is a rood screen, the panelling of which has been recently restored, but the original framework has been retained, and shows it to have been first erected in late Perpendicular times. The nave roof, though modern, is of the original pitch, the old principals of enormously thick oaken beams, roughly chamfered, being still in position. The interesting old roofing is well seen in the vestry. Two churchwarden's chairs are placed one on either side of the western piers of the transept arches. An inscription of "J. T., 1622" upon a stone, now placed in the external wall of the south transept, probably marks a restoration of the edifice at that date. There is a holy water stoup in the south wall of the nave, close to an ancient doorway at the western end of the church. To Celtic epigraphists the church is remarkable as containing a very ancient stone bearing the inscription "Aliortus Elmetiaco hic jacet." The stone was discovered some years ago when digging a grave in a newly-enclosed piece of ground adjoining the church, which had always borne the name of gardd y sant, "the saint's garden." It is now safely embedded in the west wall of the north transept within the church. The inscription is in Roman capitals, and is well and clearly cut. Discussion arose as to whether the final letter of Elmetiaco was not followed by a short horizontal stroke, as is common upon many of these early Welsh inscriptions, and representing the letter *i*, but the balance of opinion was against the idea of an additional letter. Efforts have been made to twist the name of the person commemorated, Aliortus, into that of the saint to whom the church is dedicated, Aelhaiarn, but the identification is not favoured by Professor Rhys. Equally interesting is the second word, Elmetiaco, "of Elmet," which in modern Welsh is Elved. Now, a district of Carmarthenshire is called Elved at this day, and the suggestion is made that Aliortus was an early Cymric missionary who wandered northwards until he found a grave beneath the shadow of the great fortress that his heathen predecessors had built. It must, however, not be forgotten that Bede speaks of a district of modern Yorkshire which in his day and for long afterwards was called Elmet, or Elmete. The wet and bedraggled archæologists drove straight from luncheon to afternoon tea at Glasfryn, a charming residence in the neighbourhood. The house, which has been considerably enlarged and improved within recent years, appears to date from the latter half of the seventeenth century. The hall contains some good panelling, and there are several beautiful specimens of eighteenth-century oak carved furniture. The top of a long dining-table, formed from a single oaken plank, dates from the end of great Elizabeth's reign, and is almost equal to the splendid example belonging to the Honourable Society of Gray's Inn. Thoroughly disheartened by the merciless downpour, only two of the party diverged from the direct homeward road to visit St. Cybi's well, about half a mile northward of the village of Llan Gybi; but these were rewarded by the sight of one of the most interesting objects seen during the week. From the earliest times to which tradition or record can extend, this well of St. Cybi has been the object of veneration, and there can be no doubt that its popularity in Christian days bespeaks an equally popular cult in pagan times. The water, which is of such extreme coldness that it is hardly possible to bear the hand in it even during the hottest weather, is collected within a well formed of rough, unhewn stones, constituting the pool in which the earliest divinatory rites were performed or the heathen devotee's offerings deposited. At a later period a small baptistry was erected, not over, but alongside of the well, and the water conveyed within the building by a small sluice. This edifice is now roofless and much ruined, but it is possible to make out that it consisted of a single chamber measuring about 13 ft. by 10 ft, and oriented east and west. The water was introduced at the north-western angle into an oblong basin, above which on two sides ran a ledge or shelf. At the two other, or eastern and western, ends a broad flight of shallow steps led down into the water. Niches were made in the thickness of the wall at the four corners and at other irregular distances along the sides, probably for the expectant bathers who may have had to wait for a troubling of the waters. There do not appear to have been seats within these niches, though in other sacred well enclosures in Wales and in Cornwall seats are still *in situ*. This building had a coved roof, which may be later in date than the lower courses of the walls. The doorway was at the south-east corner. This building is extremely rude, and of unquestionable antiquity. At a later period another and slightly larger chamber was added on at the eastern end of the baptistry, but a communication was not opened between the two chambers. The second building was ceiled, and had a chamber above. It is probable that at some period or other—possibly in the twelfth century—a priest from the neighbouring church of Llan Gybi was deputed to reside at the well, both for the convenience of its votaries and for better supervision over the offerings made to the saint. This edifice is now roofless. Its walls have been cemented, and no ecclesiological features remain. There is not a trace of ashlar or of architectural detail that would permit of the dating of any portion of this interesting ruin. About the middle of the eighteenth century efforts were made to exploit the supposed medicinal properties of the well, it being gravely asserted by a local member of the faculty that the water restored defective eyesight and was beneficial for pains in the nose. A letter in praise of its curative powers appeared in the *Gentleman's Magazine* for 1766, where it is stated that at that time the well chapel was stocked with crutches which had been abandoned by the lame and the halt who had been restored to vigorous health. The well was also visited by young persons of either sex anxious to obtain a peep into futurity. The genius of the well was propitiated by the offering of a small coin thrown into the water, and divination was practised by placing a rag upon its surface; if the rag floated to the south the augury was favourable, if to the north the devotee would remain unmarried. Amongst the objects reluctantly abandoned by the party was Tomen fawr, variously described in the programme of excursions as a tumulus, and in a paper in the last "Archæologia Cambrensis" as a circular British camp. Its real purpose it was hoped would have been revealed in a paper which Mr. T. E. Morris, the honorary local secretary, had intended reading upon the spot. Llanarmon Church was also unvisited. It was examined by Sir Stephen Glynne in 1861, but would appear to have been subjected to considerable restoration since that date. Llan Gybi Church was well restored and

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enlarged in 1877 by the late Mr. Henry Kennedy. At no time does it seem to have possessed any features of interest to the ecclesiastical antiquary. It was a subject of much regret to some of the party that a climb to the top of Carn Pentyrch, above St. Cybi's well, was altogether out of the question. This hill is crowned with a fine camp formed of earth and stone, and having, for this district, the unusual addition of an enclosure, which seems to have been intended for a base-court. The remains consist of three lines of defence, with intervening trenches on all sides, except the south and south-east. The first consists of an almost circular area, having a diameter of 78 ft., and surrounded by a strong stone rampart. Beyond this rampart is a ditch, 20 ft. wide, and beyond this again rises an earthern wall, which is from 10 ft. to 12 ft. high. Then comes another ditch, and finally a large enclosure, defended by an earthen rampart. It is tolerably evident that we have here a Goidelic camp, which has been strengthened and enlarged at a subsequent period, and by a later people. There probably never was a mound, but if the third enclosure and exterior wall are a local adaptation of the base court of other districts, the Carn Pentyrch camp may have an important bearing upon the pre- or post-Norman origin of those much-debated defensive posts, for it may be regarded as certain that a Norman never set foot in Lleyn or Eivionydd, and—to perpetrate an obvious bull—when he did he had become an Englishman.

To make up for the disappointments and discomforts of the preceding day Friday broke out gloriously. The excursion of this day was into the Beddgelert district, through, perhaps, the finest scenery of which Wales can boast. A halt was called at Hafod Garregog, once the residence of a Welsh bard called Rhys Goch, a contemporary of Chaucer. The party here divided, some ascending the slopes of Yr Arddu to examine a number of hut circles and a paved trackway, to which has been given the name of Roman Steps, either in emulation or by reason of its similarity to the mediæval trackway already described. Others visited what has been described by the late Mr. J. W. Grover, F.S.A., in the British Archæological Association's Journal as a Roman camp, situated about a mile south-west of the famed pass of Aberglaslyn. The only reason for considering this camp to be Roman seems to be its rectangular shape, but as no object of Roman use has been discovered here, it is more probable that it is a defensive post thrown up by British tribes after the departure of the Romans, and following Roman methods as closely as their skill permitted. Prior to the great scheme of land reclamation at the commencement of the nineteenth century, the river Glaslyn was navigable for small craft to within half-a-mile from the well-known bridge of Aberglaslyn, and the landing-stage then in use is still pointed out. After luncheon at Beddgelert the village church was visited, but so anxious were the antiquaries to desert their proper *métier* and sink into ordinary tourists with no other desire than the enjoyment of the natural beauties of Snowdonia that scant justice was done to this interesting fabric. It is probable that not a tithe of the party knew that the church was the only remaining portion of a small establishment of Austin Canons, said in a mediæval document to be the oldest monastic house in North Wales, Bardsey alone excepted. The church itself has been almost entirely rebuilt. It now consists of a single chamber, with what is termed a northern chapel. This chapel is divided from the body of the church by a single pier of the Early English period. The corresponding piers of the two bays, of which the pier just mentioned is the centre, are partially buried in the stonework of the north wall, which extends to the west and the east end respectively. It is clear that these bays are the sole remains of an elegant Early English arcade which separated the nave from its northern aisle in the conventual church, what is now called a chapel being two bays of this aisle. How far the conventual church extended, whether it possessed a southern aisle, whether it was transeptal, and what were the ritual arrangements it is impossible to conjecture. Everything has been swept away except this fragment of the north aisle, though it was stated to the writer of this notice that many years ago, upon trenching a field to the south of the church, foundations of what may have been a southern aisle or portion of the cloister were discovered. To return for a moment to the details of the arcading. The piers have clustered shafts and deep mouldings, and the capitals are beautiful examples of the art of the period. The arches, which are beautifully proportioned, have the same mouldings. The whole has been covered with plaster or thick whitewash. The present eastern termination of the church was that of the conventual church, and the east window is original. It consists of three lancets, the centre slightly taller than those on either side; it is without shafts. Though by no means without dignity and impressiveness, it is not completely successful. Had the centre lancet been carried to a little greater height the whole would have gained. An idea almost of clumsiness is also given by the heavy mullions. A long drive through the lovely Nan' Hwynan, past the romantic crag known as Dinas Emrys, beneath which sleeps the traitorous king Vortigern, and past Hen Gapel, the site of a small chapel built and endowed by Sir John Williams, goldsmith to King Charles II., and the friend of Drayton, the poet, brought the party to Hafod 'Rhisgl, whence a large number walked to what is usually regarded as the site of a prehistoric village in Cwm Dyli, about a mile below the well-known inn at Penygwryd. The ruins of cottages show that, wild as these valleys are, time has been when they were more thickly populated than they are at present, and faint tradition points to the collection of circular huts called Muriau'r dre as having been human habitations. The opinions of the visitors differed upon this point, some who were prepared to swear to the prehistoric character of those seen on the sides of Yr Arddu earlier in the day being now rendered doubtful. Nothing would settle the question but the clearance of some of the huts, and it is much to be desired that this should be undertaken. The exploration of only one would sufficiently disclose the internal arrangements of the dwellings, and settle the question whether they had been occupied by prehistoric man or very historic "muttons." The party drove home without a stop, and thus brought the excursions to a close.

A few words must be said about the evening meetings. On Tuesday evening the President, Mr. R. H. Wood, F.S.A., of Sidmouth and Trawsfynydd, read his address, which dealt in a pleasant manner with the objects to be seen and visited during the week. Professor Anwyl, of Aberystwyth University College, read a brief abstract of what will prove an important paper upon "The Early Settlers of Carnarvonshire." Of palæolithic man the county does not possess a trace, but his neolithic successors had left their remains in the numberless cromlechau, meini hirion, and smaller hill forts of the district. Their methods had been copied by the Goidelic Celts who followed them, in the larger stone fortresses, like those of Tre'r Ceiri and Penmaen Mawr, which were probably only occupied in times of danger. A short address on "Dolmen Builders" was subsequently given by Dr. Hans Gadow, of Cambridge.

On Friday evening a large audience was attracted by a paper of the Rev. S. Baring-Gould on the results of the recent excavations conducted by him and Mr. Burnard at Tre'r Ceiri; the mountain upon which this great stone fortress stands has recently been purchased by Mr. Wood, the Association's President for the present year. The caer, or fortress, is the most gigantic remain of its kind in Great Britain; its walls are built of enormous stones, and in some places are still from 10 ft. to 15 ft. high. The interior is crowded with hut circles, such as are usually regarded as distinctive products of the late Stone Age. The labour involved in its construction at a height of over 1,600 ft. above the level of the sea must have been practically incalculable. Yet it has no history. Circumstances being favourable, and permission having been readily granted, Mr. Baring-Gould, who had gained experience upon Dartmoor, and had recently investigated the stone fortresses of Pembrokeshire, was requested to undertake excavations at Tre'r Ceiri in order to ascertain its date. Work was commenced in July last, and was continued without break for ten days, five men being constantly engaged. The hut circles alone were taken in hand, the walls of the fortress being left for a later period. Of the huts, over thirty were examined. Some yielded artificial objects of antiquity, some were drawn blank. The floors were excavated down to the subsoil. The finds consisted of several stone implements, a bone comb, some late Celtic pottery, two glass beads, apparently of Egyptian workmanship; an iron pin carrying a triskele, or three-legged arrangement, perhaps part of a shield, a bronze gold-plated fibula in excellent preservation, an iron adze and hammer, an iron billhook, and about a dozen fragments of undoubted Roman pottery. Having described the finds at length, Mr. Baring-Gould announced the following conclusions at which he had arrived:—1. That the fortifications were erected by that people to whom the finds appertain. There was no evidence of earlier occupation. There were no flints or pottery of the bronze age. 2. That Tre'r Ceiri was only temporarily occupied, and during the summer season alone. 3. That the race which erected the walls and constructed the huts were Celtic, and that the period of construction was the first or second century of the Christian era. The pottery was wheel-turned and of the Celtic type, though some Roman pottery was also found. 4. The extreme rudeness and clumsiness of the walls and huts seemed to show haste on the part of the builders, and this pointed to the erection of the fortification during the first century of our era.

The main conclusion—namely, the attribution of the building of the fortress to the first century A.D.—was controverted by Mr. Edward Owen, who pointed out that it seemed to be based upon the period to which the "finds," and especially the Roman pottery, belonged. This, however, only proved that Tre'r Ceiri had been occupied up to a late period, and had no bearing upon the date of its erection. A polished stone hammer had been discovered, but this had to be treated as a "survival," while, on the other hand, the iron hammer-and-adze and billhook might belong to mediæval times. The fixing of the fortress to the first century A.D. brought it within the historic period of Welsh history. The Romans had effectually subdued Anglesey within the first century, and it is more than probable that Segontium (the modern Carnarvon, only ten miles distant) was founded before the close of that century. Was it likely that the Romans would permit the erection of an enormously strong post like Tre'r Ceiri by a people whom they had every reason to fear at the very time when they themselves were founding their principal North Wales castrum? Antiquaries were unanimously agreed upon the similiarity of Tre'r Ceiri to the immense stone fortresses on the west and south-west coast of Ireland. Yet these had never yielded, at the original level, Roman pottery or late-Celtic articles. He adduced the opinions of Professor Boyd Dawkins, Mr. Baring-Gould himself, and Professor Rhys. The latter, in the course of his address as President of the Anthropological Section of the British Association in the year 1900, dealing with the pre-Celtic peoples of this island, observed: "I may mention that the Mabinogion place the Sons of Dôn on the seaboard of North Wales, in what is now Carnarvonshire; more precisely, their country was the region extending from the mountains to the sea, especially opposite Anglesey. In that district we have at least three great prehistoric sites, all on the coast. First comes the great stronghold on the top of Penmaen Mawr; then we have the huge mound of Dinas Dinlle, eaten into at present by the sea, south-west of the western mouth of the Menai Straits; and, lastly, there is the extensive fortification of Tre'r Ceiri, overlooking Dinlle from the heights of the Eifl. By its position Tre'r Ceiri belonged to the Sons of Dôn, and by its name it seems to me to belong to the Picts." As the Picts were generally regarded as being a non-Celtic as well as a pre-Celtic people, this view pushed back Tre'r Ceiri, if not into the stone, at least into the bronze age. While accepting the correct attribution of the finds made at Tre'r Ceiri to their several periods, he contended that the conclusions of Mr. Baring-Gould were fallacious and opposed to the evidence for the building as opposed to the occupation of the fortress. Mr. Burnard, the co-worker with Mr. Baring-Gould in the work of excavation, said he agreed with the paper which had been read. Mr. Romilly Allen, F.S.A., considered that the results proved that Tre'r Ceiri was built during the late Celtic period, either in the first century B.C., or more probably in the first century A.D. Mr. Pepyat Evans remarked that none of the subsequent speakers had dealt with Mr. Edward Owen's arguments. It was quite possible that the finds might all belong to the late Celtic

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period, and that the fortress should still have been built a thousand years earlier. It had, no doubt, been the defence of more races than one. Archdeacon D. R. Thomas, F.S.A., announced that so impressed were the committee of the Cambrian Archæological Association with the importance of continuing the excavations, that a further grant of 30*l.* had been made for the purpose, and this had been supplemented by promises of support from several private individuals. A brief paper by Professor J. E. Lloyd, of the Bangor University College, on "Mediæval Eifionydd" was also submitted.

An admirable, if modest, collection of articles of antiquity had been brought together, and were exhibited in the Masonic Hall. It comprised a fairly representative collection of the church plate of the district, which marked rather the poverty than the riches of the establishment. Many of the cups and dishes were of base metal, dating for the most part from the first half of the eighteenth century. Standing out from the general collection were a silver cup and dish, the latter used as a paten, from Treflys, a silver chalice of seventeenth century date from Criccieth, and a silver cup and paten of the year 1638, from Llanaelhaiarn. From Llanarmon came a silver chalice, the gift of John Thomas Wynne in 1632; and another silver cup, dated 1698, from Penmorfa. A double-handled pewter cup from Llanengan was interesting, and it was accompanied by two (not a pair) small pewter cups with covers, probably pax cups, of late date. An exhibit of first-class importance was the longitudinal half of an ancient British boat, found in Llyn Llydaw in the year 1856. It was exhibited at the Society of Antiquaries in 1861, and at the meeting of Cambrian archæologists of 1866, and is drawn in "Archæologia Cambrensis" (4th Series, Vol. V). The boat was about 12 ft. long, the keel formed of one piece of oak, slightly hollowed. About 30 in. from each end were two triangular supports to the thwarts. There is now no trace of the original oak nails, or of the manner in which the sides were supported. Another interesting exhibit was an ancient Celtic sacring bell, in excellent condition, from the church of Llanarmon. A case of Samian ware, a few rather poor tiles, and one or two pieces of brown Upchurch ware proclaimed the Roman character of the small station of Heriri Mons. The Samian was not of good character. Toilet ware of Nantgarw china, and a set of three covered pots of marked Swansea, demonstrated the artistic excellence of South Wales pottery; and a set of seven pewter plates, bearing the crest of a family of the district, showed the limitations that existed even in the *ménage* of the wealthy before crockery-ware became cheap and plentiful.

The Portmadoc meeting of 1903 probably reached the high-water mark as regards attendance at the Association's annual gatherings. The hospitality with which the visitors were everywhere greeted was so lavish as to constitute a difficulty which the officers of the Association would do well to take into their serious consideration. Never have local secretaries been confronted with greater responsibilities, and never have those responsibilities been more triumphantly met than by Mr. T. E. Morris, LL.M., barrister-at-law, and Mr. C. E. Breese, who occupied those trying positions upon the present occasion. Next year's meeting has been fixed at Cardigan.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A THREE days' meeting of the members of the Association of Municipal and County Engineers was held at Aberdeen on Thursday, Friday, and Saturday, August 20, 21, and 22. An attractive programme of papers and visits had been arranged by Mr. Dyack, the Burgh Surveyor, and the meeting brought together a large number of members from the South of England. The members attending the meeting assembled in the Town Hall on Thursday morning, where they were received and welcomed by the Lord Provost on behalf of the Municipality.

The President (Mr. W. Weaver, of Kensington) occupied the chair, and there were present Messrs. A. T. Davis (Shrewsbury), J. Price (Birmingham), W. Dyack (Aberdeen), A. D. Greatorex (West Bromwich), T. Cole (Westminster, Secretary), W. Nisbet Blair (St. Pancras), Major Isaacs (Mayor of Kensington), N. Scorgie (Hackney), G. T. Lynam (Burton-on-Trent), J. Parker (Hereford), W. Eaton Shore (Crewe), W. Dawson (Leyton), W. H. Hopkinson (Keighley), Livingstone (Westminster), E. Newton (Paddington), G. Lawson (Southgate), and others.

Lord Provost Walker said he had great pleasure in giving the members of the Association a cordial and hearty welcome, and he hoped their meetings would not only be profitable but pleasant.

The President, having taken the chair, thanked the Lord Provost for the welcome which he had accorded them.

Municipal Engineering, Aberdeen.

Mr. William Dyack, M.Inst.C.E., Burgh Surveyor, read a paper on "Twenty Years' Municipal Engineering in Aberdeen." He said the years from 1883 to the present year had been characterised by considerable municipal engineering activity in Aberdeen. The first impetus in this direction was given by the Aberdeen Extension and Improvement Act of 1883, whereby a considerable extension of the city boundary was made. At the present time the question of a new and extended water supply was occupying the mind of the Town Council, and the services of Mr. Charles Hawksley, past-President of the Institution of Civil Engineers, had been secured to advise the Corporation as to the best possible source of supply for the city. In a question of sewerage, the members of the Association would readily understand that an increase of the city boundary was bound to mean a considerable development of sewer accommodation. The extension of the city boundary under the Act of 1883 increased the area of the city from 780 to 2,680 acres, while the extension of 1891 increased the area from 2,680 to 6,664 acres. They could well appreciate the amount of work it had entailed, in the designing and construction of new main and outfall sewers, to cope with the drainage of the added territory, and the problems involved in solving the best means of dealing with the existing intercepting sewers within the old territory. After considerable discussion and negotiations with the Dee Fishery Board, a party of proprietors having interests in the river Dee, forming practically the south boundary of the city of Aberdeen, it was resolved to promote in Parliament in the Session of 1898 a scheme for the complete sewering of the city of Aberdeen. This scheme involved the construction of a large outfall sewer, intercepting all the various main and intercepting sewers within the city, and having an ultimate outlet into the sea at Girdleness. The author was responsible, in the first place, for this scheme, but on his initiative, Mr. James Mansergh, past-President of the Institution of Civil Engineers, was called in as consulting engineer. Mr. Mansergh approved generally of the lines of the scheme. The Bill was promoted in 1898, and Parliamentary sanction obtained. Since then the construction of the scheme had been in active operation. A great portion of the work had already been carried out, but the principal part of the work was now in course of construction. The salient features of the Girdleness outfall-sewer scheme were, first, a siphon below the bed of the river Dee at a depth of about 43 ft. below high-water mark. In connexion with this, two shafts had to be sunk, one in the north and one in the south bank of the river Dee, with duplicate pipes carrying the sewage from the main sewer along the North Esplanade to the point of junction of the siphon. The siphon would consist of a cast-iron segmental tube, 8½ ft. external diameter, formed in short lengths of 18 in. long, flanged and bolted with 1-in. steel bolts, lined inside with 8 in. of fine Portland cement concrete lining; the finished internal diameter would be 7 f. 2 in. In the middle of the tube a steel diaphragm would be constructed, dividing the tube into two, so as to enable the siphon to be worked in two portions, thus allowing a better scour and the promotion of cleansing facilities. The next noteworthy feature of the scheme was carrying the sewer by means of a tunnel through the hill of Torry. The length of this tunnel in all was about 2,250 ft. The tunnel, which had been excavated for the most part through boulder clay and partly through rock, was 7 ft. 6 in. in internal diameter, and was composed of 5 to 1 Portland cement concrete 15 in. thick, with a brickwork lining in the under half. This tunnel was practically now completed. From the tunnel to the valve-house, near the sea outlet at Girdleness, the work had been completed, and was of the cut-and-cover principle. Although it had involved a considerable amount of rock excavation, there had been no great difficulties experienced during the construction of the work. The valve-house was now being constructed, and the valves were being fitted into position. The outlet from the valve-house was being laid below low-water mark 190 lineal yards in a north-easterly direction. This outlet was constructed of 7 ft. diameter cast-iron flanged pipes in 9-ft. and 6-ft. lengths, their average weight being about 7 tons. Over the top and surrounding them was a mass of 6 to 1 concrete, well dovetailed into the rocks, the exposed faces being of 4 to 1 concrete. The outlet terminated in the sea 21 ft. below high-water mark of ordinary spring tides. The total number of heavy pipes to be bolted in position was sixty-seven; of this number forty-five had been laid, and 135 lineal yards of the work completed. The bulk of this work had been done by means of coffer dams, utilising the rock formation for the purpose. The most difficult part of the work was that which was now to be carried out, and which would necessitate the aid of divers in excavating the rock in the bed for the reception of these pipes. The first tramways in Aberdeen were constructed in 1874 by a private company called the Aberdeen District Tramway Co. All these lines—which were single—were constructed with the old box rails, laid down on longitudinal beams, supported by cross sleepers. In 1888 the traffic had so increased, and the Corporation at the same time having decided to repave Union-street, the old lines were lifted and a double track laid. These lines, laid in 1888, were constructed on a new principle, *i.e.*, they were constructed of steel girder rails, supported by a foundation of Portland cement concrete, in the proportion of 6 to 1, the rails being further packed with and bedded on 2 in. of moist concrete. This moist concrete was composed of from 8 to 10 parts of sand to 1 of Portland cement, the only moisture being that contained within the sand itself. It might seem, at first sight, that this moist concrete would not be very strong, but on breaking up the track in Union-street in the spring of this year for the purpose of relaying new and heavier rails for the purposes of electric traction, it was found it had set very hard, and required a considerable amount of physical labour to break it up. In connexion with the laying of the track in Union-street in 1888, the then engineer of the tramway company laid down chilled iron blocks alongside the rails, alternating with the granite setts, on the hit-and-miss principle. The author had closely watched the effect of this mode of construction ever since that time, and he had no hesitation in saying that the introduction of these chilled blocks had meant a considerable addition to the lifetime of the permanent way. Indeed, although the track in Union-street was laid so far back as 1888, and five-sixths of the tramway traffic passed along that street, as well as a considerable portion of the vehicular traffic of the city, the surface of the street, little more than a year ago, before the introduction of electric traction, was practically unimpaired, and not a penny of expense had been incurred in the way of maintenance or repair. On the other hand the tramway track along the circular route, which was laid at the same time, was constructed without chilled blocks and had only one service of cars, or practically one-sixth of the traffic in Union-street. In spite of that, the granite setts alongside of the rail grooved considerably, and had to be turned and replaced at intervals. In addition to this the rails wore to a considerable extent, more especially on the guard portion, and, as a matter of fact, when it was decided to introduce electrical traction on the system, an examination of the permanent way showed that the track in the circular route was the worst in the whole system. Another example was that of George-street, which was laid in 1894, and had had six years' tear and wear of horse traffic, with over three years' tear and wear of electric traction—besides being the street in which the heaviest vehicular traffic of the city was to be found. This latter street was a case where the existing rails were electrically bonded, and although now the joints were giving way, and the blocks and granite setts near the joints might be getting loose, the general surface of the street and the tramway track bear striking testimony to the efficacy of the chilled block. It was no doubt true that the introduction of the chilled block

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at first increased the cost of the construction of the permanent way considerably, but the saving in maintenance and repair fully justified the preliminary expense. Since the introduction of electric traction on the city system of tramways, the author had been closely observing the permanent way. The result had been that he had formed the opinion that the rigidity of a girder rail on concrete bed had a detrimental effect, not only upon the permanent way, but also upon the car wheels. During the present year the new rails laid down on all new extensions had been supported on wooden cross sleepers—the joints employed being those of the Continuous Rail Joint Company. The ends of these joints rested for a length of 6 in. upon the sleepers, the whole thus forming a sort of continuous girder. Building operations had been very rife in Aberdeen during the past twenty years. So far back as 1886 the Town Council, in conjunction with the local architects, builders, and plumbers, established a series of by-laws for the better drainage, plumber-work, and sanitation generally of all houses, and these had been rigidly enforced and carried out ever since, with most beneficial results as regards the public health of the city. These by-laws were, at the same time, made applicable to all dwelling-houses existing in the city, the enforcement in this respect being left to the Medical Officer and Sanitary Inspector to carry out, with the result that at the present day Aberdeen might fairly lay claim to not having lagged, from a sanitary point of view, in the equipment of its houses, as compared with other cities. Prior to 1880, for the most part the footways in Aberdeen were paved with granite slabs, each slab averaging about 4 superficial ft. and being about 6 in. in thickness. Even in the heart of a granite country this was a costly pavement, the cheapest price per superficial yard being about 9s., while now it cost from 12s. to 14s. The extreme thickness used in this class of pavement had the twofold distinction of being both costly and economical—a distinction strangely contradictory—but due to the then rudimentary tools employed in its manufacture. About that time Portland cement was coming more into use for various purposes, and a start was made to lay Portland cement concrete pavement *in situ*. The smoother and less slippery surface of the concrete pavements appealed to the public, and a desire was manifested to dispense with granite and employ concrete in the construction of foot-pavements. The first concrete *in situ* foot-pavements laid down in Aberdeen were laid in long stretches. After a year or two, however, the surface was broken by long, irregular cracks, and in order to prevent this, various modifications in the mode of construction were adopted. The pavement was made in panels, with thin strips of wood to counteract the expansion, additional depth of bottoming was put in to resist the upheaval in times of frost, and the panels were laid alternately, allowing the intervening panels to be put in after. The latter was the present practice, and had been found to be most successful; but in clay and damp soils it was necessary to put in a foundation of not less than 9 in. of granite chips, and in exceptionally wet cases to put in drain tiles. In 1894 the Streets and Roads Committee ordered an experiment to be made in Guild-street with the view of testing different materials as to their suitability for foot-pavements. The materials employed were concrete *in situ*, adamant stone, Val de Travers asphalt, and Limmer asphalt. The Limmer asphalt, for some reason or another, proved a failure; the Val de Travers asphalt has stood the test better than any of the other materials tried; and the adamant paving stood better than the concrete. Travers paving, in the author's opinion, was undoubtedly the best from the standpoint both of comfort and durability, although the cost might be considered in many cases prohibitory.

Mr. J. Price, Birmingham, who moved a vote of thanks to Mr. Dyack for his paper, said he would like to ask whether the separate system had been discussed at all in connexion with the sewage disposal, whether there were any storm overflows in use, and what was the proportion of discharge between sewage and storm water. That was a most important feature in these days, when they had on their sewage farms to deal with five or six times the average daily dry-weather flow. He would like to know whether the rivers or streams running through Aberdeen and the outlying portions which had been annexed had been dealt with for intercepting relief sewers. He asked this question because he had had to deal with the same matter in Birmingham, where their old main outfall sewers had become so overcharged as to create flooding in the lower-lying portions of the town. The sewers in that case were several feet below the river bed, and the old storm overflows which were provided were so arranged as to admit the river into the storm-relief sewers instead of relieving the sewers themselves. He had proposed a large scheme of storm-relief sewers to take out the surplusage of storm water from the main sewers so as not to be troubled with the river when in flood.

Mr. A. T. Davis, Shrewsbury, seconded the vote of thanks to Mr. Dyack for his extremely interesting paper.

Mr. W. Nisbet Blair, St. Pancras, said the question of refuse disposal was occupying the close attention of many municipalities, and those who had experience of destructors would be able to affirm his statement that it was possible to burn the refuse, and, by the use of the residuals, do it at less cost than by depositing it on free shoots. But apart from the question of the economy of free shoots, there was the question of the sanitary wisdom of so disposing of their refuse. The land would some day require to be built upon, and imagine what a foundation they were providing in burying their refuse in these deep pits. It was a sanitary mistake to do so. The other question he wished to speak upon was the us of chilled iron blocks by the side of the tram rails. Some years ago they had miles of them in London, and the reason they were abolished was because of the amount of noise they created from the general traffic. They might have granite setts paved so close that they did not get the rolling, hammering noise from the traffic passing over it, but if they had a wheel running over these chilled blocks the noise was excruciating.

Major Isaacs, Mayor of Kensington, considered Aberdeen to be one of the bonniest cities in the whole of the United Kingdom. Its charm largely depended upon the material used in the building of its many handsome structures.

Mr. N. Scorgie, Hackney, said that in the preparation of the by-laws everybody was consulted but the man who had to pay the piper. When in Aberdeen the previous week he visited some premises where alterations were going on, and he found that the soilpipe, with one closet only attached, was ventilated. Then if anyone built a back addition to their house they had to relay the existing drains in accordance with the by-laws, although they might not be defective.

A vote of thanks was accorded to Mr. Dyack, who briefly replied.

Aberdeen Waterworks.

Mr. John Gordon, Assoc.M.Inst.C.E., Assistant Burgh Surveyor, read a paper entitled "Notes on Aberdeen Waterworks." Following a historical review of the water supply of the city, he said the supply having again become inadequate, in 1862 an Act was obtained to introduce a gravitation supply from the river Dee at Cairnton, in accordance with the designs of the late Mr. James Simpson, M.Inst.C.E. The works were completed and the water turned on by the late Queen Victoria in 1886. The original works cost about 160,000*l.*, but up to 1902 the subsequent additional works and extensions of mains increased the capital expenditure to 313,000*l.*, of which practically one-half had been extinguished by the operation of the sinking fund. The intake was situated at Cairnton, on the north bank of the river, about twenty-two miles west of the city. Between the intake and the intake well, a distance of 125 lineal yards, the water was conveyed in cast-iron pipes, 48 in. in diameter, laid along the river bank. Within the intake well were situated sluices for turning off the river water when discoloured, a floating gauge to indicate the amount of water passing into the aqueduct, and screens to intercept leaves or other floating material, assistance being rendered in this operation by a floating boom and rough screen situated at the intake. The total length of the aqueduct from the intake well to Mannofield reservoirs was nineteen miles, and it might be divided into two sections. The first section extended from the intake well to the settling reservoir at Invercannie, a distance of about a mile. For one-half of its length it was constructed in rock tunnel (unlined) extending through the hill of Cairnton, while the remaining portion consisted of an oval brick culvert 4 ft. 6 in. high and 3 ft. 6 in. wide. The inclination on this section was 1 ft. per mile. The second section extended from the settling reservoir at Invercannie to its termination at Mannofield reservoirs, a distance of 18 miles, and had an inclination of 2 ft. per mile, with the exception of a length of 2 miles at its eastern extremity, which had an inclination of 1 ft. 6 in. For the greater part of its length this section consisted of an oval culvert built of 6-in. brickwork 3 ft. 9 in. high and 3 ft. 2 in. wide, surrounded with clay puddle 9 in. thick carried up to a level of 3 in. below the soffit of the arch, where, however, the covering above the aqueduct was less than 2 ft. At various points cast-iron pipes 40 in. in diameter take the place of the brick culvert, and where the valleys of the Crathes Burn and the Culter Burn were crossed the aqueduct consisted of inverted siphons, each formed of one line of 40-in. cast-iron pipes. The length of the siphon at Crathes was 106 lineal yards, and the greatest head on the pipes was 16 ft., while at Culter the length of the siphon was 330 lineal yards and the greatest head 65 ft. Manholes and ventilating shafts were provided at intervals, averaging ¼ mile apart, and there were in all ten combined overflow and scour tanks, with the necessary culverts connecting to the nearest streams. The overflows were arranged so that the depth of water should not exceed 3 ft., and with the water flowing at this depth the aqueduct discharged at the rate of 8 million gallons per 24 hours, the maximum quantity which the Corporation was empowered to abstract from the river. Of late years it had been found necessary to execute extensive repairs to the brick aqueduct at points where it was apparent that leakage was taking place, as well as for the purpose of preventing the infiltration of polluting water, the occurrence of which was suspected at points where, in place of being agricultural land as at the time the works were constructed, much of the ground had now become largly residential in character. Invercannie Reservoir, originally intended as a settling reservoir, and situated one mile from the intake, formed the connecting link between the first and second sections of the aqueduct. It was circular in form, 445 ft. in diameter at the top water level, and 392 ft. in diameter at the bottom, the depth of water being 14 ft., capacity 12 million gallons. The service reservoirs, which were situated in or near the city, were five in number, all uncovered, and the following was the capacity of each, viz.:—Low-service, Mannofield, one reservoir 6,000,000, 108 ft.; low-service, Mannofield, one reservoir, 12,000,000, 168 ft.; low-service, Cattofield, one reservoir 2,500,000, 155 ft.; mid-service, Slopefield, one reservoir 6,000,000, 308 ft.; high-service, Pitfodels, one reservoir 500,000, 402 ft. The population in the drainage area of the River Dee above the intake of the city waterworks was about 11,500, mostly scattered over a large area, but a considerable proportion of this number was concentrated in four villages situated on the banks of the river. As the discharge of sewage from these populous centres constituted a serious menace to the purity of the city supply, the Corporation obtained powers by the Act of 1893 to construct and work irrigation farms at Kincardine O'Neil, Aboyne, Ballater, and Braemar, in order to prevent the pollution of the river. The various local authorities provided the land, which they handed over to the Corporation on lease for a term of twenty-five years at a nominal annual rent. The principle adopted was broad irrigation. The average amount of water supplied per day from the service reservoirs during the year 1902 was as follows:—From the low-service reservoir, 5,944,970 gallons; from the mid-service reservoir, 871,517 gallons; from the high-service reservoir, 25,186 gallons; total per day, 6,841,673. The population supplied was 150,000, and the average amount consumed per head was thus forty-four gallons, of which nine gallons represented the proportion used for trade purposes. The assessment charge on owners was 1½d. per £ of rental, and on occupiers 7d. per £, while water for trade purposes was supplied according to a table of charges, or by meter, the rates by meter varying from 7d. to 2d. per 1,000 gallons, depending on the quantity consumed. The steady increase in the total daily consumption made it apparent that the time was rapidly approaching when the daily quantity required for the supply

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of the city would exceed the amount which the Corporation was entitled to abstract from the river at the present intake, and which could be conveyed to the city by the existing aqueduct. In view of this, the City Council had given a considerable amount of attention to the question of a new or increased supply, and some time ago requested Mr. Charles Hawksley, M.Inst.C.E., to make the necessary investigations and submit a report on the matter. A report on the question was duly submitted by Mr. Hawksley, and the Council was at present giving to the question the careful and anxious consideration which the importance of the subject demanded.

The paper was not discussed, but on the proposition of the President a hearty vote of thanks was accorded to Mr. Gordon.

Electric Cable Subway and High-Level Sewer.

Mr. G. R. G. Conway, resident engineer, Girdleness Outfall Scheme, Aberdeen Corporation, read a paper on the construction of the Aberdeen electric cable subway and high-level sewer. He said that under Parliamentary powers the Town Council were at present constructing large intercepting and outfall sewers, involving an expenditure of nearly 200,000*l.*, with the object of removing the polluted storm waters and sewerage of the city from the rivers Dee and Don, and discharging them into the sea below low-water mark at Girdleness, a rocky point on the coast south-east of the city. When these works—called the Girdleness Outfall Scheme—were completed, the whole of the city, with the exception of two low-lying districts, one near Victoria Bridge and the other Abercrombie's Jetty, having an area of 392 acres, could be drained to Girdleness by gravitation. One of the leading features of the new scheme was a main high-level outfall sewer, 3 miles in length, to Girdleness, where it discharged its contents into the tidal waters 22 ft. below H.W.M.O.S.T. The execution of this work involved the tunnelling of the River Dee for a siphon, a tuonel ½ mile in length through St. Fillick's Hill, and some difficult work at the sea outlet. The sewer varied in internal diameter from 3 ft. to 7½ ft. For convenience in letting the contracts, the outfall sewer was divided into two sections, and the upper section, known as No. 1, extending from Skene-street to Point Law, a distance of 1½ miles, was first put in hand, so as to afford immediate relief to several low-lying districts that were frequently flooded, and also to allow the Ferryhill tramways to be proceeded with without unnecessary delay. The contract for the high-level sewer was let in July, 1900, and the works were well advanced when an arrangement was entered into between the Sewerage and Gas and Electric Lighting Committees of the Town Council for carrying a cable-subway in the sewer track in Crown-street, the intention being to construct a subway from the new electricity station at Dee Village to Union-street, the principal thoroughfare of the city. The electrical engineer, Mr. J. A. Bell, reported in favour of laying a subway for the main feeder and pilot cables for traction and lighting purposes, in preference to the usual methods of lifting and relaying the carriageways as might be required, and laying the cables on the "solid system," or by the other alternative often adopted of laying ducts and drawing the cables in afterwards. The subway had been designed to carry from the Dee Village station all feeder cables with their pilot leads to supply energy for traction purposes and for the distributing mains in the north, west, and central districts of the city. Provision was made at present for sixty feeder cables capable of supplying energy up to 15,000 horse-power, but if the necessity for greater extension arrived, it would be possible to considerably augment this number. The general type of the subway, where constructed independently of the high-level sewer, was of five to one Portland cement concrete, lined with red brickwork, and having an arched roof; the height was 8 ft., the width at floor level 5 ft. 6 in., the side walls having a batter of one in twelve. Throughout the subway Callender's pure bituminous sheeting was placed between the concrete walls and the brickwork lining. This sheeting ensured the interior being absolutely dry, an important matter, as a lower grade and more economical insulating material could be used to cover the cables. Where wet sandy soil overlying clay was passed through, a double thickness of the sheeting was laid under the floor and carried up 12 in. on either side. The floor was of six to one cement concrete brought to a smooth face with cement mortar. Into the brick lining of the subway cast-iron cable racks were built every 6 ft., each rack have fourteen holes tapped with a thread to receive ¾ in. wrought-iron pins to support the porcelain insulators carrying the cables; these pins were 8 in. long and were each intended to receive two rows of cables. The actual cost of the subway carried out in connexion with the high-level sewer and repayable by the Electrical Department was 8,377*l.* 6*s.* 4*d.* This included a proportion of the expense in strengthening and modifying the sewer and relaying certain gas and water mains. This was equal to about 13*l.* per lineal yard over the whole length of 648 yards. The Electrical Department had since the completion of the works continued the subway of the flat-type for a distance of 108 lineal yards through their own grounds to the electricity station, making a total length of 756 lineal yards.

The President, in moving a vote of thanks, said that all of them must be struck by the ingenuity displayed in devising and carrying out this work. This matter of subway construction was very interesting, and was receiving attention from local authorities in busy towns of the United Kingdom. At the present time the Paviors Company of the City of London had invited essays and schemes for subways for the purpose of receiving pipes and cables, and were offering fifty guineas for the best design for this purpose. In conjunction with the City of London Engineer, the Westminster Engineer, the Master of the Paviors Company, Major Isaacs, he was one of the judges and had recently been going through some thirty schemes. They had not made their award yet, so he would not give them that information which might be of interest to some present.

The vote of thanks was accorded, and acknowledged by Mr. Conway.

Tramway Track Construction.

Mr. J. T. Anderson read a paper on "Tramway Track Construction in Aberdeen." He said that since the tramway system in Aberdeen was acquired by the Corporation in 1898 from the Aberdeen and District Tramway Co., who formerly owned the system, rapid developments had taken place in introducing the latest and most improved methods of electric traction throughout the city, horse haulage having previously been the motive power used in working the lines. The total length of track taken over from the tramway company comprised seven miles of single track and 3·5 miles of double track, of which 4·65 miles were constructed of box rails laid on sleepers, the remainder being of steel girder rails, varying in section from 6 in. to 7 in. deep. The total length of track at present constructed in Aberdeen extends to 20·75 miles of track, of which 8·75 miles are double line and 3·25 miles single line. The whole of the old tracks, so far as these were constructed with girder rails, were equipped for electric traction; the rail joints being strengthened by having Marshall's sole plates, 1 ft. 8 in. by 10 in. by ½ in., placed under the flange of the rails, secured to four single and two double clips and ⅞-in. bolts and nuts. The concrete packing under the joints was removed, and after the sole plates were fixed in position they were solidly packed with moist concrete, composed of two bags of cement to one cubic yard of sand, the sand being kept moist in the heap and no further addition of water made until the cement was added, and the concrete ready for being used in the work. The old rails were of very light section, weighing about 70 lbs. per yard, and had been in use for a considerable number of years. The rails, after having been in use under horse traction, showed considerable signs of wear, particularly in those sections constructed at the earlier date, the depth of the groove being ½ in. in Union-street and ⅝ in. in the other routes. The fish-plates were 21 in. long, fastened with four 1-in. bolts, these plates giving very little bearing surface at the joints. The rails were drilled at the joints with two ⅞-in. holes and bonded with copper bonds, cross bonds being carried across the tracks every 30 yards. In laying down the new tracks the excavation was taken out to a depth of 14 in. below the finished surface of the street a width of 17 ft. over all, and the boxing formed to the proper contour of the finished roadway. The foundation of the road-bed was formed of cement concrete 6 in. thick, composed of 6 parts of broken granite to pass a 2-in. ring, and 3 parts clear, sharp sand, to 1 part of Portland cement. The rails were laid on the concrete bed and brought to their proper level by packing under the flanges with 1 in. of moist concrete similar to that already described. The tramway tracks and margins, 18 in. outside the rails, were paved with granite setts 6 in. by 4 in., procured from any of the local quarries, Kemnay, Corennie, Cove, Rubislaw, and Dancing Cairns, being the class most used in the works. The paving bed was of moist concrete 2 in. deep; the setts were jointed with ⅝ in. granite chips to within 1 in. of the surface, and then grouted with pitch and tar in proportions to give an elastic joint flush to the top of the setts. Chilled steel blocks 5 in. by 4 in. by 3½ in., weighing about 9½ lbs. each, were placed along the inside and outside of the rails alternately with the granite setts, bedded and jointed similar to the setts, experience having shown that they are a great saving on the life of the setts, and prevent the ordinary vehicular traffic from rounding off the head of the rails. On Woodside route provision has been made at the joints along the whole length of the track for tightening up the fishplates by providing special cast-iron boxes, 3 ft. 6 in. long, 5 in. wide, and 9 in. deep, with ears at each end having bolt-holes, and they are secured to the web of the rail with 1¼-in. steel bolts. The section of rail mostly used in Aberdeen was a special one, and had been supplied by Messrs. P. & W. McLellan, Glasgow. The depth was 7 in., flange 6 in., tread 2 in., groove 1 in. wide and 1¼ in. deep, lip ⅝ in., and weight 96 lbs. per yard. The rails had been rolled in lengths of 60 ft. and 45 ft., but the latter is the length now mostly in use; the 60-ft. rails were found difficult to handle, particularly in narrow thoroughfares, where facilities for turning the rails round when occasion required were not easily obtainable. The rails are tested to stand a drop of 2,000 lbs. weight falling 18 ft. on a piece of rail resting on supports placed 3 ft. apart without breaking, or bending to such an extent as to indicate soft steel. The rails used in special work and quick curves were made in 20-ft. lengths of a heavier section than the straight track rails. The groove was wider, being 1¼ in., and the lip heavier, ⅝ in., and weigh 98 lbs. per yard. The fishplates were made of steel similar to the rails, ⅝ in. thick, and had eight bolt-holes in the small plates and were pear-shaped to fit the feather edge of the bolts. The plates were fished with 1-in. steel bolts and lock-nuts, "Ibbotson's Patent," and weigh 2 lbs. each. The points and crossings for all special work had been supplied by Messrs. Askham Bros. & Wilson, Sheffield, and were made of crucible cast steel. The points for all ordinary cross-overs were 8 ft. 6 in. long, and in special work they were curved to suit the different radii. An experiment was about to be made at Queen's Cross Junction with a new patent movable point-shifter invented by Mr. A. B. Johnston, of Aberdeen, which it was hoped would obviate the necessity of having an attendant to shift the points, as at present. On Ferryhill route, which had been recently completed, the rails were laid on cross sleepers. The excavation was taken out to a depth of 14 in. below the finished surface of the roadway, and the bed prepared for laying down the sleepers. The sleepers were pitch pine, 7 ft. by 12 in. by 6 in., sawn with their upper and lower surfaces parallel an even thickness throughout their length, and creosoted previous to being delivered at the works in a cylinder working at a pressure of 130-lbs. to the square inch, about 4 lb. of creosote being injected into each cubic foot of the sleeper. The sleepers were placed at 2 ft. 11½ in. centres, except at the joints, where they were placed at 1 ft. 10 in. centres, giving a clearance of 10 in. between the sleepers, and were checked to receive the joint plates. The rails are laid on the sleepers, each rail breaking joint with the one opposite, and fixed to the sleepers with 4½-in. by ⅝-in. dog spikes, to spikes to each rail, and driven with the head square to the flange, giving a ⅝-in. grip; at the joint four dog spikes were driven into each sleeper to hold the joint plates. The sleepers were bedded and packed with clean sharp sand a depth of 1 in. to bring the rails to their proper level. The foundation for the setts, composed of 9 to 1 concrete, was filled in between the sleepers and round the ends flush with the upper surface. Under the flange of the rails on the intervening spaces between

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the sleepers, the concrete was kept ½-in. clear, so that the whole weight carried over the rails was distributed over the sleepers.

Mr. J. Price, Birmingham, proposed a vote of thanks to Mr. Anderson. With the advent of electric traction the question of traffic was a matter of serious thought everywhere. They saw tracks laid down and in two or three years going to pieces—that was the problem for which they were looking forward for a solution.

Mr. A. D. Greatorex, West Bromwich, seconded the vote of thanks, which was accorded.

The Lord Provost and Corporation entertained the members to luncheon, and the afternoon was devoted to a visit and inspection of the Girdleness outfall works.

On Friday the members visited the bathing station, the works of the Adamant Stone and Paving Company, and the quarries at Dancing Cairns. At the Adamant Paving Company's works luncheon was provided, the chairman of the company being in the chair.

Saturday's proceedings were devoted to an excursion to Ballater and Braemar.

COMPETITIONS.

BAPTIST SCHOOLS, WELLINGTON-STREET, LUTON.—The selected designs submitted in a limited competition recently held for this building comprise a large hall with galleries around, fifteen classrooms, church parlour, infants' room, cloakrooms, &c., and the usual conveniences. The whole of the rooms will be electrically ventilated. The estimated cost is about 4,600*l*. The authors of the selected design are Messrs. George Baines, F.R.I.B.A., and R. Palmer Baines, Clement's Inn, Strand, London, W.C.

CARNEGIE FREE LIBRARY AND MUSEUM, LIMERICK.—The assessor appointed by the trustees in this competition (Mr. Ashlin, President of the Royal Institute of Architects of Ireland) awarded the first premium to the designs submitted by Mr. George F. Beckett, of Dublin, and the second to those sent in by Mr. George P. Sheridan, of Dublin. The trustees have decided to adopt, for the building of the library and museum, the second premiated design. All the designs were publicly exhibited in Limerick subsequent to the decision of the trustees.

BOOKS RECEIVED.

THE PLANNING AND FITTING-UP OF CHEMICAL AND PHYSICAL LABORATORIES. By T. H. Russell, M.A. Illustrated. London: B. T. Batsford, High Holborn.

ROYAL ACADEMY OF ARTS' SCHOOL LAWS, 1903. London: Royal Academy of Arts.

REPORT ON WHOLESALE AND RETAIL PRICES IN THE UNITED KINGDOM IN 1902, WITH COMPARATIVE STATISTICAL TABLES FOR A SERIES OF YEARS. Ordered to be Printed by the House of Commons. London: Eyre & Spottiswoode. Edinburgh: Oliver & Boyd. Dublin: E. Ponsonby.

ESSAYS ON RURAL HYGIENE. By G. Vivian Poore, M.D. Third Edition. 6s. 6d. London: Longmans, Green, & Co.

Illustrations.

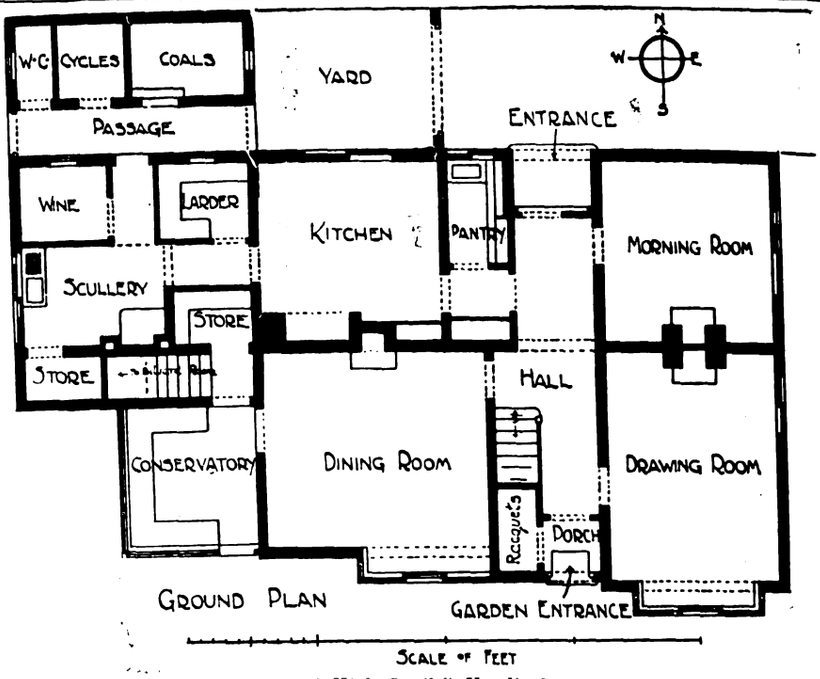
ST. PAUL'S SCHOOL FOR GIRLS.

THIS is a view of the new school for girls which has been erected for the Governors of St. Paul's School, at Brook Green, Hammersmith.

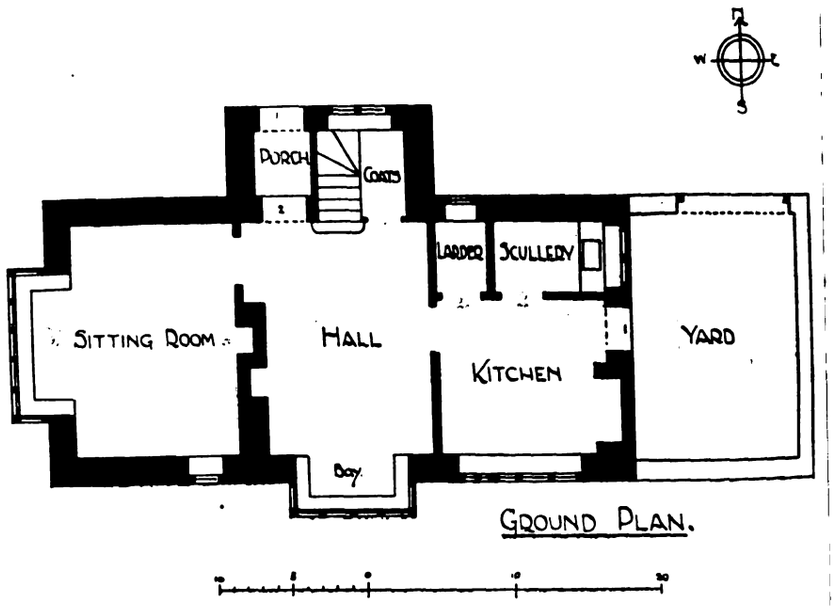
Mr. Gerald C. Horsley was the architect, and the contractors were Messrs. Holloway Bros., Westminster. In our issue for May 31, 1902, we gave an illustration of the central hall of the school, and additional particulars.

"HIGH GARTH," HEADINGLEY, LEEDS.

THIS house is built of brick, covered with rough cast, and having a red-tiled roof. The scullery and outbuilding block has a billiard-room, 25 ft. by 18 ft., over, approached by steps through the conservatory. There are four bedrooms and bathroom on the first floor, and four good attic bedrooms and boxroom. Messrs. Myers & Sons were the contractors for masons and bricklayers' work, and Messrs. Tomlinson & Son for joiners' work. Messrs. Francis W. Bedford and Sydney D. Kitson were the architects.



"High Garth," Headingley.



"Bradda Brae," Port Erin.

"BRADDA BRAE," PORT ERIN, ISLE OF MAN.

THIS cottage was built for Mr. A. G. Perkin in 1901. It is situated near the golf links and has a fine sea view. The walls are of stone, covered with rough cast, and the roof is slated with grey Portmadoc slates. The contractor was Mr. A. Costain, of Port Erin. Messrs. Francis W. Bedford and Sydney D. Kitson were the architects.

HOUSES, COLORADO SPRINGS, U.S.A.

THE four buildings here illustrated are from plans and designs by Mr. T. Maclaren, formerly of London, now of Colorado Springs.

In the house marked No. 1 on the plate, in addition to the accommodation shown on the two principal plans herewith illustrated, there is a billiard-room in the basement. The external brick walls are faced with Omaha pressed brick of buff colour, while the pilasters at corners, &c., are formed with dull-white enamelled brick. The roof is covered with St. Louis red tile. The central feature in the plan, viz., the staircase hall, is lighted by a skylight, but with an intervening stained-glass light at second-floor ceiling. The heating is by a hot-water system, partly indirect and with thermostat temperature regulation attached. The cost was about 9,000*l*., and the contractors were Messrs. Roberts & Bischoff, of Colorado Springs.

It may be of interest to add that in the planning of American houses the dining-room is always placed much nearer the pantry and kitchen than in English residences for economy of service, and from the fact that the dining-room is so seldom used, otherwise than at meals, that its proximity to the work and noise in pantry and kitchen is not considered. The dining-room is even frequently made a means of passage by the servants from the kitchen to the entrance hall of houses. In the States, it should be added, the floor next above the ground is called "second floor," not first floor as in England.

The Bath House at Wagon Wheel Gap, Colorado (No. 2), is a building 140 ft. long by 44 ft. wide, and is capable of future extension into a complete mineral-water establishment. The present building consists of a large entrance hall, from the ends of which are approached the dressing and plunge room for ladies and gentlemen, also private suites for invalids. The spring emerges at a temperature of 190 deg., and is tempered to about 100 deg. before it reaches the plunges. The walls of the building are of concrete cement plastered, and sand finish. Wagon Wheel Gap is about 8,000 ft. above sea level, and is situated in the midst of striking scenery.

The other two houses, Nos. 3 and 4, are of

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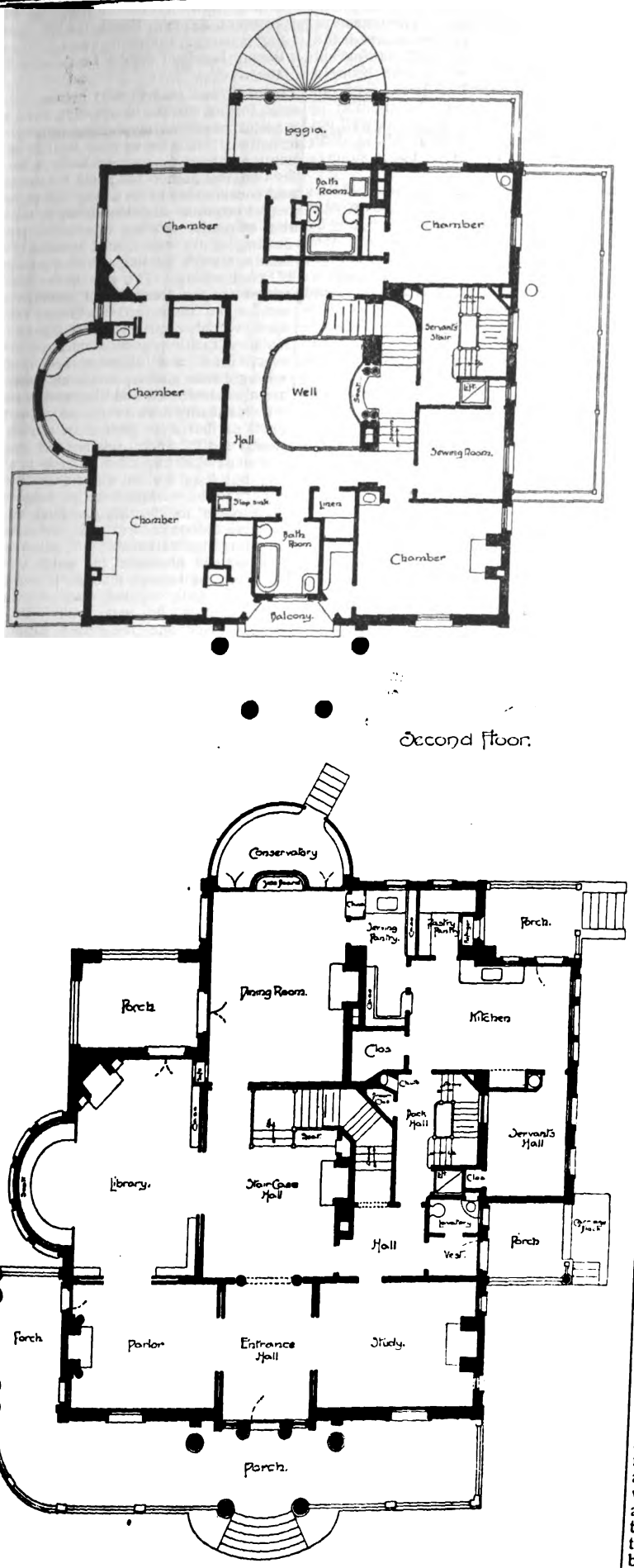

Plans of House, Colorado Springs. (No. 1 in lithograph.)

the type of construction so largely prevailing in the States, viz., in frame; the former costing 1,200*l*., and the latter 970*l*.

PEFFERMILL HOUSE.

PEFFERMILL HOUSE is situated on the outskirts of Edinburgh, in close proximity to Craigmillar Castle. The house, which is L-shaped on plan, with a turret staircase in the angle, bears the date 1636, and is a very good example of the transition from the more ancient keep to the modern mansion. It is built of grey sandstone, faced with rough-cast, and the detail of the jambs, strings, carving, &c., is characterised by a boldness typical of this class of work.

The interior, though now converted into separate dwellings, still retains some of its original wood panelling.

J. HERVEY RUTHERFORD.

BACTERIAL TREATMENT OF WATER AND SEWAGE.

THE following short address was delivered in June by Professor P. Frankland, Ph.D., LL.D., F.R.S., before Section VI. (Waterworks, Sewerage, and Gasworks) of the Engineering Conference of the Institution of Civil Engineers.

"That the purification of sewage invariably depends upon the agency of micro-organisms, either in a state of nature or under domestication, has been so generally recognised for some years past that a large amount of valuable experience bearing on bacterial treatment has now been gained by many persons working in different places and under different conditions. The present Engineering Conference would appear to be a fitting opportunity for the interchange of views on this important subject, as well as for a discussion of the conclusions which have so far been arrived at by the Commissioners appointed to inquire into the 'treating and disposing of sewage.' Perhaps the purposes of our Conference will be best served by my enumerating the several points on which it appears to be most desirable that the views of those who have had practical experience should be elicited. In this manner it is to be anticipated that diffuseness in discussion will be avoided, and that there should be a prospect of some tangible good resulting from our labours.

1. Under what circumstances are the older methods of bacterial purification of land—*irrigation and intermittent downward filtration*—to be preferred to the more modern methods of *bacterial purification without land*? This requires the most careful consideration from the point of view of (*a*) efficiency, (*b*) cost. Under this heading we may appropriately discuss the much-vexed question as to the necessity of supplementing the modern bacterial methods by land treatment. The possible contamination of subsoil water, as well as other sources of danger or nuisance, arising from sewage works of different kinds, should also be considered.

2. What are the relative merits of the different methods of preliminary treatment? Under this heading information is sought for as to the value of chemical precipitation and septic-tank treatment respectively. It is particularly desirable that evidence should be obtained as to what is actually accomplished in the *septic tank*; thus as to whether the advantages of the tank go beyond subsidence, averaging the quality of the sewage, and liquefying more or less of the organic sludge, or whether even the dissolved matters in the sewage are so influenced as to be more effectively dealt with afterwards in the bacterial beds.

A very important matter for consideration, also, is the proportion which the tank-capacity should bear to the daily flow of sewage. The question of open *versus* closed tanks will also arise. The possible advantages of chemical treatment prior to admission of the sewage on to bacterial beds must not be lost sight of. We have also to consider whether in the septic or anaërobic treatment any substantial advantage is gained by the employment of contact materials.

3. *Contact Beds.*—Perhaps the greatest variety of questions must arise with regard to this portion of the modern sewage works. Some of the most important points for consideration appear to me to be:—(*a*) Cost of construction, necessary and unnecessary. (*b*) Single, double, and multiple contact. Modes of operation, with special reference to the periods of work and rest assigned to the beds. Most advantageous depth of beds. (*c*) The mechanism of the purification process taking place in contact beds. (*d*) Continuous contact beds. (*e*) Distribution of sewage on contact beds. (*f*) Materials suitable for contact beds; capacity; cleaning and renewal of beds. (*g*) Volume of sewage dealt with per acre of beds.

4. *Effluent.*—In connexion with the effluent we shall have to consider the efficiency of the purification which can be obtained by different modes of bacterial treatment. By what standards is the purity of an effluent to be judged? In this connexion it is of great importance that

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a clear understanding should be arrived at as to what the real object of sewage purification is and as to how this purification should be controlled. The purity of the effluent must be considered also with reference to the stream or other body of water into which it is to be discharged. The relative importance of chemical and bacteriological standards also must be fully discussed, as these are at the present time a fertile source of confusion and misunderstanding. In this matter of purification and standards, above all the practical and academic aspects must be carefully distinguished. The sterilisation of effluents should also receive consideration. In discussing the efficiency of purification, I would emphasise the absolute necessity of being able to compare the chemical and bacteriological data for one and the same sewage before and after purification, and that such data for the effluent alone are of little or no value. Satisfactory comparisons of this kind in the case of land treatment are rarely available in consequence of frequent complications arising through admixture of sub-soil water.

5. *Storm Water.*—As is well known, the systematic purification of sewage is complicated by the enormous variation in the amount of liquid which has to be treated, and the practical impossibility of submitting to the same processes of purification those vast volumes of water which are carried by the sewers during heavy rainfall. This practical factor of very great importance is one which is so often lost sight of by those who approach the subject of sewage purification with preconceived ideas, gained exclusively from the perusal of scientific literature and from observations made in the laboratory. If the object of sewage-purification is to minimise the pollution of our streams and to reduce the dangers and nuisance arising from such contamination, it is obviously of the first necessity to arrive at some conclusion as to what dilution of the sewage shall be regarded as warranting a relaxation, or even abandonment, of the regular purification processes. The impossibility of avoiding these irregularities will also have to be taken into account in a consideration of what are reasonable and what are unreasonable standards of purity in the operation of a sewage works even under normal conditions.

6. *Trade Effluents.* — The purification of sewage is frequently complicated by the admixture of considerable volumes of the refuse from manufacturing operations. It is probable that in many cases the difficulties attending the purification of such materials have been greatly and purposely exaggerated; but, on the other hand, there undoubtedly are certain waste products which, if present in sufficient proportion, add most seriously to the difficulties of sewage purification.

7. *Bacterial Sewage-Works at present in operation.* — It is so frequently asserted, generally, it is true, by interested parties, that the bacterial methods of sewage-purification are still in a purely experimental stage, that it would be well if, in the course of our conference, we could place on record the number and magnitude of such works as are now in actual operation and of those which are under construction."

Books.

The Geology of the Country near Leicester. By C. Fox-Strangways, F.G.S. (Memoir of the Geological Survey.) London: E. Stanford. 1903.

THE Geological Survey, now it is a part of the Board of Agriculture, seems to be improving. It has always been a difficult matter for the layman to find out what new publications have been issued by the Survey, for the simple reason that no care has ever, until quite recently, been taken to adopt the methods of any other publishers by sending the books to newspapers and technical journals for review, except in rare instances. This book, however, has been sent to us by the Board of Agriculture, but the letter accompanying its presentation is very curious, and shows that the individual who sent it does not know much about the geology of Leicester. The letter states, "This memoir contains a full account of the geology of Leicester and adjacent country northwards as far as the important granite quarries of Mount Sorrel," &c. We cannot find the "full" account so far as that important granite is concerned, however. We suppose that such things as absorption, crushing weight, and other attributes of use to architects and surveyors escaped the attention of the author, for we find nothing but ancient descriptions of the stone itself brought out for our delectation. The book does not contain a single word about the method of working the stone, and might just as well not have been published, so far as anything of an economical character in relation to the stone is concerned.

When will the Geological Survey officials understand that publications like the present are not of the character contemplated by Government, either when the Survey was founded or at the present time? We are told that "The district is essentially a clay country, being largely Keuper marls, Lias clays, and Boulder clay." But we do not gather anything from the book as to the technical properties from a clay-working point of view of any of these deposits. Sections in brick pits are given, with the information that "this is much used," and so forth, and that is about all. Some of the best known red bricks made in England come from the Leicester district, but nobody would gather that from this book. We should not complain so much if the Survey were not maintained on the ground that it should be of some public use, and not run for the special benefit of geologists only.

In this book we find that most interest seems to have centred in the recording of fossils found at various places. We thoroughly appreciate that point of view, but we are rather amused at the lists of fossils given. This is not the place, however, to say much about fossils. But some of the determinations of the officers of the Survey remind us of what used to be written by them forty years ago at least. Very few are up to date, so that even that part of the book is really useless except, perhaps, to a strolling amateur in palæontology. We must say, though, that the list of fossils at the end of the work is more up to date than any list we have seen before in any of the Survey's publications, in spite of its many imperfections.

We must except from adverse criticism the excellent map which accompanies the book. Until quite recently the Survey have laboured under the disadvantage of having to produce "hand-coloured" maps, whereby many serious mistakes have been committed, and much trouble caused. It is obviously impossible for every hand-coloured map to be inspected in regard to minute details, and although the printing of the maps by a lithographic process may possibly be more expensive, it should prove more beneficial in the long run. The map of the Leicester district before us is an excellent example of this new departure of the Survey, and should lead to a better understanding of the official geological maps. We presume that the success of the 4 miles to 1 in. map issued by the Survey some time since has induced the production of these new lithographic maps attached to memoirs.

We have said much in regard to the book itself in a general way, and it may be well to give a few particulars as to what it contains beyond that. The Director of the Survey writes a Preface which contains nothing of any particular interest. Then comes the Introduction, which includes a general description of the district, and the most peculiar parts of it are the observations relating to "Soil and Economic Products." A few sentences only are introduced, and they are quite enough to satisfy anybody acquainted with the practical aspects of geology as to what the worth of the book is in this respect.

A description of the pre-Cambrian, Trias, Lias, Inferior Oolite, and more recent deposits follow, and we can detect nothing in any of these chapters which throws any new light on the subjects of which they treat. There is one good point in the book, however, and that is the record of well-borings in the district. Too much importance cannot be placed upon that, and it must be a very laborious matter to collect these particulars. This is one of the most useful things the Survey are doing, and, thanks to Mr. Whitaker, they have been enabled to do it now for many years. No doubt, all particulars possible are given in this section, but we should like to see the output of the wells given more frequently than they are, and more concerning the quality of the water.

Judging from the size of the print, however, more stress seems to be placed on the catalogue of fossils, and the micro-structure of the rock specimens found—which particulars are at the end of the book.

Practical Building Construction. By John Parnell Allen. Fourth Edition, Revised and Enlarged, containing over 1,000 Illustrations. London: Crosby Lockwood & Son. 1903.

THOSE of our readers who possess, or have seen, former editions of this work know it as a useful handbook of practical building construction. Since the issue of the first edition continued progress has been made in this art, so that the author has found it necessary to add considerably to his pages. His object has been to confine attention chiefly to the addition of matter relating to everyday practice, dealing lightly with special branches of work, such as electric lighting and other departments of engineering. The new matter now contained in the treatise will doubtless be of service, but some further additions and revisions would clearly be advantageous. For instance, cast-iron girders which are rarely, if ever, used are discussed and illustrated, wrought-iron girders, which are never used, are also mentioned and illustrated by a section which is badly drawn and is of incorrect proportions, but steel girders are scarcely mentioned at all. Again, columns and stanchions are somewhat important adjuncts to a building, but they are not directly mentioned anywhere in the work, and are not thought worthy of a place in the index. Fireproof floors receive adequate treatment, and under this heading the "Hennebique" system of ferro-concrete is illustrated, the author adding the enigmatical remark that it "is coming into use in spite of the fact that nothing approaching it was within the scope of ordinary and recognised building construction." Here, again, it does not occur to the author that ferro-concrete columns may be as useful in their way as beams. Foundations are still more important, but are considered in a very brief and casual manner in the middle of a chapter devoted to "Centring, Foundations, Shoring, Scaffolding, and Sewers." In the same chapter, only eight lines are devoted to underpinning—a subject that deserves more attention. Chapter XXVI., on "Sanitation," includes some subjects that should be omitted, and it omits others that should be included. Drainage is properly included, but we cannot imagine why the author considers sewers in a different chapter. No doubt it is correct to include heating and ventilation, but then fireplaces and other cooking-stoves should not be relegated to a separate chapter, for they also are heating and ventilating appliances. Lighting is certainly a department of sanitary science, but its inclusion in Chapter XXVI. leads to the importation of electric bells and lightning-conductors, which are not of a sanitary nature. The author has already a section of the book in which the wiring rules of the Institution of Electrical Engineers are printed, and in this section he ought to have collected all references to electrical work so as to form a separate chapter under a suitable title.

The "special boilers" illustrated by figs. 1,011 and 1,012 are of antiquated and unscientific design, which no one would use in the present day. In the chapter on Fireplaces much valuable space is wasted by eighteen large perspective woodcuts of ordinary and cooking stoves. These blocks are not of the least use to a student, and every architect or builder can get a much better selection of designs by referring to the makers' catalogues. The presentation of matter and illustrations from trade catalogues is always a bad practice, and it is especially to be deprecated in a work which is intended as "a handbook for students preparing for the examinations of the Board of Education, the Royal Institute of British Architects, the Surveyors' Institution, &c."

Although the new edition is enlarged to the extent of about eighty pages, it will be seen from the above remarks that the general excellence of the first edition has by no means been maintained. Examples of this kind prompt the wish that books could be sent for review before being finally published.

Practical Science for Plumbers, Engineers, and Students. By J. Wright Clarke. London: B. T. Batsford. 1903.

IN this volume the author has collected a considerable amount of information upon the subject of physical science, having chiefly in view the requirements of those who are studying the useful art of plumbing. The work is

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divided into four parts, entitled Physics, Metals, Hydrostatics and Hydraulics, Heat and Temperature. In Part I. we find a series of definitions in simple and intelligible language of "force," "energy," "work," "matter," and "gravity." Chapters V. and VI., devoted to specific gravity and falling bodies, contain examples showing the practical application of scientific principles to metal work, hot water circulation and the flow of water in pipes. The whole of this part can be read and understood withoutthe aid of mathematics, although a little simple arithmetic may be usefully employed in working out the examples given. Part II. relates to the physical properties of metals, and differs from the other portions of the book, in that it records facts instead of discussing principles. A return is made to theory in Part II., in which is discussed the behaviour of that fluid which is of so much interest to plumbers. In connexion with the flow of water, the author avoids the more or less complicated processes in which mathematicians revel and adopts simple rules which apparently are those given in the excellent little treatise on Practical Hydraulics by Mr. Thomas Box. Similarly simple treatment characterises Part IV., on Heat and Temperature, this section being specially suited to the requirements of the hot-water fitter.

Throughout the pages of this work there is ample evidence that it has been written by a practical man for practical men. The author evidently knows the needs of the class addressed, by whom the treatise should be regarded as a valuable aid.

The Modern Carpenter, Joiner, and Cabinet Maker. Vol. IV. London: The Gresham Publishing Co.

WITH the theoretical work in this volume, Section VI., Part I., we have the same faults to find as with the section in Vol. III. upon Practical Geometry. The author hesitates everywhere between the two alternative methods of mere statement and of logical demonstration; he does not emphasise the distinction, so necessary in all educational works, between his assumptions and his deductions; he will be charged by the student with slovenliness, and with prolixity by the practical man.

Section VI., Part II., comprising a large amount of useful information respecting the physical properties of timber, and its behaviour under various stresses, is a much more satisfactory contribution to the literature of the subject. It suffers mainly from the paucity and diversity of experimental data, which do not always warrant the graphical method, so liberally adopted, of plotting results. On the first page of the disquisition is a case in point. Bauschinger's experiments on the relative resistances of green and dry timber to stresses of longitudinal compression seem to decide conclusively in favour of seasoned wood, and this conclusion is certainly of great importance. But by plotting the results of these insufficient experiments, the author obtains a curve which is worse than useless, giving, as it seems to do, for perfectly dry timber a resistance that is practically infinite. On the other hand, we are given a really useful-looking plate, prepared from an original formula of the author's, and giving results which are said to be consistent with the best statistics, for the calculation of resistance to stresses of longitudinal compression in posts of various woods, under varying relations of the length to the least diameter.

NEW CITY REGULATIONS.

IN our last issue we referred to the new regulations erecting the methods of demolishing buildings in the City which have been printed by the Streets Committee of the Corporation. The following is the new code of rules:—

1. That proper hoards shall be erected and fans fixed at the level of the first floor, and such other portions as may be directed. That before any pulling down is commenced all windows and other openings in the external walls shall be close boarded in, unless a gantry be constructed, and the upper portion boarded in to the full height of the building to be taken down.

2. The roof of any building shall be removed and the internal partitions and cross walls shall be pulled down floor by floor, before commencing to take down any of the main walls of such floors.

3. Canvas or boarded screens, mats, or other suitable appliances shall be used wherever required, and so placed as to reduce the nuisance arising from the escape of dust.

4. Water shall be laid on and constantly used on each floor by means of jet and hose during the demolition of any building, and all materials shall be freely sprinkled with water to reduce the nuisance arising from dust.

5. The ceilings and lath and plaster partitions shall not be broken down, or any rubbish, lime, or mortar shot or allowed to fall from floor to floor, or into any basement, within 20 ft. of a public way, between the hours of ten a.m. and 6 p.m., except on Saturdays, when it shall be permitted after three p.m.

6. No materials arising from the demolition of buildings shall be basketted, wheeled, or loaded into carts, or carted away, between the hours of 10 a.m. and 6 p.m., except on Saturdays, when it shall be permitted after 3 p.m., unless a temporary carriage-way entrance, or draw-in across the footway has been provided in such a manner as shall prevent any nuisance arising from the escape of dust.

7. All directions of the engineer shall be strictly complied with.

8. Every person who offends against any of the foregoing by-laws shall be liable for every such offence to a penalty of five pounds for each breach thereof: Provided nevertheless that the Justices or Court before whom any complaint may be made, or any proceeding may be taken, in respect of any such offence may, if they think fit, adjudge the payment as a penalty of any sum less than the full amount of the penalty imposed by this by-law.

Correspondence.

BY-LAWS AND MAGISTERIAL DISCRETION.

SIR,—Referring to your comment on the Scott Hall case in your last issue, I regret, with you, that in such disputes, where the spirit of the law is not infringed, magistrates do not exercise the discretionary power which they have under Clause 16 of the Summary Jurisdiction Act.

It is impossible to frame by-laws that will meet every case, but where magistrates use discrimination they can give the building by-laws all the elasticity that is requisite so as to make the Local Government Board hard-and-fast regulations thoroughly elastic without the least injustice. But in the recent Malvern prosecution the Hon. Ernest Pomeroy was condemned for building a galvanised-iron billiard-room in the open country, and it is clear that the Bench ignored the Summary Jurisdiction Act as well as the plain advice of the Lord Chief Justice and two other Judges. The magistrates have re-affirmed their original decision, and the Hon. Ernest Pomeroy has again appealed. I hope he will eventually succeed.

Magistrates, like ordinary people, sometimes suffer from "stiff neck," and although we pray every Sunday that they may "have grace to execute justice and maintain truth," we all know how painful it is to turn when one has a stiff neck.

E. D. TILL.

August 26.

The Student's Column.

CONCRETE-STEEL.—IX.

THE THEORY OF BEAM DESIGN (*continued*).

IN the foregoing examples the depth, load, and span were definitely fixed, and the height of the neutral axis was assumed for each case, the object being to find the required areas of steel and concrete to comply with the stated conditions. But the same rules are equally available for determining the proportions of a beam to suit any load and span if the essential factors are known.

For instance, we can calculate the height of the compression area from the load, span, width of the section, and the unit stress of the concrete. Let $Wl = 400{,}000$ in.-lbs., $b = 10$ in., and $f = 500$ lbs.

Then

$$h^2 = \frac{Wl}{5{\cdot}3\,bf} = \frac{400{,}000}{5{\cdot}3 \times 10 \times 500} = 15,$$

and $\sqrt{15} = 3{\cdot}87$ ins.

Similarly, taking the width at 6 in., the value of h becomes 5 in.

If the comparison area is to be square in section, we have

$$b^3 = \frac{400{,}000}{5{\cdot}3 \times 500} = 28{\cdot}41, \text{ and } \sqrt[3]{28{\cdot}41} = 5{\cdot}33 \text{ in.}$$

The required distance of the reinforcement from the neutral axis will depend upon the area of steel used, and conversely the area of steel will be governed by its distance from the neutral axis. If we calculate upon the basis of 1 sq. in. of steel placed 2 in. from the bottom of the beam, and take the unit stress at 15,000 lbs. per square inch, the formula—

$$f = \frac{Wl}{8\,(h - x)},$$

may be modified to

$$(h - x) = \frac{Wl}{8f}.$$

Then we obtain

$$(h - x) = \frac{400{,}000}{8 \times 15{,}000} = 3 \text{ in.},$$

and as in this case $x = 2$, we get $3 + 2 = 5$ in.

This result implies the equivalent of a 1-in. square bar. If we reckon upon a bar of $\frac{3}{4}$ in. area, the height comes out at 6·66 in.; and if we allow for a bar of $\frac{1}{2}$ in. area, the height becomes 10 in.

Summarising these results, we have the following alternative dimensions:—

Tension Area.		Compression Area.	
Steel.	h.	h.	b.
1 sq. in. ...	5·0 in.	3·87 in. ...	10·0 in.
$\frac{3}{4}$ " ...	6·6 "	5·00 " ...	6·0 "
$\frac{1}{2}$ " ...	10·0 "	5·33 " ...	5·33 "

The width of the tension area may be adjusted to suit the spacing of the steel bars, and need not necessarily be the full width of the compression area. In the cases under consideration there would be no practical advantage in reducing the width of concrete in tension, except in the case of the 10. in. by 3·87 in. top flange, as the additional cost of moulds would more than counterbalance any saving due to reduction in the quantity of material.

The rules we have given do not involve any profound investigation, and they are deficient in the respect that the relative values of the coefficients of elasticity are not introduced as factors. This omission does not, however, make a very material alteration in the results, and our primary object will have been attained if we have succeeded in illustrating, by the aid of simple equations derived from rules in ordinary use, the general principles adopted in the design of concrete-steel beams.

Before referring to one or two of the more complete formulas which have been deduced for calculating the proportions of beams, we will give a very simple one which has been in use for some years in the United States. This equation is $f = \frac{Wl}{6\frac{2}{3}D}$, where W=the total load in pounds, l=the span in inches, D=the depth in inches from the top of the beam to the centre of the reinforcement, and f=the total stress coming on the steel.

In using this formula the total stress upon the reinforcement is first calculated, the sizes of the bars and the spacing are then settled as may be convenient, and a sufficient area of concrete is provided for resisting compression above the neutral axis. In connexion with this formula, it is assumed (1) that an absolutely perfect bond of union exists between the steel and the concrete within the limits of the working strength of the combination; (2) that the steel takes the entire tensile stress, and the concrete the entire compressive stress; and (3) that the concrete below the reinforcement is merely for the purpose of holding the latter in position. Although it is admitted that the concrete below the neutral axis is in tension, no allowance is made for such tension in the computations.

The formula is based upon the assumptions that the neutral axis is halfway between the centre of the steel and the upper surface of the beam, and that the axis of compression is two-thirds of this distance from the neutral axis. Thus, in fig. 14, D represents the distance

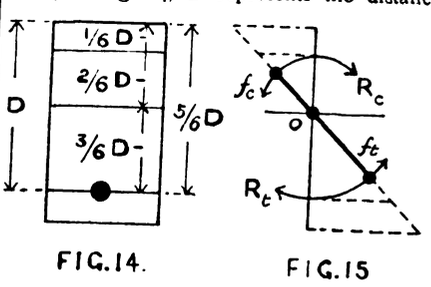

FIG. 14.

FIG. 15

between the steel and the top of the beam; the neutral axis is at the height D ÷ 2, or $\frac{3}{6}$ D, and the axis of compression is at the height $\frac{4}{6}$ D, both these measurements being taken from the centre of the steel. Consequently, the arm of

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the moment of internal forces is said to be indicated by the expression $\frac{5}{8}$ Df. For a uniformly distributed load the bending moment is $M = \frac{Wl}{8}$. The formula was derived by equating these two expressions. Thus,

$$\frac{Wl}{8} \times \frac{1}{\frac{5}{8}Df} = 0.$$

Whence $f = \frac{Wl}{6\frac{2}{3}D}$.

Up to a certain point this reasoning appears to be perfectly correct, and the total length of the arm of the moment of internal forces is certainly $\frac{5}{8}$D. But there are two internal forces, which form a couple and act about a point that we will call 0 on the neutral axis. One force acts at the distance $\frac{3}{8}$D above the point 0, and the other at the distance $\frac{3}{8}$D below the same point. Let f_c, in fig. 15, represent the total force in the upper area of a beam and concentrated at a single point in the concrete, and the symbol R_c to represent the moment of resistance of the corresponding part of the section, we have $(f_c \times \frac{3}{8}) = R_c$. Similarly, if f_t=total force in the lower area of the beam concentrated at a single point in the steel, and R_t=the moment of resistance of the same area, we get $(f_t \times \frac{3}{8}) = R_t$.

Consequently the effective length of the arm of the force f_t is $\frac{3}{8}$D, and the effective length of the arm of the force f_c is $\frac{3}{8}$D.

The formula that we are now considering is evidently intended to apply to beams of equal strength above and below the neutral axis. Hence $R_c = R_t$, and $f_c = (f_t \times 1{\cdot}5)$. As in all cases R=M, it follows that for a given load W and span l, the stress in the compression area, when the neutral axis of the beam is at the proportionate height now assumed, will be 1·5 times the stress in the lower area; or, stated in another way, it may be said that the stress in the lower area is two-thirds of the stress in the upper area.

From this it is a natural consequence that the sectional area of concrete in compression should be governed by the moments of internal forces, as well as by the ratio existing between the compressive strength of the concrete and the tensile strength of the steel.

This expression for the value of f is only suitable for employment when the neutral axis is at the relative height previously stated. When using the formula with unit stresses of 1,500 lbs. and 500 lbs. for steel and concrete respectively, its is recommended that 30 sq. in. of concrete per square inch of steel should be allowed in the upper third of the beam. This implies that the concrete will be disposed equally on either side of the axis of compression, the concrete between the upper third and the neutral axis being neglected. Thus the total area of concrete to be provided for resisting compression is similar to that found by—

$$a_c = a_s\ (F_s \div F_c \times 1{\cdot}5),$$

where a_c = area of concrete, a_s = area of steel, F_s = tensile strength of steel, F_c = compressive strength of concrete and 1·5 is the coefficient ascertained for the above stated conditions.

The statement is made on good authority that various works in the United States have been carried out on the basis of calculations made by the use of this formula, and that when loaded with as much as three times the calculated amount these works showed no sign of failure. Therefore, it is believed that the rule may be safely used in practice for any structures within the safe limit of the bond between the concrete and the steel. Under such circumstances, the inference seems to be that the actual strength of concrete-steel structures is much greater than the strength which is indicated by the application of rules in which the factors relating to the strength of steel and concrete are based upon the data ordinarily used in structural work.

As illustrating this point, we may cite some of the observations made during a series of tests conducted in 1900, at the Massachusetts Institute of Technology. All the beams tested were 12 ft. long, 12 in. deep, and 8 in. wide. The reinforcement consisted of steel bars of different sizes, placed 2 in. from the bottom of the beam in each case, and the load was concentrated at the centre of a 132-in. span. One of the beams containing one ½-in. bar failed under a load of 2,500 lbs., including the weight of the beam itself. On the assumption that the bar was stressed to its limit, the concrete still had to carry 381 lbs. to the square inch in tension as a beam. In the case of a beam containing one ½-in. bar, the portion of the load carried by the concrete was calculated to be equivalent to a maximum fibre stress of 303 lbs. per square inch. Similarly, a beam reinforced by a ¾-in. bar supported a sufficient part of the load to cause a fibre stress of 462 lbs. per square inch. Another beam containing one 1¼-in. bar was accidentally cracked through the middle before testing, and it then carried 3,000 lbs. less load than a beam having one 1-in. bar. As the latter had an excess of strength on the tension side, it was considered that the lower strength of the beam with a 1¼-in. bar was due to the absence of assistance by the concrete. On this assumption, the concrete in the beam with the 1-in. bar sustained a fibre stress of 516 lbs. per sq. in. In a similar manner, a beam with two 1¼-in. bars was compared with another having two 1-in. bars, the ultimate load of the former being 23,000 lbs., and of the latter 20,000 lbs. The difference of 3,000 lbs. carried by the concrete as a beam was equivalent to a maximum fibre stress in tension of 516 lbs. per square inch.

Although the concrete used in making the above-mentioned beams was not of richer proportions than 1 : 3 : 6, the strength contributed was particularly marked. The ultimate strength in tension of the steel bars averaged 83,330 lbs. per square inch, the highest being the ½-in. bars, the strength of which was 100,140 lbs. per square inch. If steel of lower tenacity had been employed, the proportionate stress upon the concrete would have been more pronounced. It may further be remarked that none of the beams cracked until the steel had reached its elastic limit, which averaged about 64 per cent. of the ultimate strength.

Another point of interest in connexion with these tests is to be found in the measurements of the position of the neutral axis. The height of the axis was carefully calculated for each beam, and, on the assumption that the value of E for concrete was 1,000,000, and for steel, 28,000,000, the estimated height from the bottom of the beam came out at an average of 4·77 in. Assuming the value of E for concrete to be 2,800,000 lbs., the average height of the neutral axis was determined at 5·37 in. On the other hand, the actual measurements showed considerable variation, the greatest height of the axis being 10·2 in., and the lowest 4·74 in., while the average proved to be 7·06 in. In this particular instance we have an illustration of the fact that however perfect a formula may be from a mathematical standpoint, the results afforded cannot be of real value unless thoroughly reliable data are available.

OBITUARY.

Professor Corfield.—We regret to hear, just as we go to press, of the death, at Marstrand, Sweden, of Dr. W. H. Corfield, Professor of Hygiene at University College, London.

Mr. J. H. Cook.—We regret to announce the death, in his forty-second year, of Mr. James Henry Cook, junior partner of the firm of Messrs. T. Cook & Son, of 12, St. George's-crescent, W. Liverpool, architects and surveyors. On quitting Liverpool College, Mr. Cook served his articles to the late Colonel Walker, architect, and then entered the office of his father, Mr. T. Cook. In 1883 he won the silver medal of the Royal Institute of British Architects for a set of measured drawings of Stokesay Castle, and shortly afterwards went to America, where he soon found good employment, and for a while acted as assistant to the late R. Morris Hunt in preparing plans and designs for the Chicago Exhibition, popularly known as the World's Fair. On returning to England a few years ago he rejoined his father in practice, taking charge of the architectural branch of the business. Our readers will remember that Mr. Cook was one of the eight architects whose designs — his were No. 84 — received "honourable mention" in the first stage of the competition for the Liverpool Cathedral. Of other architectural works carried out from his plans and designs we may instance the Town Liberal Club at Birkenhead; the Congregational Church at Seaforth, near Liverpool; a residence at Oxton, Birkenhead, for Mr. Thomas Gilton; the schools for the Congregational Church in Oxton-road, Birkenhead; and also the new hall for that same church. Mr. Cook was employed as architect for several business premises, warehouses, and so on, in both Liverpool and Birkenhead, and in June, 1900, obtained the third premium of 100l., upon the award of Mr. Alfred Waterhouse, as assessor, for his designs for new offices of the Mersey Docks and Harbour Board on the site of portion of the old St. George's Dock. On August 18, 1900, we published a two-page perspective drawing, with two plans, of the designs he submitted in that competition.

Mr. T. Wardrop.—We regret to announce the death, on the 22nd inst., of Mr. Thomas Wardrop, one of the senior members of the firm of Messrs. Harris & Wardrop, builders and contractors, 10 to 14, Wallwood-street, Limehouse, E. The business will be carried on as heretofore by the remaining partners, Messrs. E. Harris, C. Gregory, and J. Wolfe King.

GENERAL BUILDING NEWS.

New Buildings, Presbyterian Church, Newcastle.—The memorial stone has just been laid of new buildings in course of erection in connexion with the Westmorland-road Presbyterian Church of England. The additions consist of two parts—an entirely new building on the vacant site in Westmorland-road, and alterations to the existing caretakers' buildings in Maple-terrace. The front block contains a room on the ground floor for session and managers, with hall for week night service and other meetings. The first floor contains a ladies' room with cloakrooms, and the kitchen, &c., for caretaker, the second floor, or attics, being occupied as sitting-room and bedrooms for the caretaker. In the basement there is a heating chamber and lavatory accommodation. The existing caretaker's house in Maple-terrace will be made into a classroom, with fire-proof stairs leading up to the back part of the church, thus making a safe exit. The building will be one story in height, with a vestry provided for the minister at the church floor level instead of in the basement, the existing vestry being enlarged to form a class-room or meeting-room for young men. The work has been designed by and is being carried out under the superintendence of Messrs. Badenoch & Bruce, architects, and Mr. J. M. Whammond, of Gosforth, is the contractor.

Schools, Winlaton, Durham.—The new boys' school erected at Rowlands Gill by the Winlaton School Board, and the new infants' school established at Winlaton, were opened recently. The building at Rowlands Gill is of brick, erected upon a site an acre in extent, and provides accommodation for 240 scholars, the approximate cost being about 4,500l. The structure has been erected by Mr. Robert Smith, of Winlaton, from the designs of Messrs. Liddle & Browne, architects, Newcastle, the clerk of works being Mr. Thomas March, of Winlaton. The infants' school at Winlaton is of stone, and provides accommodation for 300 scholars, the cost being a little under 1,000l., exclusive of the site. Mrs. M. A. Armstrong, of Blaydon Bank, was the contractor, the architect being Mr. Edwin Bowman, Newcastle, and the clerk of works Mr. Thomas March.

Volunteer Headquarters, Liverpool.—The headquarters of the 1st Volunteer Battalion of the King's Liverpool Regiment are to be considerably altered and improved. The accommodation to be provided is briefly as follows:—On the ground floor will be a large orderly-room and commanding officer's-room, the sergeants' messroom, men's recreation-room, restaurant and canteen, lavatories for non-commissioned officers and men, also staircase from the drill hall, and general service staircase. The drill hall will be increased to 80 ft. in width, with an average length of 130 ft. A Morris-tube range will be provided at the south side, and a room for the machine-gun and a magazine at the east end. A few steps down from the drill hall will be the armouries, having racks for all the rifles, and workshops, stores, &c. On the first floor will be the officers' mess and ante-rooms, having a frontage of 41 ft. to St. Anne-street, with a stone balcony there. Dressing-rooms and lavatories, bathrooms, &c., are provided, and there will be service and store rooms; also a doctor's room and a quartermaster's store. The remainder of this floor is occupied by the room at present known as the Oddfellows' Hall, which has a floor space of 70 ft. by 41 ft., with an end gallery and a stage. This hall is approached from the drill hall by a wide staircase, and also from the first floor by wide passages. It is intended to use this room for a gymnasium, a bandroom, and for general regimental purposes. The attic floors are occupied as residences for the sergeant-major on the north side, and for the resident sergeant on the south side, and there are also rooms available for stores, &c. The building will be lighted throughout with electricity. The architect for the building is Colonel F. U. Holme, and the general contractor Mr. W. Hall.

Theatre, Glasgow.—A theatre is in course of erection on a site at the corner of Elmbank-street and Bath-street, Glasgow, for Messrs. Howard & Wyndham, Limited. It is to be known as "The King's," will cover an area of 150 ft. by 105 ft., and will be seated for about 2,000 people. The architect for the building is Mr. Frank Matcham, London, and the contractors are Messrs. Morrison & Mason, Glasgow; the contractors for the constructional ironwork being Messrs. Schofield & Hancox, Manchester. The building is proceeding under the superintendence of Mr. A. E. Marsh, Master of Works.

Catholic Schools, Whitwick, Leicestershire.—New Catholic schools have been erected at Whitwick, on a site termed Parson Wood Hill. The buildings, on the central hall plan, are situate a few minutes' walk from Whitwick Railway Station. The site covers 116 ft. by 90 ft., and the whole con-

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sists of a hall 72 ft. by 33 ft., having four class-rooms on each side and one at the end, each of which provides accommodation for between fifty and sixty scholars. The classrooms will be lighted from the left of the scholars, and divided from the central hall by movable glazed screens, giving direct superintendence of the respective heads of the girls' and boys' schools. There are separate entrances, and cloak-rooms with lavatory accommodation, and private rooms and store closets are provided for the master and mistress. The ceiling of the central hall is 30 ft. high. The floors are of wood block, excepting the cloakrooms, which are of concrete slabs. All the internal walls are lined with brown glazed bricks to a height of 4 ft., and the remainder of the walls, internal and external, are lined with red bricks. The dressings are of red terra-cotta and Ancaster stone, whilst the roofs are of green slates, and the ceilings plastered. The building will accommodate between six and seven hundred children, and the cost of erection is about 5,000*l.* The architects were Messrs. McCarthy & Co., of Coalville.

"RECEPTION HOUSE," BERMONDSEY. — This building, erected in Grange-yard, Bermondsey, is intended to shelter persons whose houses or rooms require disinfection because of the presence of contagious disease. The building is planned on the maisonette principle, and consists of a set of four flats. Two of these flats contain a large living-room and one bedroom, and the other two have a living-room and two bedrooms. Each flat has a bathroom, with lavatory, &c. The structure is built with a flat roof, so that at any time another story may be added if required. A caretaker's house adjoins. The premises are electric lighted, and hot water is laid on to all the baths and lavatories. The building was designed by Mr. R. J. Angel, the Borough Surveyor, and the work has been carried out by Mr. T. D. Leng, builder and contractor, Deptford, the contract price being 2,284*l.*

SAVOY THEATRE, STRAND.—As a part of the improvements that are being carried out on the south side of the Strand, a new and wide level roadway is being constructed to lead from the Strand, on the line of (old) Beaufort-buildings, to the chief entrances, on the east side, of the Savoy Theatre. The theatre itself is being extensively redecorated and repaired, both within and without, for Mrs. D'Oyly Carte, under the directions and superintendence of Mr. Arthur Blomfield Jackson, and a new iron and glass covered-way has been erected by the St. Pancras Iron Co. The theatre, built after plans and designs by C. J. Phipps, was opened on October 10, 1881, and is the first playhouse in London that was lighted with the electrical light.

STAPLE INN BUILDINGS, HIGH HOLBORN.—A new block of buildings with a frontage, No. 335, to High Holborn, and abutting against the west side of Staple Inn, has just been completed, being constructed of red brick and terra-cotta, with red granite facing on the ground floor, after plans and designs by Messrs. Alfred Waterhouse & Sons. The rebuilding comprises a new and wide thoroughfare for passengers on foot from the main road to the terrace-walk of Staple Inn, which is raised above the level of the garden of the Inn, and extends between the garden and the east front of the Birkbeck Bank.

EXTENSION TO NORFOLK COUNTY ASYLUM.—The contractors for this work, an account of which we give in our issue for August 15, were Messrs. William King & Son, Vauxhall Bridge-road, Westminster, S.W.

"VICTORIA MANSIONS" FOR MEN, HULL.—The Victoria Mansions have been built to meet the needs of single young men, and will be run practically on hotel lines. The accommodation provides for 400 men. The main entrance to the building is in the centre of the frontage to Great Passage-street, and the mansions have one entrance only for lodgers, and one entrance in the basement beneath the same for staff purposes. The new building has a frontage of 186 ft. to Great Passage-street, and extends a matter of 134 ft. deep, and comprises a basement and four floors above. Entering from Great Passage-street the clerk's office, supervising the entrance, is reached, and past the turnstiles an octagonal hall, some 20 ft. in diameter, is situated, from which the doors of the lodgers' dayrooms enter direct, and from which a staircase leads direct to all floors. The floor is of red granolithic concrete. Teak garden seats are provided in this hall. From the hall the first door to the left hand leads to the smoking room, over 80 ft. long, and fitted up with tables and seats in teak similar to the dining-room. The walls are built with a high dado of glazed bricks and plastered above. The second door on the left hand from the hall leads to the dining-room, 90 ft. long, and provides a floor area of 2,106 ft., and fitted up with teak tables and seats for 276. The walls have a glazed dado, similar to the other rooms. Within the centre of the building is the shop, lined with white glazed bricks from floor to ceiling, and fitted up with cupboards, drawers, shelving, gas-stove, &c. This room serves the purpose of grocer's shop as well as serving-room between the kitchen department and the dining-room. Between the dining-room and the smoke-room there is a service-room with walls built of white glazed bricks from floor to ceiling, and fitted up with shelving and cupboards for crockery and utensils for the use of the lodgers. A lodgers' scullery is also provided out of the dining-room, built in white glazed bricks from floor to ceiling, and fitted up with enamelled fireclay sinks, with hot and cold water to each. A gas boiler is also provided for hot water for tea-making purposes. On the opposite side of the entrance hall is the door to the reading-room, a room over 80 ft. long, and having a glazed brick dado similar to that in the smoking-room. The seats and tables here provided for the men are in teak, and seat 120. In addition, wooden easy chairs are also provided, similar to those in the other rooms. In the basement is the luggage-room, fitted up for the storage of tool-chests or other bulky articles which the lodgers may desire to have taken charge of. There are also a lavatory, providing forty lavatory basins in white fireclay, a barber's shop, and a feet-washing room, containing six deep enamelled fireclay washing-troughs, with hot and cold water to each trough. Four bath-rooms are provided (entered from the lavatory), all fitted with white glazed fireclay baths, built up solid in concrete, and faced with white glazed brick walls, and having teak bath tops. There is a hot and cold water-supply to each. The bathrooms are built in white glazed bricks. A wash-house is also provided, containing five washing-troughs in glazed fireclay, with hot and cold water to each, where the lodgers may wash their own apparel; and a heating-stove is provided, surrounded by galvanized iron framing for the speedy drying of cloths. The walls are built in white glazed bricks from floor to ceiling. A small room here is fitted up as a tailor's shop, and a space is provided in the main lavatory for boot-cleaning, &c. From the main lavatory there are three avenues fitted up with lockers for the use of the lodgers. Four hundred lockers are thus fixed. A porters' dayroom is also arranged in the basement for the use of the officials when off duty. Some forty water-closets and six urinals are arranged in a detached building on the ground floor, entered by swing doors through a ventilated lobby from the entrance hall, and are completely detached from the main building. Returning to the entrance hall, the whole of the wing on the right-hand entrance facing Great Passage-street, upon the ground floor, is devoted to the office clerk and his bedroom, and to the manager's house, having a private door from the main hall. Within this department a staircase is provided for the access of the manager to the catering department in the basement, and for the bedmaker's use up to the first floor. A lift is also here arranged, serving for bedmaker's use, from basement to each floor above. The catering department is arranged in the basement, and is entirely shut off from any portion of the premises occupied by the lodgers. This department comprises kitchen, 26 ft. by 17 ft. 6 in., built in white glazed bricks from floor to ceiling, and paved with Ruabon red tiles. From the kitchen a service lift is arranged to the shop on the ground floor. Adjoining the kitchen is a scullery, 18 ft. 9 in. by 12 ft. wide, built in white-glazed bricks, and from this room a lift returns the crockery, &c., to the service-room above. A grocery store and a linen store are also provided in the basement. The west wing of the basement is occupied as a residence for the female staff, and comprises dayroom, four bedrooms, bath, and water-closet. Provision is also made in the basement for boiler-house and coal for the hot-water service throughout. A small room is also arranged as a disinfecting chamber for fumigation or disinfection of anything that may be required. Returning to the entrance hall, the main staircase leads up to the three floors of cubicles for the lodgers. The three floors are identical, and provide a total of four hundred cubicles. The inside of the floors are fireproof, of concrete and iron. In addition to this the cubicle floors are divided by 9-in. walls into sections of about 30 ft. long. Each bed is in a separate cubicle, and every cubicle in the building has a window direct into the open air under the control of the occupant. A water-closet and housemaid's sink is provided on each landing, with cold water drinking supply. Fire mains are provided at different points throughout the building with a connexion for hose pipe upon the landing of each floor. There is also a door at the end of each cubicle division leading out to a fire escape staircase. An official's bedroom is arranged on the main landing on each floor. The buildings have been erected by the following contractors:—Brickwork, Mr. G. Houlton; masonry, Messrs. Quibell & Son; joiner's work, Messrs. J Houlton & Son; slating, Messrs. Dawber, Townsley, & Co.; plumbing, Mr. F. Abba; painting, Messrs. J. Y. Torr & Son. The hot-water service, with Lancashire boiler and steam cooking apparatus, has been carried out by Messrs. T. Bradford & Co., laundry engineers, of Manchester. The electric lighting has been carried out by Mr. A. Shaw, of Hull; the wood block flooring by Messrs. Hollis Bros., of Leicester. An illuminated clock has been erected over the entrance by Messrs. Potts & Sons, of Leeds. The concrete work has been carried out by Messrs. Walker & Son, of Idle. The whole work has been carried out under the supervision of the architects, Messrs. Gelder & Kitchen, of Hull.—*Hull News.*

WESLEYAN SCHOOL CHAPEL, FARNWORTH, LANCASHIRE.—Eight memorial stones have just been laid for the new school chapel which is in course of erection in Cawdor-street, in connexion with Moses Gate Wesleyan Church, Farnworth. Messrs. Bradshaw & Gass, of Bolton, are the architects.

SANITARY AND ENGINEERING NEWS.

DOCK EXTENSION, FELIXSTOWE.—Arrangements have just been concluded, says the *Suffolk Chronicle*, for the erection, at Felixstowe Dock, of a 200-quarter steep malting for Messrs J. Cough & Sons, of Bury St. Edmunds, and for the building of eight workmen's cottages, four to be used in connexion with the malting, and the other half for dock hands. These buildings will be raised on the South Quay, which has hitherto been used for the ordinary trade of the port. In consequence, the Felixstowe Dock Company, in order to cope with the regular trade of the port, have decided to develop the North Quay, so as to provide the extra berthing accommodation required. This work will entail a cost of upwards of 10,000*l.*, and the malting, cottages, and concomitant sidings and connexions with the Great Eastern Railway system, a further 20,000*l.* or more. Considerable delay in commencing the structure has been caused by the necessity for trial borings, which have been made during the last few months with the object of finding a foundation for the malting, but the Dock Company's Engineer, Mr. John Russell, who has also been superintending the erection of the sea wall and promenade, has now made arrangements for suitable piling and concrete work sufficient to carry the building. In the first instance, separate tenders were sent in for the foundations, but it was subsequently considered desirable to place the whole of the south quay work in the same hands. Messrs. Spencer, Santo, & Co., of Kensington and Felixstowe, have been successful in obtaining the combined contracts, and the work is to be commenced forthwith. The architects are Messrs. Evans & Son, of Nottingham. The extension of the dock itself will be carried out by Messrs. P. W. Symmons & Co., Cannon-street, E.C.

MISCELLANEOUS.

ORDNANCE SURVEY, 1902-3.—On August 10 the Director-General of the Survey issued his Report for the twelve months ended on March 31. During that period a marked progress has been made with the small scale maps, upon which much attention and labour have been bestowed for some years past. The 1 in. to a mile hill maps of Scotland and Ireland were completed in 1893 and 1895, respectively, and that for England in 1902. The process of engraving on copper being a slow one, it was not expected that the 1-in. hill map would be finished before 1910; the outlining, moreover, has been delayed for the completion of the Cadastral Survey, and the consequent reduction of the latter for purposes of the new map, which consists of an aggregate of 696 sheets, whereof 131 (for Scotland) are of double size. In the course of the twelve months covered by the report, maps to a scale of 1 in. to two miles of the country between Portsmouth and Salisbury, the south-east of England, and other districts have been prepared for use by the military authorities and for sale to the public. The four-mile and the ten-mile revised outline maps of the United Kingdom are well advanced, and a beginning has been made with the last small scale map of the survey programme—one to a scale of one-millionth. It is stated that the making of a hill drawing for the 1-in. maps from the field sketches occupies from four to six months, and that an average time of about eighteen months is passed in engraving a wholly filled single-sized sheet of that series. The Vandyke process is successfully employed at Southampton and Dublin for the printing, and a considerable amount of printing is done for other departments. Stocks of folded maps are kept for sale at certain post-offices, and by means of a newly-adopted method of folding it a map may be used when only partly opened.

ARCHÆOLOGICAL EXPLORATIONS AT BROUGH.—Explorations of a highly-interesting character continue to be made at Brough, near Hope and Bradwell. Day by day things become more interesting, as the foundations of the Roman town and military station are laid bare. Mr. John Garstang, who is superintending the work, on behalf of the Derbyshire Archæological Society, conducted the explorations at Meldandra Castle, Glossop, which was connected with the fort at Brough by the old Roman road still in existence. The explorations at Brough prove the fort to have been very extensive, indeed, almost a little town—somewhat similar to Meldandra Castle. The walls are of worked stone, and vary from 5 ft. to 8 ft. in thickness, and being entered at each corner by four gates. On the 21st inst. the circular walls of a huge watch tower were discovered, at the bottom of which was a port room, with a floor of limestone and lime ashes. In the centre of the pile, the walls of a large building, that was evidently the General's judgment hall, were found. Just before noon, on the 21st inst., a Roman bath of worked stone, about 12 ft. by 6 ft., was unearthed. On the excavations being continued, it was found that a descent was made into the bath by a beautiful flight of steps. An inscribed stone was discovered, the inscription

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showing the bath to have been dedicated to one of the Roman Emperors. Close by was found a bronze coin of the second century. Reverting to the pretorium, it may be stated that it is somewhat larger than most of these buildings, considering the size of the fortification, but, of course, the extent has not yet been revealed. It has every appearance of being of immense size. In one place pieces of tiles, pots, oyster shells, and charcoal were found, all suggesting the cooking of oysters in a pot over a fire. When the Society has completed its excavations for the present summer, the discoveries will be covered; but such is the extent and importance of the station that it is expected that the exploration will be continued for several years on the site. Members of the Derbyshire Archæological Society will probably visit the spot shortly. The Society are much indebted to Mr. Edward Nicholson, the leaseholder of the land, under Colonel Leslie, for the assistance he is rendering.—*Sheffield Telegraph.*

CHURCH OF ST. SEPULCHRE, HOLBORN VIADUCT.—The vicar and churchwardens petitioned the Consistory Court last week for a faculty to authorise the enlargement of the parish church schools upon a portion of the old graveyard which lies on the north side of the church. The existing school buildings were erected forty-two years ago in the churchyard in lieu of the former premises in Ball-court, on the east side of Giltspur-street. In May, 1890, the Chancellor of the Diocese granted a faculty for extending the infants' school to accommodate ninety infants on that site, the Education Office having declared that further accommodation was necessary. Upon that occasion Dr. Tristram, K.C., adjudged that under the circumstances of the case the provisions of Clause 3 of the Disused Burial Grounds Act, 1884, did not apply, inasmuch as the ground had already been covered partly with flagstones and partly—upon a higher level—with concrete (for the children's playground), with the parochial schools, and with an adjoining building, constructed of brick, and latterly used for a coal-house, which it was proposed to convert, at a cost of 500*l.*, for the new infants' school. The works under that faculty were delayed by reason of an insufficiency of money; a fund of about 850*l.*, however, is now collected. Meanwhile, the coalhouse has been rearranged for twenty children; but the Board of Education now require that it shall be rebuilt and enlarged, and that a cloakroom shall be added for the scholars. As the official demands involve a considerable amplification of the plans thus far agreed upon, the school managers, finding no other site could be obtained, resolved to remodel the plans so as to include an additional floor over the ground floor of the new building, to be used in connexion with the services of the church, for the purpose of church and mission services, for Sunday-school classes, and for religious, charitable, and parochial meetings. Their petition for the latter faculty was opposed by the London County Council (who had put in no answer to the petition in 1890) as claiming to be the authority for enforcing a due observance of the terms of the Act of 1884 within the Metropolis, which embraces the City of London. The petitioners maintained that the new buildings were to stand on part, being about 185 ft. superficial, of the land walled off and used for school purposes ever since the schools were first erected there; that no new drains would be needed, and that the building of the foundations upon a concrete platform interlaced with iron girders would obviate the necessity of removing human remains, if any, during the works. In delivering judgment the learned Chancellor pointed out that the faculty for building the schools for 300 boys and girls on a walled-in portion of the closed burial ground, and for taking the rest of the enclosure as a playground, was granted in 1860, twenty-four years before the passing of the Disused Burial Grounds Act; so that the playground, though formerly portion of the old churchyard, was not at the date of the Act a burial ground within purview of the Act. But having regard to the prohibitions since imposed by that statute, and in view of a recent decision of the Court of Arches in the matter of the proposed vestry at Holy Trinity Church, Tredegar-square, E. (see the *Builder* of August 15 current), Dr. Tristram refused to grant the faculty applied for, leaving each party to pay their own costs. He at the same time intimated that in his opinion the Act of 1884, which was passed through very rapidly at the end of the Session, was in some respects open to amendment without any violation of its spirit and general intent.

THE INSTITUTE OF SANITARY ENGINEERS, LTD.—A course of twenty-one Tuesday lectures on Practical Sanitary Science has been arranged by the Institute of Sanitary Engineers, Ltd., and visits to different works of interest are to be made in connexion with the course. The lectures will be illustrated with diagrams, drawings, models, and lantern-slides, and the lecturers will include Messrs. W. J. Dibdin, F.I.C.; J. C. Thresh, M.D., D.Sc.; Henry Adams, M.Inst.C.E.; W. H. Maxwell, A.M.Inst.C.E.; J. Priestley, M.D.; B. R. Tucker; A. A. H. Scott; N. W. Hoskins, and others. The fee for the course, which will extend from October to March, will be 12s. 6d.; and the opening lecture will be given on October 6, subject: "Mechanical Physics," by Mr. Hoskins.

HOUSING OF THE WORKING CLASSES.—Dr. A. W. Blyth, Medical Officer of Health for Marylebone, in his monthly Report says:—"The fine series of artisans' buildings erected by Lord Portman in Queen-street is a most important advance in the solution of the difficult problem of housing, at reasonable rates, the classes which earn by their labour a moderate weekly wage. The buildings consist of four blocks, and contain 176 tenements, as follows:—One-roomed tenements, 74; two-roomed tenements, 78; three-roomed tenements, 23. There is one four-roomed tenement, the fourth room being used as an office. The maximum and minimum weekly rents of the different tenements, including rates and taxes, are as follows:—One-roomed tenements, 2s. 9d. to 4s.; two-roomed tenements, 5s. 5d. to 7s. 4d.; three-roomed tenements, 8s. to 9s. 7d. The average size of the one-roomed tenements is 165 sq. ft. of floor space and a cube of 1,402. In one respect the buildings differ from most modern dwellings of the same class in having no dust shoot. The tenants will have to carry down their household refuse to receptacles fixed in the yards. Dust shoots are a fertile source of nuisance, and it will be interesting to see how far this new system will be successful. Another advantage of the new buildings is that the gates will be shut early, and although the bonâ-fide tenants can, of course, gain admission at all hours, yet the occupation of the stairs by tramps and other persons at night will be effectually prevented."

RUSSIAN EXPORTS AND IMPORTS.—Timber goods to the value of 2,651,043*l.* were exported from Russia, and to the value of 5,850,712*l.* from European Russia, to the United Kingdom during the year 1902. On the other hand, the exports to Russia from the United Kingdom included bricks, fireproof tiles, &c., to the value of 110,925*l.*; tin, in bars and rods, 548,531*l.*; copper, in bars, rods, &c., 1,135,835*l.*; lead, in pigs, sheets, rolls, &c., 504,773*l.*; and zinc, in bars and sheets, 203,043*l.*

PORTUGUESE SLATE.—Reporting on the trade of Northern Portugal, Mr. Grant, the Acting British Consul, mentions that there is an old-established business in slate (in British hands) which continues to develop year by year, the quality being very suitable for certain industries and well adapted for enameiling. Roughly stated, the quantities shipped over the Oporto bar to the United Kingdom for the last five years were 13,500, 13,000, 12,000, 15,000, and 16,000 tons respectively. The exportation this year is expected to attain 18,000 tons.

ART METAL AND STONEWORK.—The first International Exhibition of Art Metal and Stonework is to be held at St. Petersburg in November next. A circular from the Imperial Customs authorises the free importation of articles intended for the exhibition, provided that the Exhibition Committee lodge a deposit covering the amount of the duty, which will be returned in proportion to the re-exportation of such articles as are not sold. Full particulars may be obtained at the Russian Consulate, 17, Great Winchester-street, E.C., and a copy of the rules, &c., can be seen at the Commercial Intelligence Branch of the Board of Trade, 50, Parliament-street, S.W.

YORKSHIRE BUILDING TRADE FEDERATION.—A meeting in connexion with the Yorkshire Federation of Building Trade Employers was held at Scarborough on the 21st inst. Mr. J. Dawson, of Huddersfield, presided, and there was a large attendance of representatives. A new apprentice indenture form was approved, and a report of the half-yearly meeting of the National Federation of Builders at Cardiff on July 21 and 22 was read. After some discussion, a new form of contract agreement was approved and recommended for use by architects and engineers. A promise of support was made to the Sunderland Employers in connexion with the joiners' dispute.

PROPOSED NEW PUMPROOM FOR HARROGATE.—The report of Mr. Fox Strangways, the geologist, on the proposal of the Corporation to adopt the entrance to the Valley Gardens, a few yards from the present pumproom and well, as the site of a new pumproom, has now been received. It is favourable to the proposals of the Corporation, and points out that there will be no danger of damaging the well so long as the solid strata is not interfered with. The report has been adopted. The scheme includes the erection of a pumproom, with verandah, and covered promenade, with open sides, extending into the gardens.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

16,359 of 1902.—T. HILL & J. HOUGHTON: *Ball or Float Cocks.*

This invention has for its object to simplify the construction of ball or float cocks, such as are used for supply cisterns and the like, and to enable the seating to be renovated or replaced when necessary. The body of the tap may be of any suitable form, and where the outlet is desired an opening provided with an internal screw thread is constructed, into which is screwed the seating so that it can be readily removed by unscrewing. The valve, which is carried by a valve-rod, is arranged to close upon the seating downwardly, and when so closed is held upon the seat by the water pressure, in addition to the action of the float. The valve-rod is grooved so as to permit the passage of water, and engages at its lower end with the end of the float lever, which is pivotally connected with a depending arm or other means of support. It will be understood that, as the float descends, the valve is raised against the water pressure and *vice versâ*.

19,557 of 1902.—J. DUCKETT & SON, LTD., G. F. DUCKETT, F. S. BUTTON, and J. W. BULLOCK: *Water Closets.*

In flushing apparatus for top flushed water-closets, the combination of a removable cover for container, a trap inside said cover, and a conduit or channel to supply waste water thereto.

20,734 of 1902.—W. E. BOND: *An Automatic Draught, Dust, or Water Excluder, especially applicable to Doors, Windows, and the like.*

A draught, dust, and water excluder formed of a flap so fashioned and attached to the door or the like, that when free from its depressing slide it will have such position angularly to the plane of the door that it will ride freely over inequalities on the floor or equivalent surface, in combination with a depressing slide or abutment against which the flap is pressed into contact with the floor and with the door.

21,072 of 1902.—W. PICK: *Windows.*

In sliding sash windows, a thumbscrew adapted to pass freely through a plain socket in the frame of the lower sash and to engage with a series of screwed sockets in the frame of the upper sash.

21,457 of 1902.—L. SCHLENTHEIM & DIESPEKER, LTD.: *Domestic Baths.*

A domestic bath having a flange or beading broadest where the interior or dished part of the bath is narrowest and narrowest where the said interior or dished part is broadest.

4,062 of 1903.—W. P. THOMPSON (C. W. SCHULTZ & C. M. WALKER): *Ventilating Apparatus for Water-closets and Urinals.*

This invention relates to ventilators for water-closets, and has for its object an improved ventilator in which the ventilating flow of air is produced by a jet of water arranged to have a syphoning action on the air. A special feature of the improvement consists in an automatically actuated valve which controls the flow of the water that produces the siphoning action. This invention further relates to a ventilating apparatus, consisting in the combination with a water jet arranged to produce a siphoning flow of air, a valve arranged to be manually opened, a spring arranged to close the valve, and means for impeding the free action of the spring.

9,898 of 1903.—C. PLANER: *Inner Construction of Buildings to be Used as Theatres or for Similar Purposes.*

A building for theatrical displays, in which two rows of boxes having the shape of a horseshoe, beginning a few yards from the fore scene, are provided, one above the other, the lower series of boxes being adapted to be stored away beneath the higher series of boxes.

13,304 of 1903.—S. MÜNCHHAUSEN: *Hinges, and Means for Lubricating the same.*

A butt hinge with a lubricating arrangement, in which the ring or head of the upper pin which rests on the upper part of the hinge is provided with an annular groove-shaped oil channel, from which one or more lubricating passages and lubricating grooves connecting therewith run downwards along the pin and convey the oil to the pans or surfaces between the two parts of the pin.

13,600 of 1903.—W. G. STEVENSON: *Devices for Preventing the Rattling of Windows, Doors, and the like.*

In an anti-rattling device for doors and windows, a wheel or wheels made of flexible material and revolubly mounted upon the spindles in such a manner that the said wheels project beyond the edge or side of the sliding portion of the window-sash, so as to bear upon the adjacent portion of the grooves or beads of the window opening.

14,032 of 1903.—E. M. CRAMER & L. SHIREMAN: *Carpenter's Try-squares and Gauges.*

A try-square having a blade with a scale of measurements numbered from the handle out, and rectangular perforations in a double row through the blade, the perforations of one row being staggered with relation to those of the other row, and each perforation having a side aligned with one or more of said scale graduations.

14,509 of 1903.—R. HERRICHT: *Window Stay.*

A window stay, comprising an adjusting lever guided in a casing, against the side of which the lever is pressed and fixed by means of notches arranged in it, and the pressure of a spring arranged in the casing, so that the window can be set and secured in any desired position.

21,669 of 1902.—J. SANKEY & SONS, LTD., and J. W. SANKEY: *Construction of Flushing Cistern Bodies.*

A flushing cistern body formed in a single piece of sheet or thin plate metal from a blank by "raising" the metal in a drawing press.

* All these applications are in the stage on which opposition to the grant of Patents upon them can be made.

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10,703 of 1902.—J. T. Simpson & M. Ney. *Fire-proof Floor and Ceiling Construction.*

This consists in the combination with floor beams and girders of main supporting metal bars, extending from beam to beam and attached thereto by means of stirrups resting on the top flanges of the beams, diagonal rods passing underneath and supported by said bars, and supporting clips for said rods; the diagonal rods and clips forming a frame for the beam and girder casings adapted to receive and hold the concrete or other plastic material.

18,884 of 1902.—A. Musker: *Machinery for Making Artificial Slabs and other Blocks.*

Machinery for making artificial slabs or blocks, comprising a triple mould press, such moulds being mounted on a pivot, an hydraulic pressing ram, a mechanical intermittent revolving mechanism, a mechanical discharging means, a stationary table, and a receiving table; said mould being adapted to be intermittently revolved over said table.

20,255 of 1902.—E. L. Pease: *Structural Arrangements in a Manner Applicable to Flooring, Roofing, Walling, and the like Structural Purposes.*

In flooring and the like structural work, the construction in which boards overlapping the joists are keyed thereto by being tapered or bevelled along said overlapping edges to form an angular trough, into which fits a wedge piece secured to and forming a dovetailed ridge to the joist below.

21,187 of 1902.—W. Beeston: *Roofs of Buildings.*

The construction of a roof wherein a series of sheets of metal, papier-mâché, or other suitable material, having ribs and grooves formed upon them, are applied to the rafters to afford the necessary support for the tiles.

14,152 of 1903.—G. Viggars: *Presses or Dies for forming Tiles, Bricks, and the like.*

In a machine for forming undercut recesses in the undersides of tiles, and the like, while being pressed, in combination, a bed-plate, a die-box, top and bottom dies and undercut recess formers, the bottom die being formed with recesses adapted to receive and to guide the recess formers.

14,522 of 1903.—W. H. Peddle: *Process of Fire-proofing Wood.*

A process of fireproofing wood, which consists in saturating the same with a solution of fireproof salts in water and a monatomic alcohol, which is a solvent of resins, whereby the resins which may be contained in the wood are dissolved by the alcohol of the solution, and the fireproof salts permeate the wood the more readily and perfectly; and then drawing off the solution and drying the wood.

MEETINGS.

Saturday, August 29.

Incorporated British Institute of Certified Carpenters.—Visit to the Vauxhall Bridge Works. 3 p.m.

The Builders' Foremen's Association (Memorial Hall, Farringdon-street, E.C.).—Visit to Messrs. Spencer, Santo, & Co.'s works in Whitehall, 3 p.m.; to be followed by the monthly meeting of the Association at the Memorial Hall, Farringdon-street, at 7.30 p.m.

Monday, August 31.

Builders' Benevolent Institution.—Committee meeting. 5 p.m.

Tuesday, September 1.

Institute of Builders.—Council meeting. 4 p.m.

Saturday, September 5.

Association of Managers of Sewage Disposal Works.—Meeting at Leeds. Mr. W. D. Scott-Moncrieff in the chair.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 11.—By Stephenson & Alexander (at Cardiff).

Cardiff, Glamorgan.—87, Bridge-st., f., business premises with plant and machinery £4,150
13, Fitzalan-pl., u.t. 71 yrs., g.r. 8*l.* 10s., p. 660

August 13.—By John G. Villar (at Cheltenham).

Shipton Oliffe Glos.—Shipton Manor or Manor House Farm, 368 a. 1 r. 5 p., f., p. 8,100

By T. W. Gaze & Son (at Fenny Stratford).

Shenley, Bucks.—Dovecote Farm, Westbury Manor Farm, with premises and land adjoining, 595 a. 3 r. 5 p., f., y.r. 411*l.* 10s. 8,000
Lodge Farm, Cold Harbour Farm and accommodation land adjoining, 520 a. 1 r. 19 p., f., y.r. 382*l.* 10s. 7,000
The Town Close, 8 a. 1 r. 23 p., f., y.r. 11*l.* 325
Freehold dwelling house, y.r. 13*l.* 10s. 230
Freehold dwelling and blacksmith's s., y.r. [illegible] 190
Freehold dwelling house, y.r. 9*l.* 10s. 155

By Boulton & Cooper (at Scarborough).

West Ayton, Yorks.—Garth End-rd., thirteen enclosures of arable and pasture, 118 a. 2 r. 13 p., f. (in lots) 6,970

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; gr. for grove; gdns. for gardens; yd. for yard; gr. for greens; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 15 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 12 6	,, ,, ,,
Facing Stocks....	2 12 0	,, ,, ,,
Shippers	2 5 0	,, ,, ,,
Flettons	1 8 6	,, at railway depôt
Red Wire Cuts ..	1 12 6	,, ,, ,,
Best Fareham Red	3 12 0	,, ,, ,,
Best Red Pressed Ruabon Facing	5 0 0	,, ,, ,,
Best Blue Pressed Staffordshire ..	4 5 0	,, ,, ,,
Do. Bullnose	4 11 0	,, ,, ,,
Best Stourbridge Fire Bricks	4 8 0	,, ,, ,,
Glazed Bricks.		
Best White and Ivory Glazed Stretchers.....	13 0 0	,, ,, ,,
Headers	12 0 0	,, ,, ,,
Quoins, Bullnose, and Flats.....	17 0 0	,, ,, ,,
Double Stretchers	19 0 0	,, ,, ,,
Double Headers..	16 0 0	,, ,, ,,
One Side and two Ends.....	19 0 0	,, ,, ,,
Two Sides and one End	20 0 0	,, ,, ,,
Splays, Chamfered, Squints.....	20 0 0	,, ,, ,,
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	,, ,,
Quoins, Bullnose, and Flats.....	14 0 0	,, ,, ,,
Double Stretchers	15 0 0	,, ,, ,,
Double Headers..	14 0 0	,, ,, ,,
One Side and two Ends.....	15 0 0	,, ,, ,,
Two Sides and one End	15 0 0	,, ,, ,,
Splays Chamfered, Squints.....	14 0 0	,, ,, ,,
Second Quality White and Dipped Salt Glazed	2 0 0	,, less than best.

	s. d.	
Thames and Pit Sand	6 0	per yard, delivered.
Thames Ballast	6 0	,, ,,
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	20 6	,, ,,

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s cd. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
Bath Stone—delivered on road wagons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	,, ,,
Portland Stone (20 ft. average)— Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	,, ,,
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2 2½	,, ,,

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer in blocks	1 6	,, ,,
Grinshill ,, ...	1 10	,, ,,
Darley Dale in blocks..	2 4	,, ,,
Red Corsehill ,,	2 5	,, ,,
Closeburn Red Freestone	2 0	,, ,,
Red Mansfield ,,	2 4	,, ,,

York Stone—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. ,,
6 in. Rubbed two sides Ditto, Ditto	2 6	,, ,,
3 in. Sawn two sides slabs (random sizes)..	0 11½	,, ,,
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	,, ,,
1½ in. to 2 in. ditto, ditto	0 6	,, ,,
Scappled random blocks	3 0	per ft. cube ,,
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. ,,
6 in. Rubbed two sides Ditto	—	,, ,,
3 in. sawn two sides slabs (random sizes)	1 2	,, ,,
2 in. self-faced random flags.....	0 5	,, ,,
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
,, ,, ,, 6 in. sawn both sides landings	2 7	deld. rly. depôt. per ft. super. deld. rly. depôt
,, ,, 3 in. do.	1 2½	,, ,,

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry.dep.
20×12 ,, ,, ,,	13 17 6	,, ,,
20×10 best seconds ,,	12 15 0	,, ,,
20×12 ,, ,, ,,	13 10 0	,, ,,
16×8 best ,,	7 0 0	,, ,,
20×10 best blue Portmadoc ..	12 5 0	,, ,,
16×8 best blue Portmadoc	6 5 0	,, ,,
20×10 best Eureka unfading green....	15 2 6	,, ,,

PRICES CURRENT (*Continued*).

SLATES.

in. in.	£ s. d.	
20×12 best Eureka unfading green....	17 2 6	per 1000 or 1200 at ry.dept.
18×10 ,, ,,	12 10 0	,, ,,
16×8 ,, ,,	10 5 0	,, ,,
20×10 permanent green	11 0 0	,, ,,
18×10 ,, ,,	9 5 0	,, ,,
16×8 ,, ,,	6 10 0	,, ,,

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. ,, ,,
Best Broseley tiles	50 0	per 1,000 ,, ,,
Do. Ornamental Tiles 52	6	,, ,, ,,
Hip and valley tiles....	4 0	per doz. ,, ,,
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 ,, ,,
Do. ornamental Do. 60	0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles.....	3 0	,, ,, ,,
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 ,, ,,
Do. Ornamental Do. 54	6	,, ,, ,,
Hip tiles	4 1	per doz. ,, ,,
Valley tiles.....	3 8	,, ,, ,,
Best "Rosemary" brand plain tiles 48	0	per 1,000 ,, ,,
Do. Ornamental Do. 50	0	,, ,, ,,
Hip tiles	4 0	per doz. ,, ,,
Valley tiles	3 8	,, ,, ,,

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	,, ,, ,,
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	,,
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

Joiners' Wood.

White Sea: First yellow deals,	At per standard.	
3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
,, ,, 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0
,, ,, 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
,, ,, 3 in. by 9 in.	12 10 0	13 10 0
,, ,, battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small ,, ,, ...	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	. . .
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	. .

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

[*See also page 237.*

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COMPETITIONS AND CONTRACTS

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Offices, Sefton and Dixon-streets, Blackpool	Fylde Water Board	Not stated	Aug. 31
Sewage Works	Howden (Yorks) R.D.C.	15*l.*	Sep. 12
Hospital	Ayr District Lunacy Board	Not stated	Sep. 22
*Memorial Monument	Newton-in-MakerfieldS.A.WarCom.	10*l.*	Sep. 25
Laying out Grounds	Leyland U.D.C.	15*l.* 15s.	Sep. 26
Workmen's Cottages, Dublin	G. S. & W. R. Co.	20*l.*	Sep. 30
Library	Poplar Borough Council	75*l.*, 25*l.*	Oct. 1
*Sewage Disposal of Saltwood	Elham R.D.C.	30 guineas	Oct. 7
Free Library	Rawtenstall Corporation	100*l.*, 50*l.*, 30*l.*	Oct. 13
*New Hospital	Brighton & Hove Hosp. for Women	50*l.*, 30*l.*, 20*l.*	Nov. 9
*Additions and Alterations to Town Hall	Sunderland Corporation	100*l.*, 50*l.*, 25*l.*	Nov. 21

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Drainage Works, Little Weldon	Kettering R.D.C.	Chas. W. Lane, Kettering	Sep. 1
Granite Spalls, Mitcham, Surrey	Holborn Guardians	J. A. Battersby, Union Offices, Clerkenwell-road, E.C.	do.
Rebuilding Offices, High-street, Hull	....	Brodrick & Co., Architects, Lowgate, Hull	do.
House and Farm Buildings, Lower Yealmpstone, Devon	.....	Hellard & Bewes, Manor Offices, Stonehouse	do.
Three Cottages, Sigford, near Ashburton, Devon	.....	A. Warren, Architect, Buckfastleigh	Sep. 2
School, &c., Alfred Gelder-street, Hull	.....	Gelder & Kitchen, Architects, 76, Lowgate, Hull	do.
*Supply and Delivery of Glazed Bricks	Gainsborough U.D.C.	.....	do.
Two Houses, Percy-street, Rotherham	Messrs. H. & W. Green	J. Platts, Architect, High-street, Rotherham	do.
Pumping-Engine House at Sewage Works, Weaste	Salford Corporation	Borough Engineer, Town Hall, Salford	do.
Wood Paving, George-street and Church-road	Hove (Sussex) Town Council	H. H. Scott, Borough Surveyor, Town Hall, Hove	do.
Street Works	Middleton (Lancs) Corporation	Borough Surveyor, Town Hall, Middleton	do.
Three Shops, Bollington, near Macclesfield	Equitable Provident Society, Ltd.	Whittaker & Bradburn, Architects, 19, King Edward-st., Macclesfield	do.
Repairs, &c., 1, Victoria-terrace	Bridlington Corporation	E. Matthewman, Town Hall, Bridlington	do.
*Wood Paving	Hove Corporation	Borough Surveyor, Town Hall, Hove	do.
Alterations to Business Premises, The Hayes, Cardiff	Messrs. Morgan & Co.	James & Morgan, Architects, Charles-street Chambers, Cardiff	do.
Public Offices, near Wigan	Abram U.D.C.	Heaton & Co., Architects, Wigan	do.
School, Abercynon, Wales	Llanwonno School Board	A. O Evans, Architect, Pontypridd	do.
Twelve Houses, Grey-street, Darlington	Messrs. Welch Bros.	—. Rispin, 50, Thornton-street, Darlington	Sep. 3
Additions to Glenmount, near Kanturk, Ireland	Mr. G. S. Bolster	W. H. Hill & Sons, Architects, 28, South Mall, Cork	do.
Ten Houses, Georgetown, Tredegar	Mr. J. C. Bennett	W. S. Williams, Architect, Tredegar	do.
Additions to Hospital	Wrexham R.D.C.	G. Morison, Architect, King-street, Wrexham	do.
Additions to Hospital, Bellsprings-road, Annan	The Hospital Committee	A. Tweedie, Architect, 43, Lady-street, Annan	do.
Pumping Station	Glasgow Corporation	J. Deas, Civil Engineer, 53, Bothwell-street, Glasgow	do.
Schools, Trealaw, Wales	Ystradyfodwg School Board	J. Rees, Architect, Hillside Cottage, Pentre	do.
Rebuilding the Red Lion Hotel, Darlington	Messrs. G. White & Co., Ltd.	G. G. Hoskins, Architect, Court Chambers, Darlington	Sep. 4
Road Works, from Blackall-road, Exeter	.....	Ellis, Son, & Bowden, Surveyors, Bedford Chambers, Exeter	do.
Church, Mexborough, Yorks	The Wesleyans	J. Wills & Sons, Victoria Chambers, Derby	do.
Town Hall Extensions	Batley Corporation	Hanstock & Son, Architects, Batley	do.
Paving Works, Christle's-lane	Felling (Durham) U.D.C.	G. Bolam, Council Buildings, Felling	do.
Surveyor's Materials	Cardiff Guardians	A. J. Harris, Queen's Chambers, Cardiff	do.
Church, Portstewart, Ireland	Rev. D. Aiken	S. C. Hunter, Scottish Provident Buildings, Belfast	do.
*New Coastguard Buildings, near Sandown (I. of W.)	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	do.
Water Supply Works, Dunbeath, N.B.	.....	Jenkins & Marr, Civil Engineers, 16, Bridge-street, Aberdeen	S.p. 5
Additions to Schools, North-road, Ravensthorpe	.....	C. H. Marriott & Co., Civil Engineers, Dewsbury	do.
Road Works, Brixton Hill	.....	E. Millard, Surveyor, 1, Finsbury-circus, E.C.	do.
Tower to Chapel, Cambridge-street, Batley	The Methodists	C. J. Kirby, Borough Surveyor, Branch-road, Batley	do.
Road Works, Lees Hall-road, &c., near Dewsbury	Thornhill U.D.C.	S. W. Parker, Surveyor, Council Offices, Thornhill	do.
Street Works, Avison-yard	Wakefield Corporation	City Surveyor, Town Hall, Wakefield	Sep. 6
Sewage Collecting Tank, Fort Cumberland	Portsmouth Corporation	Borough Engineer, Town Hall, Portsmouth	Sep. 7
Sea Wall, Newgate	Margate Corporation	E. A. Borg, Civil Engineer, Town Hall, Margate	do.
Street Works	Teddington U.D.C.	—. Hainsworth, Surveyor, Public Offices, Teddington	do.
Schools, Forsyth-road, West Jesmond	Newcastle School Board	C. S. Errington, Arch., Grainger-street West, Newcastle-on-Tyne	do.
Road Metal	Carrickfurgus (Ireland) U.D.C.	J. Boyd, Town Hall, Carrickfergus	do.
Hospital	Cannock (Staffs) Guardians	A. Veall, Surveyor, 84, Darlington-street, Wolverhampton	do.
Science Buildings at School, Coventry	.....	H. W. Chattaway, Architect, Trinity Churchyard, Coventry	Sep. 8
*3,200 ft. 12 in. Pipe Sewer, &c.	Acton District Council	Surveyor to the Council, 242, High-street, Acton, W.	do.
*Erection of Industrial Hall	Cartwright Memorial Extension	Ledingham & Edwards, Architects, Bradford	do.
*Erection of Cottages, King Edward's-road	Barking Town U.D.C.	C. J. Dawson, Architect, East-street, Barking	do.
Additions to Workhouse, Beckett-street	Leeds Guardians	T. Winn & Sons, Architects, 92, Albion-street, Leeds	do.
*Stoneware Pipes	Edmonton U.D.C.	Engineer to the Council, Town Hall, Edmonton, N.	do.
*Portland Cement	do.	do.	do.
*Broken Granite	do.	do.	do.
*Fencing for Cottages	Hampton U.D.C.	Council's Surveyor, Public Offices, Hampton, Middlesex	Sep. 9
*Road Making, &c., Works	Kingston-on-Thames Corporation	Borough Surveyor, Clattern House, Kingston-on-Thames	Sep. 10
*Four Bedrooms, Cooks-terrace Infirmary, Pancras-road	St. Pancras Guardians	Clerk to the Guardians, Town Hall, Pancras-road, N.W.	do.
Schools, Hanham-road, Kingswood, near Bristol	Gloucestershire Education Commit.	J. Mackay, Architect, Richmond-place, Kingswood	Sep. 11
Lodge at Cemetery	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	do.
*Wooden Bandstd., &c., Bricklields Gardens, Limehouse	London County Council	Archs. Dprtmnt., Genrl. Constrctnl., Sectn. 15, Pall Mall East, S.W.	Sep. 14
*Erection of 24 Cottages, near Coventry	The Proprietors	H. W. Chattaway, Architect, Trinity Churchyard, Coventry	do.
*Two Sets of Pumping Plant, &c., at Melmoth-place	Metropolitan Borough of Fulham	Superintendent Engnr., Public Baths, Melmothplace, Fulham, S.W.	do.
Four Cottages at Lunatic Asylum, Armagh	The Committee	R. H. Dorman, Surveyor, Court House, Armagh	do.
*Workmen's Dwellings, Finchley	Finchley U.D.C.	Council's Offices, Church End, Finchley	Sep. 16
*Sewage Collecting Tank, &c. (212, Fort Cumberland)	Borough of Portsmouth	Borough Engineer's Office, Town Hall, Portsmouth	Sep. 17
*Repairs to Roofs, &c., St. George's Workhse, Boro, S.E.	Southwark Union	A. J. Wade, 36, Fifth-avenue, Harrow-road, W.	Sep. 18
Two Manual Instruction Centres	Portsmouth Corporation	A. H. Bone, Architect, Cambridge Junction, Portsmouth	do.
*New Coastguard Station at Fairlight, near Hastings	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	Sep. 22
*Enlargement of Post Office at Wigan	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	Sep. 30
*Erection of Tenements, Stabling, &c., New Depot, &c.	Borough of Hampstead	Borough Engineer, Town Hall, Hampstead, N.W.	No date.
*Block of Shops and Flats in Uxbridge-road, W.	.....	Palgrave & Co., 28, Victoria-street, Westminster, S.W.	do.
Reseating Wesleyan Chapel, Church-lane, Pudsey	.....	Danby & Simpson, Architects, 10, Park-row, Leeds	do.
Inn, Two Mile Hill, near Bristol	.....	G. C. Thompson, Nicholas-street, Bristol	do.
*Isolation Hospital, Steppingley	Ampthill R.D.C.	Council Offices, Ampthill	do.
Conveniences, Llethrddu Cemetery	Rhondda (Pentre) U.D.C.	W. J. Jones, Engineer, Council Offices, Pentre	do.
Street Works, &c., Anglesea-avenue, &c.	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
Road Works, Rocky-lane, Heswall, Cheshire	Wirral R.D.C.	T. Davies, 33, Kingland-road, Birkenhead	do.
Street Works, Armley, Leeds	Directors Albion Allotments Soc., Ld.	T. Winn & Sons, Architects, 92, Albion-street, Leeds	do.
*Small Residence and Outbuilding, Chipstead	.....	H. G. Gribble, Architect, St. John's, near Woking, Surrey	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. & xix.

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PRICES CURRENT (Continued).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 8 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
,, ,, galvanised	16 0 0	. . .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	. . .
,, ,, to 24 g.	10 15 0	. . .
,, ,, to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	. . .
,, ,, 22 g. and 24 g.	16 10 0	. . .
,, ,, 26 g.	18 0 0	. . .
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	. . .
,, ,, 22 g. and 24 g.	12 15 0	. . .
,, ,, 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 0 0	. . .
Pipe in coils	14 10 0	. . .
Soil pipe	17 0 0	. . .
Compo Pipe	17 0 0	. . .
ZINC—Sheet—		
Vieille Montagne ton	26 0 0	. . .
Silesian	25 15 0	. . .
COPPER—		
Strong Sheet per lb.	0 0 10½	. . .
Thin ,,	0 0 11½	. . .
Copper nails ,,	0 0 11	. . .
BRASS—		
Strong Sheet per lb.	0 0 10	. . .
Thin ,,	0 0 11	. . .
TIN—English Ingots ,,	0 1 4	. . .
SOLDER—Plumbers' ,,	0 0 6	. . .
Tinmen's ,,	0 0 8	. . .
Blowpipe ,,	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

	£ s. d. per ft. delivered.
15 oz. thirds	2½d. per ft. delivered.
,, fourths	1⅞d. ,, ,,
21 oz. thirds	3¼d. ,, ,,
,, fourths	2⅝d. ,, ,,
26 oz. thirds	3⅝d. ,, ,,
,, fourths	3⅛d. ,, ,,
32 oz. thirds	4⅛d. ,, ,,
,, fourths	4⅝d. ,, ,,
Fluted sheet, 15 oz.	2⅝d. ,, ,,
,, 21 oz.	3⅜d. ,, ,,
½ Harley's Rolled Plate	1⅞d. ,, ,,
½ ,, ,, ,,	2d. ,, ,,
½ ,, ,, ,,	2⅛d. ,, ,,

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels.. per gallon	0 1 10
,, ,, in drums ,,	0 2 2
Boiled ,, in pipes or barrels.. ,,	0 2 1
,, ,, in drums ,,	0 2 5
Turpentine, in barrels ,,	0 3 7
,, in drums ,,	0 3 9
Genuine Ground English White Lead per ton	19 10 0
Red Lead, Dry ,,	19 10 0
Best Linseed Oil Putty per cwt.	0 8 0
Stockholm Tar per barrel	1 12 0

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	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Egyptell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 6
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
Wrench and Brush Polish	0 10 0

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BEBINGTON (Cheshire).—For additions to lodge at cemetery, for the Burial Board. Mr. W. Griffiths, architect, 5, Hamilton-square, Birkenhead. Quantities by the architect:—

R. Baines	£642 0 8	Lee & Son, Bebington, Cheshire*	£393 0 0
R. T. Amery	459 0 7		
Morton & Son	449 12 0		
G. E. Ellidge	427 19 6	J. & J. Satterthwaite	383 16 0
P. McLachlan	399 18 0		

BELPER.—For the construction of pipe sewers, Overlane, Denby, for the Rural District Council. Mr. R. C. Cordon, surveyor, Duffield, near Derby:—

Cope & Raynor	£150	A. Hingley	£93
G. F. Tomlinson	135		

[Engineer's estimate, £100.]

BLAENGWYNFI (Wales).—For the execution of street works, for the Glyncorrwg Urban District Council. Mr. W. P. Jones, Surveyor, Council Offices, Cymmer, Port Talbot:—

Barnes & Chaplin, Cardiff	£1,075 5 5	Thompson	£1,036 0 0

[Engineer's estimate, £1,075 15s.]

BRIGHTON.—For the supply, for the Town Council, of 1,000 ft. run of 6 in. by 10 in. granite edge kerb, 5,000 ft. run of 12 in. by 6 in. granite flat kerb, &c. Mr. F. J. C. May, C.E., Town Hall, Brighton:—

—	Description of Granite.	Edge Kerb, 6 in. by 10 in., at per foot run.	Flat Kerb, 12 in. by 6 in., at per foot run.	Flat Channel, 12 in. by 6 in., at per foot run.
		s. d.	s. d.	s. d.
Macleod & Co.	Not stated.	1 3	1 4	1 3½
Brunton & Co.	Norway.	1 0	1 1½	1 1
Van Praagh & Co.	do.	1 0⅝	1 1⅝	1 1⅝
Blichfeldt & Co.	do.	1 1	1 2	1 1½
Griffiths & Co.	do.	1 1	1 2	1 1½
A. & F. Manuelle, London*	do.	1 1½	1 2½	1 1½
Goodchild & Co.	do.	1 1⅝	1 2½	1 1½
Mowlem & Co.	do.	1 3½	1 3½	1 3½
R. W. Cottrell	Irish.	1 3	1 3½	1 2½
L. Sommerfeld	do.	1 2	1 3½	1 3½
Pethick Bros.	Devonshire	1 10½	2 1½	1 10½
Freeman, Sons, & Co.	Cornwall.	1 3	1 3	1 2½
Road Maintenance and Stone Supply Co.	French.	1 2½	1 3	1 2½
London Basalt Stone Co.	Cottenheim.	1 4	1 6	1 6

BRIGHTON.—For the supply of 1,000 tons of granite spalls or other hard stone, for the Town Council. Mr. F. J. C. May, C.E., Town Hall, Brighton:—

	Price per ton. s. d.
Pethick Bros.	22 2
J. Hall	11 0
Griffiths & Co.	10 2
Fry Bros.	10 0
Somerset Fullers' Earth and Ochre Co., Ltd.	10 0
Mowlem & Co., Ltd.	9 11
Sandell Bros.	10 10 Cornish; 9 10 Cherbourg
A. & F. Manuelle, London*	9 9
W. Hudson	9 9
Jefford & Sons	9 9
Road Maintenance and Stone Supply Co., Ltd.	9 6
Runnalls & Sons	9 0
The Ronez Granite Quarries, Ltd.	8 11

CARDIFF.—For rebuilding No. 31, St. Mary-street, for Mr. T. J. Masters. Mr. E. Seward, architect, Cardiff:—

		Old Material.
D. W. Davies	£4,675	Nil
Watkin Williams	4,280	Nil
Knox & Wells	4,250	Nil
Symonds & Co.	4,152	Nil
Lattey & Co.	4,128	£5
F. Small	4,080	Nil
Turner & Sons	4,056	£100
Beames & Nephew	4,043	35
Thomas & Co.	3,997	30
Evans Bros., Cathays, Cardiff*	3,800	100

CARDIFF.—For the erection of a weighbridge, &c., for the Corporation. Mr. W. Harpur, C.E., Town Hall, Cardiff:—

Spencer & Co.	£126	Parnall & Son, Ltd.	£115
Alderson & Dakin	110	Hodgson & Stead	110
W. & T. Avery, Ltd.	117	Barlett & Son, Ltd., Bristol*	108
H. Pooley, Ltd.	115		

CLEETHORPES.—For the erection of a lodge and outbuildings, Cleethorpes Park, for the Urban District Council. Mr. Egbert Rushton, engineer, Poplar-road, Cleethorpes:—

	Shelters, &c.	Greenhouse, &c.
W. Ion	£353 0 0	£107 0 0
Wade, Ltd.	302 5 6	108 7 6
C. Dixon, Grimsby*	295 0 0	110 0 0

FRINTON-ON-SEA.—For the construction of a sewer in the First-avenue, for the Frinton-on-Sea Urban District Council. Messrs. Beesley, Son, & Nichols, engineers, Westminster:—

W. S. Bushnell	£1,663 0 0	Wilson, Border, & Co.	£979 7 2
B. W. Glenny	1,158 10 9		
T. Adams	1,029 0 0	G. G. Rayner, 4, Elswood-rd., Croydon*	845 0 0
Z. Fairclough	1,075 0 0		
G. Rackham	985 1 9		

GOOLE (Yorks).—For the execution of street works in the borough, for the Urban District Council. Mr. C. Owen Baines, C.E., Council Offices, Goole:—

A. H. Atkinson, Hull* £701 15 6

LEEDS.—For the erection of a house, Bramhope. Messrs. Child & Co., architects, 149, Park-lane, Leeds:—Wm. Flint, builder and joiner, Roberts-place, Burley Fields, Leeds* £380

NORTHWICH.—For the erection of a mission hall. Mr. E. T. Ward, architect, Winnington-street, Northwich:—

S. Appleton (inclusive tender)	£330
Smith & Co. (exclusive of foundations	275
A. Marsden (inclusive tender)	260
Iles & Co. (exclusive of cartage and foundations)	245

NORWICH.—For the erection of a nurses' home at the workhouse, for the Guardians. Messrs. Morgan & Buckingham, architects, Norwich. Quantities by architects:—

F. R. Hipperson	£2,510 17	Scarles Bros.	£2,283 0
J. S. Smith	2,475 0	Boddy & Son	2,287 10
R. L. Leveridge	2,434 0	J. J. Howes	2,245 0
Anderson & Son	2,365 0	S. W. Utting	2,227 0
Chapman & Son	2,327 0	Burton & Son	2,115 0
J. Evans	2,300 0	W. J. Hannant*	2,075 0

[All of Norwich.]

[Architects' estimate, £2,200.]

OXTED (Surrey).—For stables, coachman's and gardener's houses, and other buildings, for Mr. Max Michaelis. Messrs. F. S. Brereton & Son, architects. Quantities by Mr. E. G. Hardcastle:—

W. & E. Noakes	£13,025	Killby & Gayford	£12,420
E. J. Saunders	12,914	Wagstaff & Sons*	11,97[illegible]
J. Carmichael	12,700		

[*See also next page.*

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PENARTH.—For additions to schools, Pill-street, Cogan, for the School Board. Mr. G. A. Birkenhead, architect, Caledonian-chambers, Cardiff. Quantities by the architect:—

Thomas & Co. ..	£8,948 0	Blacker Bros.....	£7,845 7
Evans & Bros. ..	8,495 0	J. S. Shepton....	7,700 0
D. W. Davies....	8,000 0	John Jones, Penarth	7,200 0
Turner & Sons ..	7,888 0		

[Architect's estimate, £7,490.]

PONTYPRIDD.—For widening and reconstructing bridges over Glamorganshire Canal, for the Urban District Council. Mr. P. R. A. Willoughby, Architect, Council Offices, Pontypridd:—

R. Jones	£800	H. Parfitt.....	£630
W. A. Baker	700	J. O. Brettel	620
Dorman & Long.....	660	Dauney & Sons	540
Gilbert, Thompson, & Co.....	653	Finch & Co., Chepstow*	540
Heenan & Froude....	640		

For Masonry.

Heenan & Froude	£669 14 0	C. Ash, Pontypridd*	£409 4 5
H. Fraser.....	553 12 3		

RAUNDS.—For the erection of house, Raunds, for Mr. T. H. Billington. Mr. H. Knight, architect, Rushden:—

J. Titmus.....	£457 0 0	Tanner Bros. ..	£365 0 0
Smith & Son ..	425 0 0	Coates & Son ..	363 0 0
F. Henson	403 10 0	Harrison & Winsor	354 0 0
A. Johnson	384 0 0	Johnson & Foster, Rushden*	341 10 0
J. Lawrence....	377 0 0		
T. Hewitt.....	376 2 6		
Capps, Rowley, & Keach	375 2 6		

ROCHDALE.—For the erection of the Queen Victoria Memorial, Vicarage-road. Messrs. Woodhouse, Willoughby, & Langham, architects, 100, King-street, Manchester. Quantities by architects:—

Chas. Brierley.....	£4,295	Taylor & Co.	£3,700
Neill & Sons.....	4,100	Hendesby	3,699
J. & J. Coates	4,055	Ashworth & Wolfenden	3,589
Jas. Byrom	3,830	R. & T. Howarth, Rochdale*.....	3,570
Thompson & Brierley	3,808		
W. A. Peters	3,725		

SOUTHAMPTON.—For additions to the Hartley University College, &c. Messrs. W. H. Mitchell, Son, & Gutteridge, architects, 9, Portland-street, Southampton:—

	Erection of New Classrooms.	For Construction of Bridge, &c.	Total.
Golding & Ansell..	£2,000 ..	£876 ..	£2,876
Jenkins & Sons....	1,686 ..	793 ..	2,479
Udall & Co.	1,620 ..	838 ..	2,458
Stevens & Co.	1,548 ..	844 ..	2,392
Dyre & Sons	1,523 ..	804 ..	2,327
F. Walter	1,585 ..	738 ..	2,323

STOURBRIDGE.—For the erection of technical schools and library, Stourbridge, for the Urban District Council. Mr. F. Woodward, architect, Town Hall, Stourbridge:—

A. Simmonds £10,150		J. Mallin	£8,990
T. Rowbottom	9,790	Dallow & Sons.....	8,880
Barnsley & Sons....	9,666	C. Griffiths.....	8,817
Sapcote & Sons	9,489	Gowing & Ingram ..	8,775
G. Goodwin	9,487	Smith & Pitts	8,750
J. & A. Brazier.....	9,450	T. Hardy	8,640
Willcock & Co.	9,360	G. H. Marshall	8,600
F. Lindsay Jones....	9,162	Hadley & Son	8,568
H. Dorse	9,117	A. H. Guest	8,472
W. Hopkins	9,100	Guest & Sons, Stourbridge*	8,440
Giles & Son	8,995		

TROWBRIDGE (Wilts).—For the execution of sewerage works, for the Urban District Council. Mr. H. G. Nicholson Lailey, C.E., Town Hall, Trowbridge:—

R. H. B. Neal	£5,599 0 0	J. Riley	£4,377 3 0
J. & T. Binns	5,416 10 0	S. Wood	4,266 17 3
Free & Son..	5,310 16 6	E. H. Page ..	3,980 3 0
H. Roberts ..	5,067 8 0	E. Ireland, Morecambe*	3,734 2 6
J. H. McDonald	5,064 11 0		
Cooke & Co.. ..	4,764 12 8		

[Engineer's estimate ..... £3,785 10]

WEALDSTONE.—For the execution of road works, Station-road, for the Urban District Council. Mr. H. Walker, C.E., Council Offices, Wealdstone:—

H. Brown.....	£1,582	Free & Sons.....	£1,349
J. Meston.....	1,533	A. B. Champniss, Wealdstone*.....	1,346
Griffiths & Co., Ltd.	1,478		
The Empire Stone Co., Ltd.	1,352		

WINDERMERE.—For the erection of a house, Bowness-in-Windermere, for Miss Sinkinson. Mr. J. F. Curwen, architect, 26, Highgate, Kendal:—

W. Holmes, Windermere	£319 3 0
Geo. F. Martindale, Kendal	289 0 0
Woodburn, Kendal.....	66 11 0
P. Tanner, Kendal.....	130 0 0
	804 14 0

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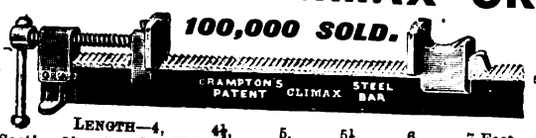

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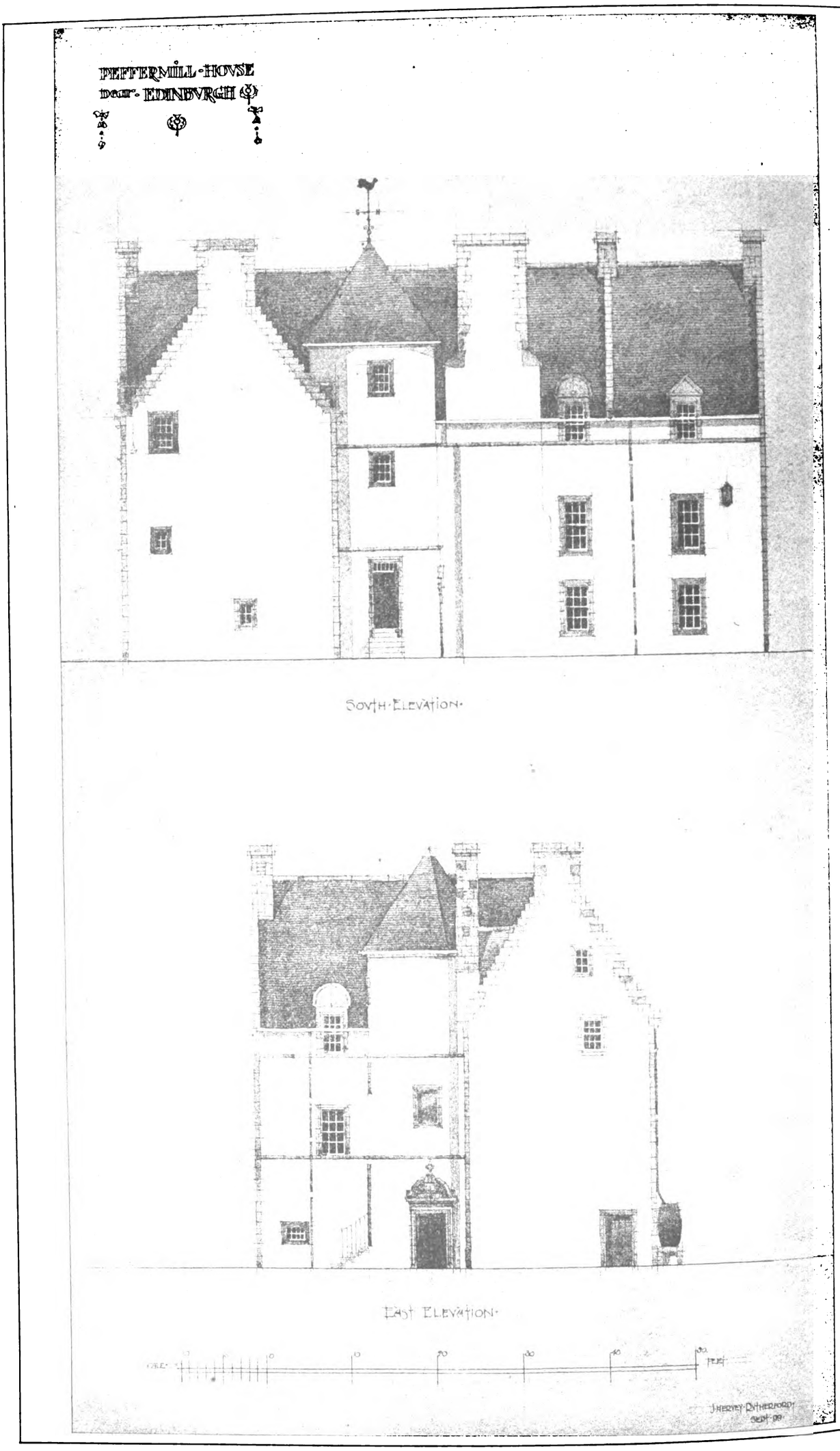

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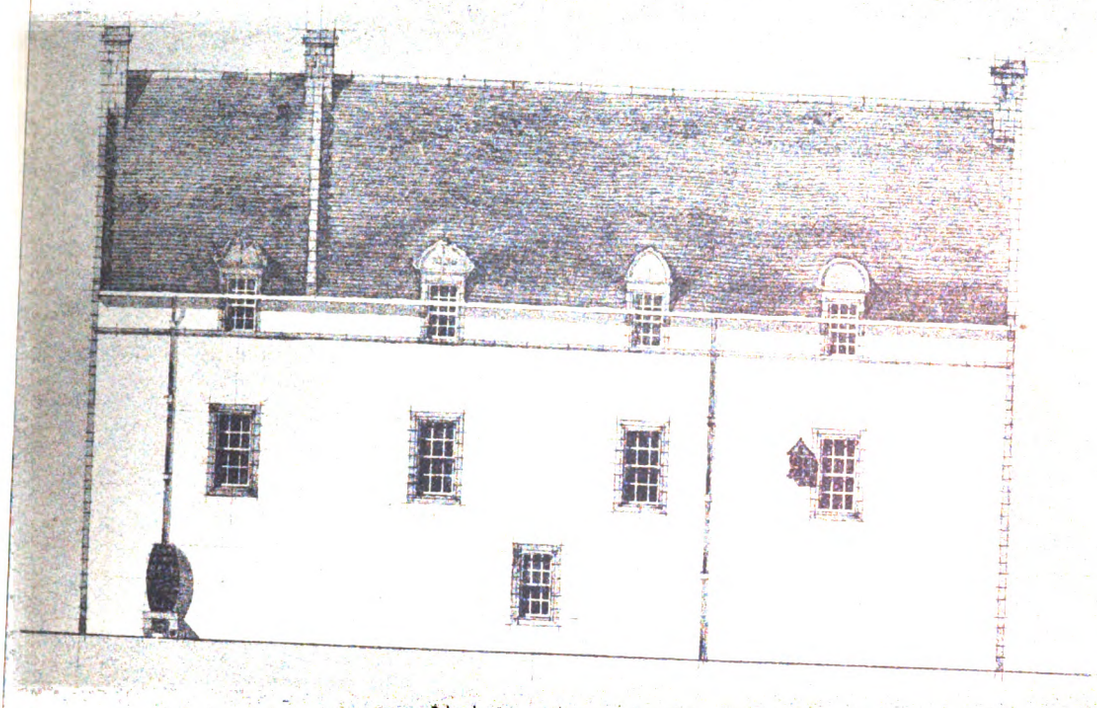

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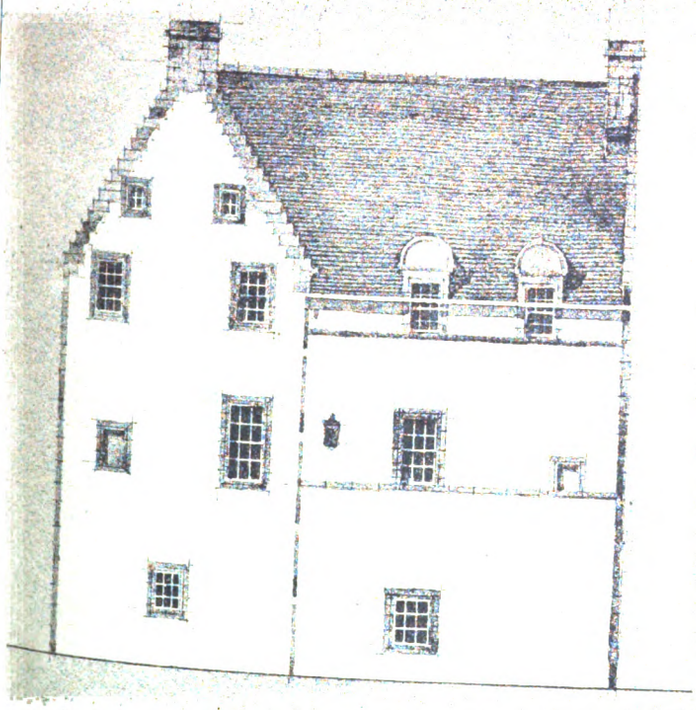

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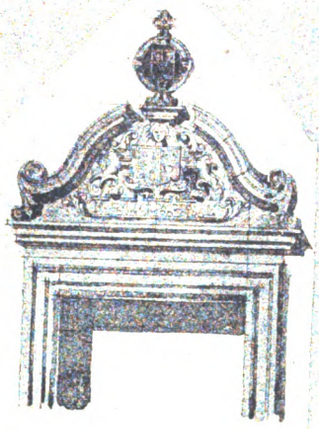

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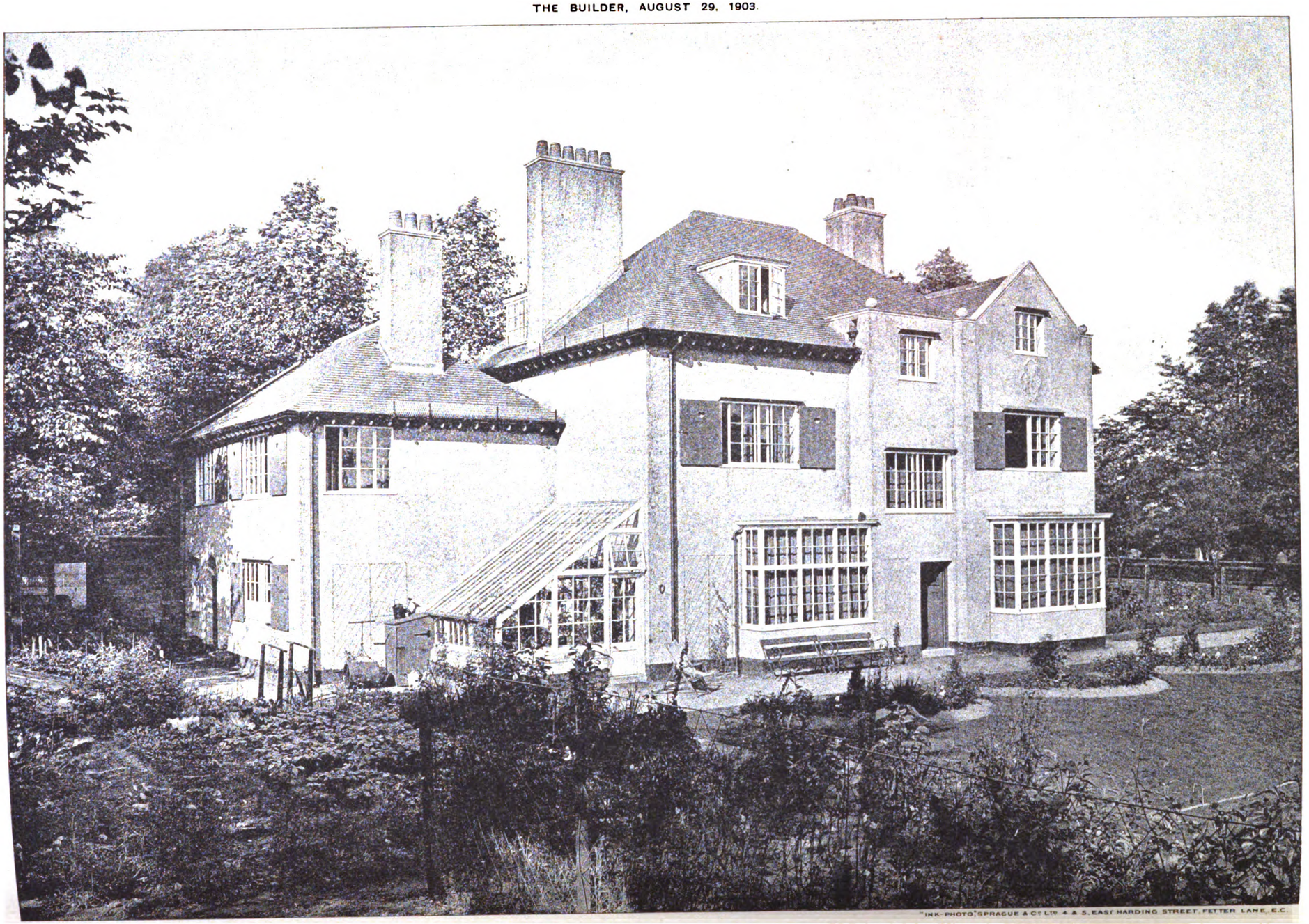

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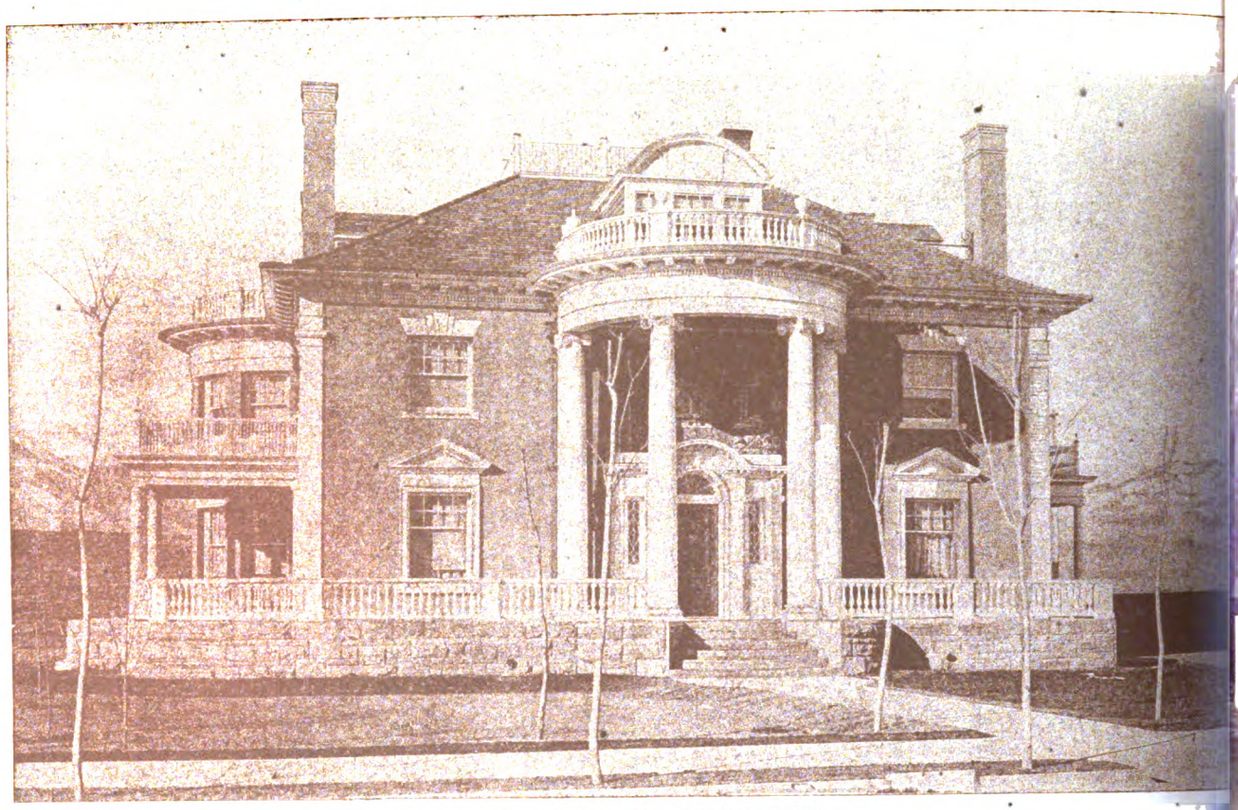

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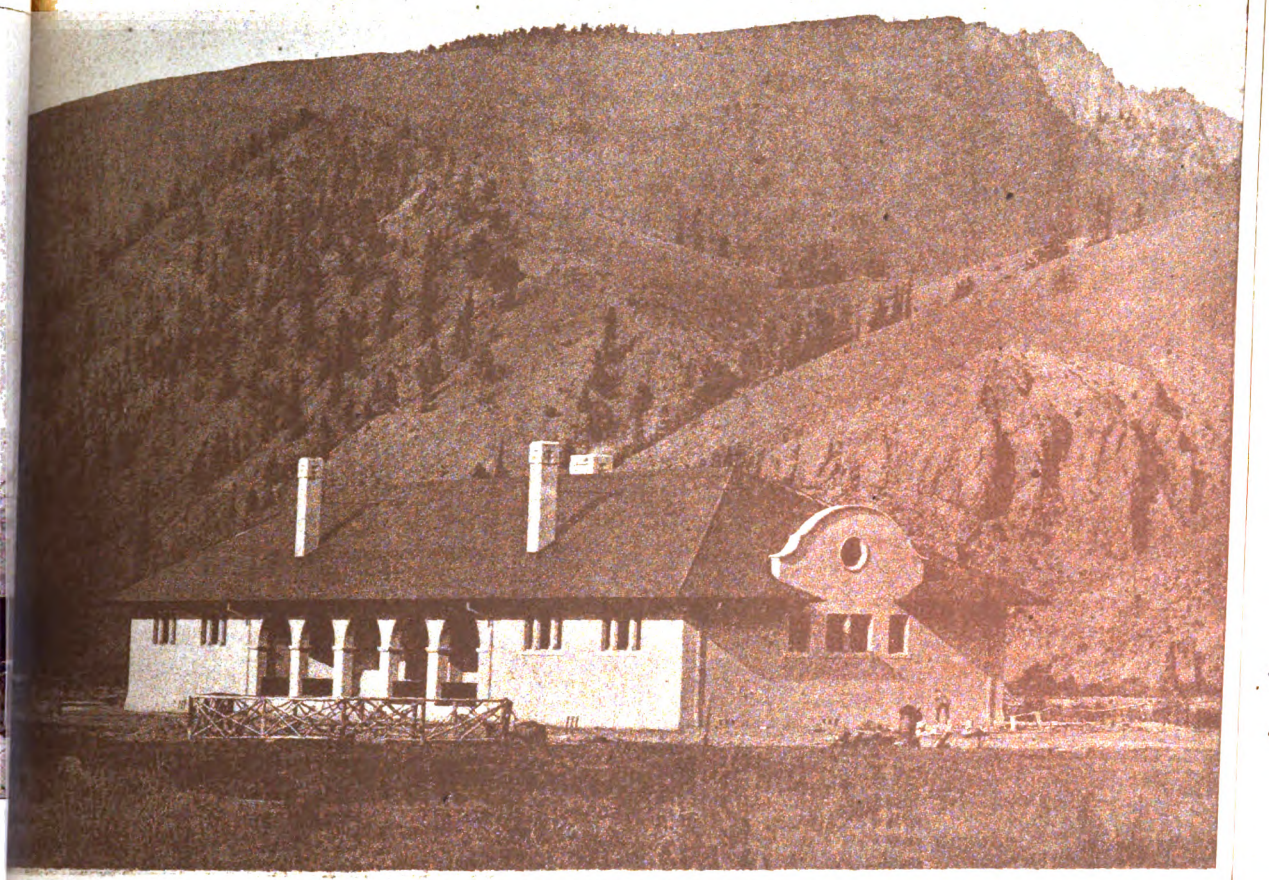

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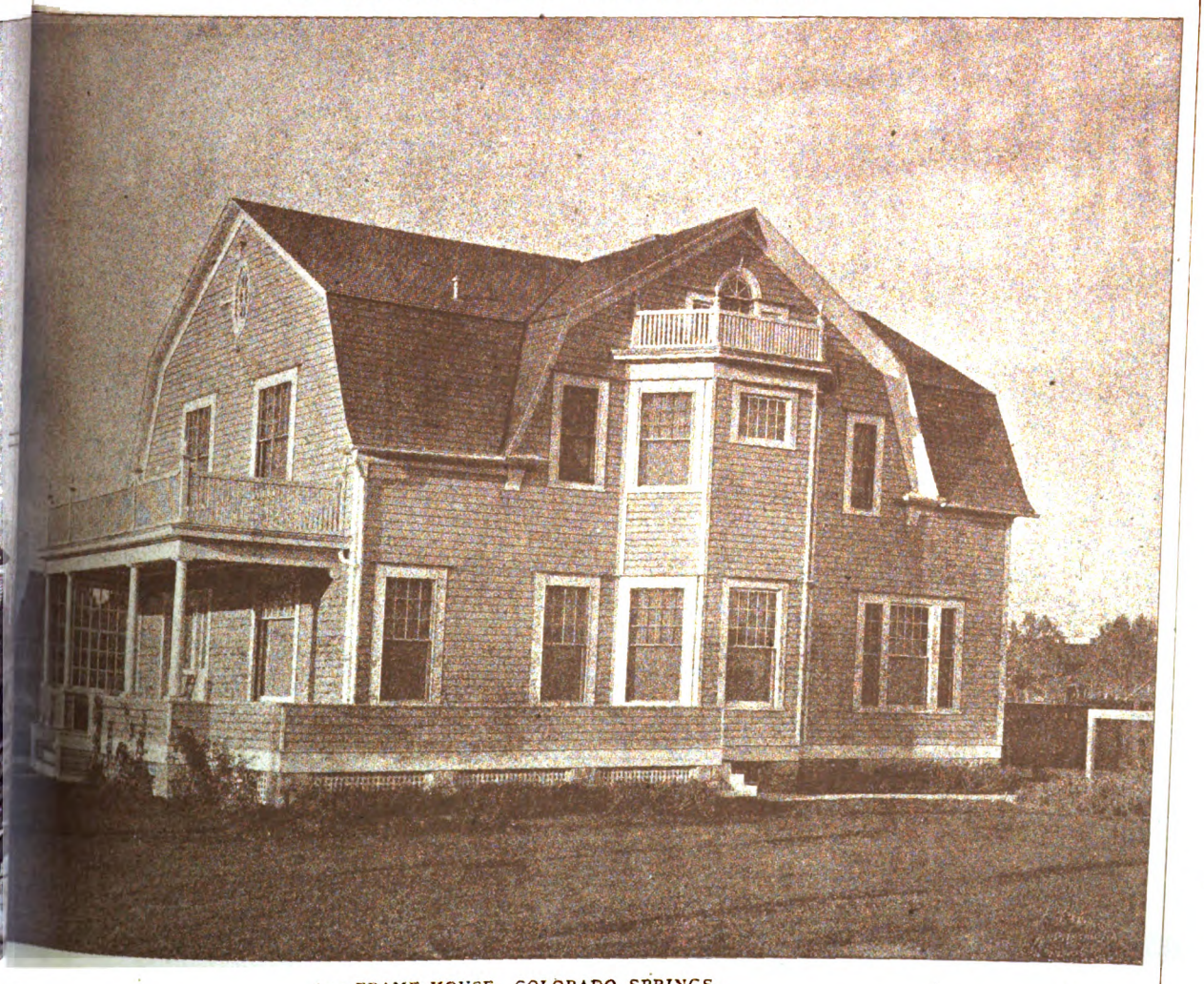

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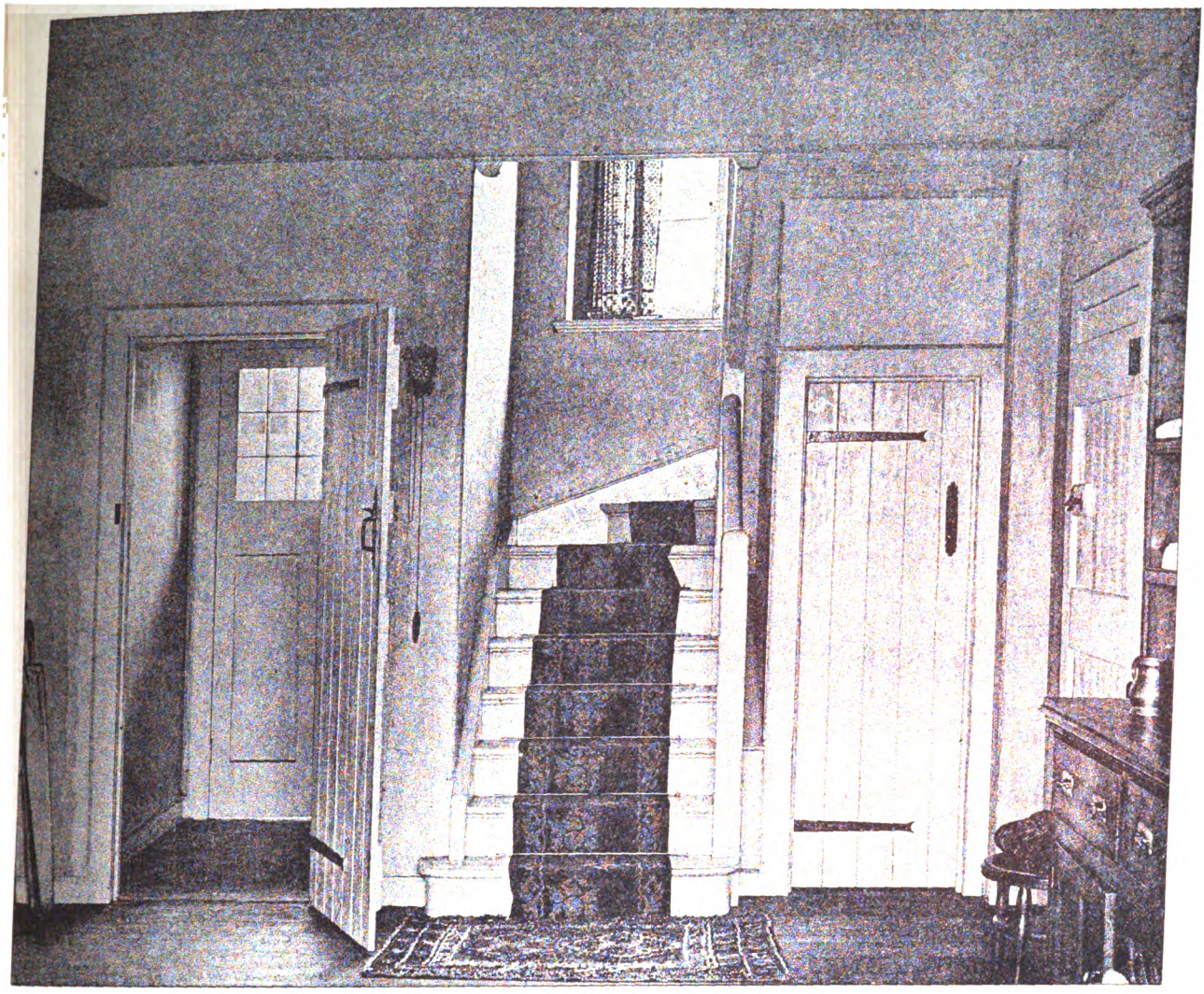

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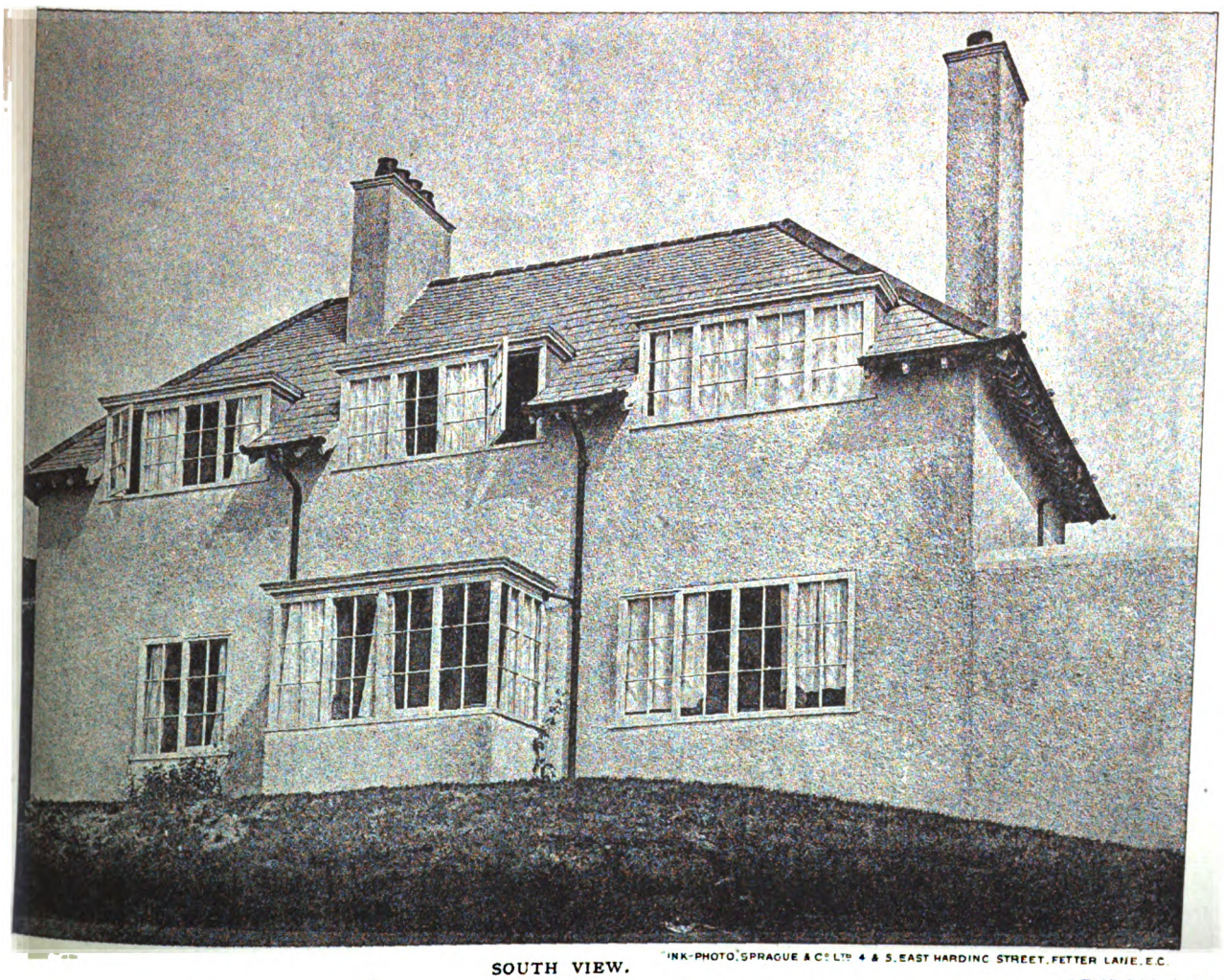

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VOL. LXXXV.—No. 3161. SEPTEMBER 5, 1903.

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Whitton Court, Salop..... Mr. H. E. Farmer, F.R.I.B.A., Architect.

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Fiscal Policy and Building.

THE question of a change in the fiscal policy of the country, which has recently been placed before an astonished public, is one which should be decided with reference to the general good of the whole community. *Salus populi suprema lex* is the cardinal maxim of social government, and it is to the rule of the majority to which in the long run in every modern community we must all submit. In consideration, therefore, of the fiscal question, this elementary point should be always borne in mind, since there naturally is a tendency for a man who is making his livelihood by some kind of business to favour or oppose a change solely from the point of view of his own business interests.

So far as the general good of the community is concerned we have no manner of doubt that Great Britain and Ireland have benefited enormously by the Free Trade system introduced by Sir Robert Peel in 1846, a change which indeed was inevitable, having regard to the dependance of these islands on imports. One of the most fallacious of assertions at the present time is that the United States have benefited by Protection. The United States is a union of various countries, of different States, within which is the most perfect Free Trade, and had that Free Trade been extended, so as not to exclude except under high duties the productions natural and artificial of other countries, the United States would have thriven even more than from natural causes they have hitherto done.

Coming, however, from generals to particulars, it is not unimportant at the present time to consider in what way building—as we will, for the sake of brevity, call all operations and interests connected with the erection and repair of structures, houses, and so forth—would be influenced by a change from Free Trade. The first point which is clear is that if food is to be taxed—and bread being the staff of life, the foundation of all family sustenance, the relieving of any other article from taxation cannot make up for the taxing of bread—wages must be higher. The moment, however, that in the building trade wages are raised, there is a general raising of expense to the rest of the community, for if it costs more to build a house the rent of that house must be raised and so with everything else. A rise in wages also in all probability would tend to a diminution of work, for it is an undoubted fact that the community unless their wealth increases must economise in some way or other, and one way of economising is to spend less on building. Therefore, from this point of view, Mr. Chamberlain's proposals would be very disastrous alike to the building trade and the general public. The building trade has nothing whatever to gain by any diminution of the import duties on English goods in the Colonies, and it would appear that the first interest of this trade is to hold fast to Free Trade.

Free Trade, by stimulating the import of raw materials in the shape of wood and cement, has certainly been of great benefit to the general community and to the building trade. In 1901 there were imported, for the seven months ending July 31, into Great Britain 103,330 loads of hewn wood from the United States. In 1903 this quantity had risen to 108,521 loads for the same period of time. This compares with 31,458 and 26,682 from Canada, and 22,317 and 27,892 from the British East Indies. These figures are given only by way of example; the complete details can be seen in the table on the next page.

We will now turn to another side of this question, namely, the prices of these articles. The accompanying table (Report on Wholesale and Retail Prices in the United Kingdom in 1902. Board of Trade, August, 1903, p. 201) is very significant. It will be observed that ever since 1861 there has been a steady diminution in the average values of imported timber. In other words, freedom from tariff duties has happily caused this country to be the market to which all the wood-producing countries of the world have sent their stuff. Norway, Sweden, Germany, Russia, and the United States have happily "dumped" their wood in this country. We give the table without further comment: a sensible man can consider and reflect on it for himself, but he should also bear in mind that all the imports of timber assist the prosperity of our shipping and of our seaports.

FIR (HEWN AND SAWN).

(Based on the *Annual Statements of Trade of the United Kingdom*. From 1861 to 1870 the figures are based on the "Computed Real Values"; after that period, on the "Declared Values.")

Year.	Average Value per load of 50 cubic feet		Year.	Average Value per load of 50 cubic feet.	
	Hewn.	Sawn.*		Hewn.	Sawn.*
	£	£		£	£
1861	3·37	3·07	1882	2·14	2·66
1862	3·27	3·08	1883	2·07	2·49
1863	3·19	3·02	1884	1.84	2·34
1864	3·09	3·01	1885	1·79	2·32
1865	2·86	3·06	1886	1·58	2·20
1866	2·72	2·86	1887	1·49	2·10
1867	2·72	2.70	1888	1·59	2·24
1868	2·73	2·66	1889	1.77	2·50
1869	2·87	2·68	1890	1·63	2·35
1870	2·94	2·72	1891	1·50	2·14
1871	2·45	2·32	1892	1·50	2·18
1872	2·51	2·50	1893	1·40	2·14
1873	2·72	3·15	1894	1·34	2·17
1874	2·77	3·36	1895	1·36	2·09
1875	2·42	2·86	1896	1·42	2·20
1876	2·45	2·88	1897	1·44	2·35
1877	2·39	2·99	1898	1·47	2·35
1878	2·09	2·57	1899	1·45	2·42
1879	1·82	2·25	1900	1·54	2·79
1880	2·07	2·66	1901	1·46	2·56
1881	2·09	2·59	1902	1·37	2·55

Note.—The values of the Imports represent the cost, insurance, and freight; or, when goods are consigned for sale, the latest sale value of such goods. They do not include Customs duty, which, until repealed in 1866, was 1s. per load on hewn and 2s. per load on sawn wood.

* Including "Split, Planed, or Dressed."

Bricks, which are, of course, so essential for building, appear to be imported in such small quantities as not to be set out separately in the returns of imports. But as regards price, we find that they rose from 22s. 6d. per 1,000 in 1863 to 35s. in 1873, and fell to 22s. 6d. in 1883, rose to 25s. in 1893, and in 1902 stood at the same figure. Therefore, but for the fall in the price of

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Accounts Relating to Trade and Navigation Issued by Board of Trade, July, 1903.

	QUANTITIES.					
	Month ended July 31.			Seven Months ended July 31.		
	1901.	1902.	1903.	1901.	1902.	1903.
II.—RAW MATERIALS AND ARTICLES MAINLY UNMANUFACTURED—*contd.*						
D. WOOD AND TIMBER:						
Hewn—Fir, Oak, Teak, &c. (other than Pit Props or Pit Wood) From Russia ...*Loads*	43,968	40,956	54,507	132,172	117 075	121,416
„ Sweden ... „	2,664	7,136	2,604	12,956	17,625	17,208
„ Norway .. „	6,697	4,642	9,307	33 704	38,720	43,602
„ Germany. „	15,170	12,597	11,223	135 496	93,855	103,873
„ United States of America. „	18,029	24,325	23,870	103,330	106,333	108,521
„ British East Indies... „	2,569	4,249	5 282	22 317	26,383	27,892
„ Canada ... „	12,558	18,114	11,867	31,458	32,510	26,682
„ Other Countries „	904	2,045	3,736	14,287	17,276	15,230
Total... „	102,559	114,646	122,396	485,720	449,777	464,424
Hewn: Pit Props or Pit Wood.....*Loads*	175,178	201,955	211,319	1,096,000	1,094,385	1,204,911
TOTAL of Wood Hewn..... „	277,737	316,601	333,715	1,581,720	1,544,162	1,701,335
Sawn or Split, Planed or Dressed... From Russia ...*Loads*	425,421	468,466	348,581	791,603	778,718	703,457
„ Sweden .. „	319,295	282,404	210,463	855,410	707,743	714,995
„ Norway .. „	39,438	43,400	45 406	304,920	330,502	335,044
„ United States of America. „	97,612	86,779	71,771	410,917	342,813	424,797
„ Canada ... „	286,351	302,623	262,266	682,670	641,438	593,932
„ Other Countries „	23,427	29,606	34,769	97,546	98 749	147,696
Total... „	1,191,544	1,213,278	973,956	3,143,066	2,899 963	2,919,921
Staves of all dimensions .....*Loads*	19,466	15,115	11,111	63,846	56,026	62,646
Furniture Woods, Hardwoods, and Veneers:						
Mahogany..... *Ton*	4,196	2,619	7,730	35,876	32,129	43,030
Other Sorts ..... „	26,324	21,532	17,102	150,081	130,913	98,268

wood, building operations would have become even more costly than they have.

As regards furniture and cabinet warehouse frames, fittings, and joiners work, the import of these, taking them together, came in value for the seven months of 1901 to 708,187*l.*, to 684,519*l.* in 1902, and to 714,487*l.* in 1903. These figures show the imports of this kind of article to be somewhat stationary, at any rate not to increase in proportion to the population. But we take it that this simply means that much imported and unmanufactured wood is worked up into the necessary articles and shelves in this country. Next we come to cement for building and engineering purposes. Here we find that the quantities imported for the seven months of 1901, 1902, and 1903 were 111,729, 144,272, and 155,944 tons, and that the averages per cwt. were—1863, 2·32s.; 1873, 3·04s.; 1883, 2·31s.; 1893, 1·70s.; 1903, 1·72s. Here, again, Free Trade has obviously benefited the building trade and the general community. Mr. Chamberlain has endeavoured to alter the business state of England without any public demand. All the facts of our national life, more especially the ease with which the taxation necessary to carry on the South African war was borne, show that the country is in a highly prosperous state. Difficulties in trade from time to time must necessarily arise, and we cannot all make fortunes; but at no time in our history was there less reason to seek to change our fiscal system, which, so far as building is concerned, can only be altered to the detriment of employers, employed, and the general community.

OLD ENGLISH DOORWAYS.

IN almost all schools of architecture the entrance to a building has naturally been the most important external feature of the design, and the one most emphasised by decorative treatment. It is the point of connexion between the external and the internal architecture, both in a practical and æsthetic sense. After the spectator has considered the exterior sufficiently, and wishes to enter the building, he naturally expects to find the entrance prominently pointed out by its architectural treatment. There are two principal means of doing this; either by placing the entrance in the base of some important addition to the building, such as a tower; or, if the entrance be made in flat of the exterior wall, by surrounding it with an enriched architectural framing. The former method is in general the most suited to the expression of a large public building. In the Houses of Parliament, for instance, the Victoria Tower is really the architectural expression of the State Entrance; an idea which was happily adopted by one of the competitors in the recent Liverpool Cathedral competition, who placed the tower and spire near the choir, as marking the Bishop's state entrance; and the use of a tower to mark the main entrance has been a common treatment in modern Town Hall designs. The special architectural decoration of the doorway itself may of course be combined with this. The decorative treatment of the doorway in the flat of the exterior wall is more expressive of the character of a private residence, where (except in the very largest class of mansions) an entrance tower would appear rather ostentatious.

The position of the entrance with reference to the whole building is also to some extent indicative of the plan and character of the interior. An entrance placed symmetrically in the centre of the façade leads to the conclusion that the planning of the interior is on a stately and symmetrical principle; a side or angle position of the entrance indicates the contrary. Of late years there has been rather a tendency to the use of angle entrances in town buildings, and in a business building an angle entrance has certainly the advantage of commanding two lines of street, but it generally means some degree of awkwardness in the planning of the interior. For a private house, whether in town or country, an entrance placed on the angle is perfectly unsuitable; it destroys repose and suggests only a misplaced ingenuity in planning.

During the Elizabethan and Renaissance periods in England a great deal of attention was bestowed on the architectural emphasising of the entrance, and there are many fine and interesting examples from buildings of those dates—private houses especially—which afford, if not examples for imitation, at all events excellent suggestions on which to base further developments: for this is the light in which they ought to be regarded. Unfortunately the use made of them in the architecture of to-day is too much in the way of mere imitation. A collection of a number of examples of English doorways of the period just referred to, such as that which has been made by Messrs. Davie and Tanner,* forms an interesting and, in a sense, a useful book; but its true usefulness depends on the spirit in which it is used. All which is old is not therefore admirable. For example, what Mr. Tanner calls "the charming little doorway from Weekly Hospital in Northampton," of which a sketch is given on p. 17, does not merit such a description at all; it is a kind of thing of which one would make a sketch because it is odd and (as an old thing) picturesque; but looked at in the dry light of criticism, apart from antiquarian considerations, it is really an incongruous medley of bad and clumsy detail, some parts quite out of scale, too, with the others; if it were done by a modern architect it would be called vulgar. Now the entrance to Montacute House, sketched on p. 13, is really an admirable and refined bit of architectural design; and to give these two, within two or three pages of each other, as if they were both almost equally worthy of notice, shows a want of critical perception, and is mischievous to the mind of the young student who may get hold of the book, and who is thus encouraged to judge of examples by their date and not by their intrinsic worth. That is the mischief

* "Old English Doorways, from Tudor Times to the End of the Eighteenth Century." By W. Galsworthy Davie and H. Tanner, jun., A.R.I.B.A. London: B. T. Batsford. 1903.

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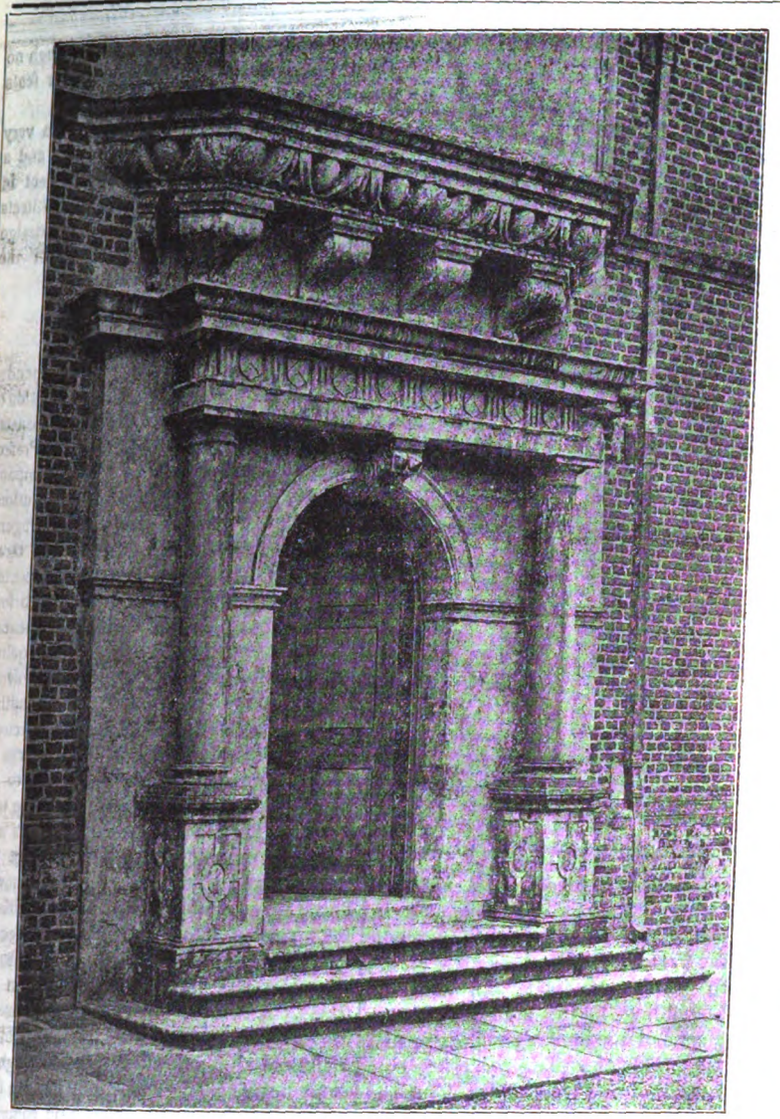

Fig. 1.—Doorway, South Wing, Cobham Hall.

of the modern antiquarian attitude of architectural criticism, that things are taken as right because they are old; and we shall never arrive at any sound comparative view of ancient and modern architecture until we get rid of that mistake, and learn to criticise ancient architecture as we should criticise it if it were modern.

It is in this spirit that we have turned over the examples of doorways illustrated in this book. The responsibility of the two authors, as we gather from the title-page, is thus divided: the separate plates are collotypes from photographs taken by Mr. W. Galsworthy Davie; the historical and descriptive notes, with the sketches in black and white, are by Mr. Tanner. With the general tendency of the remarks and commentaries in his introductory essay we are quite in sympathy; and two points we may particularly mention for approval. The one is the importance which he attaches to the architectural effect of external steps in connexion with an entrance. The flight of steps, often a double one, to the external entrance of the rather high ground floor of the typical seventeenth and eighteenth century house, gives an architectural dignity to the entrance which hardly anything else can compensate for in their absence; and even the lower but widely spread steps, as seen at Raynham Hall, are of value as an effective base to the doorway. The old-fashioned raising of the ground floor to a high level reached by a flight of steps had the advantage, also, of leaving a much better-lighted and more useful basement story than in a modern house where the ground floor is but little raised above the ground level. All this is done away with now by the modern desire for making ourselves so exceedingly comfortable, and our dread of exposure to weather; to have to ascend a flight of exterior steps from your carriage in the rain, with the inevitable umbrella, is a thing not to be thought of; and so instead of the beautiful flight of steps we have the ugly excrescence of the so-called *porte-cochère* ("carriage-porch" would be the more correct term, or *portique-cochère*, if people must have French), one of the most ungainly additions that can be made to a house. Comfort is no doubt gained by it for a self-indulgent generation, but at a loss of architectural dignity which is hardly compensated for. Mr. Tanner also rightly gives some examples of plans, as showing different positions of the entrance door and the reasons for them, without which the subject could hardly be completely considered.

In regard to the Renaissance character of many of the doorways of seventeenth-century houses, the author remarks—

"A very noticeable fact with regard to many entrance features of the houses built about the beginning of the seventeenth century is their elaboration as compared with the simplicity of the rest of the building, which, as a whole, retained a great deal of the Tudor feeling; while in the doorways, which were almost invariably treated with some adaptation of the orders, we find the most evidence of the progress of the Renaissance."

The entrance erection on the north wing at Cobham, plate 9 in the book, is cited as an instance of this. But is this elaborate erection on the background of a brick wall with plain mullioned windows really coincident with the body of the house, and not a slightly later addition? The answer would depend, of course, on a close examination of the stonework; but in this and other similar cases, where the entrance architecture differs so decidedly from that of the rest of the house, it seems not improbable that, the "new learning" in architecture having come into general acceptance shortly after the house was finished, there may have been a feeling of disappointment on the part of the owner at being belated in architectural taste; a disappointment to be salved to some extent by the erection of a new classical framing to the entrance. And that would account for the apparent concentration of architectural richness in and about the entrance. Of course, in pure Elizabethan houses we do find, often, the entrance with a kind of quasi-classic treatment, but it is always with a very corrupt form of the order; but one can hardly look at this example of Cobham and regard it as a thing designed along with the rest of the building; it has all the appearance of an addition, perhaps when the building was barely completed, but not contemplated when it was first commenced.

The illustrations given in the plates commence with a few examples which are sufficiently within the Tudor period to retain a lingering quality of mediæval taste. The best of these is the simple stone design of the doorway at Paynis Almshouses, Oundle, showing a Tudor arch under a square recessed moulding, while the heavy coping moulding sweeps round into a three-quarter circle carrying an obelisk, balanced by a similar obelisk springing from the straight coping at each side; the circular moulding leaves a three-quarter panel suitable for an inscription or symbol which would explain and justify this part of the design, but which does not appear; it is only a blank panel. Still, this is a simple, unpretending, and well-balanced design for a gateway in a boundary-wall, and it is one on which a good many variations might be based. Beyond this, the examples consist for the most part of various forms of that long favourite type, the doorway flanked by a pilaster or a column at each side, with an entablature over; with some further plates illustrating the more modern device of the projecting hood carried on brackets or consoles, without the column or pilaster. The variations in detail which are possible on the simple scheme of entablature and flanking order are almost innumerable, though the general treatment is a repetition of the same effect; and perhaps no method of architecturally emphasising a doorway in a quiet and unostentatious manner has been invented which is more suitable and more generally pleasing. At the same time we certainly do not admire all the examples illustrated here. The doorways with an order, it may be observed, divide themselves into two classes, those with an arch over the doorway beneath the architrave, and those (for the most part later types) in which the doorway has a straight

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lintel following the line of the entablature. Unless where the doorway is a very wide one, and seems constructively to require the arch, the type with the straight head is the more consistent and satisfactory in its lines. With the arch there is the difficulty of knowing what to do with the spandrel; and something has to be rather too obviously invented to fill or partly fill it. This is obvious enough in the doorway from Sackville College, East Grinstead (plate 8) where the two little circles in the middle of the spandrels have no meaning whatever and no decorative effect; they are merely put there because the designer thought he must put something into that otherwise blank triangular space. In the doorway of the south wing, Cobham Hall, and in the north doorway Hatfield House (plates 11 and 12) the spandrel is left plain, which is a more satisfactory treatment than an unmeaning attempt at ornament. The Cobham doorway looks anything but admirable, illustrated as it is in connexion with the heavy corbelled base of the oriel over with its large coarse egg-and-tongue ornament, all on a totally different scale from the details of the door entablature. This, as in the more pretentious Cobham entrance before referred to (shown in plate 9), is a case which suggests that the door framework and entablature was an afterthought and inserted, as a specimen of the new style, in a manner quite irrespective of the other portion of the building. It is impossible to suppose that any architect or owner (if the owner were his own architect) could have simultaneously drawn and caused to be executed these two pieces of detail in close contiguity, and totally out of scale and character with each other (see fig. 1); and if it is assumed that he did so, this is a very bad example to offer without note or comment to students. The entrance from Hatfield, just referred to, and the other one from the same house on plate 13, are examples of that playful treatment of the finish above the entablature which is frequently seen in Elizabethan work, and which consists of a freely treated ornament in the same style as the "strap-ornament" characteristic of the style, but with a higher relief; this is a very suitable kind of finish, since it forms an admission that the whole business of column and entablature is only ornamental, and does not need the heavy practical finish of a pediment over it, to express a slope of roof that does not exist. The broken pediment, in its various forms, was an experiment with the same object, and excusable on that account; it is objected against it that it is unmeaning, and so on, but that is exactly its object—to show that the form is only used as a kind of finish and without any structural meaning. Another example of the playful decorative finish above the entablature is shown in the example from Aston Hall, plate 16. On the other hand, the difficulty of dealing with the spandrel in the case of a semicircular doorhead could not be more unhappily illustrated than in the other doorway from Aston Hall, shown on plate 17, with its clumsy projecting triangles in the spandrels. It is a poor piece of work altogether, and not worth illustration.

Among examples that are well worth attention, on the other hand, may be mentioned the architectural treatment of the doorway with a panel and window over it, from Wakehurst Place (plate 14), all comprised under the same grouping, and a very

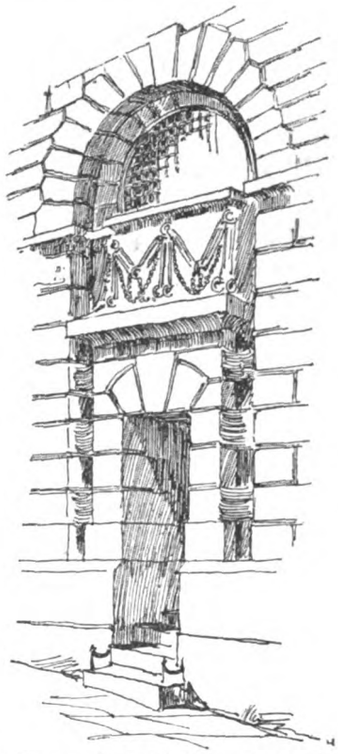

Fig. 2.—Doorway, Newgate Prison.

complete and refined piece of seventeenth-century work. Among the examples in which the doorway alone is separately treated, several from London have great merit; that from St. Helens (plate 23), with the returned-mouldings of the architrave fitting on to the caps of the flanking pilasters; that from Great St. Helens (plate 35), a fine bold piece of work; and that from Crutched Friars (plate 39), in both of which there is the same picturesque little device of turning up the architrave mouldings in the centre so as to appear to support the central break of the cornice; and that (just destroyed) from Newgate, given as the first among Mr. Tanner's sketches to illustrate the literary portion of the book. This latter, of which we give a reproduction (fig. 2), is a remarkable piece of symbolic expression in masonry, produced by the simplest means.

The practical defect of the order and entablature treatment of the doorway was that it provided no shelter, or very little, for any one standing on the doorstep; and it was probably the perception of this which led to the adoption of the more modern form, illustrated by several excellent examples, of the projecting hood carried on decorative brackets or corbels, with no flanking columns. This form of doorhead lends itself well to treatment in woodwork, and perhaps the best example given is one of the fine carved doorheads from Queen Anne's Gate (plate 43). In another example from the same neighbourhood sketched by Mr. Tanner (19, Queen Anne's Gate—an address well known in the architectural profession), the projecting hood and carved pendants are combined with the flanking pilasters, also covered with carved ornament. Among the examples in the plates that from Uxbridge (plate 49), in which the hood takes the form of a pediment, is a very fine one, remarkable for the bold and rich treatment of the carved brackets. For the shell form of canopy, of which the authors give a good many examples, we have no great admiration; it usually looks heavy and clumsy, and out of scale with the other details, though no doubt it gives occasion for some clever feats of joiners' work.

We have to thank the authors for a very interesting collection of illustrations and a very well-written essay on the subject in hand; only we hope that young architects will make use of it for suggestion in design rather than for direct imitation of the examples given.

NOTES.

The Paris Metropolitan Railway. IN pursuance of recommendations made by the commission of inquiry into the recent disaster on the Paris Metropolitan Railway the Prefect of Police has made known to the company the nature of the reforms and precautions to be adopted for the safety of passengers. These measures were classified in three series: (1) those which were to be executed at once; (2) others to be introduced before September 5; and (3) others to be commenced before November 1. The first series requires the appointment of an inspector for every five stations; every case of short-circuiting is to be reported to one of these inspectors, who is thereupon to determine the course of action. Independent oil lights are to be provided in every station to indicate the way out, and all the unnecessary barriers and automatic machines that now obstruct the passages and platforms are to be removed. These very sensible provisions have already been carried into effect. By the second series the company is instructed to isolate all motor-cars from other vehicles in the trains. All offices and installation boxes at the stations are to be of non-inflammable material; an independent system of lighting is to be installed; and fire-alarms are to be provided and placed in telephonic communication with the nearest fire-station. The third series of the regulations advises the company to study other systems of traction in which there are fewer dangers of fire or panic than in the system now used. It provides that the third rail, conveying current, is to be properly guarded, so that passengers who may be obliged to walk along the track may not be exposed to the danger of electrocution; that every station shall have at least two exits; and that air-shafts are to be constructed between the stations. The recommendations to which we refer were to some extent suggested in our recent article on the subject.

Exhibition of Building Improvements and Decorative Art, Brighton. THE Aquarium Committee of the Brighton Town Council are arranging, in continuation of a scheme of periodical trade exhibitions, an exhibition of building improvements and decorative art in the Grand Aquarium, from September 23 to October 10 inclusive. It is the desire of the Committee, we are informed, to organise an exhibition of all those things which are novel and attractive in the building world, giving due prominence to artistic, decorative, and modern improvements rather than to ordinary and staple articles of utility long since recognised. At the same time exhibits of historical interest and those illustrative of the progress of British architecture will be welcomed. Decorative metal-work, art wall decorations and enrichments, the best appliances for lighting, sanitation, ventilation, and fireproof construction, mechanically ornamented woodwork, improvements in glazing and

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roofing, artistic household fixtures and fittings, will receive special attention; and many other exhibits are invited. The Consultative Committee which has been formed includes many of the architects and builders in Brighton, and others from beyond the limits of the borough, and no doubt an interesting exhibition will be arranged. Three gold medals, three silver medals, and six bronze medals will be awarded to meritorious exhibits. A diploma of honourable mention will also be adjudicated to the best exhibit in each of the classes represented. A silver cup will be awarded to the exhibit considered the most attractive and best displayed. Intending exhibitors can obtain further information from Mr. Ed. S. Michel, Organising Manager, Grand Aquarium, Brighton. The Aquarium Committee, having decided to introduce a new heating system in the building, offer a special prize of twenty guineas for the best proposal, to be accompanied by plans and estimates, with or without illustrative working models, the cost not to exceed 600*l.*

Extensions at Euston.

Two years have now elapsed since the widening operations were commenced by the London and North-Western Railway Company near Euston Station, and good progress has been made with the scheme. Various difficulties have been encountered and successfully overcome. The site, upon which several hundreds of men are now engaged, was formerly covered with poor-class residential property, all of which has been acquired, and new homes have been found for the tenants. Three main thoroughfares — Mornington-street, Stanhope-street, and the Serpentine-road—have practically disappeared. The principal object of the new works is to afford better accommodation for shunting and housing passenger carriages close to the terminus. At the present time, vehicles arriving at Euston have to be taken to the sidings at Willesden—a distance of five miles, and brought back again when required at the terminus. This involves about ten miles of unremunerative traffic, besides occupying the lines to the hindrance of other trains. A large space has been cleared near Mornington-crescent, and the sheds to be erected here will give room for about 350 vehicles, in addition to siding accommodation for others. These sheds will be in communication with the station by means of a subway, so that trains may be run out of Euston and through the subway without obstructing passenger traffic. In addition, a tunnel is being constructed for the use of engines proceeding to the works at Chalk Farm. The operations cover a total area of about 5,000 square yards, and the quantity of excavation involved is estimated at 450,000 cubic yards. It is hoped that the whole of the works will be completed by the end of 1904, and there is no doubt that they will prove to be of very material assistance in dealing with traffic.

Testing Road Materials.

In the choice of materials for the construction of macadam roads there is sometimes difficulty in determining the most suitable kind of rock for particular highways. Many engineers are able to bring to bear upon this subject the weight of valuable practical experience, while, on the other hand, there are some who would be glad to confirm their conclusions by the aid of experimental data. Tests of materials of construction in general have proved to be most invaluable, and it is quite reasonable to expect that road materials should form the subject of similar inquiry. In the United States, laboratories have been equipped for testing such materials at Harvard, Columbia, Cornell, and California Universities, and also in connexion with the Board of Agriculture. The last mentioned of these establishments is very completely furnished with suitable appliances for tests relative to abrasion, impact, toughness, absorption, hardness, and compressive and tensile strength. Paving bricks also are tested according to the standard adopted by the National Brick Manufacturers' Association, while for the classification and naming of materials special modifications of petrographic and chemical analysis are employed. The interpretation and application of results receive the most careful attention, and the work of this, and the other laboratories mentioned, is one of great value. Of course, the characteristics of road materials must be considered with regard to their suitability for the realisation of a strong, tough, and well-drained road foundation, as well as of a hard and well-knit surface. Laboratory results may not supersede practical knowledge, but they cannot fail to be of material assistance in pointing to the materials that ought to yield the most satisfactory results under the conditions obtaining in any particular case.

The Royal Horticultural Society, and their Gardens.

Sir Thomas Hanbury has recently purchased the estate and garden of the late Mr. G. F. Wilson, F.R.S., at Wisley, near Woking, with a view to presenting the property to the Royal Horticultural Society. The estate extends over sixty acres, whereof a portion is at present under tillage, and the remainder has been devoted to the cultivation of plants in various chosen soils. Sir Thomas Hanbury's gift thus provides the Society with a new garden in substitution of their grounds at Chiswick, which have become so closed in with adjacent buildings during the last forty or fifty years that they are rendered quite unsuitable for their purpose. In the course of next year the Royal Horticultural Society will celebrate the hundredth anniversary of their formation. In 1821 they migrated from Kensington (where is now the Addison-road railway station) and Ealing to their gardens at Chiswick, where they had taken a lease, at a rent of 300*l.* per annum, of which seventeen years are still unexpired, of a portion, about thirty-three acres, of what had been market-gardeners' grounds belonging to the Duke of Devonshire's seat, Chiswick House. The buildings there were erected, 1822-3, after designs and plans by William Atkinson and W. H. Ashpitel. The grounds at Chiswick, formerly the scene of highly fashionable fêtes and exhibitions, and where Sir Joseph Paxton worked as a ground gardener at a wage of 12*s.* per week, have since been reduced to eleven acres. In 1859 Sir Henry Cole, R. Redgrave, and Captain Fowke, R.E., laid out twenty acres at Kensington, rented from the Commissioners for the Exhibition of 1851 by the Society, for whom Sydney Smirke designed the two side arcades in curves to meet the large conservatory at the north end—illustrated in our columns of July 9, 1859, and December 29, 1860. The planting, &c., of the gardens was carried out by Mr. Nesfield. The gardens were gradually altered and curtailed by the erection of pavilions and galleries for a series of annual exhibitions held in 1871-4, and were further dismantled for the series of 1883-6, begun with the Fisheries Exhibition of 1883. All the materials having been sold in 1887-9 the site was taken for Imperial Institute-road, and the blocks of flats and the public institutions since built between the Royal Albert Hall and the Natural History Museum. The Society's new London hall and offices are now being erected on the site of four houses, Nos. 77-80, Vincent-square, Westminster, Mr. E. J. Stubbs being the architect.

Royal Caledonian Asylum, Holloway.

The demolition has been begun of the buildings in Caledonian-road, which were purchased, together with the site of 2 acres, for 16,500*l.* by the London County Council for the erection of dwellings to accommodate 1,400 persons of the industrial classes. The institution, originated in 1808, was firmly established in 1813 on behalf of the children of Scottish soldiers who have fallen on the field of battle; it was incorporated two years afterwards by Act of Parliament. The asylum was originally opened for about fifteen children in Cross-street, Hatton-garden, and was then removed to Copenhagen-fields, in Islington, whence it migrated to the premises in the Caledonian-road, which have a frontage of 248 ft. to the main thoroughfare. The Governors of the charity secured a site of 7 acres at Bushey, in Hertfordshire, where the new asylum buildings have been erected after Sir William Emerson's plans and designs.

Glasgow School of Art.

The Glasgow School of Art, which is the central institution for higher art education in Glasgow and the West of Scotland, has issued its prospectus for session 1903-4. This excellent school supplies a training in drawing and painting, architecture, sculpture, and the applied arts. In connexion with the latter branch, technical art studios have been built, and artist-craftsmen give instruction in stained glass, interior decoration, needlework, book-binding, ceramic decoration, enamels, gold and silver smiths' work, block-cutting, mosaics, sgraffito, gesso, lithographic design, posters, &c., metal work, wood-carving, stone-cutting, and furniture. Besides, a loom has been erected for the use of textile designers, and a practical weaver gives demonstrations. The drawing and painting upper school includes a course from the life, composition courses, a course from the antique, anatomy lectures, and animal classes. In the architectural section the instruction given meets the requirements of the examinations for the membership of the Royal Institute of British Architects, but in addition to the subjects included in that scheme the school course provides also for the study of nature from life. A four years' course is given, but students not wishing to take the full curriculum may join any one of the classes or lectures. Through the co-operation of architects in the City it is intended to institute a series of day classes—a scheme which deserves the full support of

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all interested in architectural education. The modelling course is arranged in four groups, commencing with elementary drawing from the round and modelling and ending with modelling the figure from life and its adaptation to architecture, &c. In the design and decorative art classes for this session, furniture, carpets, wall-papers, and embroidery will be dealt with. Diplomas and certificates of the Scotch Education Department are issued in the classes for drawing and painting, architecture, sculpture, and the applied arts. The total number of students for last session was over 1,300, and the influence of training so efficient as that given in this school must continue as a healthy stimulus to the art of the country.

The Architectural Association Curricula.

WE have received particulars of the curricula of the Architectural Association for the session 1903-1904, which show that this energetic society is consistently carrying on the work of providing educational facilities, both in day and evening classes, for young men about to enter the profession or already engaged in architects' offices. Mr. H. P. G. Maule, who is the new master of the Day School, is likely to prove a worthy successor to Mr. Bolton, and he will have as his assistant master Mr. W. Aston Jones, with Mr. J. H. Squire as demonstrator. It is a pleasure to read that the result of the two years of the working of the Day School has fully come up to the anticipations of the Committee, both in the number of students and in the practical results of the work of the School; and judging from the particulars before us, there are good reasons for thinking that this success will be repeated in the ensuing session. The lecturers and instructors in the Evening School will be practically the same as those of last year, the only alteration being that the lectures on Greek and Roman architecture by Mr. F. T. Baggallay will be given by Mr. Hugh Stannus, who will also lecture on Classic ornament, in place of Mr. Banister F. Fletcher. The Association, which has been so long hampered in its work owing to inadequate accommodation, will, we are glad to say, remove in March to the premises formerly occupied by the Royal Architectural Museum and Westminster School of Art, Tufton-street, Westminster. The Museum will be open free to the public as before, but students and members will have exceptional facilities for drawing from the casts contained in the Museum.

The Architectural Association Lectures.

THE curricula include the fortnightly Friday lectures of the Association, which have been such an excellent feature of the work of the society for many years. The annual general meeting will be held on October 2, when the President, Mr. H. T. Hare, will deliver his address and distribute the prizes; and on the 28th a conversazione will be held at the Royal Institute of Painters in Water Colours. The meeting on October 16 should be of special interest to members of the Association and all those concerned in architectural education, for on that date the past and present masters, Messrs. Arthur Bolton and H. P. G. Maule, will read a paper or papers on "The Day School in Relation to Architectural Pupilage." The following are the lecturers, subjects, and dates of the succeeding lectures:—November 6, Mr. C. A. Nicholson on "Modern Churches"; November 20, Mr. H. M. Cautley on "Farm Buildings"; December 4, Paper by the Camera and Cycling Club on "Photography for Architects"; December 18, Mr. G. P. Bankart on "Old Stucco and Plaster Work with Reference to Modern Possibilities"; January 8, Mr. Hugh Stannus on "Egyptian Architecture"; January 22, Mr. Maurice B. Adams on "As to the Making of Architects, with Examples of Draughtsmanship"; February 5, Mr. W. A. Harvey on "Cottage Homes"; February 19, Mr. W. Henry White on "Corner Houses"; March 4, Mr. John W. Simpson on "Schools"; April 22, Mr. W. Gilbert on "Craftsmanship"; May 6, Mr. A. E. Munby on "The Value of Science in an Architectural Curriculum."

A Novel Offer to Architects.

THE Guardians of Windsor Union are "prepared to receive offers stating upon what commission per cent. architects are willing to prepare plans, and for preparing plans and superintendence of certain work proposed to be carried out by the Guardians at the Union Workhouse." The offers are to be delivered to the Clerk on or before Saturday, September 12 next, and the Guardians do not bind themselves to accept the lowest or any offer. The offer is surely unique in the practice of architecture. "The Guardians do not bind themselves to accept the lowest or any offer." How very careful! Perhaps, after all, the 10 per cent. man may be chosen, and, in any case, the "winner" is safeguarded against the losers. If there is no winner, the applicants have poor consolation from the knowledge that they have priced themselves in vain.

LETTER FROM PARIS.

THE jury appointed to examine the twelve sets of plans and designs submitted for a monumental circus at Limoges, has awarded the first premium and the execution of the work to M. Emile Robert, architect, of Clamart. The second premium, of a value of 120*l*., was awarded to M. Deperthes.

M. Charles Girault has terminated the architectural portion of the monument by Falguière to be erected to the memory of Pasteur on the Place de Breteuil, in the place of the iron column of the artesian "puits de Grenelle" which now occupies this square, but is very shortly to be removed.

A competition has been opened for the construction of a new infirmary annexe to the National Asylum of St. Maurice near Paris.

M. Gustave Rives, the well known Parisian architect, has been promoted to the dignity of Officier of the Legion of Honour.

The City of Paris is somewhat in difficulty concerning the award of the Prix Lheureux this year. This prize was founded three years ago, by the widow of the late M. Lheureux, to be awarded, in alternate years, to a sculptor or an architect author of the finest monument or edifice of importance erected during the two years preceding the award of the prize. The prize was awarded to M. Dalou in 1900, for his monument of "The Triumph of the Republic," and in 1901 to M. Charles Girault, for the Petit Palais on the Champs Elysées. Last year the prize went to M. Barrias, for his monument to Victor Hugo; but this year there seems to be no architectural work of sufficient importance to meet the terms of the Lheureux prize. The only two buildings which could be taken into account, the annexe of the Bibliothèque Nationale by M. Pascal, and the new buildings of the Bourse at Paris by M. Cavel, are still under construction, and can hardly compete for the prize until 1905. It has been suggested that the monnment to the late Charles Garnier, by M. Pascal, which was inaugurated in June last, although not strictly an edifice in the terms of the Prix, is still of sufficient architectural character and importance to allow the Prix Lheureux to be awarded to its architect.

The Union Céramique de France has organised a competition amongst French architects with the intention of popularising the employment of ceramic materials of all kinds, either as materials for construction, or as products for interior and exterior decorative uses. The subject for competition is a large hotel for a provincial town or a watering place. The jury will consist of eight well-known architects—MM. Moyaux, Louvet, Bouhon, Boileau, Deslignières, Wallon, Yvon, and Alinot—various managers of the Union Céramique and of large hotels, and three members to be appointed by the competitors. Four prizes will be awarded, the first prize having a value of 60*l*. and carrying with it the title of "Architect to the Union Ceramique." Several medals are offered by the Touring Club of France.

The preparatory work for the new bridge for the metropolitan railway, which is to cross the Seine at Passy, will necessitate the removal in a few days of the existing iron foot-bridge which crosses the Seine at the spot where the new bridge is to be placed. This foot-bridge, which weighs about 200 tons, will be moved a short distance down the river, and this removal will be accomplished by an ingenious and apparently simple method. It is proposed to place two large river barges under the bridge and load them with sand until the usual water line is submerged by about 1 mètre: the space between the barges and the underside of the bridge will then be filled up with timber supports and the boats emptied of the sand they contain, when it has been calculated that their buoyancy will be sufficient to raise the bridge the height necessary to enable it to be floated by the barges some little distance down stream to its new situation.

The exterior of the Madeleine will be for some time partially hidden by the immense scaffolding necessary for the restoring work now going on under the direction of M. Raphael Loiseau, official architect of the Eighth Arrondissement, in which this church is situated. The restoration of the remarkable sculptured pediment on the main front of the building is not included in the scheme of work; and the Union of Valenciennes, the town which gave birth to Henri Lemaire, the author of this work, has appealed to the Minister of Fine Arts to take in hand its restoration, and to place in a suitable position a tablet bearing the name of the sculptor.

Now that the new buildings at the Bourse are to some extend relieved of their scaffolding, the two new wings with their lateral prolongation of the colonnade form, with the original building, a more harmonious whole than had been anticipated, and the result is highly creditable to M. Cavel, who has carried out a very difficult task with much judgment and ability. This will no doubt be still more evident when the new building has been toned down by time and weathering.

The admirers of the works of Chasseriau have at last the opportunity of seeing in the Louvre one of the best productions of this painter. This is one of the mural paiutings of the old Cour des Comptes, which fortunately escaped the fire, and having been sawn off the wall, was successfully mounted on canvas and offered to the Conseil des Musées. It is an allegorical subject representing "Peace."

M. Redon, architect to the Louvre and the Tuileries, has commenced the construction of a grand staircase to give access to the new galleries containing the Thomy-Thierry collection. The staircase leads up from the Persian Pottery Gallery. He is also commencing the restoration of the splendid group by Carpeaux which decorates the attic of the Pavillon de Flore, and has suffered very severely from the effects of weather.

The Government has re-appointed M. Paul Dubois as Director of the Ecole des Beaux-Arts for a new period of five years. The appointment is generally approved, every one recognising the tact, amiability, and firmness which the eminent sculptor has already shown in this important office M. Perrault-Dabot, the archivist to the Commission des Monuments Historiques, has been appointed to the duties of additional Inspector-General in respect of "objets mobiliers."

The Académie des Beaux-Arts has accepted, subject to the approval of the Conseil d'Etat, the legacy of all his property left by M. Leon Jean Roux, the late architect. This legacy, which amounts to about a million francs, will

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serve for the foundation of various prizes to be awarded, after competition, to painters, sculptors, architects, and engravers.

The sudden and unexpected death of M. H. Bunel, architect-in-chief to the Prefecture of Police of Paris, is a great loss to the City, of which he was one of the most eminent officials. M. Bunel, who was sixty-three years of age, was a former pupil of the Ecole Centrale, and in 1866 entered the service of the Prefecture of Police as a supernumerary architect. It was not long, however, before his abilities became recognised; and as member of the "Conseil d'Hygiène et de la Salubrité," of the "Vieux Paris" Committee, and of the "Conseil Supérieur des Théâtres," he acquired a wide reputation. For seventeen years back his assistance and advice had been sought under all grave circumstances which affected the City — whether arising from the attempts of anarchists, or from accidental catastrophes such as the fires at the Opéra Comique and at the Charity Bazaar, and recently in regard to the dreadful accident on the Metropolitan Railway. During the exhibition of 1900 his experience was of great value in providing for the public safety. He was a man of remarkable practical insight, whom it will be very difficult to replace.

The department which M. Bunel directed at the Prefecture of Police is principally concerned with the maintenance of public convenience and safety in the streets. The staff includes ten architects of arrondissements, five supernumerary architects, as well as the sanitary inspectors of lodging-houses. These architects have under their surveillance the fencing of waste ground; the barring of streets for repair; the depôts of materials; scaffoldings; trenches for the conveyance of water, gas, and electricity; the prevention of obstruction in the streets; the preservation of order in connexion with public entertainments, such as theatres, concerts, and balls; and, lastly, the inspection of buildings in respect of their security from fire. As architect-in-chief, M. Bunel had also the duty of visiting prisons, and of inspecting public buildings, and of inquiring into each case in which a new license for public performances was applied for. It will thus be seen what important and delicate functions the recent eminent official was answerable for.

The death is also announced of another eminent official, M. Larroumet, whose name was more familiarly known to the world at large, since, besides having been for some time Director of the Department des Beaux-Arts, he was also a distinguished art-critic. M. Larroumet was born in 1852, and in 1884 was nominated a Professor at the Sorbonne. In 1887 he became Chief in the Department of Public Instruction, and was elected in the following year Directeur des Beaux-Arts in the place of M. Castagnary. In 1891 he was elected a member of the Académie, of which he was afterwards appointed perpetual Secretary. Among his numerous writings may be specially mentioned that entitled "Art in its Relation to the State," and an interesting critical study on the works of Meissonier.

ARCHITECTURAL SOCIETIES.

MANCHESTER SOCIETY OF ARCHITECTS. — Ten of the members of this Society visited Ashbourne, Derbyshire, on Saturday, August 15. Almost continuous rain prevented much outdoor sketching. Fortunately, the interior is very interesting, including some good Early English windows and Decorated work and some fine tombs. The curiously irregular transeptal plan, with chapels, gives some very picturesque vistas internally, and a long day's sketching proved all too short. On the evening of August 25 fifteen members visited Parr's Bank, Spring-gardens, by the kindness of Messrs. C. Heathcote & Sons, the architects. Mr. Heathcote, jun., explained the building to the visitors, and the visit was a very interesting one.

A BRICKWORKS MONOPOLY. — In his annual report on the trade and commerce of French Guinea, Captain Cromer, the British Consul, mentions that about five miles from Conakry, close to the seashore, there is an excellent deposit of brick-making clay, and an enterprising gentleman has started the manufacture of bricks and tiles of various kinds. As he has now practically overcome the initial difficulties inseparable from the starting of a new industry in West Africa, and as, in addition, he has a monopoly of the manufacture of bricks in the colony, this undertaking bids fair to be successful.

CEMENT JOINTS IN DRAINS AND DRAIN-TESTING.*

IT has been patent to me for many years that cement joints in stoneware drain-pipes fail to maintain their power of standing both, or either, the smoke and hydraulic tests, and this, sometimes, soon after the laying of the drains, and sometimes after a considerable lapse of time. As a rule, however, I find the failures can be traced to either the materials being at fault or the method of laying. These failures, notwithstanding the fact that the drains have been tested by water and found watertight at time of construction, are due to one or other of the following causes, viz.:—1. Swelling of the cement in the joint. 2. Uneven expansion of the concrete bed, especially if made of "hot" cement or ground or lias lime, and not of equal thickness, as when deep holes are filled up in the bottom of trench or in large "hand-holes," the expansion lifts the pipes off their bed. 3. Uneven settlement of the bed, causing deflection of the adjoining joints. 4. Uneven or careless filling-in of the trench, or workmen walking on or knocking the pipes, or by débris falling, &c. 5. Testing or filling in the trenches before the cement is thoroughly hard. 6. Contraction of the cement in the joints. 7. Failure of the joint to stand the pressure, excepting, of course, the jointing material.

Causes 1, 2, and 6 are due entirely to the quality of the materials at the time of using or to their wrong manipulation. A thoroughly practical and theoretical knowledge of Portland cement is absolutely necessary that no failure may arise from this material. In this short note a complete specification of this material cannot be given, but suffice it to say it should be tested for contraction, expansion, adhesion, disintegration (by boiling for twenty-four hours after parts have been made for twenty-four hours), specific gravity, which should be about 3·1—weight per bushel is an unreliable guide—also whether it contains free lime or free gypsum; then further for tensile strain, which should be not less than 500 lbs. per square inch—at seven days the briquettes, being mixed up as stiff as possible, are "thumbed" into the moulds—and lastly, but perhaps the most important, its fineness,—80 per cent. of it shall pass through a sieve having 32,400 holes per square inch, and the whole through a sieve of 2,500 holes per square inch. If not very finely ground it may expand months after using, thereby cracking the flanges or loosening the key between the pipe and the cement.

Cause 2. I do not agree with the use of hot lime for foundations, owing to its expansion; so far as lime is concerned, it should rank in the same category as clay joints. Cement only should be used.

Cause 4. As to this, probably more failures in drains found by retesting arise from these faults than any other, and carefulness alone is the remedy; and the same applies to Cause 5, both respecting filling and testing.

Cause 7 applies in many cases — (*a*) From improper form of joint. (*b*) From the sockets and spigots of the pipes being so highly glazed as not to form a proper surface to allow the cement and pipe to thoroughly adhere to make a permanent water-tight joint.

The only cement joint I know that will stand satisfactorily the water test is this, *i.e.*, the cement should be keyed at both ends, the whole space in the joint being filled in with cement without gaskin or other material, and my personal experience also proves that no sand should be used. The most important point at which the joint should be perfect is between the end of the spigot and the bottom of the socket, a fact which is overlooked by many engineers who use or specify gaskin, &c. When the pipes are being glazed in the kilns they are stacked on end, one on top of another, and where the socket and spigot touch the surfaces are unglazed, forming a natural key for the cement. If from careless stacking the ends are glazed, they should be chipped. Joints made with gaskin should be strongly opposed:—(1) Because they allow of a large amount of play in the line of pipes, allowing the pipes to "sag," thus breaking the seal between the glaze and the joint; (2) because they allow of inferior workmen making the joints; (3) because they will not stand any pressure, especially if subject to vibration. Joints made with cement should be absolutely free and rigid, and drains with cement joints should be laid on a foundation which has no possibility of yielding or uneven settlement if it is intended they should remain watertight. If concrete be used, it should be very fine, no part to exceed a ¾-in. ring gauged about 6 to 1 of Portland cement (or stronger, according to soil), and should contain sufficient sand to cause it to consolidate in a solid mass around the pipes—in fact, to form a concrete pipe outside the stoneware pipe.

When the cement used has been of the proper quality, I have no hesitation in saying that very many of the "failures" found upon retesting arise from the breaking of the seal or cohesion between this glazed surface and the cement, and this may arise from many causes tending to alter the position of the pipes after first making the joint, either before the cement is permanently hard or at any future time, or from the contraction of the cement. It is most imperative that no cement be used for drains which show any signs of contraction, and that as little water as possible be used in its manipulation. These facts are proved by careful observation, which shows that the water oozes out between the cement and the pipe.

Some authorities assert that expansion and contraction in the length of drain causes failure, but I have no personal knowledge of such a result, and cannot in any way conceive how the temperature in a sewer can so affect stoneware and cement. Perhaps this idea has been conceived along with the invention of elastic joints, such as mastic, but I cannot accept the theory without proof, which at present I cannot find.

Cement-jointed drains are now too well established to be altered from general use; it would almost, if not absolutely, require an Act of Parliament. Granted this hypothesis, we have to try and make them perfect without resort to patent joints or patent pipes. How can this be done? 1. By having a perfectly rigid foundation or bed. The only way to obtain this is by levelling up on rock with suitable cement concrete, or in other soils by a sufficiently thick bed of Portland cement concrete, which should be thoroughly hard and set before laying the pipes. 2. By carefully testing the cement to find its qualities, and selecting suitable material. 3. By instructing workmen, and employing only those who can be relied upon to properly manipulate the materials, and who thoroughly understand the causes which produce failure, not only at first testing, but at future tests in years to come. 4. By pipe manufacturers sending out pipes whose spigots and sockets are not glazed, the glazing of which can be very materially altered by proper stacking in the "salt kiln." 5. By engineers, architects, and local authorities clearly specifying, in detail, not only what has to be done, but by pointing out what has to be avoided.

* Part of a Paper by Mr. James G. D. Armstrong, Professional Associate, Surveyors' Institution, read before the Conference of Engineers and Surveyors in connexion with the Congress at Bradford of the Sanitary Institute.

COMPETITIONS.

MECHANICS' INSTITUTE, PONTARDULAIS.—It has been decided to erect a Mechanics' Institute in Pontardulais, to cost about 3,000*l.* An open competition was recently held, and the designs selected were by Mr. W. Beddoe Rees, A.R.I.B.A., 37, St. Mary-street, Cardiff, who was awarded the premium of 10*l.* 10s.

HAYMARKET THEATRE. — The London County Council have proposed to Mr. Frederick Harrison, the lessee, that he should carry out certain structural alterations of the playhouse in order to bring the building up to the standard of modern requirements. The theatre was erected, after plans and designs by John Nash in 1820-1, for Morris and Winston at a cost of 18,000*l.* upon a site measuring 61 ft. by 135 ft., leased for ninety-nine years from the Crown, and situated a few feet to the south of John Potter's "New French Theatre"—since known as the "Little Theatre," and more popularly as "Foote's Theatre"—which had been opened on December 29, 1720. Nash's building was distinguished for its oblong and spacious pit, which was considerably reduced for an enlargement of the stalls when the auditorium was remodelled by C. J. Phipps for Sir Squire and Lady Bancroft who removed thither from the Prince of Wales's Theatre in Tottenham-street about thirty years ago. During recent years extensive alterations have been made at the back of the house: a new room for the manager has been built by Messrs. Lee & Paln, and a fire-resisting screen has been fitted in the proscenium. The clock which Samuel Foote presented to the green-room of the old theatre has been preserved, and is still, we believe, in the possession of Sir Squire Bancroft.

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EXPERIMENTS IN SEWAGE TREATMENT AT SHEFFIELD.*

AT first experiments were on a small scale, some of the existing tanks being utilised. Effluent from the lime process was treated by double contact, the medium being small coal, and raw sewage was also dealt with, both coal and gas coke being used in the filters. Satisfactory results were obtained during the two years over which these first experiments extended, but the beds lost considerably in capacity, owing, no doubt, to the large amount of detritus which passed to them and accumulated. The results were, however, considered sufficiently good to warrant more extensive experiments, and early in 1899 six large contact beds, covering a total area of 9,500 square yards, were constructed. The ground, which is of a clayey nature, was excavated to a certain extent, and the material so obtained was used for the banks and divisions between some of the tanks. Three of the new beds were filled with large gas coke to a depth of 5 ft., and three with coke breeze to a depth of 3½ ft., the former acting as first contact beds and the latter as second contact beds. Raw sewage which, like the rest of the sewage entering the works, had passed through catch-pits was then pumped into the beds without further settlement. The resulting purification, which has since been carefully observed and recorded by a series of analyses extending up to the present time, is regarded as exceedingly satisfactory. The final effluents have at all times been non-putrefactive, capable of supporting fish life, rich in nitrates, and conforming to the standards employed by the Rivers Board Authorities.

The one serious defect so far discovered is the reduction in capacity, attributed to the silting up of detritus and other solids not intercepted by the catchpits. Specimens of the deposit so formed have been analysed and the result is as follows :—

Organic and volatile matter 44·3 per cent.
Mineral matter ... ... 55·6 "

On account of this decrease in capacity it was decided to elaborate the experiments by treating sewage from which, by preliminary treatment, the detritus and suspended matter had as far as possible been removed, and accordingly an open septic tank and further double contact beds were installed. By this method raw sewage, after passing a ½-in. screen, is passed to a detritus tank, 39 ft. by 4 ft. 6 in. by 3 ft. deep, and thence into a precipitation-tank of 50,000 gallons capacity, which is trapped at each end, and acts as an open septic tank. Sewage has been passed continuously through the tank at a rate of 57,000 gallons per twenty-four hours, and a portion of the effluent treated on two pairs of double contact beds, one pair being made of clinker and the other pair of burnt ballast. This process was commenced on June 22, 1900, and worked without the removal of any sludge until November 1, 1901. The water space having then become much reduced, the accumulation of sludge was removed, dried, and weighed. Estimations of the suspended solids entering and leaving the tank had also been made regularly, and from the data so supplied it is calculated that of the solid matter entering the tanks 32·9 per cent. was destroyed. The tank effluent is usually black in appearance (this being partially attributed to the presence of iron sulphide), and it frequently has an offensive odour. It also contains a considerable quantity of fine suspended matter, averaging 12·45 grains per gallon. Hydrogen sulphide is usually present in the vicinity of the effluent channel, and readily blackens lead plates or lead acetate paper. The sludge left in the tank is of varying consistency, some having to be removed with shovels. It has an offensive odour, but otherwise is not more difficult to deal with than sludge from the chemical precipitation process.

The purification effected by double contact on effluent from this open septic tank has been good. The final effluents have usually conformed to the commonly accepted standards of purity, but have not attained the high standard of the effluents from the fine coke breeze beds.

From time to time the capacity of the contact beds receiving the effluent from the open septic tank has been carefully gauged, and the following are some particulars of these gaugings :—

Details of First Contact Bed (Clinker).

Capacity of empty tank... 8,021 gallons.
Depth of material ... 3 ft.
Grade of material ... 2 in. to ¾ in.
Number of fillings ... 3 per day on 6 days per week.

Water Capacity of the Bed.		Percentage Loss of Capacity.	Number of Fillings.
Date.	Gallons.		
June 25, 1900	3,772	—	5
June 24, 1901	2,382	36·8	884
September 24, 1901	2,071	45·1	1,118
June 24, 1902	2,005	46·8	1,727
December 23, 1902	1,980	47·5	2,168
May 26, 1903	1,721	54·1	2,530

Details of Second Contact Bed (Clinker).

Capacity of empty tank ..... 8,900 gallons.
Depth of material ..... 3 ft.
Grades of material ..... ¾ in. to ¼ in.
Number of fillings ..... 3 per day on 6 days per week.

Water Capacity of the Bed.		Percentage Loss of Capacity.	Number of Fillings.
Date.	Gallons.		
August 13, 1900 ...	4,378	—	5
June 24, 1901	3,687	15·7	838
September 24, 1901	3,557	18·7	1,072
December 24, 1901	3,233	26·1	1,229
June 24, 1902	3,527	19·4	1,657
December 23, 1902	3,317	24·2	2,098
May 26, 1903.....	3,259	25·5	2,460

The material in the bed was turned over on March 12, 1902, when the capacity was increased in consequence. Finely divided solid matter is found to be deposited on the material of the first contact beds, and a slow decrease in capacity is taking place—a result which can only be expected in cases where the liquids dealt with contain suspended solids, some portions of which are composed of mineral matter. The second contact beds, on being dug over, considerably improve in capacity, and it therefore appears that much of the diminution observed after the initial loss is due to settlement of the material forming the bed.

Having in view (1) the good results obtained by the treatment on coke beds of crude sewage, which has not passed into a septic condition, (2) the large area of tanks required for the open septic process, (3) the comparatively large quantity of suspended solids in the open septic tank effluent, and (4) the danger of nuisance from these tanks, which at times is very apparent, it was decided to further experiment with sewage which had been allowed quiescent settlement in a tank, drawing off the supernatant liquid by means of a floating outlet, and dealing with the sludge separately, as in the case of a precipitation process. A precipitation tank similar in every respect to the open septic tank was, accordingly, set apart for this purpose, and supplied with sewage from the same delivery-pipe and catchpit.

A first contact bed of clinker was constructed to receive the effluent from this tank, and in addition a small experimental filter has been used for second contact in order to observe purification results. A portion of the material forming the first contact bed is graded, the smaller material being at the surface in order, if possible, to retain the suspended solids, and prevent the silting up of the bed generally.

Details of the method of working and capacity of the bed are as follows :—

Details of Contact Bed (Clinker).

Area of bed..... 221·3 square yards.
Average depth of material ..... 33 in.
Grade of clinker..... 1½ in. to ¼ in., with a 9 in. layer of 3 in. to ¼ in. and 3 in. of ½ in. to ¼ in. extending over half the area of the bed.
Number of fillings... Three per day on six days per week.

Water Capacity of the Bed.		Percentage Loss of Capacity.	Number of Fillings.
Date.	Gallons.		
August 9, 1901	16,070	—	5
August 8, 1902	9,830	38·8	842
December 28, 1902	9,924	38·2	1,157
May 15, 1903	9,167	42·9	1,517

The sewage, after settlement for two or three hours in the precipitation tank, has been allowed to flow upon the first contact bed, which is worked in a similar manner to the beds treating open septic tank effluent, and the sludge has been removed after every twelve fillings. The tank effluent has contained an average of 7·53 grains of suspended matter per gallon. The purification obtained has been very satisfactory, the effluent from the first contact bed having frequently conformed to the commonly accepted standard for oxygen absorption and albuminoid ammonia, and it has usually contained nitrates. The second contact effluent has been uniformly excellent, containing nitrates in considerable amounts, and remaining perfectly sound on incubation.

The following are typical analyses from a long series made during the experiments, both with the open septic tanks and what may be termed the sedimentation tanks :—

Results Expressed in Grains per Gallon.

Oxygen Absorbed in Four Hours.				Albuminoid Ammonia.				Nitrogen as Nitrates.	
Sewage.	Septic Tank Effluent.	1st Contact Effluent.	2nd Contact Effluent.	Sewage.	Septic Tank Effluent.	1st Contact Effluent.	2nd Contact Effluent.	1st Contact Effluent.	2nd Contact Effluent.
5·50	4·11	1·88	·71	·94	·62	·28	·09	—	·21
4·36	2·99	1·18	·51	·78	·49	·20	·08	—	·34
3·95	3·43	1·20	·75	·60	·40	·16	·08	—	·49
Sewage.	Settled Sewage.	1st Contact Effluent	2nd Contact Effluent.	Sewage.	Settled Sewage.	1st Contact Effluent.	2nd Contact Effluent.	1st Contact Effluent.	2nd Contact Effluent.
5·55	3·43	1·26	·53	·66	·36	·12	·05	·12	1·10
4·64	2·60	1·03	·41	·56	·32	·12	·06	—	·89
4·11	3·10	1·30	·44	·64	·45	·13	·05	·28	1·26

Up to the present the results obtained from the experiments described indicate that the sewage of Sheffield can be purified satisfactorily by the simple settlement of the sewage in tanks, and by subsequent treatment in double contact beds. In the case of settled sewage greater purification has been obtained than by the open septic tank process, although both systems have given effluents which are non-putrescible, and conform to any reasonable standard of purity for sewage effluents. The great advantage which it was anticipated would result from the action of the open septic tank in facilitating further purification has not been realised, nor, apparently, does the system present a solution of the sludge difficulty. As the proportion of sludge

* Part of a Paper by Mr. Charles F. Wike, M.Inst.C.E., City Surveyor, Sheffield, read at the recent Sanitary Institute Congress at Bradford.

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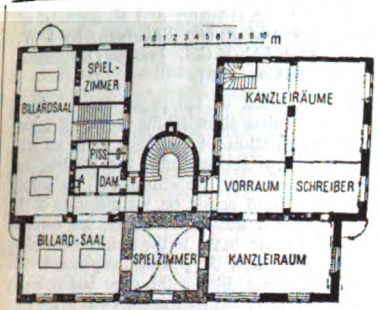

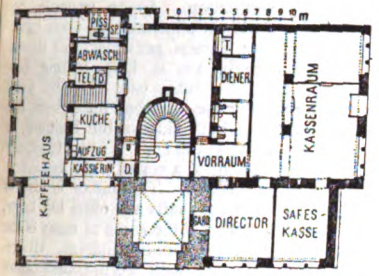

Schmetter-Haus, Troppau.—Plans.

Schmetter-Haus, Troppau, Austria. Herr Rudolf Srnetz, Architect.

(Reproduced from the *Architektonische Rundschau.*)

destroyed is only about 30 per cent. and probably less, it is a question for serious consideration whether the large tank area required, the liability to nuisance, and the difficulty in dealing with sludge in bulk, are compensated for by the destruction of so small an amount of sludge. It is possible that, in dealing with some classes of sewage, superior purification is obtained after such a treatment; but this has not been the experience of the writer in treating over a million gallons per day of raw sewage on contact beds during the past four years. Probably the question is one which each authority must settle for itself, bearing in mind its own particular conditions and the varying trade wastes, &c., which occur and complicate the problem.

Albuminoid matter is certainly broken down by the action of the open septic tank, but the rate of the process is not known, and in the case of Sheffield it is not considered that the necessity of reducing sewage to the offensively putrefactive stage in order to effect efficient oxidation has yet been demonstrated.

SCHMETTER-HAUS, TROPPAU.

THIS illustration of a rather picturesque building is reproduced on a somewhat reduced scale from a recent issue of the *Architektonische Rundschau*. It is an example of modern German town architecture which is more to our taste, because restrained and well-balanced

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than a good deal of the work that is illustrated in German publications.

The word "Schmetter" is we presume, merely the name of the owner of the company. From the plan it is evidently a kind of hotel or house of entertainment. The architect is Herr Rudolf Srnetz.

Books.

Stones for Building and Decoration. By GEORGE P. MERRILL. Third Edition. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903.

THE first and second editions of this well-known American text-book on building stones has already been noticed in our columns. The third edition before us is similar to its predecessors except that the chapter on methods of testing has been entirely revised; there is an additional chapter on the use of drift boulders for building purposes, and some new illustrations. It is with the new matter that we shall principally deal.

A satisfactory feature in the section devoted to the methods of testing building stone is that the author records his conviction that the history of tests should be carefully studied, as they yield information as to how far tests applied some years ago have been successful in proving the quality of stone for building purposes. It is definitely stated that the change of colour in a rock on exposure in a building is due mainly to a change in the form of combination of the iron. This is tantamount to saying that practically all building stones are coloured by iron in some form or another, and we do not think that the statement is quite justified by the facts. Many of our stones are coloured by manganese in certain districts, though, of course, iron is the most important mineral for colouring purposes. An interesting method of testing the permanency of colour as adopted by Professor J. A. Dodge is given, and the efficiency of the process is said to be fairly well established. Since, however, it consists of subjecting the samples of stones dealt with to very drastic chemical treatment, not at all compatible with the treatment they would undergo in the course of years in an ordinary atmosphere, we must discount many of the conclusions arrived at, though we know of no better means of artificially ascertaining permanency of colour in building stones.

In the tests to ascertain the resistance to corrosion, which were chiefly confined to calcareous rocks, Professor Dodge placed the specimens to be experimented with in water into which a jet of carbonic acid gas was run for several hours at short intervals. The action was continued for six weeks, when the specimens were removed, washed in pure water, dried, and weighed. The difference between the weight before this treatment and afterwards is held to indicate the amount of material dissolved by the carbonic acid water. Resistance to abrasion forms the subject of another section. We quite agree with Professor Merrill that a fairly accurate idea of the resistance to actual wear can be obtained by the rate at which the samples can be ground down on a common grinding bed, though results as at present given are not of much comparative value. Before they can be, it will be necessary for all experimenters to agree as to the size of the stone to be treated, the size of the face presented to the cutting medium, and the nature of the latter. The amount of pressure to be exerted on the stone whilst the face is being ground, the rate of feed, the amount of the cutting medium supplied during the operation, and the number of revolutions the cutting-table makes should also be recorded before any of the experiments relating to abrasion can have much practical value. Nothing is said in this section of the book concerning "rattling" tests as showing abrasion as applied to road metal.

Tests to ascertain the absorptive powers of stone are divided into two parts; one part deals with the determination of moisture from a damp atmosphere, and the other the amount of absorption of water through actual soaking. In regard to the latter, we pointed out some years ago that no experiment in regard to absorption can be of much use if the stone sample is completely immersed in the water, and that one face should always stand out a little above the water surface. We do not find that any such precaution has been adopted in the experiments detailed in this book. If the stone is placed entirely under the water the presence of the latter prevents the escape of air from the pores of the material to a large extent, and the results are proportionately vitiated.

We quite agree with the author that a high rate of absorption is more detrimental to a fine than a coarse-grained stone, for experiments have indicated that such stones are weaker, and will crush under less load when saturated with water than when dry. The power of a stone to resist the action of frost is, naturally, largely dependent upon its absorptive qualities, since it is the freezing of the absorbed moisture that commonly produces disintegration, especially in fissile stones. A coarsely porous stone will often withstand a freezing test better than one of fine grain, the expansive force resulting from the conversion of the water within the stone into ice finding relief outwards through the larger pores. Brard's well-known, but now discarded, process for ascertaining the effects of freezing by immersing the stone sample in sulphate of soda is described, as well as the modifications of it proposed by Mr. Page, but we need not dwell on the results, as few people nowadays have any faith in the practical value of such experiments. There is nothing like submitting the samples to actual freezing of the water in their pores, and thawing, the process being carried out several times and over a long period. Many such experiments have been carried out in Europe as well as in America, and several are recorded in this book.

The next section deals with methods of ascertaining ratio of expansion and contraction. Tests of this nature are of value for the purposes, first, of making proper allowance for expansion in parapet walls and similar situations, and secondly, because through expansion the tenacity of the stone is weakened. Within recent years some good work has been done in this direction under the supervision of the Ordnance Department of the United States army. The method of testing has consisted in placing carefully measured bars of stone in baths of cold water 32 deg. Fahr.), hot water (212 deg. Fahr.), and back to cold water once more. It was noted that in none of the samples tested did the stone quite regain its first dimensions on cooling, but showed a slight "permanent swelling." Since this can only mean that the particles composing the stone have separated, though ever so slightly, it is an important matter, as it necessitates a weakening which is shown by actual pressure tests.

We do not find anything new in the sections devoted to methods of testing the resistance of stones to crushing weights, or as to the means of ascertaining the elasticity of stone. The resistance of stone to shearing is a useful little section, but the experiments do not seem to have been of a very exhaustive character. In regard to the tests to ascertain the specific gravity of stone the book is certainly behind the times, and it does not take into account the means of arriving at the specific gravity of porous stones at all, except by the old-fashioned bell-jar and air-pump process.

We like that section relating to the testing of roofing slates, and we consider this to be the best all-round part of the book, so far as artificial tests are concerned. We quite agree with Professor Merrill that more can be learned regarding the lasting powers of a slate by microscopic methods than in any other class of rocks. We said so in these columns nearly twenty years ago, when hardly anybody took an interest in the application of the petrological microscope to the examination of building materials. The author remarks that the greater the amount of crystallisation the slates have undergone, and the nearer they approach crystalline schists in structure and composition, the tougher and more durable they are likely to be.

As already mentioned, the greater part of the work, as it appeared in previous editions, has already been noticed in our columns. As a text-book on American building stones it is pre-eminent, and it gives some account of the stone of other countries. It is full of interest from beginning to end, and bears the impress of most careful compilation and preparation. There is much in it to interest other than Americans, as a large part of the book deals with matters of general interest to all those who study building stones.

The Ventilating, Heating, and Management of Churches and Public Buildings. By J. W. THOMAS, F.I.C., F.C.S. London: Longmans, Green, & Co. 1903.

THIS little work of 140 pages claims to be a practical treatise showing the prevailing errors in the ventilation of churches, halls, schools, and other public buildings, and pointing out how the faults can be remedied. The author does not waste space on the elements of the subject or on abstract theories, but confines himself in the main to the results obtained by experiments and by practical experience. He shows the absurdity of the rules laid down by certain writers—chiefly doctors—as to the sizes of air inlets and outlets in systems of so-called "natural" ventilation. As an example, he quotes Dr. Parker's allowance of 3,000 cubic feet of air per person per hour, and shows that in a church 100 ft. long, seating 600 persons, the Tobin tubes (size 12 in. by 5 in.) must be placed close together throughout the whole length of both sides of the building, in addition to some at the ends, in order to supply this quantity of air at a velocity not exceeding 5 lineal ft. per second. The author is also of opinion that extract shafts are often too large, and that this defect is the cause of many of the down-draughts in public buildings. His remarks on cowls are well worth consideration, although they merely confirm what has already been demonstrated over and over again. The greater part of the book is devoted to natural ventilation, and the author advocates the inlet of warmed air at the floor level and the extraction of the vitiated air at the ceiling. The use of windows for ventilation is discussed in detail. One chapter deals with "mechanical and heat-aided ventilation," and the final chapter contains some very valuable "instructions for the caretaker." The author must be congratulated upon his success in writing an interesting and novel treatise on a difficult and hackneyed subject. Some of his statements are open to question, but the work as a whole may be recommended to architects and others as a wholesome corrective of some impracticable theories.

The Proportions and Movement of Slide Valves. By WILLIAM DYSON WANSBROUGH. Manchester: The Technical Publishing Co., Ltd. 1903.

THIS book, of which the subject matter originally appeared as a series of articles in *The Mechanical Engineer*, is neatly printed and bound. It contains a considerable number of problems, each with an appropriate solution, and relating to the practical design and arrangement of slide valves. The examples selected are clearly discussed and sufficiently illustrated by geometrical diagrams, but the arrangement and titles of the chapters in the body of the work do not accord with either the contents page or with the more detailed contents pages entitled "Index to Cases," and no real index is provided. These defects are quite sufficient to make the treatise quite worthless as a convenient and acceptable book of reference. In his preface the author says, "Some explanation of the reappearance of these articles in book form, so long after their original publication, may be offered." It might, therefore, be thought that he would have had sufficient time to arrange his material in a more orderly manner, and to correct or amend his proof-sheets with at least ordinary care. No explanation is offered concerning these points.

Society of Engineers Transactions for 1902. Edited by PERRY F. NURSEY, Secretary. London: E. & F. N. Spon. 1903.

ONE of the most interesting papers in the volume of Transactions which has lately been issued is a communication from a colonial member, Mr. Herbert E. Bellamy, upon "Australian Timber Bridges, and the Woods Used in their Construction." Very little attention is devoted to the first part of the subject, but there is a very complete description of various Australian timbers suitable for bridge construction, and for use in water or wet ground. Another paper in the same volume is upon "The Hennebique System of Ferro-concrete Construction," by Mr. A. de R. Galbraith. Unfortunately, the author confines his attention chiefly to descriptive matter which, although useful to a certain extent, is of very little service to the designer. Among the more practical remarks those chiefly

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noteworthy are some upon the proportions of concrete and the qualities of iron and steel most suitable for use. Some data are also given on the adhesion of concrete, but the remainder of the paper, relating to the general principles and advantages of this type of construction, appears to be taken chiefly from the handbook issued by the Hennebique Company. The discussion following this communication is well worthy of perusal.

Technical Arithmetic and Geometry, for Use in Technical Institutes, Modern Schools, and Workshops. By C. T. MILLIS, M.I.Mech.E. London: Methuen & Co. 1903.

In the course of his work at the Borough Polytechnic Institute the author has found that the teaching of artisans connected with the engineering and building trades is often difficult, because many students become disheartened by their unfamiliarity with mathematics. The object of the present book is to provide a connected course of arithmetic, geometry, and mensuration, so that students may equip themselves suitably for the reception of information upon technical subjects. The treatment adopted by Mr. Millis is very similar to that advocated for many years by Professor Perry, and his treatise somewhat resembles works on "Practical Mathematics" and "Practical Geometry" that have been reviewed in our columns from time to time. The chief point of difference is that the author confines his teaching to the simplest problems and calculations, such as those which are of daily occurrence in workshop practice. Throughout the work the rules are clearly and concisely stated, and most of the examples given are worked out both graphically and arithmetically, so that it should be impossible for any one of ordinary intelligence to miss the correct interpretation. Within the limits established by the author, this volume ought to be found of considerable service.

The Business Encyclopædia and Legal Adviser. By W. S. N. KNIGHT, Barrister. In Six Volumes. Vol. IV. London: The Caxton Press.

WE have now another volume of this useful, but rather too miscellaneous, encyclopædia. We could have done without the portraits of the successful men of business, which are out of place in such a book as this, for it is a work of reference, and one which certainly has its uses.

The Technical Dictionary-Cyclopædia. Edited by PHILIP R. BJÖRLING, C.E., and FREDERICK T. GISSING. Part I. Illustrated. London: Rebman, Ltd. 1903.

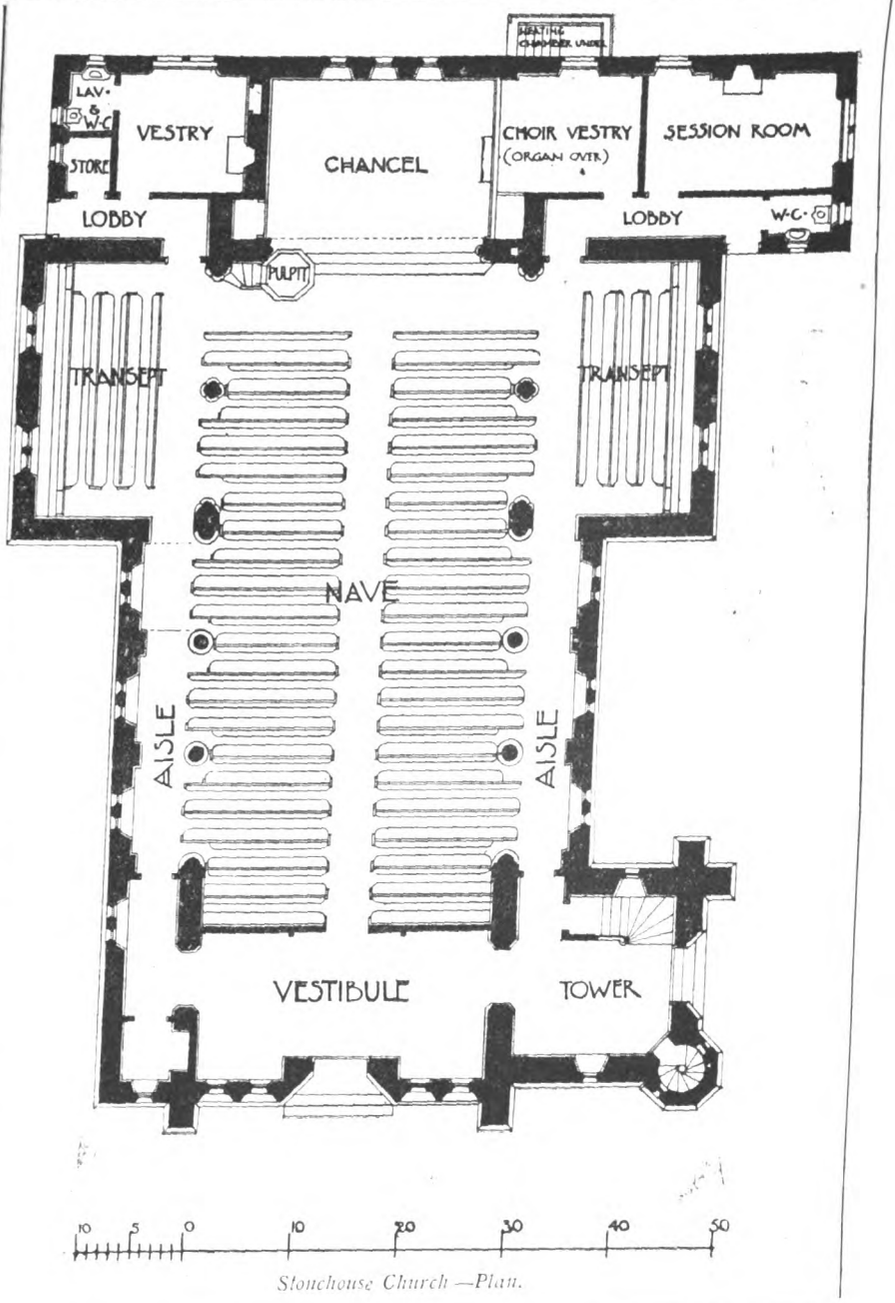
THE editors, in their "preliminary editorial notice," say that they have "many times been asked to recommend an English Technical Dictionary-Cyclopædia, and, after having made inquiries of several booksellers and publishers for a suitable work, have failed to find one"; they trust, therefore, that the new work "will be the means, in some way, of filling a vacant gap in English literature." We welcome the attempt, but are afraid that the vacant gap will not be entirely filled. The first part, which is all we have received, contains the definitions from "Abell's Furnace" to "Balance-gate," and we search in vain for architectural and building terms which certainly ought to have found a place in a "Technical Dictionary-Cyclopædia." Other professions and trades are similarly neglected. Indeed, it is difficult to understand upon what scheme the work has been prepared. We find acid, but not alkali; aërial railway, but not aërial navigation or aeroplane; atmosphere, but not air; bacteria, but not bacillus or amœba; artificial stone, but not asphalt; the A B C process of sewage treatment, but not the Amines; arc-lamp and acetylene, but not albo-carbon or Argand; air-tight stoppers for gas pipes and for the cleansing arms of drains, but not for testing drains; air-valve for water-mains, but not air-cock for hot-water warming apparatus. Mathematical terms, such as arc, abscissa, and asymptote, are not to be found. Some of the definitions are far from complete. Under anaërobes we look in vain for enlightenment as to obligate and facultative; and under analysis we find nothing about qualitative and quantitative. Other definitions are inaccurate; thus, under Aëration of filter-beds we read, "The filters at sewage works are aërated by compressed air"; certainly this method of aëration is used, but it is the exception, and not the rule; an automatic floating outlet is not synonymous with automatic tidal arm. We have not by any means exhausted our list of omissions, but those we have mentioned will, perhaps, be of use to the editors in showing some directions in which other technical terms may be sought.

Utility Fowl-houses and their Appliances. By H. FRANCKLIN. London: Dawbarn & Ward. 1903.

THIS is No. 4 of a set of small "Rural Handbooks," published at 6d. each, which contain a good deal of useful information and suggestion in regard to erections in connexion with the country house and farmyard. They are written apparently for country-house owners, but architects who are asked at times to make drawings for such things as fowl-houses may find some hints here as to what is required for the accommodation of fowls in comfort and in a healthy condition. The book is illustrated by numerous small diagrams of the structure and arrangement of fowl-houses, coops, and other such erections.

BOOKS RECEIVED.

MUNICIPAL ENGINEERING: MODEL ANSWERS TO QUESTIONS SET AT RECENT EXAMINATIONS OF THE INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS. London: St. Bride's Press, Ltd., E.C. Price 3s. 6d.



Stonehouse Church.—Plan.

Illustrations.

DESIGN FOR A TOWN CHURCH.

THE plan was worked out as suggested by the conditions, with a large central area and short sanctuary and nave. The lighting of the building is almost entirely from the upper part of the lantern, advantage being taken of the fact that two sides of the site were blocked by high buildings.

The morning chapel and vestries on the north side have top light. The organ is high up, on each side of the baptistry, and extends back over the vestibule. The domed roof of the lantern is carried by a steel cone springing from the top of the second stage.

F. C. MEARS.

PARISH CHURCH, STONEHOUSE, LANARKSHIRE.

THE interior of this building is built of grey sandstone and the pews are finished in pitch pine. The glass throughout, with the exception of the chancel, is finished in clear quarries. The complete cost of the building was about 4,500*l.*

ALEX. CULLEN.

WELLS-ROAD BOARD SCHOOL, BRISTOL.

ACCOMMODATION is provided for 810 children (560 in the mixed department and 250 in the infants), and an enlargement is possible by the

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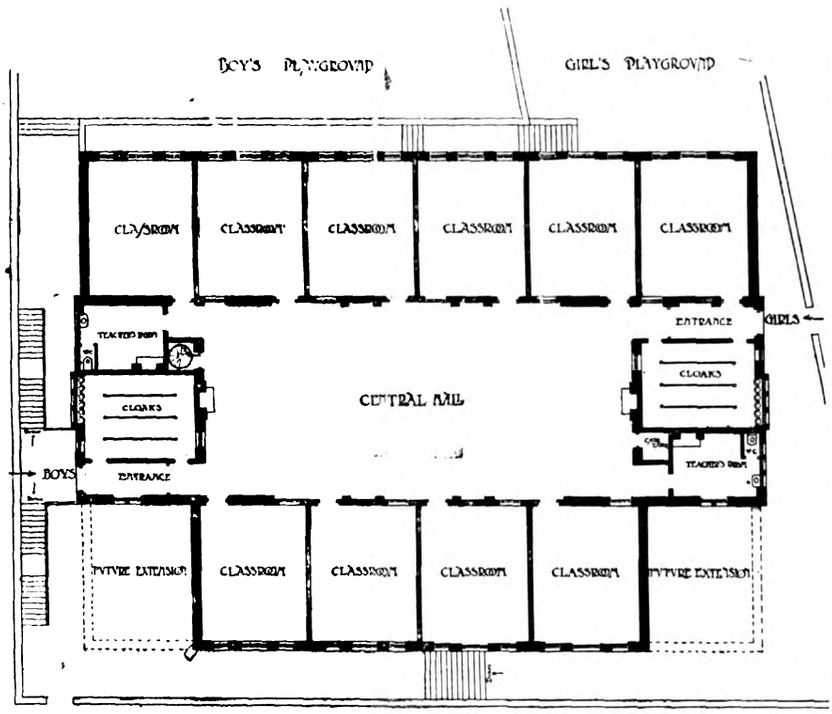

GROUND PLAN OF MIXED SCHOOL

SCALE

School, Knowle, Bristol.

addition of two classrooms for fifty children each to the mixed department.

The architect, in accordance with instructions from the Board, has made good use of the basement of the school by providing a centre for the teaching of household management. Not only have a cookery room and a laundry room been provided, but also a model sitting-room and a model bedroom. Attached to the school is a wood workshop for the boys.

The building has stone walls faced with red Cattybrook brick, with Bath stone dressings. The roofs are covered with red tiles, and the floors generally are of wood blocks on concrete; the playgrounds are asphalted and surrounded by a dwarf wall, with railings and gates of wrought iron.

One of the chief features of the scheme is the central hall of the mixed school, 80 ft. by 35 ft., which, in addition to educational purposes, can be used for public meetings of ratepayers, and for similar functions. The buildings are warmed on the low-pressure hot-water system, with ventilating radiators at convenient points, and an equable temperature is secured at all times.

The architect is Mr. H. Dare Bryan, Bristol.

CRESWELL INFANTS' SCHOOL.

ON reference to the plan it will be seen that the wing on the right forms the master's residence, and this portion, together with the central hall, formed the old school. The school-room has, however, been rearranged, and, with the addition of the central bay, and new windows on either side, now forms the central hall, the whole of the class-rooms, cloak-rooms, lavatory accommodation, &c., being new.

The exterior of the old portion is entirely stone, but the new has been built with sand bricks with stone facings, and the roof is covered with red tiles.

The boundary walls are old and have only had new gateways cut into them to suit the new entrances.

The building is at the corner of the road leading to Welbeck Abbey, and adjoining the same is the school erected by the same architects (Messrs. Brewill & Baily, of Nottingham) some three or four years ago.

STABLE AT HARROW WEALD.

THIS stable was designed for additional accommodation to one already existing, and only provides for a loose-box, stall, coach-house, coachman's rooms, and loft over.

The lower part, including the yard wall, is in red brick, the upper portion being finished with a yellow rough-cast, and the cornices run in cement; the roofs are covered with red sand-faced tiles.

The architects were Messrs. W. A. Forsyth and H. P. G. Maule.

WHITTON COURT, SALOP.

THE old hall, which forms the nucleus of the house, is plainly of the first half of the fourteenth century; but of the contemporary rooms and offices usually connected with the ends thereof there is nothing left. The entrance hall is separated from the hall by a very massive Elizabethan oak screen, which extends to the ceiling.

Towards the courtyard the hall retains its limestone facing. The elevations of the three other sides of the quadrangle were all of half timber work, in oak and plaster, the only one remaining being the one shown.

The old hall and the saloon over are wainscotted with oak panelling, the latter to the ceiling and the former to about two-thirds of its height, paintings on plaster occupying the remaining space; on the west side are three large shields with elaborate mantlings, on one of which are the initials, F. C. D., and date 1682; over the hall fireplace is a large picture of a stag hunt, with the south front of the Court in the background. The spaces on the other sides are occupied by paintings of pots of tulips and other flowers.

The saloon has an elaborate plaster ceiling, probably of the time of Charles II. The wainscotted walls are covered on three sides by Flemish worsted tapestry of the seventeenth century. Several of the rooms are wainscotted, and all have good but plain stone chimney-pieces.

The Court is about five miles from Ludlow Station and four miles from Tenbury, on the Great Western Railway.

HENRY E. FARMER.

Correspondence.

THE GAIETY THEATRE.—VANISHING LONDON.

SIR,—I see that the old front of the one time Strand Music Hall is in course of demolition. Whatever one may think of its architecture, it marked an alteration in the style of London street façades, and it was, I think, worthy of record among the delineations of vanishing London. Perhaps some of your readers have a drawing of it worth production. The notice of its opening thirty-nine years ago in Vol. XXII of the *Builder* is not a flattering one, and I cannot see any illustration of it subsequently. Mr. H. H. Collins was, it seems, associated with Mr. Bassett Keeling in the work.

It may be that the London County Council is having photographs and particulars taken of the buildings it demolishes in its various undertakings. With commendable forethought it caused a list of scores of houses (about to be taken down) to be sent to the R.I.B.A. sixteen months ago, asking if that body would assist in the work by supplying information on any of the addresses sent in the list. Many of them would have no interest, architectural or historical, but others most likely would be worth publishing. An account of the contents in the Spring Gardens Museum would also be interesting.

E. W. HUDSON.

A MONUMENT TO THE STONE FAMILY.

SIR,—In the *Builder* for the year 1859 appeared on p. 647 an article on "Notable People Buried in St. Martin's-in-the-Fields (old church)." It there gave a description of the monument erected in memory of the Stone family, 1647. For some time I have been endeavouring to find the whereabouts of this monument and the tablet with the profile of N. Stone's head, but without success. It is not in the present church nor the crypt. Do any of your readers happen to know if it is still extant, and also the monument in the same old church to Sir George Copen, executed by the same Nicholas Stone (senior about 1630?

ALBERT E. BULLOCK.

The Student's Column.

CONCRETE-STEEL.—X.

PROFESSOR HATT'S THEORY OF BEAM DESIGN.

IN the early part of the year 1902, Professor Hatt, of Purdue University, U.S.A., published a theory of the strength of reinforced concrete beams. More recently he has obtained experimental results that have enabled him to improve his previous theory, the records and conclusions drawn therefrom being described in detail in a paper read before the American Section of the International Association for Testing Materials of Construction. We do not propose to refer at length to the tests in question, but the following notes may be useful for the purpose of making the theoretical analysis more intelligible.

The beams tested were 8 in. square, and the clear span between supports was 80 in., the load being applied at the centre. Some of the beams were plain and others were reinforced. From several load deformation diagrams, presented in Professor Hatt's paper, it appears that the curve of deflection followed a nearly straight line up to a load varying from 1,500 lbs. to 3,000 lbs. for the beams tested. At higher loads the deflection increased more rapidly than the load, but the curve again straightened, so that the deflection once more increased uniformly with the load until a crack appeared at the lower surface of the beam. This point was reached with a load ranging from 4,000 lbs. to 10,000 lbs., and beyond it the deflection continued uniformly with the load until the reinforcement reached its elastic limit. Thereafter the deflection increased rapidly without any corresponding increase of load. It should be noted that there were three characteristic points:—(A) that at which the curve first deviated from the straight line, (B) that denoting the first crack in the concrete, and (C) that denoting the elastic limit of the reinforcement.

In none of the beams made with stone aggregate was any indication afforded that the compressive strength of the concrete had been reached at the point where the reinforcement failed. It should be said, however, that the metal used was iron, and the results would have been more interesting if steel bars had been adopted permitting the fuller develop-

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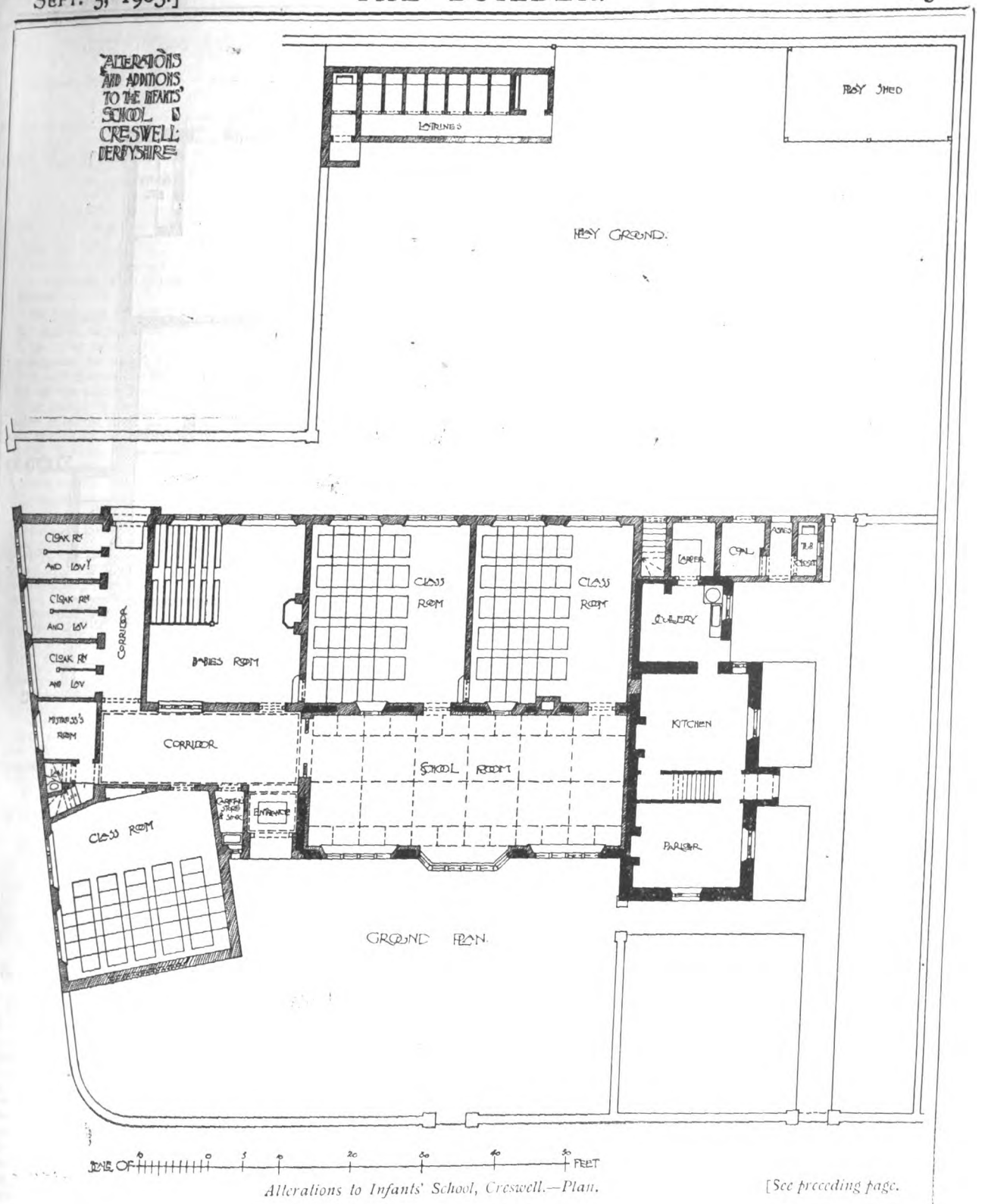

Alterations to Infants' School, Creswell.—Plan. [See preceding page.

ment of the strength of the concrete in compression.

According to these tests, the ratio of the co-efficients of elasticity of concrete in compression and in tension was 2·17, corresponding with stresses of 750 lbs. per square inch in compression, and 300 lbs. per square inch in tension. Similarly the ratio of the co-efficients of the iron and the concrete in tension was 15·0, these values applying at the point A.

We have previously mentioned the influence of reinforcement in augmenting the extensibility of concrete, and it is interesting to observe that, according to the results obtained by Professor Hatt, while the concrete in the plain beams was ruptured with an average elongation of one part in 7,000, the reinforced concrete permitted an average elongation of one part in 1,140, before failure. The explanation suggested for this phenomenon is that the effect of the reinforcement is to distribute the total elongation over the whole length of the concrete, so that it is not confined to the fractured section, as in the case of simple concrete.

Assuming the tensile strength of the concrete at 300 lbs. per square inch, and the elongation at 1 : 1,000, the value of E_t for the reinforced concrete in tension was 300,000 lbs. per square inch. The value of E_c for concrete in compression at 1,500 lbs. was found to be about 3,840,000 lbs. per square inch, and the value of E_i for the iron bars was 29,000,000 lbs. per square inch.

Hence at the point B, the ratio of the co-efficients of elasticity of concrete in compression and in tension was 12·8, and the ratio of the co-efficients of the iron and the concrete in tension was 96·6.

Among other matters, enquiry was directed to the influence of varying percentages and positions of the reinforcement. The subjoined notes summarise the more important conclusions to be drawn from the records :—

One per cent. of metal in the sectional area, placed 1 in. from the bottom of the beam, raises the load-carrying capacity to more than 3 times, and flexibility to fully 10 times that of a simple concrete beam.

Two per cent. of metal in the sectional area, placed 1 in. from the bottom of the beam, increases the load-carrying capacity to 5 times, and flexibility to about 15 times that of a simple concrete beam.

One per cent. of metal in the sectional area, placed 2 in. from the bottom of the beam, raises the load-carrying capacity to nearly $2\frac{1}{2}$ times and flexibility to 12 times that of a simple concrete beam.

Two per cent. of metal in the sectional area, placed 2 in. from the bottom of the beam, raises the load-carrying capacity to about $4\frac{1}{2}$ and flexibility to 18 times that of a simple concrete beam.

The foregoing figures are only useful in a relative sense, for they do not imply the increase of strength that might have been obtained by the employment of steel instead of iron reinforcement.

Having established reliable data as the result of his experiments, Professor Hatt proceeded to amend his original theory and to ascertain how far it accorded with the newer facts brought to light. The theory is intended to account for the three characteristic points,

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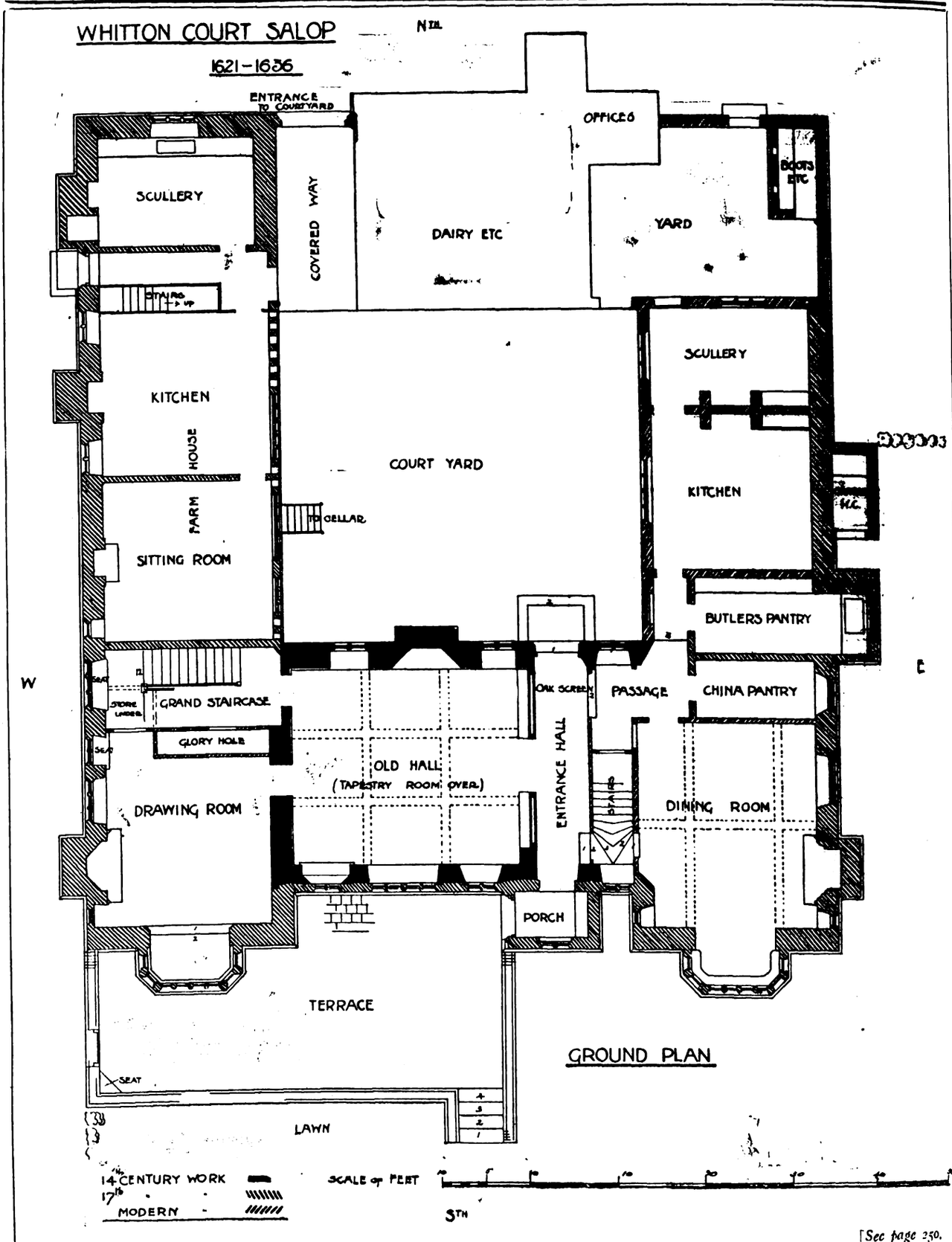

[See page 250.

A, B, and C, which are diagramatically represented in Fig. 16, and the main assumptions upon which it is based are the following :—

1. That the cross-sections of a beam remain plane surfaces after bending.

2. That the forces are applied perpendicularly to the neutral surface of the beam.

3. That the values of E_c and E_t obtained by tests for simple compression and tension will apply to the material when under stress in the beam.

4. That the bond between the materials is perfect.

5. That there are no initial stresses due to contraction of the concrete during setting.

Of course, it is necessary in connexion with every theory to make certain assumptions, but it is generally unlikely that the bases assumed will be entirely realised in practice. This is so in the case of the conditions now stated, but the resulting differences appear to be so small that they do not affect the substantial accuracy of the calculations.

Fig. 17 is a cross section of a concrete-steel beam, typical of those tested by Professor Hatt, and Fig. 18 is a part longitudinal section, to which are applied typical curves, as ascertained by Professor Hatt, representing compression in the concrete and tension in the iron at different distances from the neutral axis. For the purpose of avoiding unnecessary complication it is assumed that the curves are parabolic arcs. The following notation is adopted, and some of the symbols are shown in Figs. 17 and 18.

hx = distance of the upper fibres from the neutral axis.

hu = distance of the upper fibres to the centre of gravity of the reinforcement.

p = ratio of the cross-sectional areas of the metal and of the beam.

E_t = co-efficient of elasticity of the iron in tension.

E_c = co-efficient of elasticity of the concrete in compression.

E_t = co-efficient of elasticity of the concrete in tension.

$n = E_c \div E_t$.

$m = E_t \div E_t$.

f = tensile stress in reinforcement.

c = maximum fibre stress of concrete in compression.

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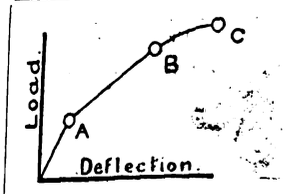

Fig. 16.

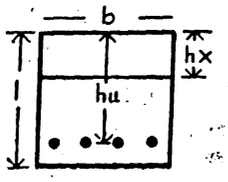

Fig. 17.

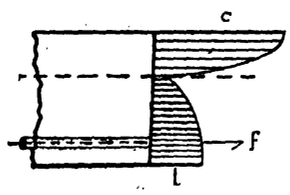

Fig. 18.

Illustrations to Student's Column.

t=maximum fibre stress of concrete in tension.

The values of E_c and E_t are measured at the stresses represented by c and t respectively. The values of x, u, and p are ratios; u and p can be settled by the designer, but x is dependent upon the values of p, u, n, and m, the two last factors being variable, according to the quality of the materials, and changing under stress, as previously pointed out, with the varying values of f, c, and t. In practical design, however, it is sufficient to use constant values of n, and m, corresponding to the points A and B.

In the development of his formulas, Professor Hatt proceeds first to determine the ratio of f to c, and of f to t.

Thus

$$c = t\,n\,x \div (1 - x) \ldots\ldots\ldots\ldots (1)$$
$$f = t\,m\,(u - x) \div (1 - x) \ldots\ldots\ldots\ldots (2)$$

For ascertaining the position of the neutral axis, which is given by the value of x, the forces of tension and compression on the cross section of the beam are equated.

Thus:—

$$\tfrac{1}{2}\,c\,x = \tfrac{1}{2}\,t\,(1 - x) + p\,f \ldots\ldots\ldots (3)$$

Next, inserting the values of c and f as ascertained by (1) and (2), the equation is obtained:—

$$\tfrac{1}{2}\,x^2\,n = \tfrac{1}{2}\,(1 - x)^2 + p\,m\,(u - x).$$

Being solved, this gives

$$x = \frac{-[(1+3pm) + \sqrt{4n + 9p^2m^2 + p(6m\{u(n-1)+1\}}]}{2(n-1)} \ldots (4)$$

When the value of x is thus found, c and f are calculated, and finally the moment of resistance of the whole section is computed.

Thus:—

$$R = bh^2\left\{\frac{5}{12}(1-x)^2 + \frac{\cdot 5mx^3}{12(1-x)} + p\frac{(u-x)^2}{1-x}\right\} \ldots (5)$$

The above formulas apply for computation of the load carried by a beam up to the point A. At the point B, the stress curve loses its parabolic form to some extent, and for very accurate results, the equations should be altered, but by adopting suitable values of n and m, as given above, the error in computation will be small. If it be desired to calculate the strength of the beam after the crack has developed and extended through the tension area, it becomes necessary to modify the formulas by omitting the effect of the tensile force resulting from the resistance of concrete in that portion of the section.

The position of the neutral axis is then found by the rule

$$2cx = 3pf, \text{ or } P\frac{E_1}{E_c}(u-x) = \frac{2x^2}{3}$$

When f is assumed to represent the elastic limit of the reinforcement, the value of c may be calculated. The moment of resistance of the section is found by the following modification of the original rule:—

$$R = bh^2\left\{\frac{5}{12}\,cx^2 + pf\,(u - x)\right\}.$$

With the object of testing the correctness of his theory, Professor Hatt made a series of calculations, using the actual strengths of the constituent materials, as found by tests, and the previously stated values of n and m.

The tensile strength of the concrete was taken at 300 lbs. per sq. in., and the elastic limit of the iron at 36,000 lbs. per sq. in. A summary of calculated and measured results is given in Table XXII., by which it will be seen that the agreement between theory and experiment is fairly close.

Table XXII.—Theoretical and Experimental Results from Concrete-Iron Beams.

(Dimensions 8 in. by 8 in. Span 80 in.)

Note.—All calculated figures are printed in italics.

Index to Results.	Reinforcement. 1 per cent. Height from bottom. 2-in.	1-in.	2 per cent. Height from bottom. 2-in.	1-in.
	lbs.	lbs.	lbs.	lbs.
At Point A.				
Centre load	2,000	2,500	2,200	3,000
	2,103	*2,366*	*2,400*	*2,648*
Stress in steel (t)	2,000	2,700	1,950	2,700
	2,000	*2,700*	*1,950*	*2,700*
,, ,, concrete (c)	*457*	*474*	*408*	*516*
At Point B.				
Centre load	5,000	6,500	5,750	10,000
	4,925	*6,232*	*7,123*	*9,680*
Stress in steel (t)	*17,320*	*22,000*	*10,550*	*21,570*
,, ,, concrete (c)	*1,556*	*1,680*	*1,937*	*2,188*
Centre load	5,500	7,300	10,250	12,000
	5,470	*6,705*	*10,830*	*12,515*
Stress in concrete (c)	*1,099*	*1,870*	*3,050*	*2,710*

It must not be forgotten that the point C, although representing the failure of the beam, does not represent the ultimate strength of the concrete in compression, for, as already mentioned, the iron failed before the concrete gave any indication that its compressive strength had been reached.

Table XXII*a* gives the calculated heights of the neutral axis from the bottom of the beam. We state the figures in this way instead of giving the distance hx, as they will be more convenient to compare with previous references to the neutral axis. It should be particularly noted that the height of the axis varies, not only with the amount and disposition of the steel, but also with increase of load.

Table XXIIa.—Calculated Positions of Neutral Axis and Values of x for Beams in Table XXII.

(Height of beam 8 in.)

Reinforcement. Percentage.	Reinforcement. Height.	Height of Neutral Axis and Value of x. Point A. x	Point A. Neutral Axis.	Point B. x	Point B. Neutral Axis.	Point C. x	Point C. Neutral Axis.
	in.		in.		in.		in.
1	2	0·433	4·536	0·302	5·584	0·272	5·824
1	1	0·441	4·472	0·318	5·456	0·298	5·616
2	2	0·454	4·368	0·354	5·168	0·317	5·304
2	1	0·463	4·296	0·378	4·976	0·382	4·944

Professor Hatt's formulas themselves may appear to be somewhat intricate for everyday use, but in many cases their direct employment could be avoided by the preparation of diagrams or tables from which the proportions of beams for various loads and spans could be found without the necessity for individual calculations.

OBITUARY.

PROFESSOR CORFIELD.—Dr. William Henry Corfield, of 19, Savile-row, W., whose death, in his sixtieth year, we briefly announced last week, was Sanitary Adviser to the Commissioners of H.M. Works and Public Buildings, and Professor of Hygiene at University College, London. He proceeded from Cheltenham Grammar School to Magdalen College, Oxford, and subsequently studied at University College, London, and the medical schools of Lyons and Paris. When twenty-five years of age he was appointed examiner for honours in the National Science School, Oxford University. During a period of six years he was a member of, and acted as reporter for, the British Association Committee upon the treatment and utilisation of sewage. In 1891 he originated the meeting in London of the International Congress of Hygiene and Demography. In 1901 he was awarded a medal by the Royal Society of Public Medicine of Belgium for his labours in the cause of public health. Professor Corfield filled many appointments, including those of Professor of Hygiene and Public Health at University College, London, Honorary Sanitary Adviser to University College and Hospital, President of the Epidemiological Society of London, Vice-president of the Sanitary Institute, and Past-president of the Society of Medical Officers of Health; he was also member of several foreign scientific societies. His numerous published works comprise—"Dwelling-houses: Their Sanitary Construction and Arrangements," "The Laws of Health," "Résumé of the History of Hygiene," "Disease and Defective Sanitation," which has been translated into French, Italian, and Hungarian, "Etiology of Typhoid Fever and its Prevention," &c. He served twenty years as Chairman of Committee of the Sunday Society for promoting the throwing open, upon Sundays, of public libraries and museums.

GENERAL BUILDING NEWS.

PRIMITIVE METHODIST CHURCH, HOLBROOK, DERBYSHIRE.—The foundation-stones have just been laid of a new Primitive Methodist chapel, at Holbrook, near Killamarsh. The erection will be about 50 ft. long by 35 ft. wide, and will be built in the Gothic style, with brick and stone dressings. There is to be a vestibule and a vestry at the rear, seating accommodation being provided for 280 persons. The rostrum and the furnishing will be of pitch-pine, and the chapel will be lighted with gas, and heated on the low-pressure hot-water system, which will be installed by Messrs. Truswell & Son, Sheffield. Mr. J. P. Earle, Sheffield, is the architect, and Messrs. J. Drabble & Son, Mosborough, are the builders.

CHURCH, CWMLLYNFELL, NEAR CARDIFF.—The foundation-stone of the new church to be erected at Cwmllynfell was laid recently. The new building will cost about 2,000*l.*, and accommodation will be provided for about 300 worshippers. The building has been designed by Mr. Jenkins, architect, Llandilo, in the Early English style, and the contractors are Messrs. Evans & Roberts, Brynamman.

WESLEYAN CHURCH, SAPCOTE, LEICESTERSHIRE.—The memorial-stones have just been laid of a new Wesleyan church at Sapcote, on the Leicester road. The cost of the new church will be 1,512*l.* 17*s.* Mr. Alderman Sawday, of Leicester, was the architect. The outside walls of the new buildings will be built of stones from the quarries in the district, given by Mr. H. J. Grace, of Enderby. The new church will provide seating accommodation for about 420, with the usual vestries, &c.

CHURCH AT SOUNDWELL, BRISTOL.—The foundation-stone has just been laid of a new church in the suburb of Soundwell. The architect was Mr. H. M. Bennett, of Bristol. The cost of the entire building is between 5,000*l.* and 6,000*l.*, but at present only about 2,500*l.* is to be incurred in the construction of the nave and north aisle. The church, when erected, will serve a population of about 4,000.

SCHOOL, INVERURIE, N.B.—A new public school has been erected at Inverurie, the walls of which are of blue granite from Burnside. There is a turret in which is to be placed a bell. The accommodation is for 670 school places, and there are eleven classrooms, each room accommodating on an average over sixty pupils. All the classrooms are lined to a height of about 4 ft. with varnished pitch-pine, and they are alternately painted in terra-cotta and soft green. The male teachers' room will be used as a boardroom for the meetings of the School Board. There is also a headmaster's room. The school is provided with a hall (90 ft. by 25 ft.), to be used for physical exercise, gymnastics, &c. All the classrooms enter from the hall, and all the sections—senior boys and girls and junior boys and girls—have separate cloakroom accommodation, and the various sections have wash-hand equipment, there being both hot and cold water circulation in the case of the junior boys' section. The building will be heated by steam. The contractors for the school were:—Mason work, Mr. John Smith, Kintore; carpenter, Mr. John Watt, Inverurie; slater, Messrs. G. Currie & Co., Aberdeen; plasterers, Messrs. Roger & Baxter; plumbing and heating, Messrs. James Laing & Sons, Inverurie; painters, Messrs. J. and S. Fyfe, Aberdeen; iron railings, Mr.

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Wm. Simpson, Inverurie, and Mr. James Sinclair, Inverurie; laying out playground, Mr. Wm. Duncan, contractor, Inverurie. The contractors for the schoolhouse were:—Mason, Mr. Paul Ritchie, Inverurie; carpenter, Mr. John Buchan, Monymusk; slaters, Messrs. Currie & Co.; plasterers, Messrs. Roger & Baxter; plumbers, Messrs. Laing & Sons; painter, Mr. J. Masson, Aberdeen. Baillie Lauder was clerk of works, and Mr. A. Marshall Mackenzie, Aberdeen, was architect. It is estimated that the total cost will amount to between 8,000*l.* and 9,000*l.*

MIDLAND HOTEL, BIRMINGHAM.—The Midland Hotel in New-street has been reopened after extensive alterations. Some portions of the shell of the old building remain, but the interior is new. The building of the new portion and the remodelling of that part of the old structure which has been retained have represented a cost of between 80,000*l.* and 90,000*l.* The new building, which contains upwards of 170 bedrooms, has main entrances from New-street and Stephenson-street, and separate entrances for the members of the staff, tradesmen, &c. A feature in the entrance-halls and ground-floor rooms is the free use of marble. The main staircase, which is composed of Sicilian marble, leads to the several suites of private rooms, bedrooms, and principal portion of the hotel. The stockroom accommodation comprises some twenty-two apartments. The rebuilding has been carried out from the plans of Messrs. Henman & Cooper, the contractors being Messrs. John Barnsley & Sons, Ryland-street, Birmingham.

PRESBYTERIAN CHURCH, LARNE, IRELAND.—In connexion with the Reformed Presbyterian Congregation, Larne, a memorial stone was laid on the 25th ult., at the new church. This new building is being erected on the Curran-road, adjoining the new Victoria Orange Hall. The interior dimensions of the building are 50 ft. by 32 ft., whilst the height to the eaves is 18 ft. The total seating accommodation of the church will be about 330. Behind the church are situated a minister's room and a session-room, divided by the heating chamber. Mr. J. Scott, Belfast, is the architect for the new building, and Mr. Hewitt, Ballyhackamore, the builder.

POST OFFICE EXTENSION, NORWICH.—Norwich Post Office is being extended, the architect for the work being Mr. W. T. Oldrieve, F.S.I., of H.M. Office of Works, while the supervision of the building operations is being exercised by Mr. W. T. Bowman, from the same office. In Crown-road is the main elevation of the building, and in King-street the other elevation. The total length of the Crown-road extension is about 98 ft., the height from the ridge of the roof to the street being 56 ft., whilst the basement goes 11 ft. lower. The King-street extension is about 72 ft. in length, and is two stories high. The width of the new portion of the whole building is about 70 ft. Both elevations are in stone, the lower portion in Portland stone and the higher portion in Bath stone. The structure comprises practically four stories—three floors, the new portion consisting of the basement, the ground floor, first floor, and the second floor. The basement has been formed by excavating practically from the level of Crown-road to King-street. At the end of the Crown-road elevation an entrance for mail vans into the loading platform is provided. The sorting office will be on the ground floor, the postmens' sorting-room on the first floor, and an instrument room on the top floor, whilst on the King-street side of the basement will be a caretaker's department overlooking the street, with accommodation for packages, and storage for batteries in connexion with telegraphy. Extra accommodation has been provided for postmen in the shape of retiring-rooms, and separate rooms will also be set apart for female and male telegraph clerks. The chief contractor is Mr. G. Hawes, of Norwich. The sub-contractor for plastering is Mr. W. Bullock, of Norwich.

RESTORATION OF WYMONDHAM ABBEY CHURCH.—This building is being restored at an estimated cost of 25,000*l.* The roofs will be carefully repaired, the lead being re-cast and relaid, and every piece of the old carved and other timbers retained as far as possible. All the floors of the church will be relaid at their original levels, the walls and windows thoroughly repaired, the large west windows in the west tower and north aisle re-opened, the seating improved, and proper lighting and warming apparatus provided. At the east end of the nave, which is at present entirely blank, will be a reredos of stone surmounted by a fresco of suitable design. Below the sanctuary there will be carved oak choir and clergy stalls, and also a chancel organ. The grand arch dividing the west tower from the nave will be opened up by the removal of the modern gallery and partition. The organ, presented in 1793, must be rebuilt and enlarged, and will then be placed on a screen, already indicated in the west tower, under a new vaulted groined ceiling (the original corner fan-shaped springers being still in existence). The choir vestry will be built on old foundations, and a clergy vestry built in the base of the eastern or abbey tower, to preserve the ancient north and south doorways, as well as the doors from the sanctuary, which were bricked up, and will be reopened. There are five bells in the west tower, but they have not been "rung" within the memory of man owing to their unsafe condition. The tenor weighs 28 cwt., and is of fine tone; the second bell is cracked, and must be recast. The remaining bells are also out of repair, the frame is decayed, and the ringing tackle has ceased to exist. Three new bells are to be added, and the others repaired. This work is being executed by Messrs. G. Day & Son, of Eye, and Messrs. Mears & Stainbank, of London. Entirely new floors and steps in the west tower are necessary. The ground around the church will be properly cleared away and a trench laid, so that no further injury by damp to the foundations may take place. The architect's report divides the work into sections, so that the various parts may be taken up as funds are forthcoming. The work has been begun in the nave and south aisle by the restoration of the beautiful roofs and the windows, walls, and floors, the opening out of the west end, and also the preservation of the eastern or abbey tower. The contractors are Messrs. Rattee & Kett, of Cambridge. Plans for the work were prepared by the late Mr. W. S. Hicks, of Newcastle, and he himself superintended the earlier part of the work. Since his death his plans have been carried on by his partner, Mr. H. C. Charlewood.—*Norfolk Evening Standard.*

CONGREGATIONAL CHURCH, WIGAN.—St. Paul's new Congregational Church, Wigan, was opened on the 26th ult. The new church occupies the site of the old structure in Standish Gate, with extensions in the rear. It provides accommodation for 750 persons, and the cost amounts to about 6,000*l.*, the architect being Mr. F. W. Dixon, of Manchester, and the contractors Messrs. J. Wilson & Sons, of Wigan.

COURT HOUSE, HENLEY-IN-ARDEN, WARWICKSHIRE.—The new Petty Sessions Court House at Henley-in-Arden, which has been erected from plans prepared by the Warwickshire County Surveyor at a cost of 2,000*l.*, was opened on the 26th ult. The new Court House, which has been erected at the rear of the police station, is a building of red brick. There is a police-court, a magistrates' retiring room, police offices, cells, and lavatories.

SCHOOLS, CLUTTON, SOMERSETSHIRE.—The new school buildings which have been provided at Clutton were opened on the 28th ult. Accommodation is provided for 340 children, being 180 in the mixed department and 160 in the infants' department, the plan admitting of future extensions if desirable. The main schoolroom for the mixed department measures 45 ft. by 22 ft., and will accommodate two classes, each of forty children. The classrooms for this division open immediately from the schoolroom, and are respectively, 27 ft. by 18 ft. 6 in. and 27 ft. by 20 ft. in dimension. In the centre of the building is placed the managers' room, facing the main road. This room will also be utilised as a retiring room for the teaching staff. The infants' division consists of a schoolroom 45 ft. by 22 ft., and a classroom fitted with a gallery for the use of very young children. A free treatment of Gothic has been adopted for the elevations. The teacher's residence has been built facing the schools on the opposite side of the road. The total cost of the buildings, inclusive of water supply and heating apparatus, has been about 3,700*l.* The contractor for the schools was Mr. Flower, of West Harptree, and the architect Mr. W. F. Bird, Radstock.

CHURCH, TRAIANGLAS.—The Bishop of St. David's recently consecrated the new chancel and vestry of St. Mary's Church, Traianglas, Breconshire. The work was carried out by Messrs. Walters & Johns, contractors, Morriston, from plans prepared by Mr. Moxham, architect, Swansea.

A NEW (BOARD) SCHOOL FOR THE DEAF, OLD KENT-ROAD.—Plans have been prepared by Mr. T. J. Bailey, Architect to the School Board for London, for the adaptation of the old premises at the corner of Townsend-street, Old Kent-road, to serve as a centre for physically defective children in lieu of the one previously proposed at the Surrey-square school, with a day centre for deaf children on the first floor, and rooms for the divisional staff and the local clerk of works for repairs on the second floor. The freehold premises of the Royal Deaf and Dumb Asylum, standing between Mason and Townsend streets, Old Kent-road, and covering an area of 28,500 ft. superficial, were sold for 16,750*l.* on October 9 last year, consequently upon the migration of the asylum to Margate, where a branch was opened nearly forty years ago. The charity was founded in 1792. The buildings in Old Kent-road were begun in 1807, and having been extended for 300 inmates in 1819, were rebuilt in 1886-7.

PALACE THEATRE, NEWCASTLE.—This building has just been reopened after alterations. The scheme has been carried out from the designs of Mr. J. Walton Taylor, architect, Newcastle, and superintended by Mr. P. R. Donald from the architect's office. The constructional work and mahogany fittings have been carried out by Mr. F. J. Hepple, Newcastle; the fibrous-plaster decorations, carpets, and upholstery by Messrs. A. R. Dean & Sons, of London and Birmingham; the ornamental copper grilles by Messrs. Hardman, Powell, & Co., of Birmingham; the brass and iron division rails by Messrs. Henry Walker & Sons, of Newcastle; the brass and copper handrail in entrance, marble stairs, and fire hydrants by Messrs. Emley & Sons, Ltd.; the electric fan and ventilation and electric lighting by Messrs. Rowland, Barnett, & Co.; the bevelled plate glass and mirrors by Messrs. Reed, Millican, & Co., Newcastle; the stained glass by Messrs. Davison & Walker; and the painting and decoration by Mr. Matthew Alexander, Newcastle.

SOMERVILLE COLLEGE, OXFORD.—An importan addition is in course of being made to Somerville College, after the plans and designs of Mr. Basil Champneys. The new buildings will occupy a prominent situation in the grounds of the college, and will supply increased residential accommodation for the members of the college and a library to contain some 30,000 volumes. The college was founded for girl students in October, 1879, in St. Giles's, in the City of Oxford, and three years afterwards the south-east wing was erected, from Mr. T. G. Jackson's designs, at a cost of about 2,500*l.* In 1887-8 were added the new buildings in Walton-street, comprising the dining-hall, gymnasium, a library, and large drawing-rooms, the architect being Mr. H. W. Moore, who also prepared the plans and designs for a further extension, made ten years ago, on the west side of the buildings, providing new lecture-rooms and "rooms" for nineteen students.

ISOLATION HOSPITAL, STONEHAVEN, N.B.—The formal opening of the new Infectious Diseases Hospital at Stonehaven took place on the 29th ult. The architects were Messrs. Brown & Watt, Aberdeen, and under them have been the following contractors:—New road and water and gas, Messrs. Peters, Bervie; masonry and joiner work, A. Gordon & Son, Montrose; plumber work, Blaikie & Son, Aberdeen; plaster and tile work, Maitland & Son, Aberdeen; painter work, Lamb & Son, Aberdeen; electric bells and telephones, Claud Hamilton, Ltd., Aberdeen.

BO'NESS ACADEMY, LINLITHGOW.—The Bo'ness Academy, which has just been completed at a cost, including the price of furnishings, of 7,000*l.*, takes the place of the Anderson Academy. The new academy occupies a site known as Williamson's Land, situated to the east of, and adjoining, Bo'ness Public School. The building faces Stewart-avenue, and accommodation is provided for 360 scholars. All the classrooms open from a central hall, 48 ft. by 22 ft. On the south side are four classrooms to accommodate 200 pupils, and on the north side three rooms for 160 pupils. The heating of the school is by hot air. The architect was Mr. Alex. Cullen, of Hamilton.

MIDLAND HOTEL, MANCHESTER.—The new Midland Hotel at Manchester has just been completed. Over 1,500 men have been at work for some time with the object of finishing the undertaking before the end of the summer. The site covers about two acres and is surrounded by open streets. The building is ten stories high, and contains 480 rooms, including public rooms for meetings, lectures, concerts and balls, in addition to the usual public and private dining-rooms, restaurant, &c. The general contractors were Messrs. Brown & Son, of Salford. Messrs. Mark Fawcett & Co. have constructed the fireproof floors, ceilings, and roofs at the rate of 1,000 yds. per week; the Banks' Syndicate have incased the main girders with their helical lathing; the London Fireproof Plate Wall Co. have constructed the internal partitions, and every effort has been made to render the building as fire-resisting as possible. A general description of the building was given in our issue of January 24 last (p. 95). Mr. Charles Trubshaw, the Company's architect, has acted throughout, and the completion has been superintended by Mr. Rodgers.

FOREIGN.

INDIA.—A new diversion is to be constructed at the Bansra station on the Eastern Bengal railway, and the estimated cost is 30,000 rupees.——The construction of a single line between Dum Dum and Sinthee, on the same railway, has also been sanctioned at a cost of 40,000 rupees.——The preliminary survey of the proposed line from Podanur to Palni by the Madras railway, for the Government of India, is well in hand, and a great deal of work has already been accomplished.——The strengthening of the girders of Chevar bridge on the North-western line of the Madras railway by inserting central masonry piers for four spans and replacing the other spans by new girders will be taken in hand and completed this official year.——Buildings are to be erected at Maymyo and Mandalay Hill for British soldiers, at a cost of about 10½ lakhs of rupees.——It is expected that the electric tramway lines now being constructed in Mandalay will be open before the end of the present year.——The Home Board and the Government of India have both sanctioned the construction of large additions to Magra station on the East Indian railway.——It is contemplated to use crude oil to lay the dust on important roads in Bombay.——The Bombay Port Trustees have decided to apply to Government for sanction to raise a loan of 252 lakhs of rupees for the construction of the new docks at Bombay.——Important architectural works are to be carried out in Indore, under the superintendence of Mr. C. F. Stevens, architect, of Bombay. Amongst other works, the Sherpur Palace is to be completed as a residence for the young Maharaja, the Rampur Kothi is to be rebuilt in elaborate style, and a new Residency is to be designed and erected.——Two lakhs of rupees, part of a sanction of 4½ lakhs, are to be immediately expended by the Port Trustees of Karachi on the general improvement of the port.——The military and railway departments at Sibi have arranged to execute a water supply

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scheme on the combined principle, and the work is already in hand.——The Indian Government has sanctioned the retention of the establishment for the Howrah and Rajapore drainage scheme for another five years.——The Indian Government has accepted a scheme for establishing a central workshop and store at Rurki for the repair and testing of electrical appliances, and for the issue of stores required in connexion with electrical installations in cantonments.——A school house and quarters for teachers are to be constructed at Negapatam.——New station buildings are to be erected at Latteri on the Madras railway.——The Viceroy's prize at the Simla Arts exhibition this year has been left unawarded in the absence of any picture of sufficient merit.

GERMANY.—The memorial to Prince Bismarck in the new cathedral near the Castle in Berlin, has been completed in the clay by Reinhold Begas, and is accepted. It will stand against a wall between two square pillars with florid Ionic capitals. The centre of the panel shows Prince Bismarck seated and draped on a pedestal. Immediately in front is an ornate sarcophagus, with low relief on its long front. To the right of the sarcophagus is a half-draped youth, a male "Fame," who holds a long trumpet to his lips with his left hand, and with the right raises a drapery from the tomb. To the left is another half-draped figure, a female, "Muse of History." Under the flowing drapery of Bismarck one sees that he is clad in a suit of mediæval armour. His right fist is against his right knee, and his left hand lies on his left knee. The head is turned slightly to his right. On the tomb front an enthroned Germania is carved, who is receiving the crown from the federated German Princes.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Mr. Hepworth Collins, A.M.Inst.C.E., consulting chemist and engineer, has changed his address to 17, Nicholas-street, Manchester (care of Messrs. Edward Wihl & Co.)——Messrs. N. S Joseph, Son, & Smithem have removed to new offices, No. 83, Queen-street, Cheapside. Their new telephone number is 6,082, Bank.

"THE FLEXURE OF BEAMS."—Referring to the first article in last week's *Builder*, Messrs. Crosby Lockwood & Son ask us to mention that they are the co-publishers of the book noticed ("Experiments on the Flexure of Beams," by Albert E. Guy) with Messrs. Van Nostrand, as appears on the title-page of the book. The omission was due to an oversight. Messrs. Crosby Lockwood & Son have exclusive rights of sale in this country.

A GARDEN CITY AT HITCHIN.—The Garden City Pioneer Company have acquired an estate of about 4,000 acres adjoining the Great North-road at Hitchin, distant thirty-five miles from London, and having its nearest point at a distance of rather more than a mile from Hitchin Junction Station on the Great Northern main line, whence the branch line to Cambridge traverses the estate. It is stated that there is a good supply of labour in the neighbourhood, and that ample building material can be obtained, and at a low cost, in the district. The ground lies at an altitude of from 250 to 300 ft. above sea level, there is an ample supply of good water, and the strata consist of chalk partly overlaid with gravel. A company with a large capital will soon be formed for carrying out the scheme, and subject to a cumulative maximum dividend of 5 per cent. per annum paid to the shareholders, the balance of the profits will be devoted to the benefit of the town and its inhabitants.

EXTENSION OF THE PATENT OFFICE BUILDINGS.—On August 14 the Royal Assent was given to the Bill promoted by the Commissioners of H.M. Works and Public Buildings for a further enlargement of the Patent Office buildings in Southampton-buildings. The Act provides for the acquisition of certain houses, premises, and lands upon the area which is bounded on the east side by Furnival-street, on the west side by the existing Patent Office and the garden of Staple Inn, on the south side by No. 13, Furnival-street, and Nos. 1 and 2, Took's-court, and on the north side by No. 6, Furnival-street, and a portion of Staple Inn. Some of the scheduled land consists of garden ground at the rear of Furnival-street (west side), and the new buildings will form an extension towards that street of the block that faces the terrace and garden of Staple Inn. Additional accommodation is required for an increasing executive staff, the scope of whose duties is considerably enlarged by recent legislation. As a temporary expedient several suites of offices have been rented in the adjacent chambers which form part of the new Birkbeck Bank. The block on the north Side of Quality-court, Chancery-lane, adjoining the sale of Specifications department, is also being rebuilt for official purposes. The premises recently demolished in Quality-court formed the last remaining portion of the old offices as originally designed, after the Classic style, by Sir William Chambers, and was the last building erected from his designs in London during his lifetime. The elevation in the court comprised a Roman Doric order with four fluted engaged columns and an angle-pediment standing upon a rusticated base, constructed of Portland stone.

BRITISH RAINFALL.—The British Rainfall Organisation, founded in 1860 by the late G. H. Symons, will henceforth be carried on under the sole charge of Dr. H. R. Mill, as Mr. Sowerby Wallis has been compelled by ill-health to retire after more than thirty years' connexion with the Association.

CEMENT NOTES.—Mr. Baldwin, H.M. Acting Consul at Lourenço Marques, writes that Germany and Belgium have obtained a strong hold on the cement trade there, and, as the article costs 100 per cent. of its value to import, competition is principally influenced by freights. These, for various reasons, have not been particularly favourable to the British manufacturer during the past year. The greatest rival to the British article is Alsen's (German) Portland cement, and this firm enjoys peculiar advantages by being connected with the principal German shipping line running to Delagoa Bay. A rough calculation shows that the value of a shipment of 2,000 barrels of Alsen's was 11,740 marks, and that the cost of freight, insurance, &c., to Delagoa Bay was 10,035 marks, making a total of 21,775 marks, equivalent in sterling at the current rate of exchange to 1,062*l.* 10s. (price per barrel, say, 10s. 9d.). The packing of the German cement is said to be better than that of the British, and there is consequently less wastage.——From Portland, Oregon, U.S., Mr. Consul Laidlaw reports that much cement is being used for building purposes and streets, but British has been out of the market for some years, being replaced by Belgian and German, at an average price of 10s. per cask for artificial and 9s. for natural. Cement is superseding wood as material for footpaths.——H.M. Consul at St. Petersburg observes that in his district Russian cement satisfies nearly all local requirements, there being even over-production, and that some of it is of good quality.

CENTRAL LIBRARY, BARRY, GLAMORGANSHIRE.—The Barry Public Libraries Committee met recently, when a letter was read from Mr. Andrew Carnegie declining to contribute an additional amount towards the cost of the proposed central library and reading-room at Barry. The committee had a consultation with Messrs. Hutchinson & Payne, of London, the architects, and reductions in the estimates were decided upon in order to bring the cost of the building within the amount of 8,000*l.*, which Mr. Carnegie has given.

CAERWENT EXPLORATION.—Work continues to be carried out in the excavation of Roman remains at Caerwent, near Newport, Mon. The most important features recently brought to light are some Roman houses near the schools, with a later house overlaying one of them. This later house includes a small subterranean chamber, or cellar, built largely of Roman materials. The line of pipes which was traced near the North Gate was again discovered in this field, with the addition of a small concrete culvert, and some portions of streets have been discovered. Subscriptions are invited for the continuance of the work. The hon. Secretary of the Committee is Mr. A. T. Martin, of Bath College, Bath.

THE HOLBORN-TO-STRAND IMPROVEMENT.—Sir John Wolfe Barry has issued his award as umpire in the arbitration which has recently been held to determine the amount to be paid by the London County Council to the Metropolitan Electric Supply Co., Ltd., for the compulsory acquisition by the Council of the company's generating works at Sardinia-street, Lincoln's Inn-fields. The amount of the award is 183,150*l.*

VENEZUELAN ASPHALT.—According to a Report received at the Foreign Office from the British Consul, a new article of export from Venezuela during the past year was asphalt. It is very probable, the Consul thinks, that export of this produce will be very important in the future. The asphalt comes from a series of mines (or lakes) situated on the shores of Lake Maracaibo. The concession is being worked by an American company, who, during the last six months of 1902, shipped about 3,355 tons. A railway from the mines to the shore of the lake has been built, and it is hoped that very soon about 2,000 tons of crude and refined asphaltum will be exported monthly.

PATENTS AND DESIGNS AND THE ST. LOUIS EXHIBITION, 1904.—An Order in Council which has just been made declares that certain provisions of the Patents, Designs, and Trade Marks Acts of 1883-6 shall *pro tanto* apply to the International Exhibition to be held at St. Louis, U.S.A., next year. Section 39 of the Act of 1883 safeguards the right of an inventor or his legal personal representative to apply for and obtain letters patent, and to that extent assures the validity of the patent so granted, notwithstanding the circumstance that the invention may have been exhibited at an industrial or international exhibition, certified as being such by the Board of Trade, or published by means of a description of it during the period the exhibition is held, or used for purposes of the exhibition or during the holding thereof by any person elsewhere without the inventor's privity or consent. Section 57 of the Act contains similar provisoes in respect of the rights of proprietors of designs. In the case of both patents and designs alike the protection under the Act is secured only if the exhibitor gives previous notice of his intention to do so, and if the application for either letters patent or registration is made before or within six months from the date of the opening of the exhibition. A clause of the amending Act of 1886 empowers the King to declare by Order in Council that the Act of 1883 shall apply to any exhibition mentioned in the Order, as though it were an industrial or international exhibition, so certified by the Board of Trade; and, further, to relieve the exhibitor from the obligation to give the previous notice of his intention to exhibit the invention or design, or any article to which a design is applied.

THE GRAMLIAR SCHOOL, LINCOLN.—Steps are about to be taken for the erection of new buildings for the grammar school. The present school premises in Lindum-terrace were built in 1884 after designs by Mr. W. Watkins. The school, founded in the latter half of the sixteenth century, was, in 1583, amalgamated with the Cathedral School, then in the Close, and then, having been endowed with a scholarships' fund by Sir Christopher Wray, Chief Justice of the King's Bench in 1574-1603, and his wife, was united with the Jersey School of the Corporation. Twenty years ago the Charity Commissioners made a scheme for dividing the foundations into the Grammar and Middle Schools, assigning to the former a capital sum of 10,000*l.* paid by the Ecclesiastical Commissioners and a yearly subsidy of 300*l.* paid by the Dean and Chapter of the Cathedral. Thereupon the Grammar School vacated, in favour of the Middle School, their old quarters in Broadgate, which had belonged to the Franciscan Friars established there in the thirteenth century by William de Beningworth, and which the Corporation bought in 1574 from Justice Monson, of the Common Pleas.

THE SALE OF CITY CHURCHES.—A return just issued by the Home Office sets forth that during the period August 2, 1894—December 31, 1902, four City churches were demolished, and that the sums realised by the sale of three of the sites were—for St. Michael, Wood-street, 31,617*l.* 4s. 9d., less 670*l.* 9s. 7d. for "charges"; for St. Michael Bassishaw, 36,014*l.* 17s. 2d., less 773*l.* 6s. 9d. for "charges"; and for St. Bartholomew, Moor-lane, 20,420*l.*, less 392*l.* for "charges." The site of St. George, Botolph-lane, is not yet disposed of. Out of those several amounts certain appropriations have been made thus:—St. Bartholomew, Moor-lane, 2,000*l.* to providing a parsonage-house for a new church at Stamford Hill, with 4,252*l.* 4s. 6d., as part of the ex-incumbent's pension and for use upon other objects after his decease. St. Michael Bassishaw, 10,000*l.* to the new church at Edmonton, and 2,000*l.* to the parsonage-house there; 4,000*l.* to a parsonage-house for the united benefice of St. Lawrence Jewry with other parishes; 12,000*l.* towards the building of the Church of St. Aldhelm, Edmonton, and the completion of the Church of St. Peter, Lower Edmonton; 4,000*l.* transferred to the Union of Benefices Fund in respect of the cost (2,444*l.* 2s.) of the removal of human remains, and 500*l.* to improvements at St. Lawrence Jewry. St. Michael, Wood-street, 14,783*l.* 15s. 6d. to the new Church of St. Andrew and St. Michael, East Greenwich, and its parsonage-house; 2,000*l.* to the Union of Benefices Fund; 4,000*l.* to a parsonage-house for the united benefice of St. Alban, Wood-street, St. Michael, Wood-street, with other amalgamated parishes; 1,000*l.* to improvements at St. Alban, Wood-street; 5,043*l.* 15s. to the purchase of India Three per Cent. Stock to yield an income of 150*l.* a year for the incumbent of St. Andrew and St. Michael, East Greenwich; and 600*l.* to the maintenance of the disused burial grounds of St. Olave, Silver-street, and St. Mary Staining. The return also specifies how the parochial endowments of the three parishes concerned have been severally applied. In the case of St. Bartholomew, Moor-lane, they are annexed partly to St. Giles, Cripplegate Without, as the mother church of the two newly united parishes, and partly to the ex-incumbent's pension, with a reversion in favour of the new benefice at Stamford Hill and in the cases of St. Michael Bassishaw and St. Michael, Wood-street, to the united benefices respectively, and to kindred purposes in connexion with the new churches and their endowments.

PAVING AND TRAMWAYS IN MOSCOW.—According to a recent report on this subject, the streets of Moscow are in the following condition:—The total area of roadway is 2,200,000 square sajens (1 sajen equals 7 ft.) Of these 500,000 sajens are totally unpaved; 500,000 have not been repaved since the town took over the roadways in 1875; and the remaining 1,200,000 have a pavement of cobbles which is unsatisfactory, both from a technical and sanitary point of view, and is also badly kept up. To pave the streets that have not yet any pavings, and in general to lay down an improved roadway, would, it is estimated, cost not less than 3,125,000*l.* The Town Council has for the present decided to put down a certain amount of improved paving, probably an area of about 400,000 square sajens. This will be wood on the level parts and squared stone on the slopes. It is proposed to employ pine blocks and Swedish granite. The Town Council have also adopted a scheme for the extension and electrification of the tramway system. It is to be divided into five sections, each section to be constructed in a year. The first three years will be employed in converting the present tramway system into an electric service, and the remaining two years in constructing additional electric lines. The total length of lines will be about 125 miles. The trolley

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system has been adopted, and the probable cost will not be less than 4,200,000*l.*

DANTZIG TIMBER TRADE.—It is stated in an official report on the trade and commerce of Dantzig for the year 1902, that supplies of all kinds of wood from Russia were greatly impeded by the difficulty experienced by the owners of the forests there in obtaining advances from the banks to allow of their felling and floating the timber down to the shippers. In addition to this, Dantzig's best customers showed no anxiety to buy largely. The trade with the United Kingdom felt the effects of the war in South Africa. Belgian industries were far from flourishing, and there was no desire to increase stocks. France preferred using wood from the French forests in the Vosges and Pyrenees. The demand from Berlin was larger than ever on account of the activity in the building trade. The low freights which continued from the year 1901 were in favour of shippers, and the diminished arrivals from the forests kept the prices up to a remunerative point. Of the 242,000 tons of wood exported from Dantzig in 1902, 116,714 tons were shipped to the United Kingdom, as against 120,134 tons out of 223,000 tons in 1901. The British steamers that go to Dantzig to load timber are said to be so loosely drawn that before they have been there many hours they come into conflict with the custom of the port in regard to taking in cargo. It is the custom for the master to give a receipt for the full number of pieces of wood as soon as they are brought alongside in rafts. When bulk is broken to haul the timber on board all the water-logged portion of the raft sinks to the bottom of the river. The master, knowing that his ship will have to make good the deficiency on discharging in the United Kingdom, notes a protest. The shippers, on the other hand, decline to recognise the protest on the plea that they hold the master's receipt for the whole quantity. The decline of the trade during the last five years is indicated by the following figures of the timber that was either floated down the River Vistula or reached Dantzig by railway :—

Year.	Quantity. cubic metres.	Value. £
1902	273,567	443,080
1901	446,859	661,955
1900	429,159	637,830
1899	717,100	1,093,900
1898	605,055	1,010,975

CAPITAL AND LABOUR.

SUNDERLAND JOINERS.—A meeting of the Northern centre of the Building Trades Employers was held at Leeds on the 26th ult. A deputation of the Amalgamated and Associated Societies of Carpenters and Joiners attended by invitation and discussed fully the position of the Sunderland house joiners' strike and the proposed lock-out over the Northern Counties Federation. The operative societies requested that the lock-out should be postponed from the 29th inst. until a fortnight later, in order that the operatives might take a ballot of their members throughout the area affected by the proposed lock-out. The operatives agreed to report the result of their ballot to the Northern Centre before the expiration of next week. The Northern Centre of the Building Trade Employers agreed to this proposition. —It is stated that the Sunderland joiners are going on with their scheme for establishing workshops in the town. The joiners have modified their ideas respecting the raising of the capital, and the present proposition is to raise 1,000*l.* by 2*l.* shares. Every member of the society, shareholder or not, will be given employment if there should be sufficient work. If there is not sufficient work for all each man will be allowed to work every other week.

PATENTS OF THE WEEK:

APPLICATIONS PUBLISHED.*

21,518 of 1902.—T. W. RHODES and F. R.C. RHODES: *Sliding Window Sashes.*

In sliding window sashes, the combination of a metallic chain attached to the stile of the sash and running over a chain wheel mounted in a metallic frame screwed to the sash frame, with the end of the chain attached to the sash-weight.

4,159 of 1903.—R. G. W. EATON: *Metallic Window Frame.*

According to this invention, the joining of lengths of metallic window-framing is made by means of tongues or tenons at the ends of two short lengths of framing, passing through a slotted hole in a long length of framing, as many slotted holes being made as the number of windows to be formed required.

10,087 of 1903.—J. T. C. TENNANT and L. TENNANT: *Window Sashes and Framings.*

This relates to window sashes, window frames, and their fittings, and consists in the formation of grooves or slides in or on the said frames, in which, pins or studs fixed to the sashes are free to slide said grooves having slots or outlets through which the pins can be passed so as to permit of revolving or turning over the sashes for cleaning or ventilating purposes, the upper of the said sashes having a rack on each side in which cogs fixed to the lower sash, and having ratchets each controlled by a pawl, are free to run when the said ratchets are released so that the sashes can be moved up and down.

12,749 of 1903.—E. R. WOOD: *Appliances for Holding Doors, Windows, and the like.*

An appliance for holding doors, windows, and the like in any desired position, consisting of or comprising a hinged pawl, or arm, fastened to and supported from the door, window, or the like, and having its end adapted to engage with the ground or floor, when free.

14,348 of 1903.—F. SPRING: *Chimney-cowls.*

A chimney-cowl, comprising in combination a base-plate with a central opening, a conical flange surrounding said central opening, four vertical supports at the corners of said base-plate, inclined guide plates curved longitudinally and fixed between the vertical supports so that their upper edges project into the inner space of the cowl, and a head-piece with a central opening.

15,365 of 1902.—A. J. BOULT (C. CAVEGLIA): *Cement Floors, Plates, or Structures.*

A reinforced cement floor, plate, or structure adapted to withstand simple bending stresses, or tension or compression as well as bending stresses, formed of concrete or mortar with uniform reinforcing metallic bars arranged remote from the neutral line, the bars extending wholly, or partly, across the structure, and being entirely unconnected one with the other and so arranged as to strengthen the structure at its weakest points.

17,738 of 1902.—G. L. MOUCHEL: *Caissons, Foundation or Building Cylinders, Columns, Piles, Bridge Abutments, Wharves, Piers, Sea Walls, Quay Walls, Dock Walls, and like Structures.*

The combination of a pile which penetrates the ground, a casing which encircles the pile, a hearting between the pile and casing, a row of sheet piles disposed between the said casing, a filling behind the sheet piles, and struts between the casing and the sheet piles.

21,273 of 1902.—D. M. NESBIT AND W. CLOWES: *Steam Heating Systems and the Like.*

In steam heating systems collecting the water and steam escaping from the various traps on the system in such a manner that the same may be utilised as feed water or for other useful purposes.

27,187 of 1902.—O. RUHL: *Strengthened or Armoured Concrete, or Other Slabs.*

Armoured concrete or other slabs, characterised by the employment of metal strengthening pieces, which after having passed through the portions in which the tension is exerted at the supports and at the middle of the slabs, form, between these two spots (either directly or indirectly by the projection of the cross section of the ceiling), a rectangular trapezoidal or other figure, both the upper half as well as the lower half being strengthened by this means whilst allowing the point at which the bending moments become nil to change place, inside the said rectangular figures having a trapezoidal or equivalent form without the slabs being exposed to danger resulting from the formation of cracks.

6,960 of 1903.—T. WITHEY: *Fire Escape.*

A fire escape, consisting of a tube extending from the top to the bottom of a building to which it is attached, the said tube being partly filled with oil, and having a balance-weight resting in its lower end, a wire cord being attached to said weight and passing up the tube through guide blocks and over pulleys to and through a horizontal branch tube, the said cord passing out through a nipple at the end of the latter, and being connected to a chain extending down the front of the building, a sling or cradle being hooked to the chain for permitting the descent of occupants of the building from any of the floors of the same.

14,824 of 1903.—S. H. JACOBSON: *Ventilators.*

In a ventilator a casing covering, an opening communicating with the space to be ventilated, and having its ends open, a series of pivoted deflecting blades therein, and movable means, automatically thrown into operation when a change takes place at the point of entrance of the air current to said casing.

14,945 of 2903.—C. MEINECKE: *Apparatus for Painting, Varnishing, and the like of Floors and other Surfaces.*

An apparatus for painting, varnishing, and the like of floors and other surfaces, comprising in combination, a liquid receptacle to be moved to and fro by means of a handle; brushes inserted in suitable sockets of the receptacle; means for supplying the liquid from the receptacle through the brush head and laterally of same; and means for closing the supply openings of the liquid receptacle when the apparatus is not required for use.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

MEETINGS.

SATURDAY, SEPTEMBER 5.

Association of Managers of Sewage Disposal Works—Meeting at Leeds. Mr. W. D. Scott-Moncrieff in the chair.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 18.—By HATCH, WATERMAN, & SON (at Ashford).

Wye, Kent.—The Wye Water Mill, f.	£800
Great Horton Field, 6 a. 1 r. 5 p., f.	460
Sheldwich, Kent.—Enclosures of arable and woodland, 16 a. 0 r. 3 p., f.	300
Chilham, Kent.—Danshurst Cottage, f., y.r. 26*l.*	280
Enclosure of orchard or building land, 1 a. 2 r. 38 p., f.	480
Freehold cottage and garden.....	185

August 19.—By COOK & BIRMINGHAM (at Dulverton).

Exton, Somerset.—Witheridge and South Huckham Estate, 262 a., f., w.r. 160*l.*	2,760
Widlake and Loggetts Estate (otherwise Locketts), 211 a., f., y.r. 198*l.*	2,595
Accommodation holding and cottage (Loggetts), 4 a., f., y.r. 15*l.*	400
Part of Quarme Wood, 4 a. 1 r. 21 p., f.	100
Part of Leys, or Copplebam, 2¾ a., f.....	100

August 20.—By THORNBORROW & Co. (at Penrith).

Penrith, Cumberland.—Friar-st., freehold house and stable	165
Four enclosures of arable, 16 a. 1 r. 26 p., f.....	810
1 to 10, Poplar-pl., f., y.r. 113*l.*	1,885
Grub-st., six freehold cottages	590
Freehold house and cottage, y.r. 34*l.* 4*s.*	580
Melbourne House, Melbourne Cottage and Enclosures, 75 a. 3 r. 29 p., f.....	4,700
Fowler Syke Cottage and meadow, 1 a. 1 r. 32 p., f.	815
Fell-la., three freehold closes of pasture	1,100
Bishops Yard, freehold printing works and three dwellings	2,650
Dacre, Cumberland. — Zerubbabel-pl. and close of land, 8 a. 1 r. 19 p., f.	723

By RICHARD AUSTIN & WYATT (at Meonstoke).

Meonstoke, Hants.—Wattons-la., The Waddens and 93 a. 1 r. 9 p., f., y.r. 55*l.*	1,170
Harvestgate Farm, 167 a. 2 r. 38 p., f., y.r. 110*l.*	1,270
Hill House and 2 r. 4 p., f.	310

August 21.—By PROTHEROE & MORRIS (on Estate).

Newhaven, Sussex.—Mount Pleasant Estate, 63 freehold plots; also Denton Barn and four cottages (in lots).....	1,687

August 22.—By THORNBORROW & Co. (at Keswick).

Borrowdale, Cumberland.—Stonethwaite, freehold grazing farm, 437 a.	2,100

August 25.—By THORNBORROW & Co (at Penrith).

Penrith, Cumberland.—Carlton Hill, several closes of meadow and pasture land, 29 a. 0 r. 33 p., f.	1,075
Townhead, eight closes of pasture, meadow, and arable lond, 19 a. 3 r. 26 p., f.....	1,045

By E. G. RIGHTON (at Stratford-on-Avon).

Alveston, Warwick.—Tiddington, freehold farm, 210 a. 0 r. 25 p., p.	6,980

August 26.—ROBERT TIDEY & SON.

Stoke Newington.—8 and 10, Millard-rd., u.t. 69 yrs., g.r. 11*l.*, y.r. 59*l.*	66

JAMES ELEY (at Boston).

Boston, Lincs.—Royal Oak Hotel, f., y.r., 120*l.*...	2,200
Butterwick, Lincs.—Close of arable, 3 a. 0 r. 39 p., f.....	163
Thornton-le-Fen, Lincs.—Freehold farm, 10 a. 1 r. 27 p.	360

FRITH, GARLAND, & Co. (at Harringay).

Harringay.—141, Wightman-rd., u.t. 84 yrs., g.r. 7*l.*, e.r. 40*l.*.....	420
95, Duckett-rd., u.t. 92 yrs., g.r. 7*l.*, e.r. 38*l.* ..	350

A. G. & A. NOTLEY (at Lowestoft).

Kirkley, Suffolk.—Acton Estate, 243 freehold building plots (in lots)	1,701
White House Farm, 39 a. 1 r. 21 p., f.	1,350

August 27.—By EDWIN ROBINSON & Co.

Limehouse.—2, Turners-rd., u.t. 60 yrs., g.r. 5*l.*, y.r. 65*l.*	350

By STIMSON & SONS.

Balham.—5, Shipka-rd., u.t. 73¾ yrs., g.r. 7*l.*, e.r. 34*l.*	310
Forest Hill.—20, 21, and 22, Wynell-rd., u.t. 60 yrs., g.r. 22*l.* 10*s.*, y.r. 90*l.*.....	580
Norwood.—121, Auckland-rd., u.t. 59¾ yrs., g.r. 10*l.*, p.	800
New Kent-road.—14, Gurney-st., u.t. 63 yrs., g.r. 8*l.*, y.r. 48*l.*.....	430
Old Kent-road.—46, Marlborough-rd., f., y.r. 48*l.* 2*s.*	540
Putney.—43, Oakhill-rd., u.t. 87 yrs., g.r. 7*l.*, e.r. 42*l.*.....	410
Thornton Heath.—4, 5, 6, 7, 8, and 10, Kimberley-ter., u.t. 96 yrs., g.r. 31*l.* 10*s.*, y.r. 163*l.* 16*s.*..	2,100

By R. J. STEEL (at Kew Bridge).

Hounslow, Middlesex.—1, 2, 3, and 4, Magdala-cottages, f., w.r. 83*l.* 4*s.*	950
Putney.—14 and 16, Pentlow-st., u.t. 59¾ yrs., g.r. 7*l.*, w.r. 65*l.*	430

August 28.—By A. J. SHEFFIELD.

Edmonton.—137, 139, and 141, Fore-st., u.t. 53¾ yrs., g.r. 24*l.*, y.r. 180*l.*	1,800
Poplar.—19 and 19a, Wilson-st. (wheelwright's premises), u.t. 35¾ yrs., g.r. 17*l.*, y. and e.r. 100*l.*	430
Bromley-by-Bow.—43, Ellesmere-st., s., u.t. 58 yrs., g.r. 2*l.*, w.r. 39*l.*.....	270

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

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PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 15 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 12 6	" " "
Facing Stocks....	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 8 6	" at railway depôt
Red Wire Cuts ..	1 12 6	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	£ s. d.	
Thames and Pit Sand	6	0 per yard, delivered.
Thames Ballast	6	0 " "
Best Portland Cement	30	0 per ton, delivered.
Best Ground Blue Lias Lime..	20	6 " "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s od. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	£ s. d.	
BATH STONE—delivered on road wag- gons, Paddington depôt	1	6½ per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1	8½ " "
PORTLAND STONE (20 ft. average)— Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2	1 " "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2	2½ " "

	£ s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Bear in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	£ s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 90 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
2½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes(under 90 ft. sup.).....	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20 x 10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry.dep.
20 x 12 " " "	13 17 6	" "
20 x 10 best seconds "	12 15 0	" "
18 x 8 best " "	13 10 0	" "
20 x 10 best blue Portma. doc	12 5 0	" "
18 x 8 best blue Portmadoc	6 5 0	" "
20 x 10 best Eureka unfading green....	15 2 6	" "

PRICES CURRENT (*Continued*).

SLATES.

in. in.	£ s. d.	
20 x 12 best Eureka unfading green....	17 2 6	per 1000 or 1200 at ry.dept.
18 x 10 " "	12 10 0	" "
16 x 8 " "	10 5 0	" "
20 x 10 permasent green	11 0 0	" "
18 x 10 " "	9 5 0	" "
16 x 8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0 " "	" "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
⅞ in.	1 0 0	"
Fir timber: Best middling Dansig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

White Sea: First yellow deals,	At per standard. £ s. d.	£ s. d.
3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10 0
" " " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
⅞ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	- -

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
⅞ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
⅞ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON— Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 0 0	9 5 0
" " galvanised.....	16 0 0	- -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	- - -
" " to 24 g.	10 15 0	- - -
" " to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.....	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:— Ordinary sizes to 20 g.....	16 0 0	- - -
" " 22 g. and 24 g.	16 10 0	- - -
" " 26 g.....	18 0 0	- - -
Galvanised Corrugated Sheets:— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.....	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	- - -
" " 22 g. and 24 g.	12 15 0	- - -
" " 26 g.	14 0 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0

(Under 3 in. usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 0 0	- - -
Pipe in coils	14 10 0	- - -
Soil pipe	17 0 0	- - -
Compo Pipe	17 0 0	- - -
ZINC—Sheet— Vieille Montagne ..... ton	26 0 0	- - -
Silesian	25 15 0	- - -
COPPER— Strong Sheet ..... per lb.	0 0 10½	- - -
Thin ..... "	0 0 11½	- - -
Copper nails ..... "	0 0 11	- - -
BRASS— Strong Sheet..... per lb.	0 0 10	- - -
Thin "	0 0 11	- - -
TIN—English Ingots ..... "	0 1 4	- - -
SOLDER—Plumbers' ..... "	0 0 6	- - -
Tinmen's ..... "	0 0 8	- - -
Blowpipe ..... "	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths.....	1¾d. " "
21 oz. thirds	3¼d. " "
" fourths.....	2¾d. " "
26 oz. thirds	3¾d. " "
" fourths.....	3¼d. " "
32 oz. thirds	4¼d. " "
" fourths.....	4¼d. " "
Fluted sheet, 15 oz.	2¼d. " "
" 21 oz.	3¼d. " "
½ Hartley's Rolled Plate	1¾d. " "
⅜ " " "	2d. " "
½ " " "	2¾d. " "

OILS, &c.

	£ s. d.	
Raw Linseed Oil in pipes or barrels..	per gallon	0 1 10
" " " in drums.....	"	0 2 2
Boiled " " in pipes or barrels..	"	0 2 1
" " " in drums.....	"	0 2 5
Turpentine, in barrels	"	0 3 7
" in drums	"	0 3 9
Genuine Ground English White Lead	per ton	19 10 0
Red Lead, Dry	"	19 10 0
Best Linseed Oil Putty.....	per cwt.	0 8 0
Stockholm Tar.....	per barrel	1 18 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak.....	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches.....	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Designs for a Free Public Library	Borough of Tamworth	20*l.*, 10*l.*, 5*l.	Nov. 14
*Additions and Alterations to Town Hall	Sunderland Corporation	100*l.*, 50*l.*, 25*l.	Nov. 21

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Extension and Refitting of Oxford Circus Convenience	M. B. St. Marylebone	Borough Engineer, Town Hall, Marylebone-lane, Oxford-street, W.	Sep. 4
*Ward, Isolation Blocks, &c., at Isolation Hosp., Watford	Watford Isolation Hospital Board	C. P. Ayres, Binvale, Watford	Sep. 8
Boundary Walls, &c., Corporation-yard	Colchester Corporation	H. Goodyear, Civil Engineer, Town Hall, Colchester	do.
Sewerage Works, Back King-street and others	Church (Lancs) U.D.C.	W. E. Wood, Surveyor, Council Offices, Church	do.
Ice Factory, Scarborough	Ice and Cold Storage Co., Ltd.	Freeman & Co., Architects, 11, Carr-lane, Hull	do.
Cricket Pavilion, Hampden Park	Eastbourne Corporation	D. J. Bowe, Borough Surveyor, Town Hall, Eastbourne	do.
Tar Paving	Southampton Corporation	J. A. Crowther, Borough Engineer, Southampton	do.
Sewerage Works	Dursley (Glos.) R.D.C.	V. A. Lawson, Civil Engineer, 17, Rowcroft, Stroud	Sep. 9
Sewers, &c., Green-lane	Walsall Corporation	J. R. Cooper, Borough Offices, Walsall	do.
Sewers, &c.	Ripon R.D.C.	H. A. Johnson, Civil Engineer, 15, The Exchange, Bradford	do.
Sewerage Works	Ryton-on-Tyne U.D.C.	J. P. Dalton, Surveyor, Ryton	do.
Water Mains, Millbrook Building Estate	St. Germans R.D.C.	F. W. Cleverton, 4, Buckland-terrace, Plymouth	do.
Refuse Destructor	Osset (Yorks) Corporation	W. Emmott, Civil Engineer, 35, Commercial-road, Halifax	do.
House, South-street, Egremont, Cumberland	Mr. G. Rigg	J. Cowan, Surveyor, Egremont	do.
Stabling, Sunnybank	Weymouth U.D.C.	W. B. Morgan, Engineer, Melcombe Regis	do.
Additions to Richmond Lodge, Wavertree	Toxteth Park Guardians	W. Thomas & Co., Architects, 15, Lord-street, Liverpool	do.
Vestry at Chapel, Cross Inn, Llangathen	.....	D. Jenkins, Architect, Llandilo	do
Shop, Pontmorlais, Merthyr, Wales	.....	C. M. Davies, Architect, 112, High-street, Merthyr	Sep. 10
Stabling at Chambers Farm, Brigsteer, nr. Cambridge	.....	J. Banks, Kendal	do.
Paving Works, Pedley and other streets	Crewe (Cheshire) Town Council	G. Eaton-Shore, Borough Surveyor, Crewe	do.
Shop and Hall, Westfield, Workington	Beehive Co-operative Society, Ltd.	W. G. Scott & Co., Architects, Victoria Buildings, Workington	do.
Cottages, Tullyskeharney (Ireland)	Manorhamilton R.D.C.	P. Keany, Workhouse, Manorhamilton	do.
Bridge, Glanyrafon, Rhostyllen	Wrexham R.D.C.	T. R. Evans, Surveyor, Johnstown, Ruabon	do.
Bridge Works, Southside, Longparish	Andover R.D.C.	J. Wormald, Surveyor, The South Cottage, Andover	do.
Sewers, &c., Lane End	Pudsey (Yorks) Corporation	J. Jones, Borough Surveyor, Church-lane, Pudsey	do.
Fifty-two Houses, Frystone, near Castleford (Yorks)	Wheldale Colliery Co., Ltd.	Garside & Pennington, Architects, Castleford	do.
Retaining Wall, Bordesley, near Birmingham	Great Western Railway Company	G. K. Mills, Paddington Station, S.W.	do.
Lodge at Cemetery	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	Sep. 11
Road Works, Marldon	Totnes (Devon) R.D.C.	S. S. Rendle, Surveyor, Hillside Paignton	do.
Electricity Plant	Stoke-on-Trent Corporation	J. B. Ashwell, Town Hall, Stoke-on-Trent	do.
Paving Works, Delaware and other roads	Preston (Lancs) Corporation	Borough Surveyor, Town Hall, Preston	do.
Alterations to Premises, Ogmore Vale	Nantymoel Industrial Co-op. Soc.	J. Morgan, Nantymoel	do.
Two Houses, Hartwell, near Aylesbury	.....	F. Taylor, Architect, 26, Temple-street, Aylesbury	Sep. 12
Works at 3 Houses, Pier-road, Berwick-on-Tweed	.....	J. M. Edney & Co., Sandgate	do.
Iron Fencing, West Mersea, Sussex	.....	J. Ennals, Surveyor, Copford	do.
Road Works, Caldecott Park	Lexden R.D.C.	D. G. Macdonald, Civil Engineer, Rugby	do.
Setts and Kerbs	Rugby U.D.C.	Bruce Gray, Civil Engineer, Town Hall, Selby	do.
Road Metal	Selby U.D.C.	W. J. Taylor, County Surveyor, The Castle, Winchester	do.
Sewerage Works, Lund-road	Winchester Corporation	Surveyor, Theatre-street, Ulverston	do.
Sewers, &c., West-street	Ulverston U.D.C.	J. Whitaker, Surveyor, Worsbrough Bridge	do.
Repairs to Church Spire, Doncaster-road	Worsbrough (Yorks) U.D.C.	City Surveyor, Town Hall, Wakefield	do.
Sewers, &c., Killough, Ireland	Wakefield Corporation	R. L. Morrow, Council Offices, Downpatrick	do.
*Building Works (Extension of Electricity Works)	Downpatrick R.D.C.	Borough Engineer, Town Hall, Croydon	Sep. 14
*Smith and Ironfounder's Work, Electricity Works	Croydon Borough Council	do.	do.
Road Works	do.	M. H. Sykes, Borough Surveyor, Stockton	do.
Twenty Houses, Cwmfelinfach, near Ynysddu	Stockton-on-Tees Corporation	J. Boothman, School House, Ynysddu	do.
Additions to Shops, Dundalk	Cwmfelin Building Club	Engineer, Amiens-street Terminus, Dublin	do.
Thirty-four Cottages, Wolston, near Coventry	G. N. R. Co. (Ireland)	H. Chattaway, Architect, Coventry	do.
Pier Works, Aird Point, Aulthea, N.B.	Messrs. Blummel & Bros.	—. Manners, Civil Engineer, 12, Lombard-street, Inverness	do.
Additions to Electric Power Station, Macdonald-road	.....	R. Morham, City Architect, City Chambers, Edinburgh	Sep. 15
Quay Works	Edinburgh Corporation	D. and C. Stevenson, Surveyors, 85, George-street, Edinburgh	Sep. 16
Surveyor's Materials	Pittenweem Town Council	S. E. Burgess, Civil Engineer, South Shields	do.
Road Works	South Shields Corporation	P. G. Parkman, Surveyor, Town Hall, Hounslow, W.	do.
Water Supply Works, Talgarth, Brecon	Isleworth U.D.C.	R. E. W. Berrington, Civil Engineer, Wolverhampton	do.
*Heating Chamber, &c., at Dundonald-road School	Hay R.D.C.	Thompson & Pomeroy, Hill-road, Wimbledon	Sep. 17
*Destructor Buildings, &c., at Sewage Farm	U.D.C. of Wimbledon	Council's Surveyor, Bromley Hurst, Church-street, Epsom	do.
Lodge at Hospital, Clay-lane	Epsom U.D.C.	B. L. Reynolds, 12, Easton-street, Wycombe	do.
Sewers, &c., Coulsdon and other places	High Wycombe R.D.C.	R. Chart, Surveyor, Union Bank Chambers, Croydon	Sep. 18
Manual Instruction Centres	Croydon R.D.C.	A. H. Bone, Architect, Cambridge Junction, Portsmouth	Sep. 19
Market	Portsmouth Corporation	J. C. Mount, Borough Surveyor, Town Hall, Lancaster	do.
Drainage Works	Lancaster Corporation	E. W. Dixon, Civil Engineer, Harrogate	Sep. 21
*New Engine House, &c., at Knowle Asylum, Fareham	Harrogate Town Council	County Surveyor, The Castle, Winchester	Sep. 22
*Materials, &c., City of London Cemetery, Little Ilford	County of Southampton	Engineer to the Corporation, Guildhall	do.
*New Sorting Office, Muswell Hill, N.	Corporation of London	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	Sep. 23
*Making-up Roads	Commissioners of H.M. Works, &c.	Council's Surveyor, Town Hall, Chiswick, W.	do.
*Sewerage Works	Chiswick U.D.C.	T. Hennell, Engineer, 6, Delahay-street, Westminster, S.W.	do.
*Car Depot, Stores, Repair Shops, &c. (Electric Trams.)	Sevenoaks R.D.C.	Lacey & Sillar, 2, Queen Anne's Gate, S.W., and Manchester	do.
*Public Baths and Washhouses, Plumstead	Swindon Corporation	Borough Engineer, Maxey-road, Plumstead	Sep. 21
Walls, &c., at Cemetery	Woolwich Borough Council	W. B. Johnson & Son, Architects, 31, King-street, Wigan	Sep. 26
Surveyor's Materials	Wigan Town Council	T. F. Berry, Surveyor, Trinity-road, Sheerness	Sep. 28
*Erection of Tenements, Stabling, &c., New Depot, &c.	Sheerness U.D.C.	Borough Engineer, Town Hall, Hampstead, N.W.	Sep. 30
*Underground Convenience in Falcon-square	Borough of Hampstead	Office of the Engineer, Public Health Department, Guildhall, E.C.	Oct. 6
*Terby Workmen's Cottages, Purfleet	Corporation of London	V. Millett, 72, Bishopsgate-street, Within	No date.
Additions to Workhouse	Derby Corporation	C. P. Ayres, Architect, Burvale, Watford	do.
Walling, Cookridge, near Leeds	Watford Guardians	Newsom & Gott, Surveyors, 3, East Parade, Leeds	do.
Schools, &c., Padiham (Lancs)	.....	T. Bell, Architect, 14, Grimshaw-street, Burnley	do.
Additions to Institute, Llanbradach	.....	Teather & Wilson, Architects, Queen-street, Cardiff	do.
Additions to House, Middles Farm, near Consett	The Committee	R. G. Moore, 5, Rosebery-terrace, Consett	do.
Club, Clitheroe	.....	J. C. Howard Sandbach, Architect, 15, Richmond-terrace, Blackburn	do.
	.....		

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Clerk of Works	Colwyn Bay and Colwyn U.D.C.	2*l.* 2*s.* per week	Sep. 8
*Clerk of Works	Derby Corporation	3*l.*	Sep. 14
*Surveyor's General Assistant	Wandsworth Borough Council	2*l.* per week	Sep. 15
*Clerk of Works	Trowbridge &c., Jnt. Isol. Hos. Com.	3*l.*	Sep. 16
*Junior Measuring Clerk	Corporation of London	200*l.*	Sep. 22
*Architectural Draughtsman	H.M. Naval Establishment, Rosyth	Not stated	No date.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, lv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvii.

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PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 1s. 6d each: also

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Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Corent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

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TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER, Catherine-street, W.C

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

TO CORRESPONDENTS.

J. E. L.—J. B.—A. D. G.—E. & C. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is understood, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ABERGAVENNY.—For additions, &c., to Corn Exchange Inn, Gilwern, for Mrs. Edwards. Mr. B. J. Francis, architect, Abergavenny :—

Thos. Morgan, Crick	Lowell £350

ABERTILLERY (Mon.)—For the erection of laundry buildings, stables, &c., for the Abertillery Steam Laundry Co., Ltd. Mr. G. C. Hillard, architect, Market-chambers, Abertillery. Quantities by the architect :—

J. Haberley	£2,347 0 0	E. C. Jordan	£1,893 7 0
Bartrum & Co.	2,037 0 0	D. W. Richards,	
N. Bagley	1,895 6 6	Ltd., Newport*	1,852 0 0

BARKING.—For alterations at the Barking Cross Tavern, for Mrs. Holland. Mr. J. M. H. Gladwell, architect :—

Tall & Sons	£377 0 0	H. Bishop*	£268 0 0
C. North	362 10 0		

BRISTOL.—For the construction of sewers at Horfield for Messrs. Hellier and others. Messrs. Holbrow & Oaten, surveyors, 9, Clare-street, Bristol :—

W. Thomas	£171 15	T. Williams*	£130 8
G. Hedges	152 0		

BRISTOL.—For alterations to No. 392, Gloucester-road, Horfield, for Mr. E. Jenkins. Messrs. Holbrow & Oaten, architects, 9, Clare-street, Bristol :—

F. J. Slade	£148 0	W. Foster	£110 0
E. Preece	128 10	F. Brown*	103 18
C. Jennings	110 10		

BRISTOL.—For the construction of roads and sewers adjacent to Mina-road, Bristol, for Messrs. Hemmings & Cunningham. Messrs. Holbrow & Oaten, surveyors, 9, Clare-street, Bristol :—

Thatcher Bros.	£1,518 0 9
W. & J. Bennett	1,330 0 0
W. Thomas	1,177 0 11
A. Webb	1,038 18 11
G. Hedges*	1,053 0 0

BRISTOL.—For the erection of Council Schools, Wick-road, Brislington, Bristol, for the Bristol Education Committee. Messrs. Holbrow & Oaten, architects, 9, Clare-street, Bristol. Quantities by Mr. J. Maynard Froud, Baldwin-street, Bristol :—

General—T. R. Lewis	£10,035
Plumbing.—G. F. Tuckey	724

CHADWELL HEATH.—For erection of houses situate in Whalebone-lane, Chadwell Heath, Essex, for Mr. F. Flower. Mr. J. M. H. Gladwell, architect, Essex House, High-street, Stratford, E. :—

Death	£4,680	D. J. Deeks*	£3,250
E. Jones	3,370		

CHIPPING ONGAR, Essex.—For building children's homes at Chipping Ongar, for the Guardians of the Hackney Union. Mr. W. A. Finch, architect, 76, Finsbury-pavement, E.C. Quantities by Mr. G. T. G. Wright, 3, Great Winchester-street, E.C. :—

Appleby & Sons	£59,835 0	Johnson & Co.	£49,877 0
Killby & Gayford	57,737 0	H. Lovatt	49,600 0
Perry Bros.	56,890 0	Chessum & Sons	49,325 0
Perry & Co., Ltd.	56 885 0	C. Gray Hill	48 900 0
Shurmur & Sons	56,781 0	Willcock & Co.	48,861 0
A. Porter	56 742 0	Wall & Co.	48,660 0
A. Monk	54,733 0	Thomas & Edge	48,320 0
B. E. Nightingale	53,150 0	Kerridge & Shaw	47,878 0
Ferguson & Co.	52,741 0	Foster & Son	47,444 0
Sheffield Bros.	50,571 0	C. Wall	47,3 0 0
F. & E. Davey	50,469 0	Lawrence & Son	46,957 0
Mallett & Wood	50,223 11	McCormick & Sons, Northampton-street, Essex-road, N.*	45,087 0
Leslie & Co., Ltd.	49,672 0	W. Wallis	45,986 0
Kirk & Randall	49 934 0		

CLEETHORPES.—For the erection of a shelter, &c., in park, for the Urban District Council. Mr. Egbert Rushton, surveyor, Poplar-road, Cleethorpes, near Grimsby :—

W. Ion	£460 0
Wade, Ltd.	410 13
C. W. Dixon, Grimsby*	406 0

CLUTTON (Somerset).—For providing and laying c.i. water mains, &c., for the Rural District Council. Mr. W. F. Bird, C.E., Midsomer Norton, near Bath. Quantities by engineer :—

Chas. Franks	£2,800 0 0	Smith & Son	£1,671 11 2
G. Summers	2,050 0 0	Hall & Roberts	1,610 0 0
Free Bros.	2 301 12 8	Collins & Co.	1,573 13 11
Smith & Marchant	1,842 13 0	Macdonald	1,540 2 5
Bevan & Sons	1,834 12 7	Rutter & Sons	1,453 12 0
Wills & Son	1,796 5 0	Woodward & Co., Gloucester*	1,442 15 10
Harvey	1,088 10 10		
Snow & Sons	1,676 0 0		

COVENTRY.—For the erection of a shop and stores, Harnall-lane East, for the Perseverance Co-operative Society, Limited. Messrs. Harrison & Hattrell, architects, 23, Hertford-street, Coventry :—

W. Yardley	£1,220 0	Goode	£832 0
T. Hancox	1,025 0	R. Wootton	857 0
Hallam & Co.	967 5	C. Gray Hill	850 0
E. Harris*	899 0	[All of Coventry.]	

COVENTRY.—For the erection of six houses, King Edward's-road, for the Perseverance Co-operative Society, Limited. Messrs. Harrison & Hattrell, architects, 23, Hertford-street, Coventry :—

R. Wooton	£1,750	T. Hancox	£1,415
Goode	1,535	Hallam & Co.	1,345
C. Gray Hill	1,730	E. Harris*	1,320
W. Yardley	1,450	[All of Coventry.]	

CROYDON.—For alterations to No. 116, North-end. Mr. A. Broad, architect, 22, George street, Croydon. Quantities by the architect :—

D. W. Barker	£700	Pearson & Co.	£630
W. Potter	699	Smith & Sons, Ltd.	627
E. J. Saunders	680	Hanscomb & Smith	622
Lorden & Son	666	Bulled & Co.	597
Dawson & Son	643	Smith & Sons*	563
Akers & Co.	637		

DEVIZES.—For alterations to Town Hall, for the Corporation.—Mr. F. G. Billingham, Borough Surveyor, 15, Market-place, Devizes :—

R. B. Mullings	£932	Ash & Chivers,	
J. Chivers	825	Devizes‡	£761

‡ Accepted, less £16, work in Assembly Room not to be done.

FERNDALE (Wales).—For additions to 9, Strand, for Mr. C. Oliver. Mr. Edwin Jones, architect, Porth. Quantities by architect :—

T. Lewis	£422 9 9
G. Hallett, 43, Partridge-road, Cardiff*	420 10 0

GUILDFORD.—For the construction of an underground convenience, North-street, for the Corporation. Mr. C. G. Mason, C.E., Borough Engineer, Tuns Gate, Guildford :—

R. Smith	£1,293 0	Streeters & Todhunter	£1,158 10
A. & F. Gammon	1,298 0	Mitchell Bros.	1,138 0
W. G. Edward	1,237 0	Swayne & Son, Stoke-road, Guildford*	1,035
Tribe & Robinson	1,205 0		
R. Wood	1,182 0		

HARROW.—For alterations and additions to premises, High-street, for Messrs. Wright Cooper Bros. Messrs. Cowell & Shaw, architects, 49, Finsbury-pavement, E.C., and Harrow :—

H. Woodbridge	£475 0	Collins & Lee*	£461 8

ILFORD.—For alterations at the White Horse p.h., Broadway, Ilford, for Mr. W. D. Golding. Mr. J. M. H. Gladwell, architect, Essex House, High-street, Stratford, E. Quantities by Mr. L. E. G. Colins, 31, Great St. Helen's, E.C. :—

Todd & Newman	£2,667	J. Maddison	£2,526
Harris & Hardrop	2,549	J. & H. Cocks, Ltd.	2,516

KETTERING.—For the execution of reservoir works, near Thorpe Malsor, for Kettering Urban District Council. Mr. T. Reader Smith, engineer, Market-place, Kettering :—

J. F. Price	£26,549 0 0	Hodson & Son	£20,010 2 2
Dixon & Son	23,984 2 6	S. Wood	19,685 7 6
J. H. Macdonald	22,076 1 8	W. H. Pickin	19,500 0 0
C. Chamberlain	21,564 13 9	Pethick Bros.	18,766 14 7
T. Smart	22,299 0 0	J. Moffatt	18,610 10 1
H. Ashley	22,252 4 0	G. Henson	18,600 0 0
Cooke & Co.	21,866 0 0	Jones & Son	17,254 10 4
G. Young	21,768 6 8	A. Jewell	16,850 0 0
B. Firth	21,173 9 0	W. Cunliffe	15 090 0 0
G. Bell	20,671 0 0	J. Barlow	15,800 0 0

KILMURRY.—For the erection of a shop, &c., for Mrs. J. Murphy. Mr. A. W. Barnard, C.E., Macroom :—

P. Reen	£275 0 0
J. Delaney, Macroom*	250 17 6

KING'S LYNN.—For the erection of a workhouse, Page Stair-lane, for Mr. H. J. Finch. Mr. H. Tilson, architect, Railway-road, King's Lynn :—

W. H. Brown	£382 0	Spragg & Son	£340 0
Read & Wildbur	381 0	Hardell Bros.	339 0
R. Dye	380 0	W. F. Smith	335 0
Knape	368 0	I. Medwell	325 0
R. Shanks, Chatteris	357 0	Tash, Langley, & Co.	325 0
Rennaut Bros.	319 10		

[Rest of Lynn]

KINSALE (Ireland).—For the erection of six cottages, Kilnaglery, for the Rural District Council. Mr. R. Evans, C.E. :—

For Alterations, Additions &c., to House at Kilnaglery.

M. Canty, Carrigaline*	£125
T. McDonnell, Carrigaline*	120

Building Cottage, &c., at Doonavanig.

D. Denchy, Nohoval*	£165

LEYTON.—For combined drainage to ten houses, Lea Bridge-road, N.E., for Mrs. Saunders and adjoining owners. Mr. J. M. H. Gladwell, architect, Essex House, High-street, Stratford, E. :—

H. G. Fryer	£167 0	E. Jones*	£149 0
H. Bishop	167 10		

For Six Houses Ditto.

H. Bishop	£82 0	E. Jones*	£76 15

LLANDILOFAUR (Wales).—For the erection of a bridge near Glanamman, for the Rural District Council. Mr. Evan Jones, surveyor, Glancenen, Llandilo :—

Willie Morgan, Gwynfe	£120—For Berrach Bridge, Glanamman.
Do. do.	380—For Neuadd Bridge, Garnant.

LONDON.—For proposed smithy and engineers' workshops, Wimborne-street, New North-road, Hoxton, for Mr. W. Hurst. Mr. A. W. Hudson, architect, 87, Finsbury-pavement :—

J. & W. T. Inkpen	£1,240 0 0	Lawrence & Sons	£998 0 0
S. J. Scott	1,120 0 0	Grovers & Sons	974 0 0
Hawkey & Oldman	1,032 0 0	E. H. Capon	897 2 5

LONDON.—For alterations at 31, Portland-place, for the Countess of Essex. Mr. F. W. Foster, architect, 41, Bedford-row :—

B. C. Hubble*	£1,875

LONDON.—For new staircases and entrance, with other alterations decorations, and repairs, at the Welsh Congregational Church, King's Cross. Mr. Alfred Conder, architect, Palace Chambers, Westminster :—

Henry Young	£1,787	Lascelles & Co.	£1,252
T. H. & R. Roberts	3 539	Grover & Son*	2,974

LONDON.—For foundations of Clerkenwell Police-court. Mr. J. Dixon Butler Surveyor to the Metropolitan Police, Architect. Quantities by Messrs. Thurgood, Son, & Chidgey, Charing Cross-chambers, Duke-street, Adelphi, W.C. :—

Parker	£3,664	Lawrance & Sons	£2,563
Holloway Bros.	2,749	Ashby & Horner	2,549
Mowlem & Co.	2 685	H. J. Williams	2,517
Holiday & Greenwood	2,635	F. & H. F. Higgs	2,510
Lascelles & Co.	2,617	Shurmur & Sons	2,480
Colls & Son	2,609	Clark & Bracey	2,420
Leslie & Co.	2,603	Grover & Sons	2,399
Lathey Bros.	2,603	Greenwood, Ltd.	2,268

[*See also next page.*

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LONGTON (Staffs).—For the execution of sewage disposal works, for the Town Council. Mr. J. W. Wardle, C.E., Courthouse, Longton. Quantities by Borough Surveyor :—

Nowell & Sons	£9,974	W. Williams	£7,900
J. Byrom	9,849	S. J. Forsyth	6,995
H. P. Embrey	8,306	F. Barke, Stoke-on-Trent*	6,938
P. Dawson	7,592		

MAIDSTONE.—For Mill-street widening (west side). Mr. T. F. Bunting, Borough Surveyor, Borough Surveyor's Office, Maidstone :—

J. Coker	£4,220 3
R. Avard	983 0
Clarke & Epps	942 0
H. J. Smith	889 0
Wallis & Sons	878 0
W. T. Burrows	780 10
Barden & Head*	739 0

[Borough Surveyor's estimate, £767 3s. 4d.].

MANSFIELD.—For making up Brownlow-road, for the Corporation. Mr. R. F. Vallance, Borough Surveyor, White Hart-chambers, Mansfield :—

A. F. Houlton	£1,000 0 0	J. Greenwood	£937 0 0
H. Bennett	978 1 8	H. Ashley	929 0 0
J. Lane	969 10 0	J. Bradley	916 0 0
W. A. Vallance	939 0 0	Lane Brothers, Mansfield*	911 5 0

MANSFIELD.—For the construction of sewage disposal works, Pleasley Hill, for the Town Council. Mr. R. F. Vallance, Borough Surveyor, Mansfield :—

Vickers, Ltd.	£4,375 0	Firth & Co.	£3,555 5
J. Byrom	4,237 10	W. R. Unwin	3,488 13
J. Bradley	3,735 0	Lane Bros., Mansfield*	3,379 16
J. Greenwood	3,607 0		
H. Ashley	3,593 0		

MORLEY (Yorks).—For the erection of three terrace houses, St. Andrew's-avenue. Messrs. Buttery & Birds, architects, Queen-street, Morley :—

Masonry.—Pearson & Ainsworth	£1,287 8 5
Joinery.—Binks & Sons	393 0 0
Plumbing.—J. W. Stakes	184 0 0
Plastering.—Ellis Firth	189 7 7
Slating.—Atkinson & Son	70 4 0

STEVENAGE.—For making up Pasils-road and Grove-road, for the Urban District Council :—

Shrouder & Matthews	£1,683 0	Wallace & Inns, Hitchin*	£872 0
Redhouse & Co.	1,088 0	H. W. Catchpole (withdrawn)	809 0
H. Williams	1,049 4		
D. Meston	997 0		

STRABANE (Ireland).—For the erection of a creamery, Dunnalong. Mr. W. Stuart, architect, Bowling-green, Strabane. Quantities by architect :—

G. Dillon	£230	J. Coulter, Brady, Ellis	£210
	220	Strabane*	

SUSSEX.—For alterations and additions to Old Lodge, Sussex, for the Countess De La Warr. Mr. F. W. Foster, architect, 41, Bedford-row, W.C. :—

Wells, Plumpton* £3,642

WILTON (Wilts).—For the execution of sewerage works for the Rural District Council. Messrs. Lemon & Blizard, C.E., 38, Silver-street, Salisbury :—

R. H. B. Neal	£13,236	G. Bell	£10,859
J. C. Trueman	12,400	A. G. Osenton	10,849
Wort & Way	12,204	M. Bridgman	10,535
Jesty & Baker	12,056	J. Riley, Cheltenham*	10,097
S. Wood	11,935	Tryhorn & Son	9,119
F. W. Trimm	11,839	Webb & Co.	8,797
Cooke & Co.	11,890		

[Engineer's estimate, £10,826.]

WIMBLEDON.—For the erection of two blocks of flats, Queen Alexandra's Home. Messrs. Ernest George & Yeates, 18, Maddox-street, W., and Mr. C. E. Lancaster Parkinson, 44, Bedford-row, W.C., architects. Quantities by Messrs. Young & Brown :—

W. Willett	£27,870	C. F. Kearley	£22,487
Martin Wells & Co.	24,199	Johnson & Co.	22,463
L. H. & R. Roberts	23,977	Simpson & Sons	22,343
Long & Sons	23,620	Carmichael	21,900
F. Britton	23,500	Tennant & Co., London*	20,819
W. J. Renshaw	22,819		
H. L. Holloway	22,518		

YSTRAD RHONDDA (Wales).—For the erection of seventeen cottages, for the Brodringallt Building Club. Mr. Jas. Jenkins, surveyor, Ystrad, Rhondda :—

T. Rees	£205 10	T. Reynolds	£194 5
W. E. Willis	195 0		

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Chief Office :—Norton, Stoke-under-Ham, Somerset.
London Agent :—Mr. E. A. Williams, 16, Craven-street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 41, Poultry, E.C.—The best and cheapest material for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

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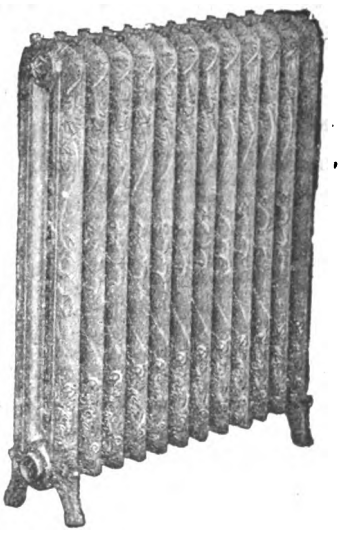

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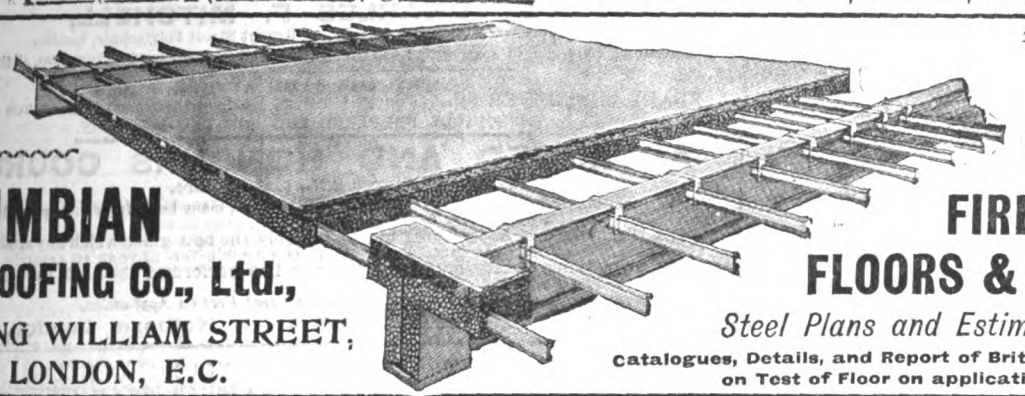

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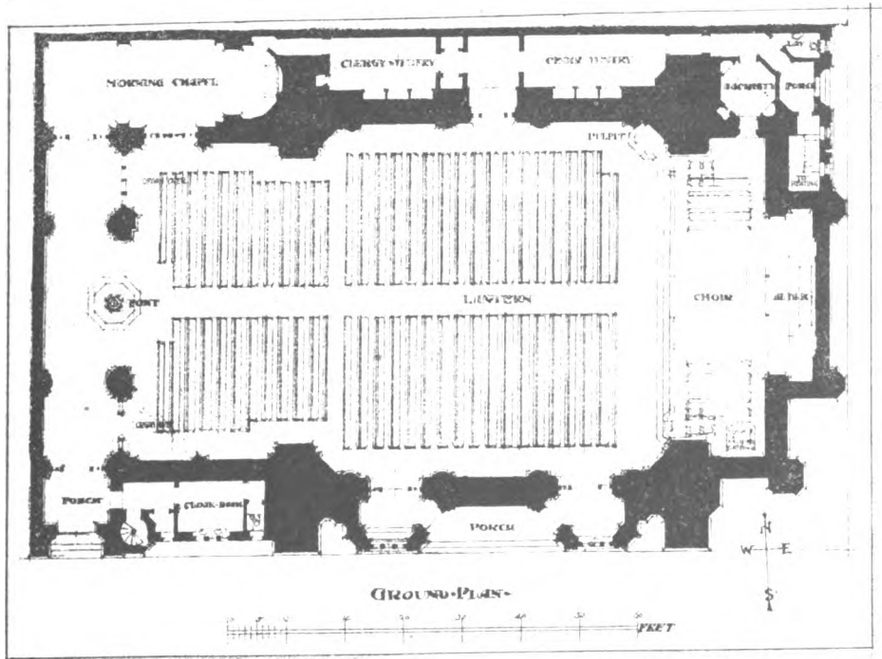

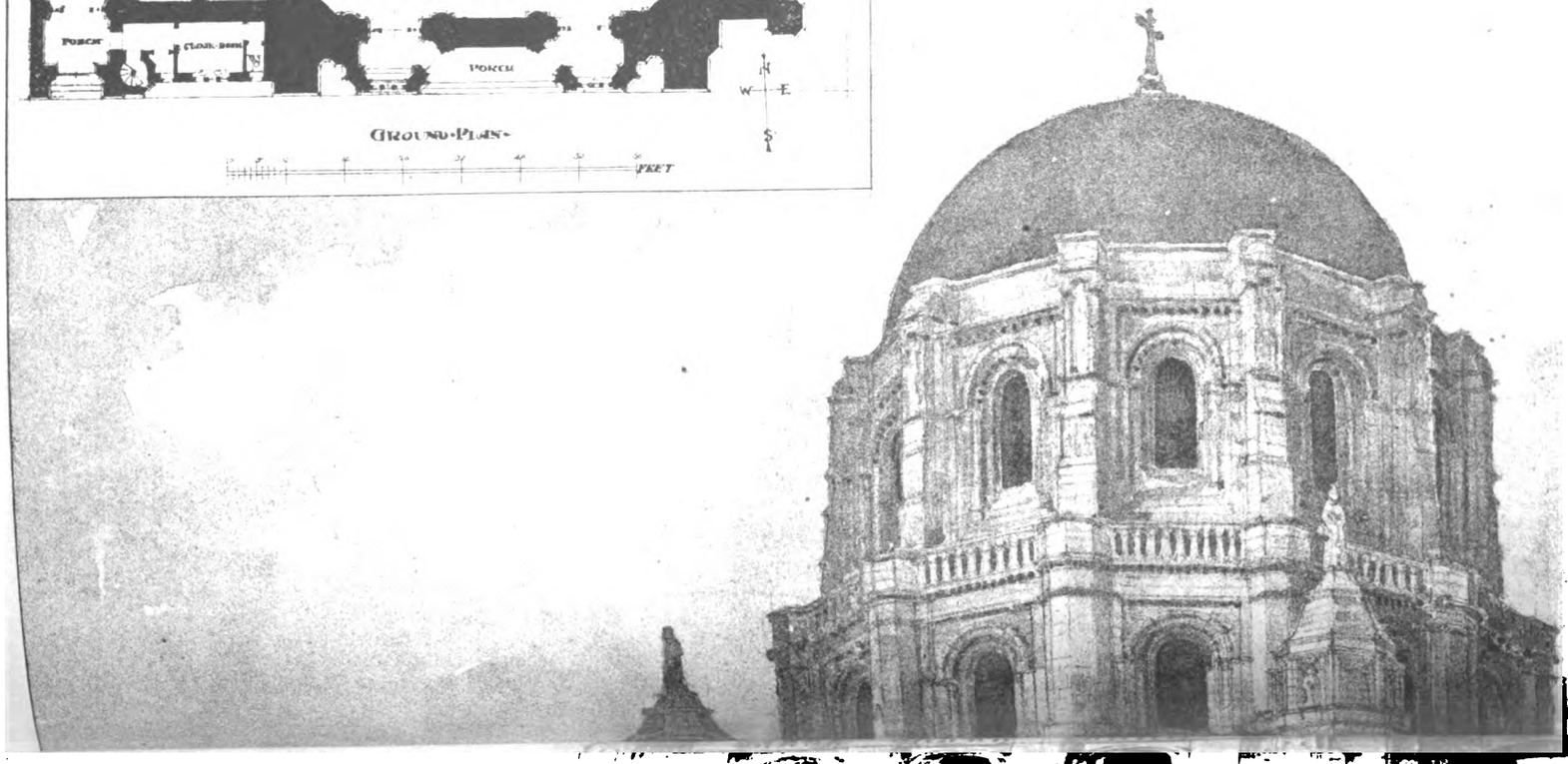

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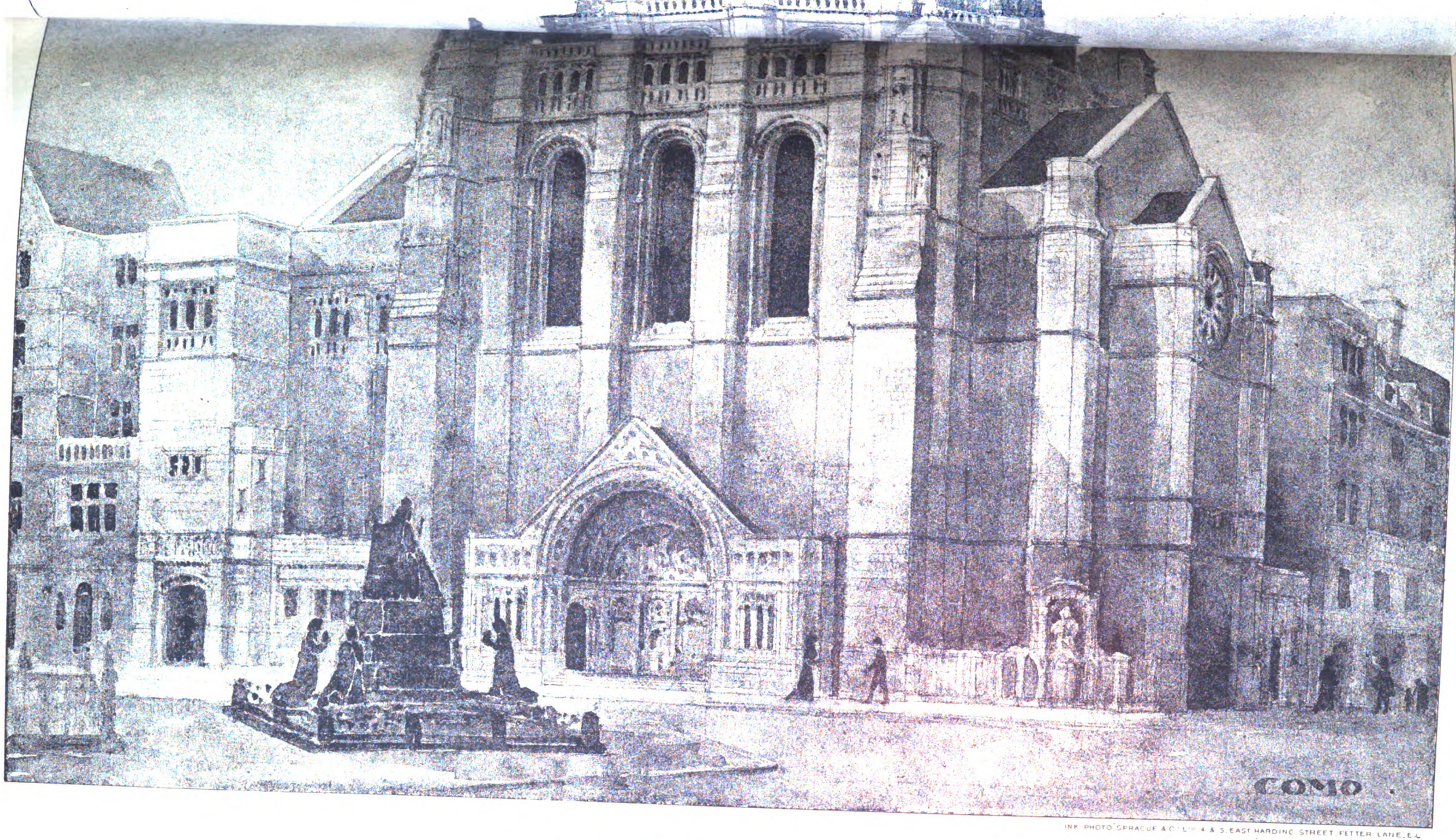

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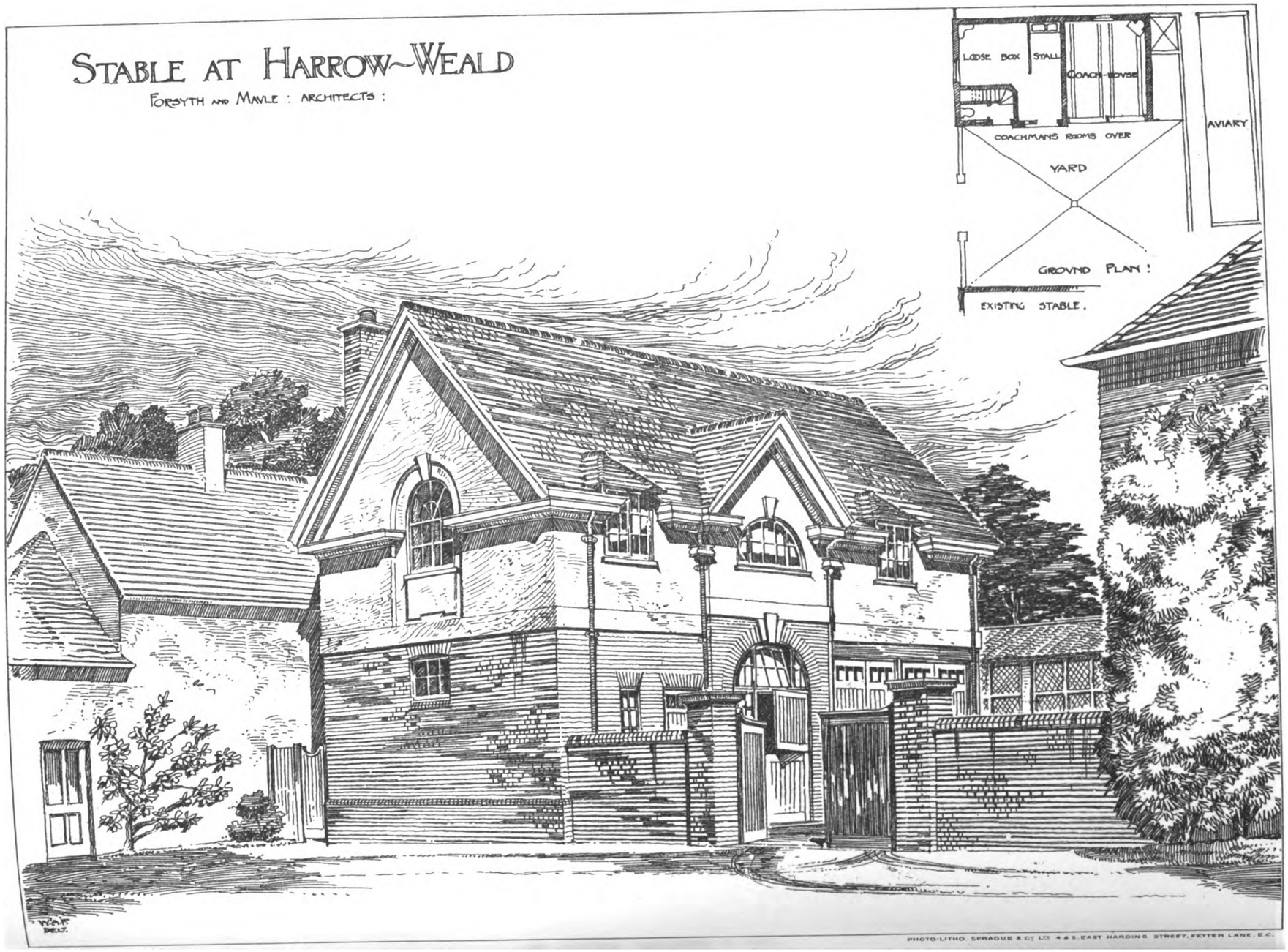

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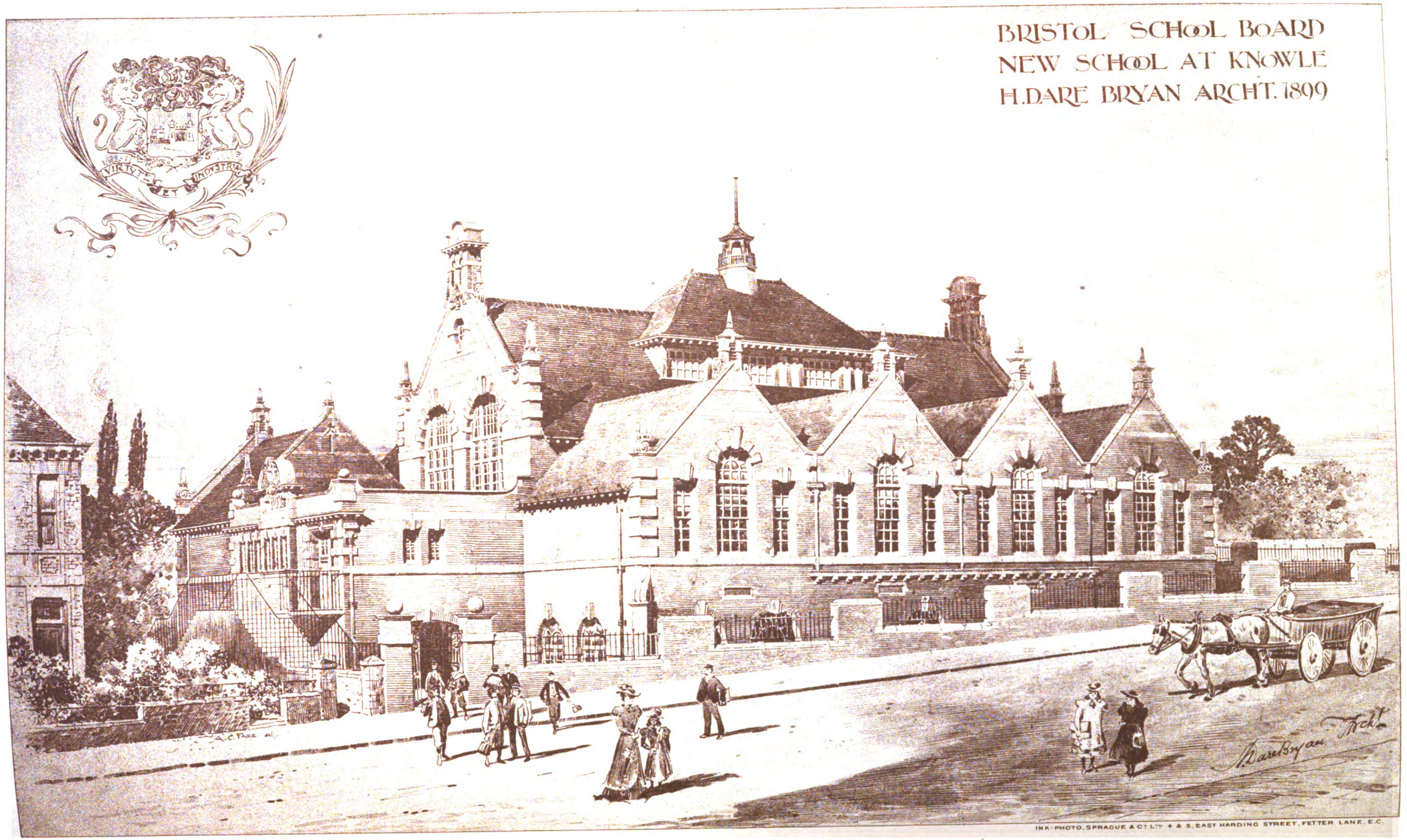

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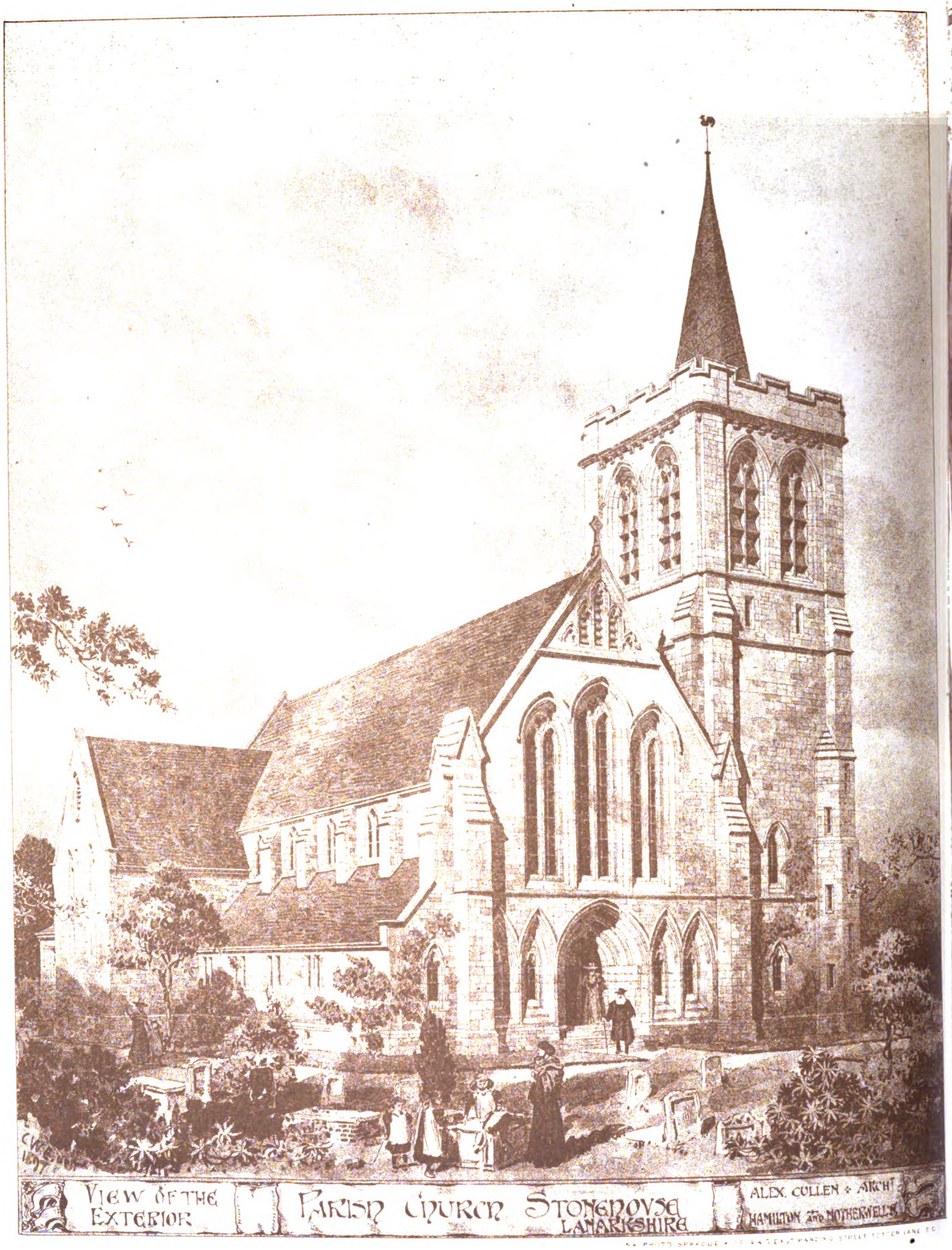

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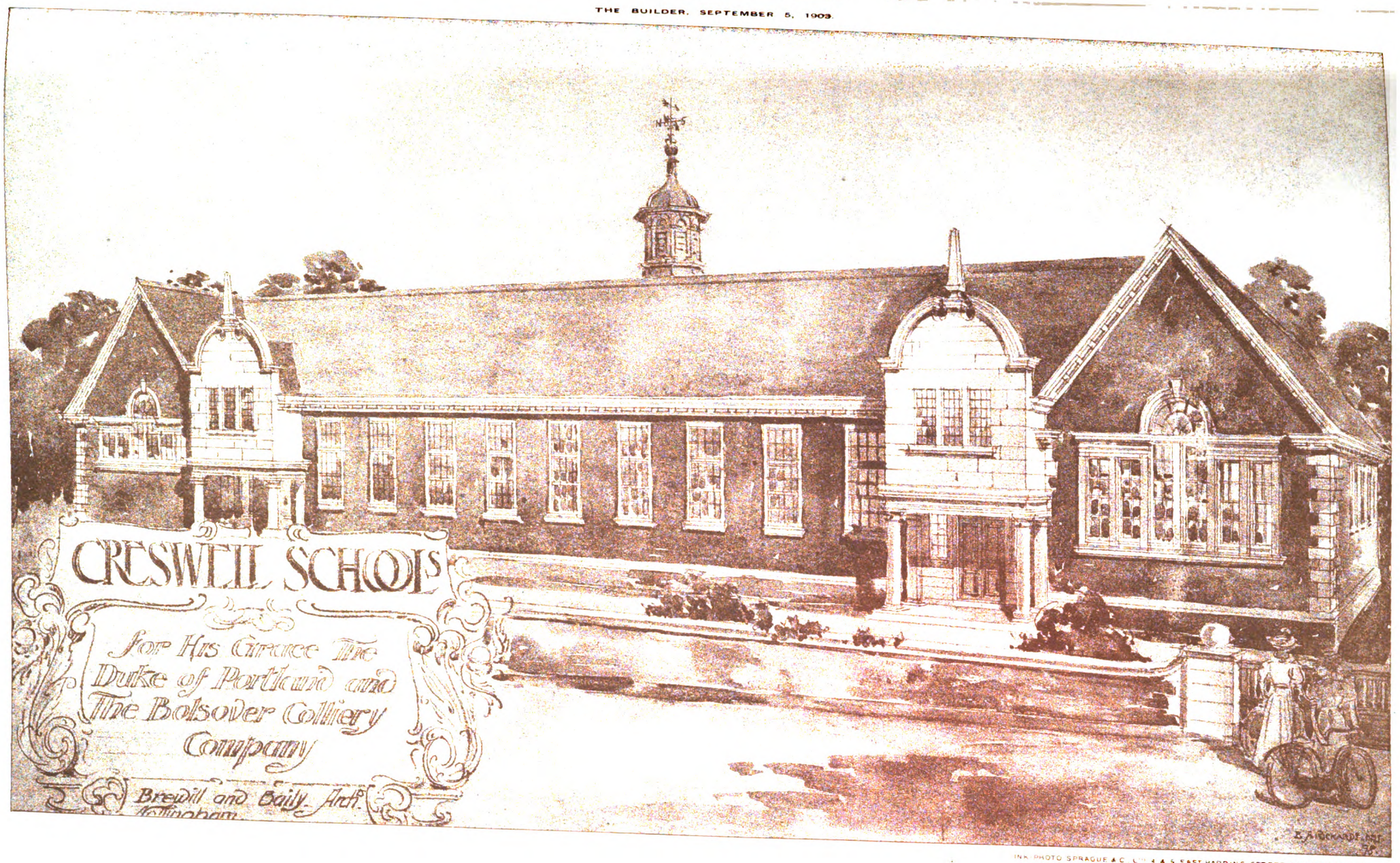

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The Parish Church of Ashburne.

IN one of the earliest chapters of the "Life of George Eliot" occurs the sentence—"Father indulged me with a sight of Ashburne Church, the finest rural parish church in the kingdom." This praise is too high, for there are certainly several parish churches, if not of greater size, of more diversified architecture, and of finer general effect. Nevertheless, the Church of St. Oswald, Ashburne, may with justice be included among the first score of England's parish churches; for the peculiar grace of the central spire, and the beauty of the whole outline, notwithstanding the meagre character of the nave, fully entitle the fabric to the title of "The Pride of the Peak," which was conferred on it towards the beginning of the last century.

The general charm of the church, in part owing to its situation, has long ago been recognised. Ray, in travelling through Derbyshire in 1658, though he had complained of the condition of Derby's five churches, which he found "decayed and ready to drop down," on reaching Ashburne, wrote, "There is a very fair church, built cathedral-wise." In the next century it was described and roughly illustrated both in the *Gentleman's Magazine* and in the *European Magazine*. Dawson and Hobson's "History of Ashburne," a creditable work, published in the "thirties" of last century, supplied two interesting engravings of the church in its old state, one of the exterior and the other of the interior. This was followed by the large folio publication of the Rev. S. T. Mosse, then curate of Ashburne, with poor letterpress, but a variety of lithographed plates showing the results of the "restoration" of 1840. The British Archæological Association visited Derbyshire in 1851, and a good paper on this church appeared in their journal of the following year. The early history and description of this church form a prominent feature of the second volume of the Rev. Dr. Cox's "Churches of Derbyshire," issued in 1877. Since that date a paper on the records of the church, and an account of restoration work, were contributed to the Derbyshire Archæological Society's Journal by the late Rev. F. Jourdain when he was vicar of Ashburne.

Notwithstanding all this, the history of this church, both in records and in stone, is so exceptionally full and interesting that it is well worthy of a monograph, which yet remains to be written. Its history, for our present purpose, may be condensed into a single paragraph.

A church and a priest of Ashburne are named in the Domesday Survey. A few years later (1093) William Rufus gave the church and its numerous chapelries to the cathedral churcl. of Lincoln. In the following century an early vicarage was here established, but the vicar took all the emoluments on condition of paying an annual pension of 100 marks to the Dean of Lincoln. In 1241 Bishop Patishull modified this arrangement, made elaborate provision for the nine important chapelries (all of which, save one, had been for a long period independent parishes), and provided that the vicar should personally reside, and serve the great central church of Ashburne, with a staff of two chaplains and a deacon and sub-deacon. Henry III., towards the end of his reign, seized on the advowson of this church, and gave it to the abbey of Vale Royal; but Edward I., in 1277, restored it to Lincoln. From that date until early in Victoria's reign, when the advowson was transferred to the Bishop of Lichfield, the patronage of Ashburne remained with the Lincoln chapter. Within the church were two important chantries founded in the fourteenth century.

The church consists of a large chancel of four bays; north and south double transepts; and nave, with south aisle, of four bays. From the central piers rises a fine tower, surmounted by a spire which attains to a height of 210 ft. The chancel is 65 ft. by 25 ft., the total length of the church 180 ft., the transepts are 85 ft. by 40 ft., and the width of the nave and aisle 50 ft.

Of the Saxon church, and of its successor, given by William Rufus to Lincoln, there are now no remains, save that of the Norman structure there are a considerable number of stones in the present fabric that bear the unmistakable marks of Norman axeing. These can be best noticed in the interior of the central tower, where the stones of the Norman church were freely used; here, too, at least, five fragments of Norman moulding can be detected. A large number of Norman moulded stones were also found in the restorations of 1840 and later dates.

The chancel and transepts were rebuilt on a fine scale in the first half of the thirteenth century. This is one of the very few cases in which a dedication inscription has been preserved, whereby the exact date of the completion of an important architectural work can be settled. A small brass plate, beautifully engraved with a short inscription in Lombardic capitals—which has often been carelessly transcribed—states that:—

"Anno ab incarnacione Domini MCCXLI. viii kl. Maii dedicata est hec ecclesia et hoc altare consecratum in honore Sancti Oswaldi regis et martiris a venerabili patre domino Hugone de Patishul, Coventrensi episcopo."

There can be no doubt that this plate was originally fixed to the high altar or on the wall near by; but after a temporary sojourn at Ashburne Hall, and after having been fastened in two different positions in the centre of the church, it is now to be found inappropriately placed in the sacristy of the south transept.

This Early English work, completed about the end of 1240, was probably begun, as Parker in his "Glossary" conjectures, about five years earlier. It synchronises with some of the very best work of the period, such as the presbytery of the cathedral church of Ely, part of the west front of Peterborough, the church of St. Neots, Huntingdon, and the choir of the Temple church. Although Ashburne lacks some of the elaboration of design distinctive of these masterpieces, still enough remains to show the peculiar elegance and refinement of the work here accomplished at the cost of the chapter of Lincoln Minster.

By far the greater part of the walls of the whole church, save nave and south aisle, are those that were consecrated by Bishop Patishull in April, 1241, though in various places pierced with windows of a later date. On each side of the chancel are three pairs of coupled lancet windows, 21 ft. in height. The buttresses and base-moulds are also effective examples of the style; they have been considerably but carefully restored. The priests' doorway in the third bay on the south side is part of the original work, though the jamb-shafts were spoilt by bad

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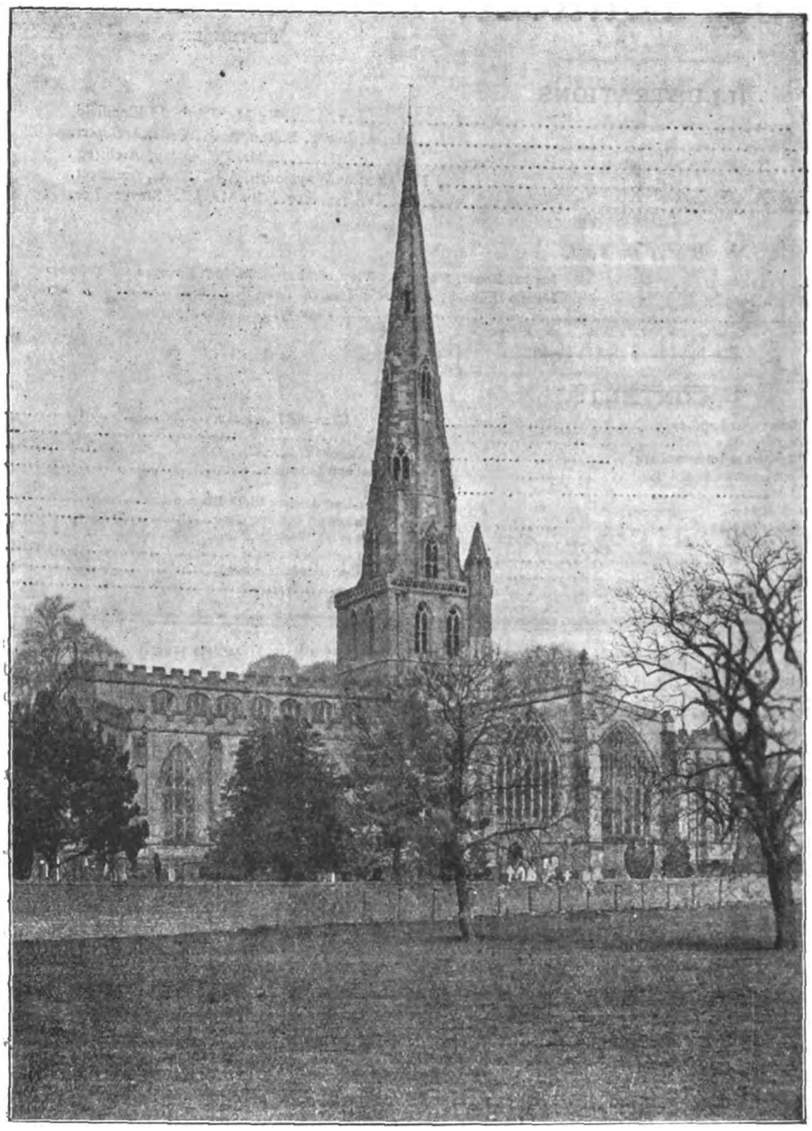

Ashburne Church: from the South-west.

restoration in 1840. A low blocked-up doorway should be noticed in the second bay on the north side; this probably led into a small sacristy or treasury, of later addition, but which long ago disappeared. In the east wall of the north transept are two good windows of triple-lancet formation; the west wall of this transept also retains the original lancets. On the east side of the south transept triple lancets, of which there is some slight trace, remained till early in the eighteenth century. On its west side the original lancets still remain, though partially blocked up by the later south aisle of the nave. The south entrance to this transept is a fine example of Early English work, having the characteristic dog-tooth ornament carried round the dripstone and downward between the jamb shafts. To this period, too, belongs the font, which, after many movings, has now found a resting place at the west end of the south aisle. The font is a fairly good, but not elaborate, specimen of the style; it stands 3 ft. 4 in. high, and the bowl has a diameter of 2 ft. 11 in.; it is engraved in Paley's "Illustrations of Baptismal Fonts."

It is quite clear from a careful study of this building, compared with its records and the accounts of the various restorations of last century, that there stood here, in Norman days, a fair-sized cruciform church with a central tower and of good proportions. The present tower-piers shown on the plan have a kernel of earlier Norman work; the nave would be about the length of its successor; the transepts, with perhaps apses on the east, would be only the same width as the low central tower or lantern, and the chancel would not extend further than about the first bay of that which is now standing. The work that was carried out *c.* 1235-1240 brought about the erection of a chancel and transept on a much more imposing scale. The high altar being moved considerably further to the east necessitated the reconsecration of 1241. The Norman nave, which must have been aisleless from the extent of the thirteenth-century work and windows on the west sides of the transepts, would be used for divine worship during the rebuilding of the rest of the fabric. It was probably in good repair, and there was no immediate idea of carrying out the new plan in that direction. There can be no doubt that the building of a central tower was intended to be at once taken in hand, but certain circumstances arose that hindered its execution for a considerable period.

In the case of Ashburne, of whose church there are so many records among the valuable capitular muniments of Lincoln, the written history illustrates the history in stone after a most interesting fashion. The skilled ecclesiologist has no difficulty whatever in deciding from the details of the fabric that the nave, with its south aisle, was the gradual work of the days of Edward I., begun in the north wall nearest to the transept, about thirty or forty years after Hugh Patishull's consecration. Now the records tell us that Henry III. claimed the advowson, and made an illegal appointment in 1260, notwithstanding the very handsome bribes held out to him from Lincoln. In 1269 the church was re-bestowed on a distant abbey, and it was not until 1278 that Edward made formal restitution of Ashburne to the Lincoln chapter. No one would expect that any further work at the fabric would be taken in hand during this period of distraction; and what is more natural than that the Lincoln authorities should be ready to signalise their resumption of the charge of this important preferment in 1278 by again finding funds for certain extensions?

The idea at first seems to have been to simply build a nave in the newer style on the Norman lines, so as to gain greater light and afford more scope for the display of painted glass; but before the work was finished, or soon afterwards, it seemed desirable—perhaps some benefactor found special funds for the object—to increase the nave accommodation by the addition of a south aisle. This was effected about the close of the thirteenth century, or beginning of the fourteenth, with the result of somewhat spoiling the south transept. The four niches between the windows on the north side of the nave should be noticed; two of them have trefoil and two cinquefoil heads. The lines of a north doorway, blocked up in 1840, can be traced below the second window from the west end. The windows of the south aisle mark a distinct advance on those of the north side of the nave, and are of a decidedly Decorated style. The second one from the west is modern imitation, and supplies the place of a large two-storied porch—a feature sadly lacking in the present structure—which was unhappily destroyed during the 1740 alterations.

Other work of the Decorated period, pertaining to the earlier part of the fourteenth century, may be noticed elsewhere, as in the two windows inserted in the west bays of the chancel. The two north windows of the north transept are of this period, though of different dates; the later of the two, that towards the east, is of rather poor design, but the other one is a really beautiful example of reticulated tracery. The doorway below this beautiful window is of debased and imitative design. Above the Early English doorway of the south transept already mentioned is an exceptionally fine seven-light window of the latter part of the reign of Edward III.; it has been compared with the great window of Melton Mowbray church, Leicestershire, but its proportions are not of the best, as it lacks length, owing to its position over the doorway.

The special feature, however, of the earlier Decorated work of this church is the central tower and spire. The tower with its fine double belfry windows arises to a considerable elevation above the building. The newel staircase is in the south-eastern angle, which is surmounted by a lofty crocketed pinnacle. The parapet of the tower, renewed after the old design, is effectively pierced with a trefoil pattern. From within this parapet rises the lofty octagonal spire of exceptionally graceful proportions. The moulded ribs that run down the angles of the spire are enriched with the ball-flower ornament; it is pierced with twenty windows, in five tiers of four. It has often

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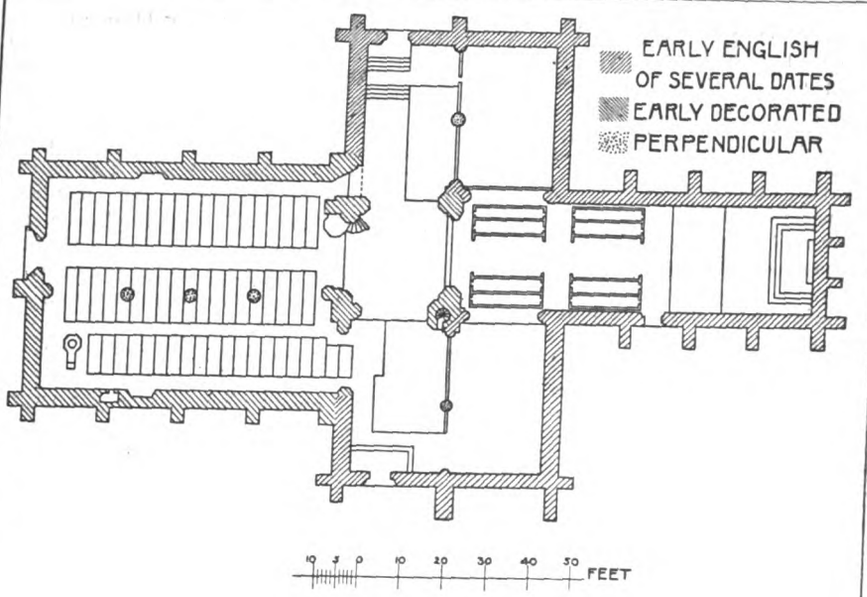
suffered from its exposed position, and the few feet at the summit have been several times renewed; nevertheless, in its main features it is practically the same spire as that which left the builders' hands six centuries ago. Dr. Pegge, in his MS. collections at the Heralds' College, tells of serious damage that was done to the tower and spire in a gale of wind in February, 1698. The most extensive repair to the spire was in 1706, when 21 ft. of the summit was renewed.

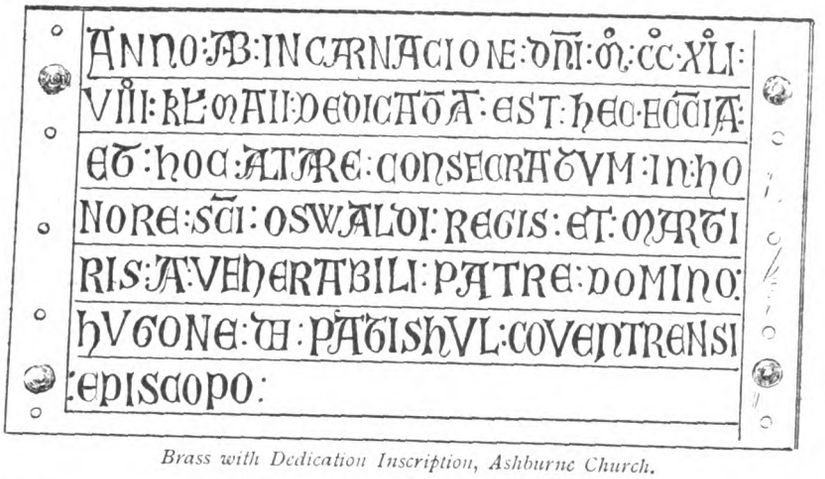
The church gives considerable evidence of alterations during the fifteenth and early sixteenth centuries. The old high-pitched roofs, plainly shown by the weather mouldings on the tower, were removed; the walls of chancel transepts and nave raised 3 ft.; ranges of square-headed windows inserted above the old ones in the north transept and in the clearstory of the nave; and the whole fabric recovered with the almost flat roofs of the Perpendicular style. On the south side of the south transept, in the eastern portion, is an effective Perpendicular window of seven lights. There can be but little doubt of the exact date of this window, for the Bradburne choir was founded in this part of the church in 1483. The great east window of the chancel, also of seven lights, is of very similar design. The great west window of the church was a much poorer style, probably *temp.* Henry VIII.

With regard to repairs of the eighteenth century, memoranda in the registers state that the nave roof was all made new, both in timber and lead, "from the steeple to ye great western window, in 1706"; that the Bradburne choir was renewed about 1710, and "the south end of the crossile" rebuilt in 1720.

The building endured a whole series of restorations during the nineteenth century. In 1839-40, 4,000*l.* was spent on the church; this great sum (for that period) was chiefly raised through the energy of Mr. Moore, at that time curate of the parish. There is no doubt that the comparatively poor taste and small knowledge of these renovators did certain mischief to the building, and there was not a little vandalism in connexion with monuments; but it should not be forgotten that they accomplished a most beneficial work in sweeping away many abuses that made the church of Ashburne a special scandal even in the earlier times prior to 1840. When Mr. Moore became curate in 1830, "the church was cold, damp, deserted, and deformed. The two elegant Early English windows to the monumental chapel, and all the lancet windows on the north side of the chancel, were closed up with masonry .... The chancel was completely cut off from the nave and aisles by a coarse screen of lath and plaster encompassing the organ; and eleven different flights of steps led to as many cumbrous lofts, one of which on the north side of the nave the late learned Bishop Ryder called 'the sixpenny gallery.' The approach to this was extremely grotesque; a viaduct of brickwork was constructed on the outside, and those who came to worship entered through the upper part of a handsome window, the mullions forming the casement of the door." The worst work of 1840, although the multiplicity of deforming lofts were cleared out of the nave, was the insertion of side and west galleries in the nave, supported on iron girders; they cut the windows in two and did other damage to the fabric.



Plan of Ashburne Church.



Brass with Dedication Inscription, Ashburne Church.

In 1876-8 the chancel underwent restoration at the hands of Sir Gilbert Scott. The vicar, churchwardens, and leading inhabitants signed a petition to Mr. Errington, the lessee of the great tithes, who was finding the funds, begging that the high-pitched roof might be restored, but Sir Gilbert refused, and the high blank walls above the lancets still remain. There was much to be said on both sides, but certainly the beauty of the chancel must have been far greater in its original proportions. The incongruity of this has been made all the more manifest on the north side, for, under the direction of the Rev. F. Jourdain, then vicar, the double high-pitched gables over the north transept were replaced, in accordance with the tower weather mouldings, in 1879-80. It was almost a pity to do this unless the chancel was to undergo like treatment.

In 1881-2 considerable works were undertaken under the immediate direction of Mr. Jourdain, which much altered and in many ways improved the building and its interior effects. The galleries were removed from the nave, and the handsome arcade between the nave and the south is now well seen. The undignified west window, prolonged in 1840, was removed, and a window of five lights, intended to harmonise with the north windows of the nave, took its place. A west doorway of considerable magnitude, 14 ft. high by 7 ft. wide, was introduced into the west end of the church, designed from fragments that had been built into the walls by the 1840 restorers when that doorway was abandoned; but it is doubtful whether these were not in reality the fragments of the entrance to the south porch removed at the same time. Care was taken to insert this doorway, though somewhat awkwardly, so that "the worshipper who enters by this doorway finds himself, in spite of the irregularity of the building, exactly opposite to the altar." A good deal was sacrificed and much ingenuity exercised to produce this effect, and to ensure, at the cost of other awkward irregularities, an absolutely straight line from the west door to the centre of the high altar at the far end of the long chancel.

In the south wall of the chancel are three sedilia of thirteenth-century execution, with a small piscina under a trefoil niche. In the north wall, opposite the sedilia, is a sepulchre recess, with a richly ornamented arch and crocketted pinnacles of fifteenth-century date. It was doubtless designed to serve for the Easter sepulchre rites, and at the same time probably served, as was not unusual, for the tomb of a benefactor. The supposition, based on tradition, that here Robert Kniveton, who died in 1471, was buried is most likely correct.

In the south wall of the south transept is a double piscina, now much restored. In the north wall of the north transept or Lady-chapel is a curiously carved stone bracket of Early English date with a face or mask of almost Egyptian type. Here probably stood

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an image of St. Modwin. Sir Thomas Cokayne, by will of 1357, left his body to be buried "in the Church of Hassheburn in my Lady's choir before the image of St. Modwin."

It is in the eastern half of this transept that the Cokayne and other interesting monuments are to be found, enclosed within a parclose of Decorated design. The Cokayne monuments are exceptionally fine, and well worthy of close examination by those who are students of England's former schools of sculpture. There is hardly any other English family of note that can boast of such a series of monuments, extending for more than two centuries from the reign of Edward III. to the close of Elizabeth. The one of the series that is missing, Thomas Cokayne, 1488, has his monument at Youlgreave. These monuments owe much to the late Mr. Andreas Cokayne, who has given an exhaustive account of them in the exceedingly rare and privately printed second series of "Cokayne Memoranda." Mr. Cokayne was a good deal ridiculed by some for the heraldic and other restorations of these tombs, and for giving new noses and toes to the effigies; but, on the whole, the work that he accomplished some thirty years ago was well done, and will probably result in the preservation of these memorials for centuries yet to come.

The ancient family of Cokayne settled at Ashburne about the middle of the twelth century, and there they continuously resided and flourished till towards the close of the seventeenth century. The oldest monument now bears the alabaster effigies of John and Edmund Cokayne, father and son, the younger of whom was killed at the battle of Shrewsbury in 1404. The second has the alabaster effigies of Sir John Cokayne (Edmund's son), who died in 1477, and his first wife. The third is an inscribed alabaster slab to Sir John Cokayne, son of the last named, who married a Vernon of Haddon, and died in 1505. Thomas, their eldest son, is buried, as already mentioned, at Youlgreave. The fourth commemorates Thomas's son, Sir Thomas Cokayne, one of the most celebrated of the family, and his wife, Dame Barbara; he was knighted on the field of battle by Henry VIII., at the siege of Tournay, and was the author of "A Treatise on Hunting." Sir Thomas and his wife are portrayed in incised effigies on a raised slab of alabaster, bearing this inscription:—

"Here lieth Sir Thomas Cohayne
Made Knight at Turney and Turwayne
Who builded here fayre houses Twayne
With many profettes that remayne
And three fayre parkes impaled he
For his successors here to be
And did his house and name restore
Whiche others had decayed before
And was a Knight so worshipfull
So veertuous wyse and pitifull
His deeds deserve that his good name
Lyve here in everlasting fame.
Who had issue iij sonnes iij daughters."

Sir Thomas Cokayne died in 1537, and was succeeded by his son Francis, who only survived his father for a year. In memory of Francis and Dorothy, his wife, there are good brasses, which have been carefully restored. The last of these monuments is the stately mural monument to Sir Thomas Cokayne, son of Francis, and his wife Dorothy, daughter of Sir Humphrey Ferrers, of Tamworth; he died in 1544.

In the south transept was the Bradburne chantry, and the burial-place of that family. One of the worst features of the 1840 restoration was the wanton treatment of the Bradburne tombs. Up to that date there were three raised tombs of that family in a parclose separated by a screen from the western half of the transept. The best of these, with two graceful but mutilated effigies, probably to John Bradburne, the founder of the chantry, and his wife Anne Vernon, was carried across the church to the opposite transept. At the same time the two other tombs, to their hopeless confusion, were absolutely knocked into one and also removed. Mr. Morse's own words are—"To obtain room during the recent alterations, these two monuments were removed to the south of the transept, and now appear as one tomb."

In the south transept there are also many memorials of the Boothby family, who purchased the Ashburne Hall Estate of the Cokaynes in the time of Charles II. One of these is the sculpture of the Sleeping Child, by T. Banks, R.A., to the memory of Penelope, the only child of Sir Brooke Boothby, who died in 1791; there are pathetic inscriptions in Latin, English French, and Italian.

There are some slight remains of old painted glass in the north transept. Elias Ashmole noticed a considerable display of heraldic glass in this church in 1662, but much of that which escaped the Puritanic violence of the sixteenth and seventeenth centuries fell a victim to the slothful neglect of the eighteenth and early nineteenth centuries. There are, however, twenty old coats in the upper lights of the great east window.

There is a new low screen at the entrance to the chancel and brass gates; but the chancel would be immensely improved in general interior effect by the re-erection of a lofty canopied screen, of which there used to be abundant traces in the stonework. The choir stalls are new, but some of the old ones of late fifteenth-century design, which were discarded in 1840, have been recovered, and are now in the south transept.

At the west end of the church various traces of bullet marks of a skirmish during the Great Civil War still remain; and in the sacristy is a small cannon-ball that embedded itself in the church tower in 1644.

NOTES.

The British Association Address. It has been a not uncommon course for the President of the British Association, when he happens to be a prominent exponent of some important branch of science, to make his address a kind of summary of the history and present position of his own science. Had Sir Norman Lockyer done this, we should have had no doubt a very interesting and masterly exposition of some of the leading problems of modern astronomy; and we confess that we should have been more interested in hearing him on this subject than on the general plea for the extension of university teaching and opportunity which formed the main subject of his address. It is an important subject, but one on which much has been said of late; and though Sir Norman Lockyer helps to drive the nail in by repeating the warning that trade follows brains, and that we have shown a false economy in respect of technical education and thereby allowed other nations, the Germans especially, to get the advantage of us, it hardly required a British Association meeting to deal with so obvious a truth. However, we may hope that the address will have some practical result, in preparing the country and the Government for a more liberal policy in regard to national technical education.

The Iron and Steel Institute. At the summer meeting of the Iron and Steel Institute, last week, several interesting subjects were introduced for discussion. The heat treatment of steel is a question at present occupying much of the attention of metallurgists and engineers, and in a paper on "Sorbitic Steel Rails," Mr. J. E. Steed showed how certain desirable qualities may be secured by converting the constituent "pearlite"—carbide of iron in association with iron—into what is termed "sorbite." This is effected by heat treatment, and not by altering the constitution of the material. When heated to a certain temperature, the carbon contained in the steel dissolves into the iron, and although the cause is not known, the result appears to be that the steel becomes more completely homogeneous. This treatment is recommended by the author for steel tyres, axles, bolts, and other objects. For the production of sorbitic rails, re-heating is not required, as the heads are quenched to the critical temperature as soon as they are sawn to length. The result is said to be an increase in strength of from 37 tons tenacity for the normal rail up to 45 tons for the sorbitic rail. The wear is also greatly in favour of the latter, and the author believes the improvement will be as much as 50 per cent. A paper read by Mr. C. H. Ridsdale on the "Diseases of Steel" opened up a very large field for discussion, the object of the author being to collate various types of faults and defects to which steel is subject, and to append some of the main data known as to peculiarities of the metal. There is no doubt a great deal to be learned upon this subject, but at the present time the best safeguard for the engineer is to insist that the steel maker shall supply steel of a certain analysis from which he knows trustworthy material will result. Among other papers we may refer to one upon "Weldless Steel Tubes," by Mr. Ehrhardt, of Dusseldorf. Our readers are, of course, aware that steel tubes of moderate diameter can be obtained without difficulty in this country, but it is not so generally known that tubes or cylinders are now being made in Germany up to 8 ft. in diameter, and 10 ft. in length. Such cylinders are admirable for steam boilers, and other plant, owing to the avoidance of riveted joints, which always constitute an element of weakness and possible leakages. The chief difficulty in the way of making large diameter pipes and cylinders was the piercing of ingots of large diameter and considerable length, as a preliminary to rolling out in the mill. This has been surmounted, and it is stated that seamless rings can now be produced more cheaply than welded or riveted rings.

The Metric System. A CANVAS has recently been made among the members of the American Society of Mechanical Engineers as to the desirability

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of adopting the metric system. Over 500 members voted, a large proportion being distinctly opposed to any change, the objectors being about equally distributed among all the classes taking part in the inquiry. A series of questions were asked, the members being classified in groups—such as railroad men, draughtsmen, mechanical and consulting engineers, teachers, and miscellaneous business men. The most practical question was, "Would the substitution of the metric system for the English be detrimental to your business?" There were 242 replies in the affirmative, and 145 in the negative, while eighty-nine members replied that it would be an advantage. It is instructive to note that the mechanical and consulting engineers voted as under on this point:—"Would be detrimental," 56; "would not be detrimental," 47; "would be an advantage," 28; while the votes of the miscellaneous business men on the same questions stood at 125, 47, and 25 respectively. Even the teachers voted with the majority, averse to any change; and, altogether, the result of the canvas must be rather unpleasant reading for advocates of the metric system.

Railway Amalgamation. We took the occasion to point out last year (27th December) that co-operation between rival companies in facilitating through passenger traffic from one system to another would lead to large increase in passenger receipts; the present obstructive policy of rival companies discourages the travelling public, and is a policy injurious to the railway companies themselves. It is, however, a principle so ingrained in railway management that it seems ineradicable. A notable example of this false policy is to be found in the action of one of the Southern companies, which, although it professes to have amalgamated two rival systems, has failed to amend its time tables, thus rendering passage from one part of the system to another as difficult as it was when the two companies were engaged in keen rivalry. The sooner the shareholders of all lines draw the attention of their boards to the advantages to be gained by co-operation in passenger traffic, by so much sooner will the dividends increase, and the risk of competition also be lessened.

Carriage of Goods by Electric Tramways. Some of the questions involved in the carriage of goods by electric tramways are discussed in an interesting paper by Mr. A. H. Gibbings which has just been published in the Journal of the Institution of Electrical Engineers. The electric tramway system of South Lancashire is a very important one, and Liverpool, Blackburn, and Manchester are all linked together by it. Mr. Gibbings gives illustrations of two forms of trucks which should prove adequate for all purposes. One is an American express car suitable for conveying miscellaneous goods, and the other is a novel form of car with detachable top which can be removed bodily by means of a crane in a somewhat similar manner to that adopted by the South-Eastern Railway Co. in conveying passengers' luggage to the Continent without unloading. Such a system of goods conveyance would prove lucrative to the tramway company, and would be appreciated by manufacturers. It seems to us that very special precautions would have to be taken when a motor-truck and trailer—weighing together about 30 tons—were going down an incline, and the most powerful magnetic track brakes would have to be provided. In single-line sections, also, some system of automatic signalling with semaphores and red and green lamps fixed to the trolley standards would have to be adopted, as it would be hardly feasible to keep signalmen on duty all night at every turn-out. An automatic system of signalling has been in operation on the Portsmouth tramway for a year, and several tramways have adopted a system of automatic cut-outs when their lines run through level crossings. In the latter case, the mere closing of the railway gates cuts off the current from the trolley wire for a certain distance on either side of the crossing. An influential committee has been formed in furtherance of a general scheme of goods conveyance by electric tramways in South Lancashire, and as it seems to us that this method of conveyance will be quieter and more expeditious than the present horse-lorry system, we wish the committee success.

Portland Slag Cement. In a recent United States Consular Report it is stated that the manufacture of Portland cement from blast-furnace slag and limestone in Germany and Belgium has proved successful, and that negotiations are now being carried on to establish the industry in England. It is claimed that Portland cement can be manufactured more cheaply from slag and limestone than from the materials at present employed; and that, owing to the uniformity in the composition of the slag, the finished product is less liable to variations in composition, and is therefore more trustworthy. Mortar made with slag cement in the proportion of three parts sand with one part cement had a tensile strength of 383 lbs. per square inch after seven days' hardening, and a strength of compression of 3,880 lbs. per square inch. After twenty-eight days the strengths had increased to 551 lbs. and 5,441 lbs. respectively.

The Consistency of Concrete. Comparatively few experiments have hitherto been made upon wet and dry concrete, and owing to the lack of data on the subject a series of experiments was conducted this year by Mr. J. W. Sussex, at the University of Illinois. Forty-five 6-inch cubes were made with three percentages of water, and broken in a testing machine at the ages of seven days, one month, and three months. The quantities of water used were:—For dry concrete, 6 per cent.; for medium concrete, 7.8 per cent.; and for wet concrete, 9.4 per cent., and the proportions of material adopted were 1 part cement, 3 parts sand, and 6 parts of broken stone. The dry concrete was about as moist as damp earth; the medium concrete would not quake in handling, but when well tamped water would flush to the surface; and the wet concrete quaked in handling, and would bear only slight tamping. From the published results of the tests in question we learn that at the age of three months or more wet concrete is stronger than either dry or medium concrete. When recently set, medium concrete gives the greatest strength, thus showing that wet concrete acquires its strength more slowly than drier mixtures. In breaking the cubes it was found that the wet concrete was distorted more than the dry before failure occurred, thus proving the existence of greater elasticity. By using a rather wet mixture a compact mass could be obtained with comparatively little tamping, whereas a compact mass could not be formed with any amount of tamping upon a dry mixture. Summing up the conclusions to be drawn from the experiments, it appears to be clear: (1) That dry concrete should not be used under any circumstances. (2) That medium concrete may be desirable in cases where immediate strength is required. And (3) That wet concrete is stronger than either dry or medium concrete at any age over three months.

Blast-Furnace Gases. For many years the fact has been realised that the blast furnace is practically a huge gas producer, and partial utilisation of the fuel formerly wasted has been extensively practised in Great Britain and in other countries. More recently considerable progress has been made in utilising blast-furnace gases by means of the internal-combustion engine. As Mr. Humphreys showed in a recent paper, there were in operation at the end of the year 1902 fully 327 gas engines capable of developing an aggregate of more than 180,000 h.-p., and at the present time it is probable that the engines already built or in course of construction represent a total of some 220,000 to 230,000 h.-p., most of these engines being operated or intended to operate with furnace gas. In iron and steel works the waste gas is chiefly used for firing boilers supplying steam to steel plant, rolling mills, and other machinery. The fact is now recognised that this is a roundabout method, and there is reason for believing that the continued improvement of large gas engines will ultimately render the use of steam unnecessary in large iron-works. As an indication of movement in this direction we may mention the fact that the Buffalo works of the Lackawanna Steel Co., U.S.A., are now being equipped with three new plants, one including eight 1,000 h.-p. gas engines for driving dynamos, and two others having sixteen 2,000 h.-p. engines for driving blowing engines.

Vibration from Engines. When vibration is communicated to the building from adjacent or adjoining premises where a steam or other engine is running, it is essential that careful consideration should be given to the whole of the surrounding circumstances, and that the nature and probable influence of the soil should be duly taken into account. The importance of the latter point is illustrated by an incident which recently occurred in a provincial town. The occupant of a house was considerably annoyed by vibration transmitted from a newly-equipped engine-house a short distance away. After interviews, followed by correspondence affording pleasant occupation for two lawyers, it was arranged that two architects, the parties to the dispute, and, of course, the lawyers also, should meet on the site. As not infrequently happens when experts meet on behalf of opposing

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clients, one architect found the vibration to be very bad, and the other was unable to detect the slightest tremor, until the increasing oscillation of water contained in a wine-glass, set upon a window-sill, finally upset the vessel. Then it was agreed on behalf of the offending owner that a new engine-house should be built at a greater distance from the dwelling affected. This costly programme was carried out, but when the aid of an engineer was invoked upon some points of detail, it was discovered that all vibration could have been prevented from reaching the house affected, by the simple and inexpensive expedient of isolating the foundation from the surrounding soil, by digging a trench and filling it in with clay. Of course, a remedy that is satisfactory in one case may not be efficacious in another. For instance, it has recently been reported that vibration was transmitted from an engine bed founded upon clay, which is not a particularly favourable conductor of such motion. The procedure followed in this case was to sink cast-iron cylinders to an underlying stratum of chalk, afterwards filling the cylinders with concrete, so as to form foundations perfectly independent of the clay.

The Urft River Dam.

A MASONRY dam now in course of construction across the River Urft, near Aachen, in Prussia, is worthy of note, as one of the highest structures of the kind hitherto built. The object of the work is to afford summer supplies for irrigation, and to prevent damage from floods in the winter season. This dam has a total height of 190 ft., and will form a reservoir with a maximum depth of 174 ft., capable of holding up 1,600,000,000 cubic feet of water. The length of the dam is about 750 feet, and it is arched up stream on a radius of 650 ft. The cross section measures 18 ft. wide on top, and 165 ft. at the base. On the up stream side the face of the dam is vertical, for about half the height, the remaining part being battered to an angle of about 17deg. from the vertical. Against the up stream face a paved earthen embankment is formed. The dam is constructed of argillaceous slate laid in courses inclined against the line of pressure, and the up stream side is finished with a face wall of trap rock, backed with a layer of cement, and a lining of asphalt. Two tunnels passing through the earthen embankment place the gate chambers in communication with the reservoir, and beyond the valves water is conveyed in steel pipes, passing below the dam proper. An overflow weir, 300 ft. in length, is provided at one end of the dam, and facilities for an augmented discharge are furnished by gates at intervals. In addition to supplying agricultural requirements, the water stored in the reservoir will be employed for power purposes. A tunnel has been constructed leading to a valley, where water will be supplied under a head of 360 ft. to a power-house, in which eight 1,250-h.p. turbo-generators are to be installed for providing energy to the surrounding districts.

A Concrete-Steel Bridge.

A NEW bridge built at Laibach, in Austria, from the designs of Professor Melan, of Prague, presents some features that are worthy of notice by those interested in concrete-steel construction. The bridge is a three-hinged structure, the concrete hinges being formed of concrete hinge blocks, and the steel hinges consist of pins acting between cast steel shoes. Another detail in accordance with modern masonry bridge construction is the employment of relieving arches for the support of the roadway over the main arch. These secondary arches are formed of re-inforced concrete, but are not hinged. This bridge crosses the river at an angle of 9° 14′, the main arch having a clear span of about 108 ft., and a rise of 14 ft. 6 in. The roadway is 33 ft. wide, and the pathways for foot passengers are each 6 ft. 6 in. wide, the extreme width of the bridge being about 50 ft. With the object of securing a suitably artistic effect, an architect was commissioned to act in conjunction with Professor Melan. It was at first intended to fill the spaces between the relieving arches with panels of bronze or forged iron, but for the purpose of keeping the cost within desired limits it was afterwards decided to use moulded panels of concrete. The face of the main arch ring was finished in similar material, the concrete blocks being jointed like stone masonry. In places where facing blocks were not requisite the outer part of the concrete was of a quality suitable for receiving a fine finish. The balustrade is also of concrete, relieved with bronze lamp-posts and figures on pedestals at the portals.

Southwark Bridge.

BY a recent census of the four bridges across the Thames, within the jurisdiction of the City Corporation, it is proved that Southwark Bridge is very little used. This fact was already well-known to everyone who has had occasion to make regular use of the bridge, the reason being the severity of the approach gradients, particularly on the nothern side of the river. The suggestion was subsequently made by the Corporation to the Bridge House Estates Committee, that a viaduct should be constructed from a point in Queen-street, over Upper Thames-street, to the commencement of the bridge, and it was further suggested that inquiry should be made as to the practicability of removing the cast-iron semi-circular arches of the bridge, with the view of replacing them by low-crowned elliptic arches. These matters were referred to the City Surveyor and the consulting engineer, with the result that the following propositions were made:—(1) To lower the summit of the existing bridge by some seven or eight feet, and to raise the levels of Upper Thames-street and Queen-street some three feet, with a proportionate elevation of some minor streets leading therefrom; and (2) to lower the present bridge, and to construct a viaduct across Upper Thames-street. The former of these projects was approved by the committee at an estimated cost of 350,000*l*. It is stated that the adoption of the scheme will alter the gradient at the northern approach from 1 in 20 to 1 in 50, and at the southern approach from 1 to 23 to about 1 in 40—certainly a great improvement. The actual extent of the lowering will depend upon the requirements of the Thames Conservancy, but as the structure now gives a headway of nearly 4 ft. more than the railway bridge at Cannon-street, it is tolerably certain that a certain amount of reduction will be permitted. The new gradients will compare very favourably with those at Blackfriars Bridge, which are 1 in 40. As the scheme involves the practical reconstruction of the bridge, with the exception of the shore abutments, it will be interesting to hear something more as to the architectural treatment of the new structure. This is a matter to which we shall give attention when the decision of the Thames Conservancy has been communicated to the Corporation.

Euston Station.

IT is satisfactory to be able to note that the entrance, as it may be called, to Euston Station, that is to say, the line outside the station, has now been considerably enlarged. This will facilitate dealing with the incoming and outgoing traffic. It is to be hoped, however, that the Board of the North-Western line are pushing forward their scheme of an enlargement of the station itself. This, which at one time was regarded as the ideal railway station of London, is now rapidly becoming the worst. Nothing can be more inconvenient than the widely separated West and East departure platforms, and the want of communication between the different parts of the station. Those who are acquainted with the convenient simplicity and spaciousness of the central stations at Cologne and at Frankfort must feel some surprise that the board of the chief English railway has been so long in the rebuilding of Euston Station.

Fetter-lane and the Black Swan Distillery.

NEW premises have just been completed after designs by Messrs. Treadwell and Martin for Messrs. James Buchanan and Co., at the northern end, west side, of Fetter-lane. The new buildings have replaced a portion of the old Black Swan distillery, formerly occupied by Messrs. Anderson and Co., gin distillers, who adopted the sign of the Black Swan for their distillery works at Nos. 25—6, Holborn, many years ago, to commemorate the circumstance that the distillery had been established there early in the eighteenth century on the site of a hostelry by that same sign. On Wednesday, June 7, 1780, the "No Popery" rioters, together with the prisoners they had liberated from Newgate, sacked and burned the two houses in Holborn, at that time tenanted by Langdale and his son, a firm of distillers, ostensibly because of their religious tenets. On that occasion the adjoining Barnard's Inn narrowly escaped from the flames. A graphic description of the attack upon Langdale's is given in "Barnaby Rudge." The two freehold houses in Holborn were re-built in 1897, after Messrs. Treadwell and Martin's plans and designs for Messrs. James Buchanan and Co.

The Old Gaiety Theatre and its Site.

ADVERTING to Mr. Hudson's letter in our last week's number (p. 250 *ante*), we may say that Mr. E. Bassett Keeling was but twenty-six years old when he adopted for the Strand Music Hall a style which, whilst forming a novel and original departure at the time, has not been without its

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influence since. We believe that C. J. Phipps, who designed the restaurant too, somewhat modified the façade when he converted the hall as the Gaiety Theatre, which was opened on December 21, 1868. Having been leased by Mr. John Hollingshead in 1876, the theatre was afterwards enlarged at the side, and at the rear by the inclusion of the offices in Wellington-street, still distinguishable by a wide and curved bay, of the *Army and Navy Gazette*, and previously of *Household Words* in Charles Dickens' day. For the Strand Music Hall was demolished the New Exeter Change, or Wellington Arcade, leading out of Wellington-street into Catherine-street, which was built for the Marquis of Exeter in 1843–3, after designs by Sydney Smirke, R.A., the elder; the passage, 60 ft. by 12 ft. and 20 ft. high, had three middle rectangular bays with skylights, and polygonal vestibules with ceilings at the ends—the latter skilfully masked the obliquity of its direction. The second Marquis of Exeter directed by his will that all his London property, including the New Exeter Exchange, Exeter-street, and the vicinity, should be sold to pay his debts incurred on the turf. During the demolition now in progress has been found a picture, painted, it is said, in 1868, by Mr. Stacy Marks, R.A., and representing a group of merry-makers, for a space above the arch of the proscenium.

MAGAZINES AND REVIEWS.

THE *Art Journal* contains personal recollections of Whistler, by Mr. Croal Thomson, who would have us believe that everyone who did not admire Whistler as much as he admired himself was merely stupid, and merited the sarcasms of the artist. There are, however, people who are as much enthusiasts for art as Whistler himself, and as little Philistines, who do not think him as great an artist as his clique of admirers declare him to be; and it may be a question whether Whistler himself was not a Philistine in other directions, as when he declared (*teste* Mr. Thomson) that there was nothing admirable in London except the way the police directed the traffic. A stupid thing to say, if he meant it; but he very likely did not mean it, and would have contradicted some one else who had said so. As to the "Symphonies," Mr. Thomson is quite right in implying that the use of a musical term for a study in colour was quite legitimate, and no one need have taken exception to it once in a way; but a great many of these "symphonies" sank into mere unmeaning tricks of effect, and we doubt if the painter believed in them himself. Personal recollections of so very personal an artist are, of course, sure to be interesting. When, however, we are told that Whistler will in time be reckoned with Titian as a figure painter, we can only say that people must be a little out of their minds about him. Fifty years hence those who unearth this kind of judgment out of art periodicals of to-day will laugh at it. Lady Victoria Manners writes an article on "The Rutland Tombs in Bottesford Church," a very noteworthy collection, among which that to William Lord de Ros (1393-1414) is a perfect model of decorative treatment of the side of the tomb—angels in low relief in panels, separated by narrower panels left blank; nothing could be more suitable or more refined in the details. "Some Recent Decorations by Mr. W. Reynolds-Stephens"—portions of rooms showing decorative schemes—have a great deal of originality, but show a little too much the effort to be original; and the flower friezes are far too realistic in detail to take their place in a scheme. Mr. G. F. Laking concludes his valuable illustrated articles on the armour of the Wallace Collection. Beautifully decorated as are the ancient firearms, they lack the beauty of fitness for their work. A modern breech-loading field-piece has an art in its finish and fitness which puts it above the clumsy-looking over-ornamented Venetian cannon illustrated on p. 263.

The *Magasine of Art* devotes an article, with illustrations, to the etchings of Mr. Frank Short, an etcher who can be praised without reservations. The article, by a member of the Society of Painter-Etchers, contains a good deal of technical information on processes, useful, if not to etchers themselves, at any rate to those who wish to rightly understand the objects and capabilities of the art. Mr. Hamilton Jackson contributes the first of a series of articles on "Electric Light Fittings of To-day;" dealing with "Foreign Fanciful Designs"—rather too fanciful, some of them. As the writer remarks at the close, many fittings have been made in England which are excellent from the point of view of design, "and also conform to the requirements of utility and the proper use of material." The foreign designs illustrated here seem contrived to look like anything rather than a light-holder, and to give you a kind of surprise when you find out what the thing is meant for. The *résumé* of Mr. Gilbert's Royal Academy lectures on sculpture, compressed as it is, is full of brilliant artistic suggestion. Was he correct, by the way, in saying that the key-pattern had its origin in ancient Persia? The key-pattern is found, in a more or less crude form, in ancient art all over the world, even among savages; the Greeks perfected it, but it seems more or less inherent in the minds of all races when they begin to decorate. Mr. Spielmann in this number gives "A General Survey" of the subject of art forgeries. One is not surprised to learn that "drawings by Old Masters" is one of the most successful lines of forgery. They are not as expensive to make as forgeries of jewellery and metal-work, and "the ability to forge drawings good enough to be passed off upon the general public is not uncommon." The procuring a paper which may pass for a contemporary product is the chief difficulty. The taste (a somewhat perverted one) for Rowlandson caricatures has led, it is said, to an extensive fabrication of these. Coloured prints professing to be old are in general to be regarded with great caution. "Stump work" and "Tempera" are the subjects of two articles; and Mr. Reginald Barrett writes on "Venice as a Painting Ground"—one of which he has made such good use. His reason in favour of rebuilding the Campanile is an odd one: "From the nature of the design and materials, and the absence of any individual sculpture or detail, it is quite possible to make an absolute replica." Is it any the better for that?

The *Architectural Record* (New York) contains a short article on "The Building of a Parisian House," written by a master mason who has worked on it. The article, which is of some interest, is really more concerned with the arrangement and conditions under which the Paris artisans work than with any detailed description of the building. The house, a five-story one at Passy, was carried out very quickly by a very moderate staff of men, with apparently a very systematic division of labour. There were six "compagnons," or journeyman masons; ten "garçons" (assistant masons); two to four "tailleurs de pierre" (carvers), and four men whose sole occupation was raising and placing the blocks of stone in position.

"Certain labour-saving appliances contribute to the speed with which a mere handful of men can construct a large house, as, for example, the winch with which we raise stones and mortar. I understand that English builders use for this purpose a kind of wooden tray on the top of a pole, which they bear on their shoulders, but such a primitive tool would never do in the case of six and seven story houses. So we use a winch which simultaneously winds and unwinds a long cord, one end of which is ascending while the other is descending. In many cases it is worked by electricty, but even when used by hand, as it was in our case, it enables a couple of workmen to do the work of a dozen hod men."

"Grandview," a house at Pittsburgh designed by Mr. J. E. Keirn, is a kind of return to the English eighteenth century ideal of a very plain square house with little architectural interest externally, but treated internally with great decorative elaboration; more remarkable in this case for richness than artistic feeling. Mr. Cervin's article on "The Spanish-Mexican Missions of the United States" affords, in its illustrations, interesting examples of the transference of the characteristics of Spanish Renaissance to Mexican soil; but with a difference. An article by M. Pierre Calmettes on "The Modern Style in Jewellery" (French jewellery of course; a French writer does not recognise the existence of any other!) is accompanied by illustrations which show determined "cleverness" rather than good taste.

The *Berliner Architekturwelt* illustrates no very important piece of architecture this month; the leading subject is the "Landhaus Scherl" in Grünewald, a good-sized country-house the exterior of which does not much interest us, but some of the interiors are good. It is by a Munich architect, Herr Seidl. A series of studies of arrangement and decoration of rooms, apparently from an exhibition by the "Neue Gruppe Berlin" (a kind of art society, we presume), have a great deal of interest, and, in spite of the "Neue," are fortunately free from the eccentricities and sinuosities of "L'Art Nouveau."

The *Burlington Magazine* (August 15) contains an article by Mr. Pennell (to be continued) on a rather new subject—the importance of collecting later nineteenth century book illustrations, which include much work of the highest interest of its kind. Mr. Pennell complains that collectors of book illustrations confine themselves to the work of older periods, neglecting those of their own day or the generation just preceding, which are well worth collecting and preserving while they can be easily had, and which may be unattainable hereafter. We entirely agree with the protest, and hope it may have some effect. The fourth of a series of articles on "Oriental Carpets" will interest many of our readers. The numerous illustrations included in the number are of the highest class, and in themselves give it a value. It would be more convenient if the list of articles on the cover were placed in the same order as that in which the articles occur; it seems rather careless not to attend to this.

Public Works goes on admirably, and seems to be a publication full of what may be called, in a time-honoured phrase, "useful knowledge." It concerns itself in the main with facts, not with opinions. Among the most interesting articles to our readers are one on the new building regulations of Paris, by M. Paul Strauss, Member of the French Senate; and one on a system for the photographic measurement of buildings, or the laying-down of the plan of a building (exterior lines) from photographs. This implies, of course, the knowledge of the measured distance between the building and the lens. The article is by Mr. H. Bridges Lee. Other articles are on "The Public Fountains of Brussels," and the mechanical means of supplying them with water; on "Pioneers of London Street Reform"—namely, Inigo Jones and Wren—by Mr. Rotherby; and on "The Regulating Works of the Mississippi System," by Mr. Steece, the city engineer of Burlington, Iowa.

In the *Antiquary* is an account, by the Rev. E. Maule Cole, of personal observation and experience in the opening of tumuli on the Wolds in the East Riding of Yorkshire, during the last thirty years. Within a radius of eight or nine miles from Wetwang are some 300 tumuli. The writer's friend, Mr. J. R. Mortimer, has been chiefly concerned in the carrying out of the work, and is about to issue a book on the subject, with more than a thousand drawings. The present article is intended as a preliminary summary of the subject. The following remark as to the best method of procedure may be of use to others:—

"A word or two more on how to open a mound. Our method is to cut a square of some 16 ft. to 24 ft., according to the size of the mound, from the top in the middle, and dig a trench round each side some 2 ft. deep, gradually approaching the centre. The process is repeated over and over again till the original surface soil is reached, and so there are sections left on all sides. Then the ground is tested, and, where found disturbed, further excavated, and the size and shape of the grave is soon ascertained. Immediately on any bones being discovered, tools are discarded, and Mr. Mortimer, kneeling on flat pieces of iron plating, to prevent destruction of any pottery, works away with a pocket knife, so that even a pin or a button could not escape notice."

In the *Fortnightly Review* Dr. Wallace answers his critics in regard to his former article on "Man's Place in the Universe," but his argument nearly all turns on what may be considered a side issue—whether the universe of stars is finite or infinite. Even

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under the former supposition, its scale is so vast, compared with the solar system, that the question of the probability or improbability of this earth being the only orb inhabited by intelligent beings is hardly affected by it. Dr. Wallace, in his summing up, makes the same curious lapse of logic which many men of science make. He says that such delicate adjustments and such numerous combinations of physical and chemical conditions are required for the development and maintenance of life as to render it improbable that they should all be found again in any planet. Certainly the combinations that man requires will not be, and it is quite certain that no inhabitant of this planet could exist if transferred to any other planet of our system. But does it never occur to those who reason thus that there may be intelligent mind acting through quite a different corporeal mechanism from our own? They talk as if man and animals, as we know them, were the only possible mechanical agents of life and thought. Surely there is no need to assume that. However, Dr. Wallace has at least raised reflections on a great and absorbing subject.

Knowledge contains No. 4 of Miss Clerke's remarkable series of articles under the general heading "Modern Cosmogonies," this one being on the subject of "Tidal Friction as an Agent in Cosmogony." The recognition of the importance of this agent is only of comparatively recent date. It will be seen from the article that our own satellite has exercised a tidal friction on her primary, in earlier stages of their history, which is quite exceptional in the solar system. The larger the satellite in proportion to the primary, the greater, of course, is the tidal action, and as it is now believed that the moon originally revolved almost in contact with the earth, her influence on the mechanism of the latter must have been enormous. No other planet has a satellite of anything like the same proportionate mass. The subject is reviewed in reference also to the sun and other stars—double stars especially—between which this influence of tidal friction must be very marked. Learned as Miss Clerke's article is, we are obviously only on the threshold of the subject; but in astronomy (as astronomers would probably agree) we are always on the threshold.

In the *Cornhill* is a short concentrated article, full of information and scientific reasoning, on the strange and puzzling phenomena of "New Stars"—*Novæ* as they are called in astronomical language, by Mr. F. W. Dyson, F.R.S. Wonderful are the problems of fact and observation connected with this subject. From a process of reasoning described in the article, it was assumed that Nova Persei was so distant that its light took 300 hundred years to reach us. If so, it was calculated that at the time of its greatest brilliancy it gave out 8,000 times the light of the sun. The tremendous explosion of light and heat which rendered it recently visible took place, therefore, in the reign of James I. or somewhere about that time. Yet was its spectrum analysed; and more, even the spectrum of a nebula which seemed to have formed around or behind it. The theory of collision between two vast bodies or groups of matter, which has been suggested as the origin of *Novæ*, is discredited. "More plausible is the hypothesis that the star, in its movement through space, entered a region filled with faint, possibly invisible, nebulous matter, and flared up, like a meteorite in its course through the air." An article on "Rural Techniques," by Mr. G. Bourne, is interesting. It is an attempt, pretty fairly made out, to trace the form and make of various rural implements—the axe, the scythe, and others—to the influence of practical necessities of work and handling. It is rather a new subject, and well treated.

It is curious that Layard should have come to the conclusion, after some trial diggings at Niffer or Nippur, in 1851, that no important results would follow the excavation of the mounds. Mr. Valentine Geere's article in the *Monthly Review* on the work there of the University of Pennsylvania's expedition proves that he was entirely mistaken. The illustration of the inner court of the Temple of Bel shows what remarkable things were waiting for excavation. The article gives very full information as to what has been done. We may quote part of the description of a small palace of the second or third century, B.C., which is said to be the most thoroughly explored building of the site:—

"In nearly every respect this palace ranks above the other buildings of Niffer. In place of an apparently fortuitous agglomeration of ill-balanced courts and cramped chambers, with walls running in all directions and at all angles except right ones, its plan exhibits ingenious contrivance and an aiming at balance and unity; and its general detail marks at least an earnest seeking after grace and refinement, instead of a mere piling up of ponderous masses of brickwork, such as satisfied the builders of the temple and the library for instance. The architects were heavily handicapped by the hopeless material at their command—the black Mesopotamian mud; for, unlike many of the builders, they did not make extensive use of the burned bricks of earlier buildings for their walls and pavements. Possibly there were good reasons against their doing so; and it is noteworthy that in the great fortress of the same period burned bricks were sparingly used. Be the reason what it may, the walls of this palace were constructed of crude bricks, a foot square and about seven and a half inches deep; but for the thresholds, the columns of the courts, and parts of the porch burned brick was employed.

The palace was divided into two nearly equal portions, the half towards the canal being set aside for the public apartments and the use of the men, while the other side of the building (the south-west) was reserved for the women's quarters and domestic requirements. This section was further divided, the women's quarters, grouped round a courtyard in which was a broad portico, being closely shut off and accessible only through a lobby. The lobby could be reached from the main building by means of a narrow passage which might be closed by a door at either end, as was shown by the discovery of two brick door-sockets in position; or it could be entered from the servants' quarters through a second smaller lobby. The women of the household and the servants could reach their particular apartments from the main entrance through a narrow passage, without being observed from any of the principal rooms. Another room was evidently a bath. Its floor was covered with bitumen and sloped towards a drain opposite the doorway, and a skirting of burned brick, also covered with bitumen, ran round the room."

In the *Nineteenth Century* Sir Edward Brabant, the Commandant-General of the Cape Colonial Forces, writes a summary of "The Resources of South Africa." From this the inquiring reader may learn that there are many sources of mineral wealth in South Africa besides diamonds. The list includes gold, coal (extensive deposits), iron, copper, tin, lead and silver (galena), asbestos, etc. "Near Port Shepstone, on the coast of the Colony of Natal, are extensive quarries of marble stated to be of very superior quality. Before the war, a company was in course of formation to work these quarries and ship the marble to England. Now that the war is over this project will probably be revived, as a railway is now open from Port Shepstone to Durban, the port of shipment; and low freights would doubtless be charged in the absence at present of any bulky article of export to make up homeward cargoes."

In *The World's Work* will be found an illustrated description of "Building a Balloon," an unhackneyed subject in construction. A short article on "The Buried Stones of the Chilterns" gives some information as to "Denner Hill Stone," the peculiarity of which is that it is not found in strata that can be quarried in the ordinary way, but in large isolated blocks; sometimes one entirely alone, sometimes several in near neighbourhood. One stone of a hundred and twenty tons weight was found in the heart of the woods round Hampden, with no others anywhere within half a mile of it. Under the title "Exploring the Air" Mr. W. Napier Shaw gives an account of the use of kites as a means of scientific investigation.

The writer signing "Sigma," in *Blackwood*, disappoints us with a programme of "Personalia," in which we read the names, "The Pre-Raphaelite Painters"—"E. Burne Jones" (whom he deprives of the hyphen), "D. G. Rossetti," etc.; but no weighing of their artistic place is attempted—only personal anecdotes, more or less interesting, but not in all cases quite credible. The little there is of art criticism is of a very superficial order.

In *Scribner*, under "The Field of Art," Mr. Russell Sturgis suggests in outline "a possible art library," to be formed by the collection of old illustrated books. The short article shows much knowledge of books of this kind, and suggests a collection in which books should be catalogued under the name of the illustrator, not of the author.

The *Revue Générale* contains a long and sympathetic article by M. Alphonse Roesch on "Les Fouilles de Knossos." The author sums up the result, as regards art history, in the following sentence:—

"Dès maintenant, le formidable hiatus, l'immense lacune qui existaient entre le temps où fleurirent les civilisations de l'Asie et l'époque où l'on placait les débuts de l'histoire grecque n'existent plus.

Dans l'histoire de l'humanité, les Egéens, les Crétois, ont joué le rôle grandiose d'être les éducateurs, les premiers maîtres des Hellènes: iis ont été pour eux des initiateurs et des précurseurs. Knossos ne fut pas seulement un foyer de civilisation brillante et avancée, mais ce fut un centre fécond dont l'influence a été très notable et très persistante. En quittant ces lieux, en jetant un dernier regard sur ce vaste palais, sur ces objets nombreux, sur ces œuvres d'art, sur ces inscriptions mystérieuses qui n'ont pas encore livré leurs secrets, on éprouve une impression analogue à celle que l'on ressent en partant de Rome ou d'Athènes: celle de laisser après soi un des endroits où s'est formée la pensée moderne. Qui veut comprendre notre civilisation, abstraction faite des idées morales et religieuses, doit remonter à Rome et puis à Athènes; qui veut avoir l'intelligence de la

M. Beck, Secretary to the Ministry of Agriculture grecque doit remonter à Knossos."

In the *Gentleman's Magazine* is an article by Mr. Giberne Sieveking on "The Decadence of the Art of Cob-Walling" in Devonshire. Now, cob-walling is building walls of earth mixed with straw, a time-honoured practice in the district referred to, but now supposed to have been driven out by brickwork; for one reason, because the cob-walling took so long to dry in winter; moreover, though one perhaps would not expect it, brickwork is cheaper. Cob-walling is a mystery in the hands of experts, of whom the author found two or three still with a practice in one small hamlet. It seems, however, to be a dying industry; nor can we doubt that the brick wall is superior in every practical respect; a lingering conservatism seems alone to cling here and there to the old method of walling.

INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

THE OPENING SITTING.

THE triennial International Congress, which at its tenth assembly in Paris in 1900 adopted Brussels as the city for the meeting of 1903, met on Wednesday, September 2.

The opening general meeting was held in the Palais des Academies, under the presidency of Prince Albert, with whom on the platform were assembled the President of the Congress, M. Beck, Secretary to the Ministry of Agriculture; M. Francotte, Minister of Works; M. Favereau, Minister of Foreign Affairs; the general secretary of the Congress; Professor Putzeys, University of Liege; a large number of representatives of foreign governments, and the principal officers of the Congress. After a brief address of welcome extended to the members of the Congress and the delegates, or whom there were over 1,900 already inscribed. M. Beck delivered an address in which he sketched the history of the crusade in favour of what has now become generally known as Public Health. The initiative was taken by the founder of the present dynasty, Leopold I., by a Congress convened in 1852, which was followed a quarter century later by the present ruler of Belgium, his Majesty Leopold II. After these preliminary Congress, due to the initiative of Belgium, the Congress in its present form was instiuted at the Paris Exhibition of 1878, which was thenceforward reckoned the first of the series. The second was held at Turin two years later, and successively thereafter at Geneva, the Hague, Vienna, and again in Paris in the Exhibition year of 1889. The seventh of this series, at which, said the President, his Majesty Edward VII., then Prince of Wales, admirably explained the sanitary policy of the English Government, was held in London in 1891. The Prince of Wales then said that while serving on the Royal Commission for the improvement of the dwellings of the working classes, he had perceived the new and pressing danger to the public health caused by the rapid growh of modern industry, which was bringing in its train a superabundance of population to the towns. He then understood what enormous difficulty they would have to maintain the progress of trade in all its branches without endangering the public health, particularly in the great centres of population. The Prince

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of Wales continued in his Presidential address by observing that the improvement that had been realised in the public health during the previous quarter-century was proved by the diminution in the rate of mortality and the augmentation in the average duration of life. The President, in continuing his address, referred to the different stages of progress realised at each of the previous Congresses, and the advance which they hoped to see realised in the Congress of 1903, in which there would be introduced, as a leading subject for discussion and realisation, the intervention of the governing bodies of the various countries in securing practical measures for the improvement of public health. The importance of the role of Governments in political sanitation could not be over-estimated, and for the first time it would be brought into due prominence as a subject to be considered in the sittings of the Congress.

The delegates of various governments and learned faculties were subsequently called upon by Prince Albert to address the Congress, the list including Dr. Sims Woodhead, the delegate of the British Government. After thanking the Prince and the officers of the Congress on behalf of the British members for the hospitality extended to them in that great and beautiful city, he said they all accepted with the utmost pleasure the task of discussing under the patronage and co-operation of an enlightened king, and were delighted with the honour of sharing with the promoters of the Congress the task of endeavouring to make the lives of the people better and happier. At the rising of the opening meeting the President of the Congress, Professor Dr. Putzeys, general secretary, and the principal officers of the Congress, proceeded to open an International Health Exhibition organised in connexion with the Congress, and in the afternoon the sittings of the hygiene division in seven sections were opened in various rooms of the National Palace (Palais de Parlement) were opened. Most of the sectional meetings were well attended, that of technology, in which the subjects to be discussed include sewage purification, disposal of town and trade refuse, separate and combined systems of drainage, the maintenance of public roads, ventilation and heating of dwelling-houses, and hygiene as applied to building construction, planning, aeration and decoration of interiors being inconveniently crowded in the great heat prevailing. The sittings of the Demography division are held in the Palais des Academy. His Majesty the King invited the members of the Congress to an entertainment at the Royal Palace, and reception, which commenced at nine o'clock.

A large number of the English representatives are attending the Congress, among them being Dr. Sims Woodhead, Dr. Rideal, Dr. Fowler (Manchester), Dr. W. R. Smith (President of the Royal Institute of Public Health), Dr. A. Newshilme (Brighton), Dr. John Sykes (London), Colonel Yabbicom, M.I.C.E., and other eminent engineers, and a large party of members of the Sanitary Inspectors' Association, headed by their President, Sir James Crichton Browne, M.D., and the late President, Sir Hugh Gilzean Reid.

The Sectional Sittings.

Section III.

Engineering and Architecture in their Relation to Sanitation.

This section began its labours on the afternoon of the opening day, September 2, in the lecture hall of the National Palace, under the presidency of Lieutenant-General Docteur, who, after a few preliminary observations, called upon the six gentlemen who had been selected to prepare reports on the first question to summarise their reports and conclusions, which had been printed and distributed to members of the Congress. The subject was "Bacteriological Methods of Purification (a) of Sewage and (b) of Trade Refuse." Five of the authors responded, their communications being summarised in the following order:—Professor Dunbar (Hamburg), Dr. Gilbert Fowler (Manchester), and Dr. Rideal (University College), whose reports were printed in English, M. Lannay, engineer (Paris), and M. Rolants, Pasteur Institute (Lille). The conclusions were as a rule either printed or translated into English, French, and German. MM. Duyck (Brussels), Montricher (Marseilles), Konticovski (St. Petersburg), and Beckmann (Paris) responded to the invitation to speak upon the several points before the meeting, and eventually the various conclusions of the reports were reduced to a common form and adopted by the section. Different views were advocated, not only as to methods, but as to the objects to be aimed at. By purification was meant by some the rendering of the water contaminated by sewage or trade waste to such a state of purity as to be fit for drinking purposes, while others thought we ought to be satisfied with its restoration to the purity of ordinary river water. The conclusions were adopted by the section in the following form:—The various biological methods of treating sewage and trade refuse for purification depend on the same general principles the application of which opens up a new and fruitful era for the purification of streams and the improvement of the health of towns; whenever engineers, sanitarians, manufacturers, or municipal authorities are called on to deal with the problem of sewage purification or that of manufacturers' refuse, they should adopt these principles, from which they might derive advantages either in employing certain methods exclusively or in combination with other methods already known or applied. It is desirable that the study of practical methods of application should be continued.

Systems of Drainage.

The second subject considered by the section was the advantage or disadvantage pertaining to various systems of drainage, called separate and combined or mixed systems, on which the following gentlemen were called upon to report:—Professor Büsing (Superior Technical School, Berlin), Dr. Cambeaux (Municipal Engineer, Nancy), Mons. Putzeys (City Engineer, Brussels), Mr. Roechling, M.I.C.E. (Leicester), and Signor Donato Spataro (School of Engineering, Rome). The report of the Italian expert not having arrived, Dr. Edwardo Wilde, Minister at Brussels of the Argentine Republic, was called upon to read a report on sanitary improvements in Buenos Ayres.

Mr. Roechling pointed out that both systems had advantages and disadvantages which must be considered in each particular case in order to arrive at a correct conclusion as to the system to be adopted in the case. The abstract discussion of either principle would lead to no practical result. As early as 1840 the necessity of the separate system was recognised in England. In the words of Edwin Chadwick, they ought to get the "rainfall to the river and the sewage to the land." This dictum eventually led to the modern systems of sewerage. Economic considerations were in most cases the deciding factors. Where the streets were kept clean by flushing the dirt into the common sewer, the separate system was out of the question. Where rain water could be turned into the rivers by means of rain water sewers without being much contaminated on the way, the separate system might be preferable. The following general conclusion was printed in English and French in the paper, and translated into German in the section: "It may appear to the uninitiated that the separate system possesses *a priori* undoubted advantages in simplicity and cost over the combined one, but it is hoped that the observations preceding will fully demonstrate that such a conclusion may prove very illusory, and that a correct judgment is only possible after, in each case, the two systems have been fully compared from all points of view, sanitary and economic." M. Charles Lucas (Paris) asked whether consideration could not be given to the problem of the disposal of refuse water from the cheap dwellings established in the suburbs of many large towns.

M. Chardon (Health Company of Levallois-Perret, near Paris) contended that no mechanical system could be universally applicable. He described the system adopted by the company of Levallois-Perret which had been in use for ten years in a community of 60,000 inhabitants. It would be classified as a separate system. The arrangements made under the system to provide for the sewerage of the line of restaurants on the north bank of the Seine during the 1900 exhibition, where there was hardly any fall, and where neither steam nor electricity could be used, were described. He had been enabled to succeed by the application of compressed air.

Mr. Wilkinson (Manchester) said the ideal system would be one that gave back to the river all the liquid contained in sewage and to the land all the solids. Of the different systems in use, one answered best in certain circumstances, and it would be a great advantage if it were authoritatively laid down in what cases the separate system and in what cases the combined system could best be adopted.

Eventually the following conclusions were formulated, and unanimously adopted by the section: The separate and the combined or mixed systems may be usefully adopted according to circumstances. It is only after a comparative study, in which the advantages and disadvantages have been carefully contrasted in each particular case and submitted to him, that the sanitary engineer can pretend to formulate his conclusions.

Water Supply.

The third subject discussed was water supply from calcareous sources. The reports were to establish the hygienic conditions found in water derived from calcareous sources. Among the reports was one by Mr. Horace B. Woodward, F.R.S., of the Geological Survey of England, and another by Mr. Allen Howe, of the Jermyn-street Museum; but neither gentleman was present, and only Mr. Woodward's report was distributed. The principal reports considered were those of Mons. Janet (Paris) and Mons. Martel, a cavern and rock specialist of Paris. Mons. Janet, in his conclusion, contended that recourse should not be had to calcareous sources of water supply so long as sandy soils could be found to furnish sufficient. Water from calcareous sources should only be admissable after careful examination, and when a rigorous supervision had been established over the gathering ground. The general conclusion of Mons. Martel was that water issuing from calcareous sources is in most cases dangerous, and always to be distrusted. Such water should not be used unless water could not be obtained from sources less exposed to the many causes of contamination, variable, permanent, or temporary, than are calcareous sources. In the course of the discussion, which occupied three long sittings, observations were made from the English point of view by Dr. Rideal and Mr. Roechling, and a communication was read from an English water expert (Mr. Kendal, Museum of Geology) in which the views of the most advanced among English sanitarians with regard to this subject were summarised. Water from limestone rocks was very hard, and always contained sulphates, to which fact boiler explosions were probably often due. Among the advantages claimed for hard water was that it was bone-producing; but there was probably but little force in the observation, since big men were often to be found in soft water districts. One disadvantage attributed to hard water was that it tended to produce dyspepsia, but the greatest of its disadvantages were of an industrial character. Hard water was difficult to use for detergent purposes, and many objected to it either for washing or drinking purposes. Many limestone rocks produced water of a high degree of purity. But there were two kinds of calcareous rocks, one porous and the other compact. In the former, impurities might get into the water from different districts, and it should therefore always be filtered. Water from porous limestone rocks was to be distrusted. In some cases holes which had existed for centuries had been to some extent used as cesspools, and not unfrequently such rocks contained paraffin and bituminous matter.

There was a general consensus of opinion that the absolute terms in which M. Martel had couched his conclusions were too sweeping, but that on account of the very variable conditions under which water from calcareous sources was found, very searching and thorough examinations with the aid of specialists should be considered indispensable.

Professor Pagliani (University of Turin) said many calcareous sources in Piedmont yielded absolutely pure water. The earth was a great biological and chemical filter, and therefore they would often get water from chalk soils which contained no chalky matter. For testing whether there was connexion between water sources apparently separated, biological tests were often more reliable than mechanical tests with colouring matters. In the growing difficulty of finding fresh sources of water supply, calcareous sources should not be rejected, but they should be carefully examined.

M. Janet contended that great and sudden

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changes in either the quantity yielded or the temperature of the water obtained were unfavourable indications. He pointed out various means of improving an inferior water supply.

Dr. Struelens stated that when first he became connected with the prison of St. Gilles twelve years ago it depended entirely on well water, the cases of epidemic maladies were frequent; but since the wells had been suppressed and the water supply was exclusively from the river Bocq, not a single case of typhoid or other infectious malady had been recorded among the 600 prisoners there incarcerated.

Mr. Roechling deprecated discussion of particular cases. The qualities of water from limestone rocks varied very considerably. In some the impurities were absolutely nil. It was quite impossible to lay down any general law, but they might safely state as the general view that calcareous sources of water supply should be looked upon with suspicion until the actual conditions had been ascertained by thorough examination. Any expression of views by the congress might form the basis of legal enactments, and if they admitted sweeping statements they might destroy the chance of obtaining water from many good sources.

After the luncheon interval, M. de Kontkowski discussed the question from the point of view of the Russian engineer, and Dr. Rideal from the English point of view.

Dr. Rideal said he wished to supplement his remarks of the previous day with regard to Clarke's softening process. He had hardly made it sufficiently clear that this process had hygienic advantages as well as the industrial advantage of softening, which was the principal object of its adoption. He had examined water bacteriologically before and after the softening processes, and at first had found in hard water a great number of organic impurities, but after the softening process the same sample was practically free from bacteria. It might therefore be that as the softening process would eliminate the bacteria, they would have the great advantage of now finding in the hitherto suspected calcareous supply an additional source of hygienic water. Would it not be a great advantage if they were able at the intake to treat the water chemically for softening, and at the same time find that they had eliminated the bacteria. After some further discussion the following conclusions were formulated and unanimously adopted. (1) Water supplies from calcareous rocks ought to be the object of particular attention, because of possible defects through filterage in fissured rocks. (2) A minute examination from the double point of view, hydro-geological and chemico-biological, ought to be made before water is taken. (3) When once water has been taken, measures must be adopted providing for the protection and continuous supervision, not only of the water, but of the whole gathering ground.

Hygiene of Towns.

Saturday was devoted to the discussion of the best measures for securing healthy houses in healthy towns; methods of removing and finally treating house and town refuse. In order to bring the subject before the congress in the most effective manner possible, reports were presented by the chairman (Mr. Alfred Roechling, of Leicester) and five members of an "International Committee of Street Hygiene" specially appointed to study this question. Of one of the seventeen members of this committee who died in March, 1901, and was replaced by Herr Bohm, a Berlin magistrate, the report of the chairman says:—"It is with the greatest possible regret that the committee have to report the death of one of their members, F. Andreas Meyer, Chief Engineer of Hamburg, who was without doubt one of the leading engineers on the Continent of Europe, and a pillar of sanitary engineering." The reports are exhaustive, covering every point of the subject, and the conclusions have been published in English, German, French, Swedish, Italian, and Dutch, and Colonel F. v. Kontkowsky, the representative of Russia on the committee, has undertaken to translate them into Russian and Polish. They are far too long to be quoted, but they represent a practical ideal of a systematic and well-regulated system of cleansing streets which every local authority should be urged to adopt. Authorities are urged to take the following general principles for their guidance:—(1) Prevention is better than cure; (2) the most efficient sanitary work is the cheapest in the end; (3) local authorities should carry out their sanitary arrangements with their own staff under specially skilled superintendence; (4) all sanitary arrangements ought to be so designed that they will work regularly throughout all seasons of the year. The conclusions and rules deal (a) with the construction and maintenance of the surface of public roads and streets, (b) with their cleansing. (c) with plants and trees in public streets and places, (d) with urinals and water-closets in public places, (e) with the removal of snow, (f) with house refuse, (g) with dry refuse from factories, (h) with dry refuse from markets, (i) with refuse from slaughter-houses, and (k) with the administrative care of streets. Or the last point Mr. Roechling thus concludes:—"The construction and maintenance of the surface of public streets, roads, and places, the cleansing thereof, the planting of trees, shrubs, plants, etc., in them and the care of these afterwards, the construction and maintenance of water-closets and urinals in public streets, roads, and places, the collection removal, and disposal of refuse from houses, industrial establishments, markets, slaughter-houses, etc., ought to be in the hands of one administrative official, who should be directly responsible to the authorities, and who should be a trained engineer well acquainted with hygiene."

Among the most universal of the rules are —no contractors—avoid dust by systematic watering—cleance at night or early morning —burn street sweepings—remove snow as soon as possible—burn house refuse—no refuse tips —provide (if possible in duplicate) air and water-tight bins, to be removed full and to be cleansed and disinfected every morning. In the case of each report the most valuable and interesting facts are given—of Berlin and Hamburg by Herr Bohm.

Following Mr. Roechling, the Chairman of the Streets Committee (Berlin), Herr Bohm, summarised his conclusions, the chief points referred to being the asphalted roads and the plantations of trees in public places in Berlin. Details were given of not only the collection, removal, and disposal of house and street refuse, but of the water-closets and public urinals, their maintenance and disinfection. The multiplication of seats in the streets and public places Berlin had spent large sums; in all about 50,000 chairs and 2,000 benches were provided. The rules laid down in the paper for the collection, removal, and finally disposing of house refuse and dry refuse from mills, factories, and markets were generally followed in Berlin, destruction by fire being the best method of disposal. It was proposed thus to treat even the refuse of slaughter-houses, although the compost formed of the blood had for many years been sold to agriculturists. In Berlin alone this would involve a sacrifice of a large proportion of annual income. The totals of workpeople, their wages, cost of waggons, repairs, etc., under the first head alone—keeping clean the surface of the streets and roads—cost an enormous sum annually. In Turin, Warsaw, and Berne the situation was described in the reports of Dr. Pagliani, M. Tedeschi, Dr. Polak, and Dr. Smid, who all rallied to the conclusions enunciated by the Chairman, and they had little to add.

The discussion of the conclusions was commenced by M. Leurs (Alderman for Public Works), the officer responsible to the City of Brussels for carrying out all sanitary work in conjunction with the City Engineer, and he declared that for many years the sanitary arrangements of Brussels had followed the principles recommended by the International Committee. He gave details of the way in which various departments were organised, their methods, cost, and the very extensive plant necessary, and particularly with regard to the disposal of street and house refuse, which has been the most troublesome and the most costly. They took credit to themselves that their new works (which he had the honour of showing to many members of the Congress on the previous day) for cremating all the refuse of the streets, the houses, the markets, and the slaughter-houses were not surpassed by any municipality. Twenty years ago they were able to sell a portion of the refuse to agriculturists, but through the general employment in later years of chemical manures they had been compelled to deposit it in increasing proportion on a piece of waste land, the lease of which was running out and could not be renewed. Brussels was far from the sea, and was precluded by the expense from sending the refuse to sea or to the marshes of La Campine, and the City Council was compelled to take up afresh a project for cremating it which they had failed to carry some years before on account of the opposition of the friends of the agriculturists. After visiting London, Leeds, Bradford, Huddersfield, Leicester, Hamburg, Berlin, and Vienna, they decided to follow the example of Hamburg, and put up a Horsfall Destructor plant capable of dealing with the entire refuse of the city. The works were completed a few weeks ago, and had been successfully at work for a month without costing a centime for fuel, although during the summer the refuse contained from 30 to 40 per cent. less cinder refuse than at other seasons of the year. The works were within the city itself, on the Quay de Willebroeck, not very distant from the Bourse, the Hotel de Ville, and the great railway stations, and no complaint of nuisance had been evoked. The destructor—which was of the Horsfall Standard type, with 24 cells—had been put up by the Horsfall Destructor Company, Leeds, on a scale calculated to burn 180 tons of refuse per day, but the actual duty accomplished was 200 tons per day (twenty-four hours), a result which would be greatly exceeded during the colder months. The heat generated sufficed to drive two dynamos, each of 100 h.p., which sufficed to produce all the electric light required about the establishment, to supply forced draught, work cranes, screening machinery, clinker-crushing machinery, and all the power they required, with a margin left for future developments of an additional 400 h.p., the maximum power to be ultimately developed being estimated at 600 h.p. In the course of his observations, Alderman Leurs announced the fact that the burning of coal in the three summer months had fallen to a very small proportion, even in the poorer quarters of the city. The consumption of gas for cooking purposes had increased by 40 per cent. The Alderman was in complete agreement with all the conclusions of the International Committee, and he hoped to see the principles laid down speedily and generally adopted. On the proposal of Lieut.-General Docteur, the President, the section adopted unanimously the following vote:—"The section approves the conclusions presented by the International Committee of Street Hygiene, and strongly recommends their application. The section requests the Committee to continue its labours, in view of future Congresses." The President formally thanked the Committee in the name of the section, and congratulated the members on their complete success.

Mr. Roechling said it was a delight to find that the Committee's conclusions had met with unanimous acceptance. It was not an easy task to draw up a code of regulations on so complex a subject, so as to please all the world. Certain points were left for consideration at the next Congress, and in the meantime the Committee would endeavour to obtain more complete statistics.

In the course of the proceedings a very striking and novel diagram was exhibited by one of the members of the Commission, M. Van der Perk, Chairman of the Streets Committee of Rotterdam, which cannot fail to be of great value to all future students of town hygiene. The diagram showed in 365 vertical columns, one for each day of the year, the comparative amounts of the ingredients of street refuse removed daily from the streets of Rotterdam. The different ingredients are shown by differences of colour, and the comparative amounts by the greater or less space occupied for each ingredient in the column.

Progress in Heating and Ventilation.

The fifth question before the section was "The Progress of Twenty Years in the Heating and Lighting of Dwellings." Only the report (in German) of M. Pfützner, of Dresden, was in time for distribution; another, which arrived too late was by M. Etienne Herscher-Geneste, engineer, Paris. The author of the German paper gave a summary of his report, his comments and conclusions being translated into French.

M. Heyniux (chief architect of Batiments Civils), one of the vice-presidents of the section, explained, by means of diagrams, a new temperature regulator worked from a distance, of which he proposed on an early date to give a practical demonstration at the Royal Observatory. A great mechanical simplification was claimed to have been effected by substituting rarefied air in place of compressed air in the

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working of the regulator. After some observations by M. Haller, of Berlin, on the advantage of heating from a central source, the discussion was adjourned to Monday.

Mr. Adolphe Smith (London) pointed out that there existed very few buildings in Europe where an effective system of ventilation had been carried out systematically. At the Bourse of Havre various experiments had been made with more or less ill-success until recently, when they introduced the plan of extracting the foul air from below. In a few public buildings, beginning with the English Houses of Parliament, effective measures of ventilation were in force, and later instances were the Chamber of Deputies and the Sorbonne, in Paris, but in all these cases the cost had been very great. Ventilation in the houses of the poor was unknown and unattempted in England, as elsewhere. The law even recognised its inability to prescribe any method of ventilation, since it offered a premium where certain classes of houses were properly ventilated by a remission of house duty. In most houses all they could do was simply to throw open all the windows, when, except in the height of summer, the rooms would be rendered uninhabitable. Every sheet of paper on a study table would fly through the opposite window, and while such a current of air was in action the room was uninhabitable. He knew of only one room in London which was properly ventilated. This ideal chamber was in the house of Dr. Lyon. In this room were two stoves a short distance apart. Sufficient air to constantly and regularly renew that of the chamber was admitted at one side and discharged at the other without its being observed. The outer air was admitted through a chamber containing oil, which intercepted all impurities in suspension. The air passed through a sort of screen full of holes regularly graduated. This was certainly a scientifically-ventilated room, but what was the cost. To properly ventilate this one room cost over 3,000 francs—more than the full value of some small houses. But this proved that the problem could be solved, and that they had only to continue their researches and experiments to arrive at last at the desired result, which was to make possible in the small dwellings of the poor conditions which could only now be enjoyed by the very rich.

The President, after observations from the reporter and one or two other speakers, proposed the following order of the day, which was unanimously adopted:—"The section thanks the reporters for their interesting labours and their conclusions, in which engineers, architects, and those who interested themselves in the welfare of the people might find some useful information. The section also thanks the speakers who have been good enough to communicate their experiences to the section." The section then adjourned.

Hygienic Houses.

The last question for discussion before the section was then submitted to the experts appointed to report upon it to the Congress of Brussels:—"General rules of hygiene to be observed in the planning, the permanent aeration, and the interior decoration of dwellings." Only the report of M. Louis Bonnier, architect, Paris, arrived in time to be distributed to the members of the section, another report, that of Professor Mussbaum, of the Superior Technical School of Hanover, only reaching the President during the closing sitting of the section.

M. Bonnier said that at the tenth Congress, held in Paris in 1900, his regretted friend M. Henri Pucey had presented a report upon this subject which was so elaborate and complete that it might have been said to have exhausted the subject, were it not as eternal and many-sided as progress—as science itself. But the infinite diversity of cases renders it excessively difficult to lay down rules ever so little followed. Great obstacles were met with wherever one attempted to codify the rules of health. The report of which he spoke, in establishing several categories of dwellings, had often to repeat the same rules for all the categories.

There were two methods at the choice of the student of the question of these general rules: (a) He might begin by seeking for the absolute, the visionary rules indicating what ought to be, in theory, that which one would expect in an ideal city, created bodily in a temperate climate, laid out in a well-chosen direction on a sound soil, with excellent materials, with inhabitants caring for their comfort, and with an intelligent administration free from all fetters. Such a combination of conditions could rarely be met with, and it might well be thought such a code of hygienic rules would be useless. (b) He might seek for an immediate remedy for all evils—a simple and practical amelioration such as can only be found at the end of definite stages of progressive evolution, taking count of the climate, soil, materials, direction, and manners, and of administrative and all other difficulties. The second method is the method of results, but from the very fact that one must be preoccupied with the multifarious data of each local problem, it is almost impossible to make rules which are general without risk of making them too general.

During a period of twenty-five years great efforts have been made everywhere. Learned societies have been multiplied to show individuals, municipalities, and Governments the road to be followed, and it must be admitted that, if much still remains to be done, great progress has been realised. In France the Government promulgated, on February 15, 1902, a law with a fine title, "Law on Public Health," a powerful organic law, penetrating into every commune, every habitation, bringing it light and air, and being armed with powerful means of coercion. Although at the present conjuncture we are simply called upon to prescribe rules for a country of moderate climate, it is necessary to vary the prescriptions according to their application to capitals like Paris, to large towns, or to rural communities. Perhaps it might even be desirable to distinguish in the last category between the house of the peasant and the country house. It is necessary to point out that the edicts of the Minister of the Interior are themselves only models—charts upon which the chiefs of departments might inscribe definitive regulations. What might suit the climate of Nice had many chances of not being applicable to Lille. And yet we are at present concerned with only the sixtieth part of the total surface of the countries represented at this International Congress. It would seem, therefore, reasonable, if general rules applicable everywhere are to be formulated, that we should adhere to very simple principles, leaving to the authorities of each country the task of accommodating them to their personal needs.

Six great principles might be enumerated. (1) Isolate dwelling-houses from all immediate contact with the soil, either by non-conducting materials or by trenches. (2) Place dwelling-houses at a distance from any centre of decomposing organic matter, sewers, ditches, kitchens, water-closets, stables, or dunghills. (3) Ventilate dwelling-houses by currents of air coming from the exterior with reduced force and crossing the rooms. (4) Thoroughly light dwelling-houses by giving access to the direct sunlight, and for that purpose widen streets, extend courts, diminish the height of houses, and extend the superficial area of towns. (5) Employ none but sound materials, suppress all complicated and useless decorations, make thick walls, and contrive in the roofs protecting cushions of air. (6) Distribute profusely pure water to houses and to individuals. It would seem impossible to further distinguish among these principles without taking from them the desired character of generality.

One point could not be too strongly insisted upon if they were to advance by a few turns of the wheel upon the road that will lead humanity to better regions. It is indispensable that municipal authorities and governments should become interested in what might be called general architecture, the beauty of towns and picturesque views, the study of plans—logical, harmonious, and therefore practical—should emulate each other in organising competitions in the tracing of new quarters and in transforming old towns into modern ones. They should show the inhabitants, by special exhibitions, the results achieved and the end to be attained. They should, in short, give to everyone taste, self-respect, pride in his town, in his own quarter, in his own house, in his own lodging. They must render hygiene—that is, health—fashionable.

The Discussion.

The section concluded its business with a brief discussion, in which M. Bonnier, M. Anciaux, Dr. John Sykes (Medical Officer of Health, St. Pancras), M. Tobianski, and other speakers took part.

Dr. Sykes, speaking in French, said that until a comparatively recent period an English family commonly occupied a whole house, the area of towns in England being, as a rule, not restricted by walls or fortifications—a restriction which perhaps had at a much earlier period in history forced the inhabitants of French and other Continental cities to live in large houses of many floors, with many families in residence. During the last half-century a great change had taken place in the houses of the poorer English people. Small houses were everywhere disappearing, and through the continually augmenting immigration of rural populations into the towns London and other great cities were rapidly changing, and instead of the one-family house they were now building great houses with many floors or flats, as English people called the *étage*, every flat containing numerous families, each in a single room. In such houses the staircases and even the passages on each floor were common to many families, the result being generally very insanitary. Dr. Sykes cited a house in which ten families occupied ten rooms, the only means of ventilation being access to a common passage or corridor. A case of measles breaking out in one of the families, the outbreak spread rapidly, until every family had one or more cases of measles. In order to mitigate the sanitary evils arising from the overcrowding of such tenement houses, by-laws and regulations were prescribed by the authorities, which it was the duty of the medical officers to see carried out. In regard to ventilation, many of these houses were utterly defective. In a house of ten rooms occupied by ten families, the whole of the chimneys would all smoke if all the fires were lighted, because there were no systematic arrangements for ventilation. Currents of air were only too plentiful, but there was no real ventilation. In order to encourage the owners of such defective houses to comply with the sanitary regulations, a considerable reduction was made in the amount payable as house duty on obtaining a certificate from the officer of health that certain regulations had been carried out by the owner. Regulation 4 prescribes that the common staircase shall be permanently ventilated at each floor-level, or by through ventilation, so as to break the connection. Regulation 5 prescribes that each dwelling shall be arranged so as to be through-ventilated from one front to another. A current of air across the room is secured by this regulation, but it is rather perflation than ventilation. With perflation the room is not habitable, except perhaps in the height of summer. Another prescription is that there shall be at least one water-closet, properly and effectively supplied with water, for every twelve occupants or less on each floor, disconnected aerially from any dwelling in the interior of the building.

After observations from other members the President submitted the following order of the day, which was unanimously adopted: "The section, recognising the importance of the points raised in the sixth question, and declaring the interest of the communications that have been made, resolves, without coming to definite conclusions, to recommend that this question be placed on the order of the day of a future Congress.

Colonel de Kontkovski (Reval) stated that the work done by the section had been very considerable, and that it was largely owing to the manner in which the discussions had been directed by the President of the section, Lieut.-General Docteur.

The President disclaimed the credit, which belonged to the members of the section themselves, and particularly to the various secretaries, to whom the thanks of all were due.

The section was then closed.

The closing general meeting of the Congress was held on Tuesday afternoon in the Palais des Academies, M. Becq presiding, supported by the Minister of Agriculture, the Burgomaster of Brussels, M. Putzeys (the general secretary), and a number of official delegates and representatives of foreign Governments. M. Putzeys recited a long list of resolutions arrived at in the different sections, among the leading subjects being the transmissibility of tuberculosis, water-supply from calcareous rocks, the hygiene of towns, measures to be adopted to encourage the construction of cheap houses, bacterial systems of purification of refuse, ventilation and decoration of dwelling-houses, the inspection of houses for the working-classes by local administrations, hygienic inspection of schools, and inspection and disinfection of railway carriages, the provision of

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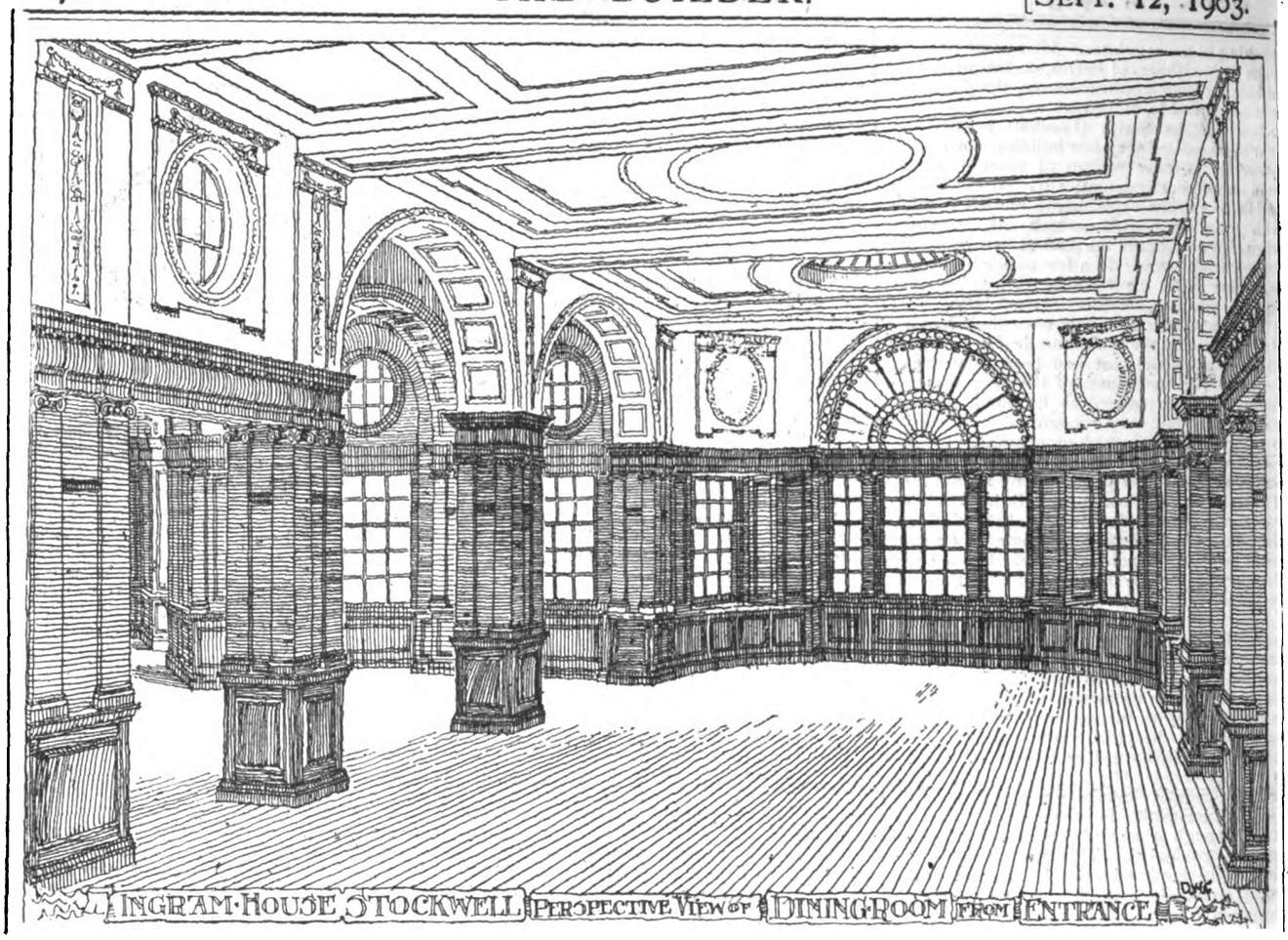

sanatoria for cases of tuberculosis, and an international understanding from the point of view of health as to the hours of labour. A telegram was read from King Leopold stating that he had followed the discussions of the Congress with keen interest, and applauded the results arrived at.

It was resolved to accept the invitation of Germany to hold the next Congress at Berlin in 1907, M. Von Kohler, the German Government delegate, in thanking the Congress for its decision, declaring it to be the intention of the Emperor William to deliver an address at the forthcoming Congress. The foreign delegates, headed by Dr. Brouardel, severally thanked Belgium and her Government for the hospitality extended to them, and their gratification at the important results attained.

Illustrations.

MUSIC ROOM, HATCHLANDS.

THE music room at Hatchlands, near Guildford, has been built for Lord Rendel from the designs of Mr. Reginald Blomfield.

It consists of an oblong room 37 ft. 6 in. by 24 ft., with four Ionic columns supporting a dome, the diameter of which is the full width of the room (24 ft.). Over the centre is a lantern cupola. The heighth from floor to top of cupola is 33 ft 6 in. At the end of the room there is a recess for an organ, to be supplied by Messrs. Walker and Sons.

The interior is finished in white panelling, mahogany doors and enriched plaster ceiling and dome, executed by Messrs. G. Jackson and Sons.

The exterior has been built in red brick, Portland stone, and gauged brick, with Westmorland slates.

The external carving and stone urns have been executed by Mr. Aumonier. The general contractors for the works are Messrs. King and Co., of Abinger Hammer.

INGRAM HOUSE, STOCKWELL.

THE drawings illustrate the scheme for residential clubs promoted by a company formed for the purpose of erecting such clubs.

The accommodation shown in the plans is for 270 residents, with a female staff of 25 servants. The residents are distributed in five floors of 54 bedrooms on each floor, all the rooms being 7 ft. by 10 ft., excepting the 40 angle rooms of a larger size. The staff bedrooms are on the lower ground floor, and in a mezzanine over the same in one of the wings of the building. The provision of a fireplace with a flue for all bedrooms, proposed to be fitted with a small gas fire with a penny-in-the-slot meter, was one of the features of the scheme, which, with the need for large windows for the two lower floors of club rooms, suggested the constructional scheme of piers connected in large arches, with a framework filling of wooden sashes.

The club rooms are of large size, and on the principal floor form a suite of a certain uniformity of treatment, suitable for occasional receptions on a large scale.

The general distribution of the plan, while obviating any courtyard rooms, also meets the difficulties of light and air encountered on three sides of the site, which is an old orchard at the rear of No. 42, Stockwell-road, extending also behind Nos. 40 to 46 in that road.

The entrance will be by a private road through the former stables of No. 42, and the existing house will be used as the residence for the managing head.

The articles of association of the company provide that in making regulations for the management of any of the residences under the control of the company the directors shall not impose any religious test as a condition of admission or of residence.

The site at Stockwell is close to the station of the City and South London Railway, which provides quick communication with the City, and is also close to many lines of trams and omnibuses giving access to all parts. There is also the advantage that it lies between the Brixton and Clapham roads, enabling anyone with a bicycle to reach within a short time all the commons and the cricket and football grounds on the Southern side of London.

The club rooms—carrying out the social idea of the scheme—include a lecture-hall, available for concerts and entertainments, to be fitted also as gymnasium, and conforming to the requirements of a public hall; a library, a smoking room, two billiard rooms (each of three tables), and a dining-hall capable of seating 200 at one time.

A feature of the plans is the ample bath-room accommodation up stairs and down, and the large lavatory building, arranged in duplicate, on the lower ground-floor level.

The balcony at the fifth-floor level, 63 ft. above the street, provides a means of escape in case of fire, circulating round the building, and connecting the two bedroom staircases. There is also a panic fire escape staircase of iron in the centre block, leading down on to the large flat over the dining-room bay, and thence by a short turret stair to a flat 7 ft. 6 in. above the street.

The architect to the company is Mr. Arthur T. Bolton, of Westminster, and the quantities for the building were taken out by Messrs. Widnell and Trollope, surveyors.

Tenders were received, as already published from a selected list of contractors, the lowest being within 500*l.* of the authorised estimate of 40,000*l.* The building in progress at the present time is being carried out by Messrs. Rudd and Son, of Grantham, on a somewhat reduced scheme for 208 residents, the top storey having been omitted, and the design modified accordingly.

QUEEN VICTORIA HIGH SCHOOL FOR GIRLS, STOCKTON-ON-TEES.

THIS building is intended to accommodate 150 girls, for whom are provided six class rooms, including a kindergarten room for 30. Additional accommodation can be obtained, if necessary, by putting a class-room at each end of the east front.

The class-rooms are placed on the first floor, separated from the hall by a corridor, and facing east; on the top floor are the science rooms and studio. The building is of red brick, the upper part being covered with rough cast, the centre portion of the front being in cut brick.

BUSINESS PREMISES, HOLBORN.

As a study for a mere front of London business premises, I have found this of unusual interest.

The ground, first, and second floors consist of large open spaces for showrooms, where the floor itself has to be left quite clear. Settees for the use of customers, recessed into bays, give this result; hence a bay-window treatment.

To carry these, steel construction is nowadays practically essential; but nevertheless the eye requires to be satisfied, which result

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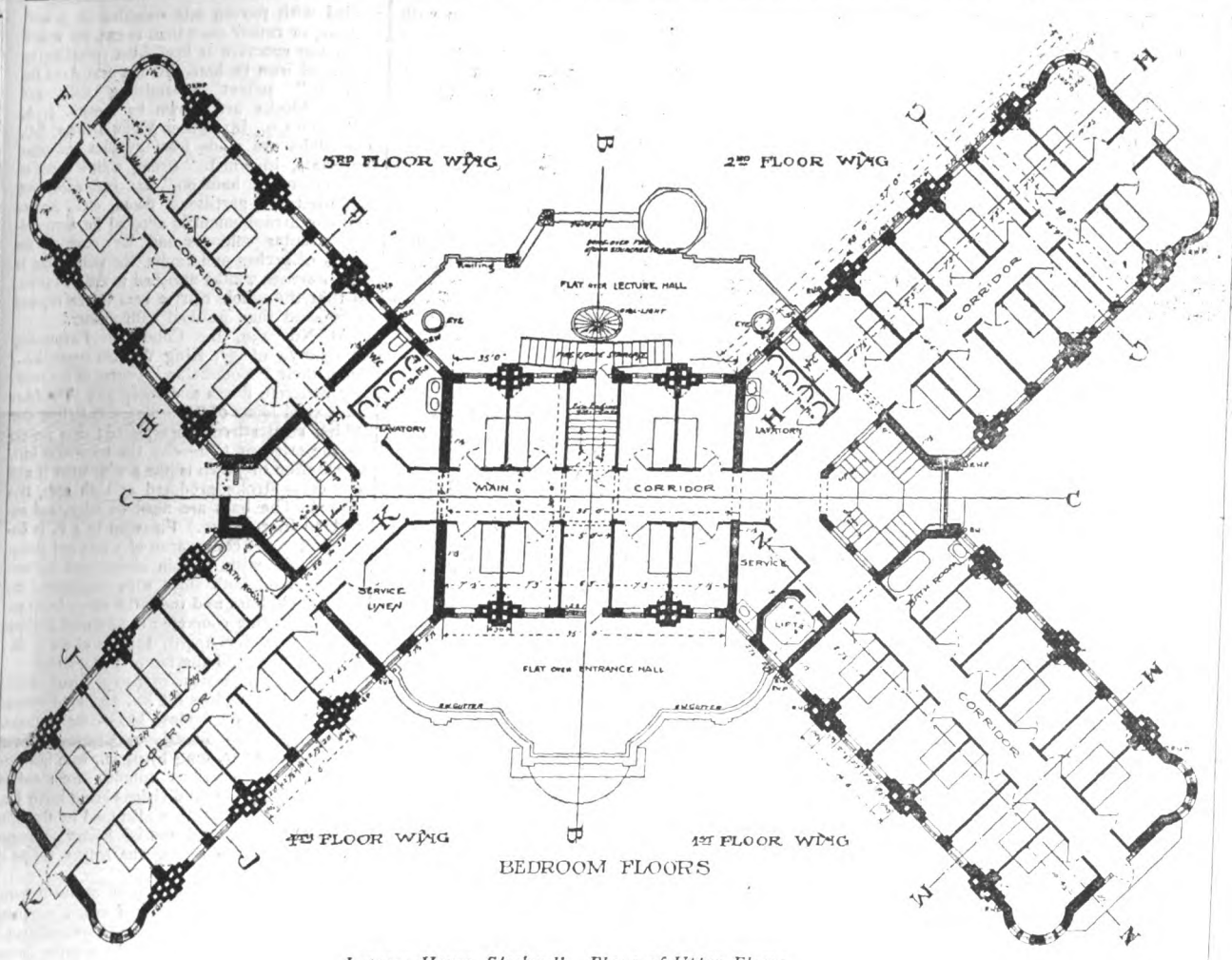
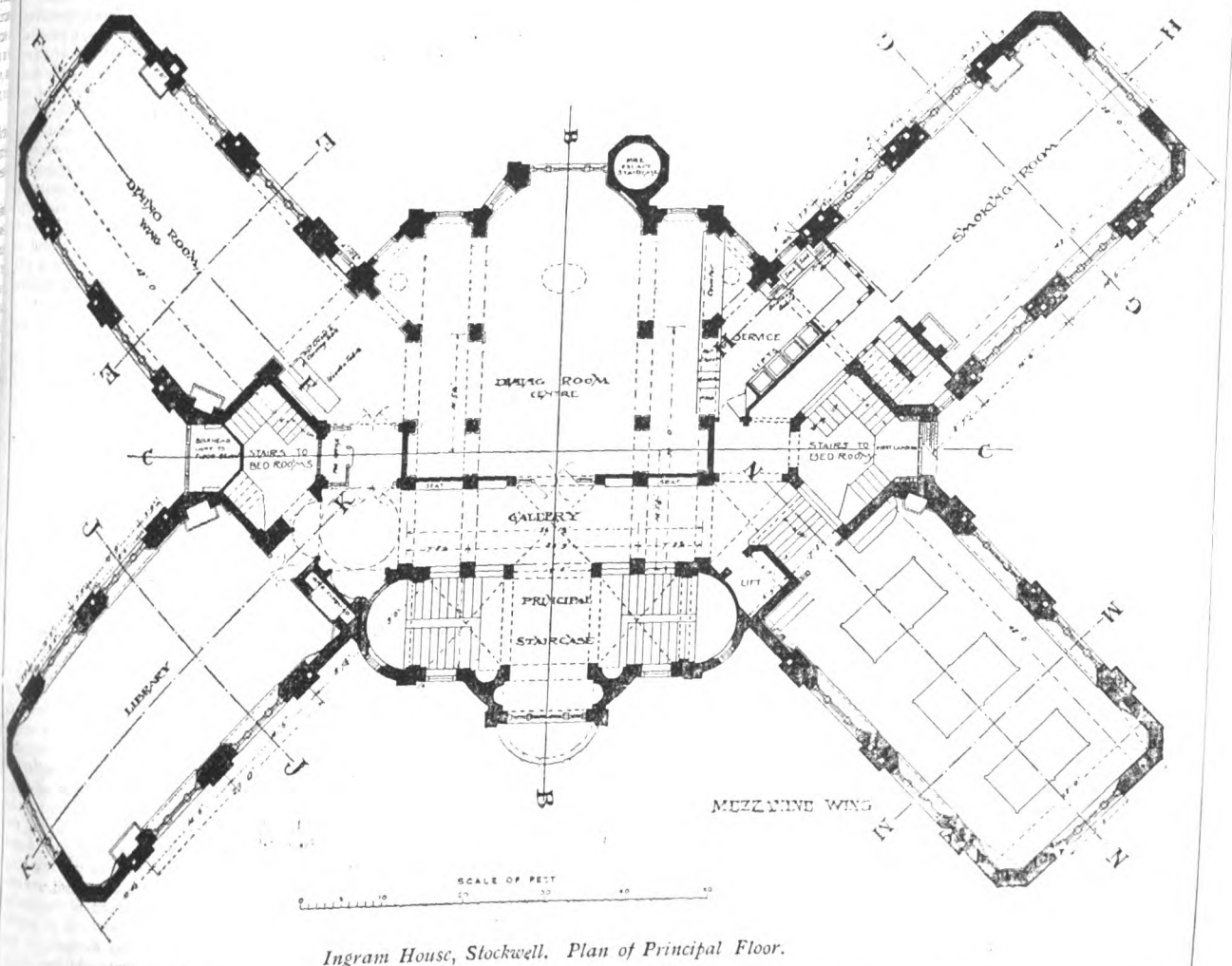


Ingram House, Stockwell. Plans of Upper Floors.



Ingram House, Stockwell. Plan of Principal Floor.

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seemed best attained in the manner executed, and which bears its story upon its face. The camel frieze, portraying the method of conveying Eastern rugs and carpets from the looms to the coast, was intended to be continuous, and is by Mr. E. Roscoe Mullins, sculptor.

The wood shop-front retains the character of the original, but is entirely remodelled to give the required structural lines of support; but that these do no more than satisfy the eye is evident from the lines of arches and panelling, while an infusion of Eastern feeling will be found in the detail.

Play of light and shade is obtained by recessing the principal entrance-doors, round which are grouped figures in wood of the various native carpet-workers of the East.

W. CHAS. WAYMOUTH.

DESIGN FOR A GARDEN BY A RIVER.

THIS design, which is sufficiently explained by the small plan in the corner, is a good suggestion for the kind of combination of architectural features with a garden in which the Italians have shown so much perception, but which has not been much attempted at any period in England. It must be admitted that such a design only has its full effect in bright weather; and with our short summer—which too often does not come off at all—it is perhaps only a millionaire, who can afford to keep a riverside mansion specially for the summer months, who could find it worth while to expend the necessary sum on such a piece of outdoor scenery.

If, however, any such millionaire does wish to add in this way to the dignity of a riverside garden, we may recommend his attention to Mr. J. S. Lee's design, as a very good example of the way to treat this kind of semi-architectural garden.

FURTHER NOTES AT THE INTERNATIONAL FIRE EXHIBITION.

IN our former article on this Exhibition (May 16, 1903) we mentioned a number of exhibits which were at that time incomplete, and alluded to other stands which were unoccupied, although, according to the catalogue, they were let. We will now attempt to describe briefly some of these exhibits, and then continue our survey at the point where we left off.

In the German Section the Eggert system of fire-resisting flooring deserves further notice. In its simplest form the flooring is constructed of concrete, with iron rods, from $\frac{3}{8}$ in. to $\frac{5}{8}$ in. in diameter, embedded therein; the special feature is the arrangement of the rods. These are bent upwards at the ends and turned over in the form of hooks, so as to be firmly secured in the upper part of the concrete, which is under compression, while the central portions of the rods are in the lower half, and thus increase the tensile strength of the floor. The thickness of the specimen floor, which has a span of 30 ft., is $9\frac{3}{4}$ in.; for a span of 18 ft. the thickness would be $6\frac{3}{4}$ in.; for 12 ft., $4\frac{1}{8}$ in.; and for 8 ft., $3\frac{1}{4}$ in. Special bricks are used to form the soffit of the specimen floor, and for small spans the bricks may be used without any concrete above them.

At Stand No. 17, Johannes Mueller, Marx, and Co., of Berlin, show models of their concrete floors, which are reinforced by a rather complicated meshwork of iron rods and bars, the rods being bent over the top flanges of steel joists or secured to hooks in the walls, and the whole meshwork being allowed to sag between the joists so that at the centre of the span it is very near the soffit of the concrete. A model of a stable is also shown, the chief peculiarity of which is the manger; this appears to have an iron front, curving outwards from the base till a total projection of about 20 in. is obtained. The space between the front and the wall is then filled with concrete, and the top of this is shaped to form the food-troughs.

At No. 28 (originally 27) there is an interesting model showing a vertical section through a building of several stories, fireproofed by the specialities of the Deutsch-Oesterreichishe Isolir und Korkwerke Gesellschaft, of Dresden. The material is used in the form of bricks and slabs for walls and partitions, plates for floors and ceilings, segments for enclosing columns and pipes, and in other ways, and appears to be composed of small pieces of cork embedded in cement. It is very light, and can be used in connection with woodwork. One of the floors has ordinary wood joists, and on these a layer of "cork-plates" rather more than an inch thick is fixed, and this layer is then covered with floorboards in the usual way.

The Prüss patent "self-bearing" walls are shown at Stand No. 31 (originally 35) and in the grounds. The walls are constructed of bricks laid in the compartments (about 18 in. square) formed by horizontal and vertical bands of hoop-iron. Stones or concrete may be used instead of bricks. The system has been adopted for external walls, partitions, retaining walls, garden walls, etc.

Specimens of "Lapidon" are shown at No. 36 (formerly 34). The material is said to be made from comminuted wood or stone, sand, etc., mixed with chloride of magnesium, magnesite, and other substances. The specimen tiles exhibited appear to be of the kind made from wood; they are coloured in various ways and are highly polished, light and warm, but are slightly warped; in actual practice the material is laid in situ, without joints, in one or two layers, each a quarter of an inch thick. It can be oiled or wax-polished like hardwood.

A novel fire-escape ladder, patented and made by Franz Scherrer, of Bonn, is shown by a large model at stand No. 5. It is designed for fixing to windows which are vertically over each other. Each opening is fitted with a skeleton iron casement, to the inner side of which an iron ladder is fixed, and another ladder is attached in such a manner that, when the casement is opened it slides downwards until the lower end fits into the slots provided for it in the top of the casement below. All the casements can be opened simultaneously by turning a handle on any of the floors, and the complete ladder can therefore be made ready for use in a few seconds. We understand that these ladders have been fixed to a number of buildings on the Continent, and that one has been fixed to a factory in London.

In the Queen's Palace, at No. 57, the "Shepwood" fireproof partitions, made by the Shepwood Company, of Walton-on-Thames, are shown, and at No. 62 the exhibits of the British Uralite Company, Limited, of 50, Cannon-street, E.C., are now complete. Among those which have been added since our first visit, we may mention a large model of a bungalow, in which uralite is used for the walls and roofs, and a fire-resisting door constructed of two thicknesses of deal boards with uralite between and on each side, the whole being enclosed with thin steel plates, and hung to slide with Mather and Platt's special fittings. A door of this kind, tested by the British Fire Protection Committee, is shown in another room, and affords satisfactory proof of the fire-resisting qualities of the material. Messrs. J. H. Heathman and Co., Rectory-road, Parson's Green, S.W., have a large and interesting display of telescopic ladders, telescopic folding scaffold-trestles and towers, etc.; and Mr. W. Gooding, of North-road, Holloway, N., shows at No. 130 some specimens of his safety treads for stairs; these consist of metal plates with holes, through which pieces of indiarubber, 1½in. square, are passed. The stand of the General Electric Company (No. 79) is a well-designed structure of hammered iron, and contains a miscellaneous assortment of electric fittings. Near this, Mr. L. G. Mouchel, of 38, Victoria-street, S.W., exhibits a number of views, plans, elevations, and sections of armoured concrete buildings and other structures, chiefly on Hennebique's system. The principal peculiarity is in the arrangement of the iron or steel bars, and in the clever adaptation of the system of construction to different classes of work. Among the buildings illustrated are a large warehouse at the Manchester Docks and a grain silo at Dunston-on-Tyne; there are also views of a jetty at Purfleet, a pier at Falmouth, and a quay extension at Southampton. At No. 92 there is a large and excellent exhibit of "Impervious Stone" by the Patent Impervious Stone Company, of Rutland Wharf, Hammersmith, W., comprising steps, balustrade, moulded cornices, enriched panels, etc., in grey and buff tints.

We pass now to the Imperial Court, where the first exhibit (No. 131) is that of Stuart's Granolithic Stone Company, Millwall. The material is a well-made concrete, and examples are shown of its use in flat floors, flat floors with arched soffits, arches, steps, columns, and ornamental details. One of the floors with arched soffit has a thickness of 3 in. at the centre and 12 in. at the haunches, a span of 9 ft., and a width of 3 ft., and is loaded with paving sets weighing (it is said) 22 tons, or rather more than 16 cwt. per square foot; the concrete is kept from spreading by means of iron tie-bars. At the next stand the "Mack" patent fire-resisting slabs and hollow blocks are shown by Messrs. J. A. King and Co., 181, Queen Victoria-street, E.C. The slabs are made from gypsum and other materials, in which "strong hollow reeds of the nature of bamboo" are embedded, and are used for partitions, floors, etc. An ingenious arrangement is adopted for surrounding circular columns and for covering the soffits of arches and vaults, the slabs being in very narrow widths attached to coarse canvas, so that the whole can be bent to the required curve and then finished with plaster.

At No. 139, the Columbian Fireproofing Company, of 37, King William-street, E.C., show their "Columbian" system of fire-resisting concrete floors and roofs, etc. The floors have steel joists of the ordinary H section, over which steel stirrups are placed; slots are cut in the stirrups to receive the transverse bars, the section of which is like a wide letter H with the cross-stroke produced at both ends, thus -I -I- The bars are fixed on edge, and embedded in concrete. Pipes up to 5 ft. in diameter for the conveyance of water and sewage are made with a thin sheet-metal cylinder, stiffened on both sides with longitudinal and concentric bars and rods, the whole being embedded in fine concrete; the finished thickness of concrete for a 4-ft. tube is about 3½ in.; the joints are of the lap or rebated type.

Mr. A. E. Brown, of Essex Wharf, Whitechapel, E., exhibits (at No. 147) some remarkable terra-cotta hollow blocks for partitions, etc., made by Frazzi, of Cremona. Some pieces are 15 ft. long by 9¾ in., with four rectangular perforations running from end to end., the walls and divisions being barely ¾ in. thick. The blocks are also used for the soffits of flat floors, and special hollow abutments are made for encasing the bottom flanges of the steel joists.

Around the greater part of the Imperial Court there is a series of rooms containing the "historical, loan, and art collection." Room No. 5 will be of the greatest interest to our readers, as it contains the remains of building materials and fittings tested by the British Fire Prevention Committee. There is a representative collection of doors, including wrought-iron doors of ordinary type, a panelled Jarrah door, a teak door composed of three thicknesses of boards, a door of double deal boards with sheets of uralite between and on both sides, a similar door covered with thin sheets of steel, and a deal door covered with steel but without uralite. We need not describe these in detail, but may say that the door of deal and uralite encased in steel appears to have withstood the test most satisfactorily. On the side exposed to the fire one of the steel plates has sprung, and the wood behind is charred, but on the other side the door is still perfect. Among the other exhibits are massive wood posts, concrete, wired glass, etc., and a series of the "red books" containing the results of the committee's tests.

In Room No. 7 we noticed a series of photographs of London fire-stations, a map of London showing the fires in 1902 (lent by the British Fire Prevention Committee) and a great number of photographs of recent notable London fires (lent by Mr. E. O. Sachs).

The next room contains a number of designs for provincial fire-stations, including the large station now being built in Manchester from the designs of Messrs. Woodhouse and Willoughby and Langham, those at Sheffield (by Mr. Joseph Norton), Aberdeen (by Mr. A. H. L. Mackinnon), Bournemouth (by Mr. F. W. Lacey, F.R.I.B.A.), and others. Drawings of the stage at Covent Garden Theatre are also shown. Some photographs of buildings struck by lightning are exhibited by the Lightning Research Committee of the R.I.B.A. One of the most interesting examples is a house at Heathfield, Sussex, which was twice struck by lightning in 1902, although "protected" by at least eight lightning rods. Another interesting photograph is that of the wall-paper of a room, showing two small holes made by the lightning on entering and leaving the room; it appears that the lightning passed from the iron eaves-gutter to the supporting bracket which was fixed in the wall, and continued its path from the end of the bracket through the wall, and passed out at a lower level without doing serious damage. A map lent by Messrs. J. W. Gray and Son, of 115, Leadenhall-street, E.C., shows the distribution

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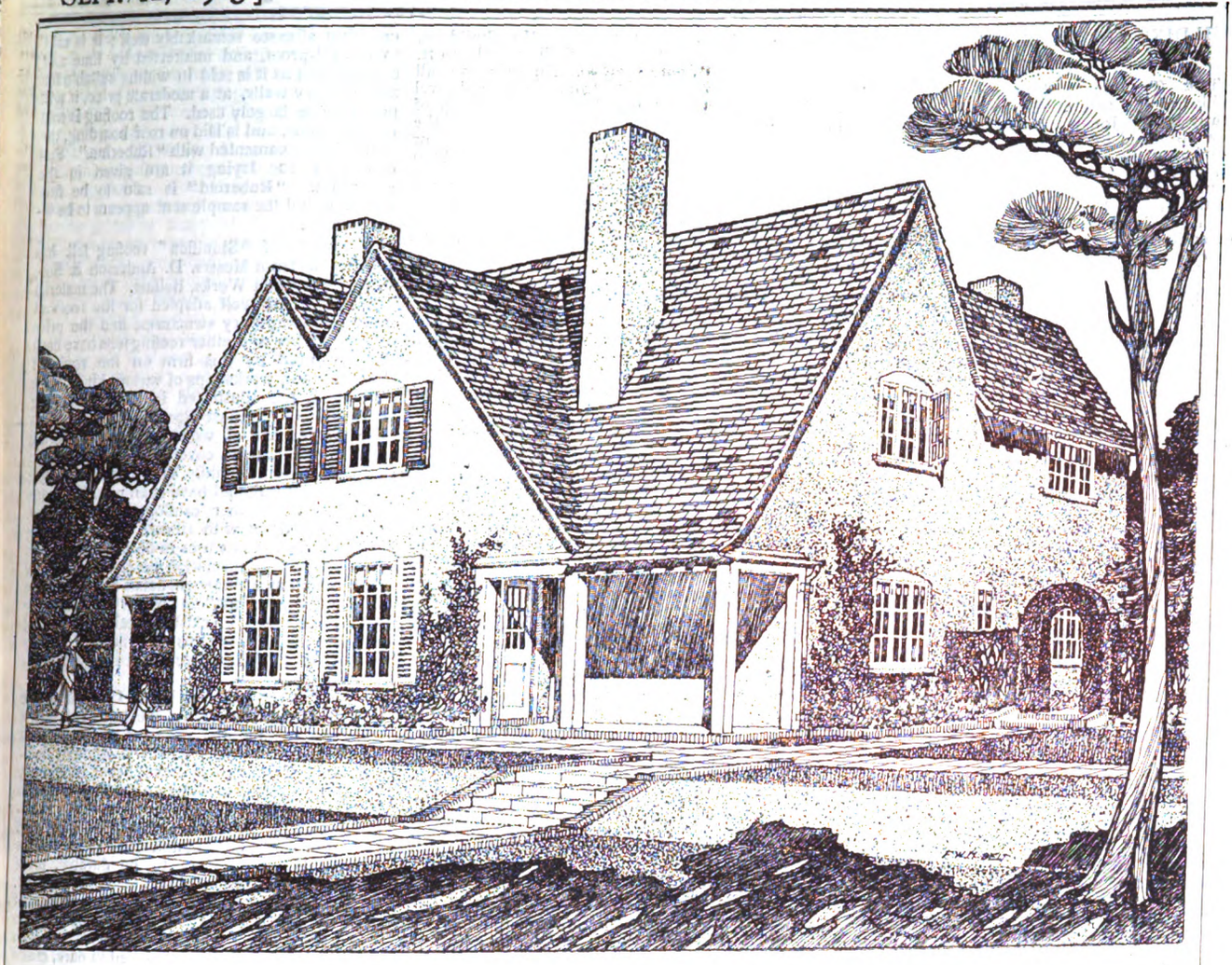
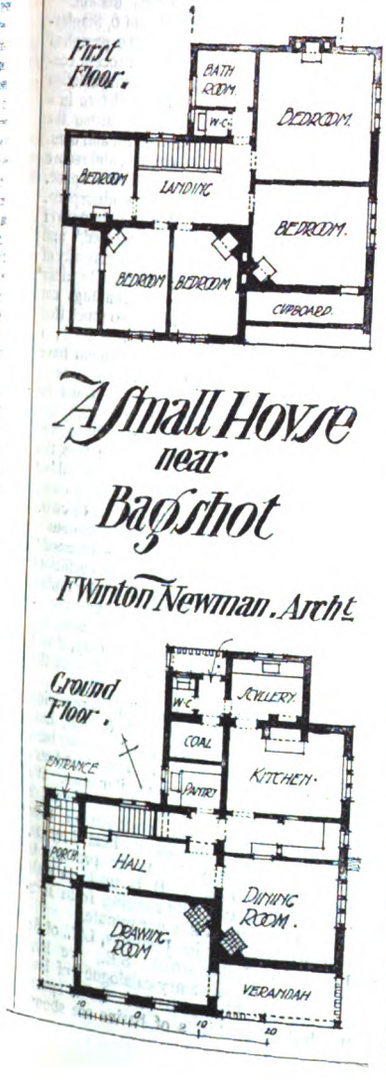


A Small House near Bagshot.



of 1,304 buildings in England and Wales reported to have been struck by lightning between January 1, 1898, and May 18, 1903.

A Fire Exhibition would not be complete without exhibits of fire-engines, escapes, alarms, and other apparatus required by fire-brigades, and these may be seen at Earl's Court in great variety, notably at the stands of Messrs. Shand, Mason, and Co., and Messrs. Merryweather and Sons, in the Imperial Court.

A SMALL HOUSE NEAR BAGSHOT.

This house has been erected at Carley Hill near Bagshot. The walls are built of brick, and are covered with rough cast, as the house stands well up and is open to the south-west. The outside joinery is painted white—with the exception of doors and shutters, which are dark green. The fireplaces have been planned anglewise by special desire.

The architect is Mr. F. Winton Newman, and the builders are Messrs. Mussellwhite, of Basingstoke.

ENGINEERING SOCIETIES.

The Junior Institution of Engineers.—The summer meeting of this Institution, which has recently taken place, was exceptionally well attended, a circumstance no doubt due to the particularly attractive character of the programme provided. The proceedings opened at the Town Hall, Sheffield, where the Lord Mayor welcomed the Institution, after which the members visited the works of Messrs. Davy Brothers, at Attercliffe, when they had the opportunity of seeing in course of erection the most powerful armour-plate mill yet constructed. It is for the Imperial Japanese Government, and will be capable of rolling a 40 or 50 ton hard chrome steel ingot into a plate in about 15 minutes. The next visit was to Messrs. Hadfield's Steel Foundry Works, at Tinsley. A most interesting afternoon was spent in the inspection of the splendid foundry, where steel casting for hydraulic, marine, and other machinery, track work, points and crossings, and mining machinery of all kinds were being turned out. Haddon Hall and Chatsworth House were visited on the following day, and next morning the works of Messrs. Charles Cammell and Co. were opened to the members, an armour-plate for H.M.S. "Hindustan" being specially rolled on their arrival. The various other processes incidental to armour-plate manufacture were shown, and file-making, tool-steel rolling, general forgings, and crucible steel melting furnished other features of interest. In the foundry, marine, locomotive, dynamo, and other castings were in hand. The party afterwards proceeded to the works of Messrs. James Dixon and Sons, where the numerous operations involved in the manufacture of silversmiths' goods were witnessed. The whole of the following day was spent in an excursion to Castleton for the purpose of going through some of the remarkable caves there. The Speedwell and the Blue John, which takes its name from the wonderful mineral mines, were inspected. Next day the Toledo Steel Works of Messrs. John Henry Andrew and Co. were visited. Springs, wire, Siemens and Bessemer steel, and specialities in casting steel, rolling mills, mining tools, etc., afforded ample subjects for the morning's inspection, and in the afternoon the Master Cutler's Works (Messrs. Thomas Turner and Co.) were visited. Here cutlery of all kinds was being made, the striking feature being the large amount of work which was being done by handicraft. The series of visits was brought to a close by inspecting the works of Messrs. Mellowes, where the well-known "Eclipse" roof glazing is produced, and in the evening the institution summer dinner was held at the Royal Victoria Hotel, the chairman, Mr. Kenneth Gray, presiding. The Master Cutler, the Deputy Lord Mayor, representatives of the different works visited throughout the week, and other guests were present. An illuminated vote of thanks was presented to Mr. Ernest King in recognition of his valuable service as honorary local secretary of the meeting.

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BUILDING BY-LAWS IN JOHANNESBURG.

THE *Transvaal Government Gazette* has published the text of the by-laws adopted recently by the Johannesburg Town Council, and now approved by the Lieutenant-Governor, for regulating the construction and arrangement of building and laying out of streets within the municipality. Subjoined is a summary of some of the principal clauses:—

The by-laws are not to apply, save in certain exceptional circumstances, to any building now in existence or hereafter to be erected on any mining ground which is used or intended to be used exclusively for the purpose of carrying on mining operations or of storing mining materials.

Every person intending to lay out a township, or subsidise any piece of ground, within the municipal area for the purpose of sale, hire, or transfer, must submit plans to the town engineer, showing any proposed new streets, with the widths and names thereof, the stands or lots into which it is proposed to subdivide the ground, with their numbers and dimensions; also showing the true north point, also all angles observed or measured in surveying the township or ground. Such plans shall also show the levels of the different streets and points at not more than 200 Cape feet apart, referred to some known datum or bench mark. [1,000 Cape feet equal 1,033 English feet.]

Except where local topographical conditions prevent, all blocks of ground in any subdivision shall be rectangular. No block shall exceed 2½ morgen, nor shall any block be less than one morgen [two English acres], except by special permission of the Council. The lengths of blocks shall be from two to three-and-a-half times their depth, and such depth shall not be less than 200 Cape feet. The principal thoroughfares shall be parallel to the short side of the blocks.

Every person so laying out new streets shall cause such streets to preserve continuity of line, access, and grade with streets already laid out. No street shall be less than 40 Cape feet in width, and where the Council deem that any proposed street is likely to be used as a main thoroughfare the Council may require it to be of any greater width, not exceeding 120 Cape feet. Every street shall have an entrance equal in width to the width of such street.

So far as possible streets shall be laid out so that no gradients steeper than 1 in 15 may occur in them. On main roads gradients steeper than 1 in 30 shall as far as possible be avoided.

Where trees are planted in streets or roads they shall be planted in rows so as not to obstruct the traffic. No two rows shall be nearer to each other than 20 ft., and the distance apart of trees in the same row shall not be less than 15 ft.

Any person intending to construct a new street shall, in addition to the plans and specifications required as aforesaid, submit drawings showing intended sidewalks, kerbing, carriageways, etc., and accompanied by specifications of the materials to be used and work done in the construction of such street.

No building or structure shall be erected within the municipal area which the Council shall deem to be a disfigurement to the town or neighbourhood or any annoyance to the inhabitants thereof.

Every person erecting a new building shall construct every external or party wall thereof of stone, brick, or concrete, or other hard and incombustible material, or of wood, iron, or steel framing, covered with corrugated iron or other incombustible material.

The cubical contents of any single compart- of a building of the warehouse or office class shall not exceed 250,000 cubic feet. Where the aggregate cubical contents of two or more compartments of any building exceed that amount such compartments shall be separated by fireproof walls and no part of any opening in such shall exceed 8 ft. above the floor next below it.

No person shall erect any building of raw and unburned bricks except at such place as the Council may approve, and then only where there shall be a clear space of not less than 15 ft. from the nearest building, and no such building shall exceed one story of 15 ft. in height. The thickness of external walls of unburned brick shall not be less than 12 in. No wall shall be composed of burned and unburned bricks built together.

All new buildings on a stand or lot facing a business street shall have their walls constructed of hard-burned bricks, terra cotta stone, or sound and hard concrete or other such material, built with lime, mortar, or cement mortar.

In all dwellings or buildings used for domestic purposes on damp ground the floor of the cellar or the ground below the ground floor shall be covered with hydraulic lime, concrete, cement, or other impervious material at least 4 in. thick.

No building shall exceed in height on any of its front or faces one and two-thirds the width of the public street adjacent to such front or face measured from the kerb line to the top of eaves, gutter, or parapet. No building, wherever it may be situated, shall exceed 140 ft. in height measured as above. Roof slopes shall be such that a line drawn from the ground level at the opposite side of the street to the top of eaves, gutter, or parapet of buildings of the maximum height shall clear them. Towers or turrets may be carried to a height greater than specified above provided that they do not occupy more than 1-5th of the frontage and that each tower shall not exceed 400 square feet in area and 20 ft. on the street frontage.

No person shall, within the fire limits of the municipal area, build any erection constructed of or covered with wood, canvas, reed, or other matter of a combustible nature, or roof a building with thatch, reed, or other inflammable material. Such material, however, may be used outside the fire limits provided that no portion of such structure shall be distant from the boundary of the ground on which it is situated, or from buildings in a different occupation, not less than 20 ft.

All walls of dwelling-houses shall have a proper damp course of tar, sand, slate, cement, or other durable material impervious to moisture beneath the level of the timbers of the ground-floor and above the ground level when considered necessary by the town engineer.

All party walls of buildings shall be built up from their foundation without openings, and shall be carried up above the roof 18 in. in the case of domestic and office buildings, 2 ft. 6 in. in the case of warehouse buildings, and 3 ft. in the case of public buildings, measured in each instance at right angles to the slope of the roof; and except where otherwise expressly specified, such wall shall not be les than 8½ in. in thickness and shall be coped with stone, cast-iron, terra cotta, or brick set in cement mortar.

Any person intending to erect a building exceeding 100 ft. in height shall give notice of his intention by public advertisement not less than one month before the plans are submitted to the Council, in order that any adjoining owners who may consider themselves likely to be prejudiced by the erection of such public buildings may lodge their objections and protests with the town engineer before the plans are considered.

Every domestic building hereafter erected exceeding 45 ft. and less than 60 ft. in height shall have the second and third story floors fireproof.

METROPOLITAN ASYLUMS BOARD.

AT the first meeting of the Metropolitan Asylums Board, after the summer recess, on Saturday last, it was agreed that the plan prepared by Messrs. A. and C. Harston, architects, for the extension of the tramway at the Joyce Green Hospital, be affirmed, and that tenders for the necessary work be invited by public advertisement.

The Works Committee reported that they had instructed the Clerk to reply to the following effect to the Local Government Board, who had asked for certain further information with reference to the Managers' application for an order authorising them to incur additional expenditure, not exceeding 3,468*l.* in connection with the drainage, etc., at the Millfield Convalescent Home at Rustington:—"When the Local Government Board issued their order for 20,500*l.* in respect of the erection of the Millfield Homes in February, 1901, they intentionally omitted a sum of 500*l.* which had been provided for the proposed cost of drainage works, the mode of draining the homes not having then been considered. The Board subsequently issued an order for 698*l.* in respect of the septic tanks. This amount did not, however, include the drainage of the home as far as the septic tanks, neither did it include the cost of the sewage outfall, which was not contemplated as necessary, but which had to be constructed and carried from the tanks to low water-mark of ordinary spring tides, a distance of nearly 1,400 ft. from the breastwork, to meet the requirements of the Board of Trade. There were not, therefore, any deductions from, additions to, or amendments in the original scheme sanctioned by the Local Government Board."—The Works Committee also submitted plans by Messrs. T. W. Aldwinckle and Sons, architects, for the erection of a boat-house and workshop (involving the demolition of the old timber gantry) at the South Wharf, the cost of which was estimated to be 950*l.* for the erection of the building and 200*l.* for the demolition of the timber gantry. It was agreed to approve of the plans, and to forward them to the Local Government Board for their sanction.

TRADE CATALOGUES.

MESSRS. ROBERT W. BLACKWELL & CO., LTD., 59, City-road, E.C., have sent us a sample of their "Ruberoid" damp-course, and a pamphlet containing information about this and their "Ruberoid" roofing. The damp-course is pliable and waterproof, and resists crushing stresses remarkably well; it is said to be rot-proof, and unaffected by lime and cement, and as it is sold in widths suitable for all ordinary walls, at a moderate price, it will probably be largely used. The roofing is sold in 36-in. rolls, and is laid on roof boarding, the seams being cemented with "Ruberine." Full directions for laying it are given in the pamphlet. "Ruberoid" is said to be fire-resisting, but the sample sent appears to be inflammable.

A sample of "Stoniflex" roofing felt has reached us from Messrs. D. Anderson & Son, Ltd., Lagan Felt Works, Belfast. The material appears to be well adapted for the roofs of light and temporary structures, and the price is low. This, and other roofing felts have been largely used by this firm on the roofs of factories and workshops of various kinds, some of which are illustrated in their interesting catalogue of "Belfast Roofs." In these roofs the trusses are of wood, of the bow-string lattice type, and are covered with boarding on which the felt is laid. The trusses are light and economical, and have been used for spans of 100 ft. Another catalogue from Messrs. Anderson deals with silicate cotton or slag-wool, and shows its uses in domestic buildings, and also for the insulation of cold stores. By the arrangement shown in detail No. 12 for "fire and sound proofing," an ordinary joisted floor can be applied to existing ceilings without difficulty. Prices of this material and of felts of various kinds are given in a separate price-list.

From the Lubrose Paint Co., Moorgate Station Chambers, E.C., we have received a descriptive pamphlet, price-list, and samples of their Lubrose paint, which is made in Hamburg, and appears to have been extensively used in Germany and, to a smaller extent, in Holland, France, and Norway. The testimonials show that it has been successfully used on iron, wood, cement and concrete, and other materials. It appears to be durable, proof against damp and acids, and easily applied. The composition of the paint is not stated, but it evidently differs from ordinary paints, as a safety-lamp or electric-light must be used when the paint is being applied in dark, closed spaces, or where there is no air circulation.

The Powell Wood Process Co., of 6, Stanley-street, Liverpool, sends a descriptive pamphlet on "Powellised Timber." The process consists in boiling timber in a saccharine solution and afterwards evaporating the moisture in a drying chamber, and is said to harden the timber, increase its strength, weight, and durability, check the tendency to dry rot, and reduce the tendency to warp, split, shrink, and expand. Some tests are given comparing the absorption, transverse strength, and compressive strength of timbers "processed and not processed," and while they show in the main the superiority of the "processed" timber, they are not altogether convincing. The strength of scantlings cut even from the same tree varies so much that no reliance can be placed on a few tests; a long series of careful experiments would have to be carried out before a definite opinion as to the advantage of the new process could be given. The tests mentioned in the pamphlet are not all in favour of the process, although at the first glance they appear to be: thus, the bending tests of yellow pine give the breaking load of the "processed" specimen as 7¼ cwts., and that of the "non-processed" as 6½ cwts., but when the slight difference in dimensions is taken into consideration, the "non-processed" wood is found to have the greater coefficient of rupture. If the process will render timber more durable and will reduce to any appreciable extent the shrinkage and warping, without injuring the wood in any way, it will probably be adopted, whether it increases the strength or not.

The "Empress Smoke Cure," with revolving cowl, made by Messrs. Ewart & Son, Ltd., 346-350, Euston-road, N.W., has already been mentioned in these columns. The same firm's "Victoria" ventilator is on similar lines. We have also received from Messrs. Ewart & Son an illustration and price-list of their "B"-pattern califont—a geyser heated by gas, and supplying hot water under pressure to any part of the house. It is made in eight sizes, the stated capacity ranging from 1½ to 16 gallons of warm water per minute.

From Messrs. George Jennings, Ltd., of 63-67, Lambeth Palace-road, S.E., we have received their "temporary catalogue" of lavatory fittings. Tip-up basins are a special feature, but other kinds of basins are shown.

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Some of the basins rest on wood enclosures, while others are supported on metal legs or brackets. Most of the designs for the woodwork and ironwork leave much to be desired, but many of the basins appear to be thoroughly satisfactory. Everyone knows that the prices in a trade catalogue of this kind are subject to a discount, and that the discounts allowed by different manufacturers vary from about 10 per cent. upwards. The discount allowed by Messrs. Jennings is not stated in the catalogue, but the prices of many of the fittings are so high that we assume the discount to be exceptionally large. One shampooing lavatory with tip-up basin, statuary marble slab, white metal legs, and plated fittings, is priced 60*l.*, and a simple panelled cupboard front under a basin is priced 3*l.* for deal, and 5*l.* 5*s.* for mahogany, with an extra of 1*l.* or 2*l.* 10*s.* respectively for each returned end; a slightly more elaborate front is priced 6*l.* for deal, and 10*l.* for mahogany, with extras of 2*l.* 10*s.* and 4*l.* 10*s.* for each returned end. These prices are so high that many architects will decline to specify the fittings or to show the catalogue to their clients.

Mr. F. Wallis Stoddart, of the Western Counties Laboratory, Bristol, sends us a pamphlet containing a short description of the Stoddart Continuous Sewage Filter. The special feature of this filter is the method of distributing the sewage, but as this has already been described in these columns, we need only repeat that the distributor is designed for the purpose of allowing the sewage to fall in drops equally over the whole surface of the filter. The pamphlet contains information as the area and depth of filter required, and illustrations drawn to scale. A photographic illustration of a large filter of this kind at Salisbury, forms the frontispiece. The filter is well adapted for small purification works, such as those required for country-houses.

The Hartshill Brick & Tile Co., of Stoke-upon-Trent, send us their new catalogue of glazed bricks, roofing tiles, ridges and finials, floor-tiles, red and buff chimney-pots, paving-bricks, drain pipes and traps, sinks, and other clayware. The catalogue is a comprehensive one, and the opening edges of the leaves are cut out and printed to form a "thumb index," which facilitates reference. The illustrations occupy the right-hand pages, and the prices face them. The catalogue will be of service to architects and builders. A closely-printed page of "builders' notes" contains some useful memoranda, a few of which, however, stand in need of revision.

Messrs. Hart, Son, Peard, & Co., Ltd., ironmongers, of 138-140, Charing Cross-road, W.C., and Grosvenor Works, Birmingham, have sent us their new catalogue of builders' ironmongery, brasswork, &c. It contains nearly one hundred pages, and as the illustrations are small (though clear), a very large number of fittings are shown. We do not notice anything particularly novel or artistic, but the catalogue may be recommended as a work of reference for general use. It is fully priced, and contains a complete index.

A more elaborate catalogue of builders' ironmongery and brasswork has reached us from Messrs. Colledge & Bridgen, Midland Works, Wolverhampton. It contains 112 pages and is printed on good paper and well bound. Many of the illustrations are reproduced from photographs. Among the contents we notice some artistic door furniture, including *repoussé* lock-plates and finger-plates, handles and knobs of various kinds, Suffolk latches, &c. The catalogue includes also locks, casement stays and fasteners, espagnolette and other bolts, hinges, fanlight-openers, name-plates, hat and coat hooks, air-grates, and other goods. Wrought-iron safes and porcelain enamelled iron baths are also shown. The architect and builder will find the catalogue useful.

We have received from the Simplex Steel Conduit Co., Ltd, of Norfolk-street, Strand, an abridged price-list of their wiring accessories and fittings, and notice that two new types of conduit are listed which are intended for high-class installation work. The "Simplex Wireduct Conduit" has screwed ends, so that it is perfectly watertight, and has a smooth interior and exterior surface. As its price compares favourably with gas barrel, there ought to be a demand for it. The "Simplex Solid Drawn Conduit" is manufactured from Siemens-Martin steel, and is seamless throughout. Although more costly than other types of conduit, yet, as it admits of being bent when cold, a saving can be made, as fewer "bends" will be required to set up the conduit. The price-list is of a very convenient shape and size, and as it contains a reprint of the rules of the Institution of Electrical Engineers, it is useful to keep for reference.

We have received a booklet from Messrs. Lawrence, Scott, & Co., of Norwich, entitled "Notes on Electric Motors." It is intended primarily for engineers who have only occasionally to manage electric motors, but electrical engineers will find it both interesting and instructive. The non-technical descriptions given of the working of series and shunt motors are very good, and will be useful in helping the general reader to understand the main points of difference between the two types of motor. The relative advantages of carbon and copper brushes are impartially stated, and the diagrams given of the starting switches and the regulating resistances for motors can be readily followed. The diagrams given of multipolar motors illustrate the great improvements that have recently been introduced into the design of this class of machinery, and the modern electric motor is a thoroughly trustworthy machine.

Correspondence.

FISCAL POLICY AND BUILDING.

SIR,—In reference to your article re Fiscal Policy and Building, you raise the question of an import duty on timber, but I think you will find that several speakers have stated that it is not intended to impose duties on raw materials other than what can be obtained within the boundaries of the United Kingdom, or her colonies, or that by the imposition of a small duty could be caused to be procured within such boundaries, say, by afforestation (you had an article on this recently, deploring the absence of timber in England); and you must also give our legislators credit for having the common sense not to strangle such an important industry as the building trade by the imposition of large duties, until such time as the home market could supply timber in sufficient quantities, and at the same rate at which the article could be procured from foreign markets, less duty. I am sure that a duty on imported joiners' work would be a great help to the steam joinery works of the kingdom, thus giving more employment to carpenters and mechanics, and incidentally to the building trade in erecting the works, and your artistic eye would not, in the future, be shocked by nasty and inferior joiners' work, or art furniture that is all glue and whiffle.

B. AUSTIN.

BOOKS RECEIVED.

THE ELEMENTS OF ELECTRICAL ENGINEERING. By Tyson Sewell, A.I.E.E. Second edition, revised. (Crosby Lockwood & Son.)

SAINT ALBANS: THE CATHEDRAL AND SEE. By the Rev. Thomas Perkins, M.A. (George Bell & Sons.)

THE ENGINEER IN SOUTH AFRICA. By Stafford Ransome, M.Inst.C.E. (Archibald Constable & Co.)

The Student's Column.

CONCRETE-STEEL.—XI.

PROFESSOR HATT'S THEORY OF BEAM DESIGN (*continued*).

IN practical computations n, m, u, and p, are settled; x is then calculated from formula (4), c and f are determined by the aid of (1) and (2), and finally the moment of resistance is ascertained from (5). As the moment of resistance is always equal to the bending moment, it is easy to ascertain the load corresponding with any conditions of loading and span.

Example I. For the purpose of practically illustrating the application of the formulas, we will now calculate the load at the point A, for one of the beams tested by Professor Hatt, selecting a proportionate reinforcement of one per cent. placed two inches above the bottom of the beam. We will take the following values for the ratios, viz.:—

$n=2$, $m=12$, $u=(6\div 8)=0{\cdot}75$, and $p=0{\cdot}01$.

The first two of these differ fractionally from the ratios found by Professor Hatt, and the results will consequently be slightly different from those in Tables XXII. and XXIIa.

The first step is to compute the value of x, serving to settle the height of the neutral axis. Thus:

$$x=\frac{-\frac{1}{2}(4+3pm)+\sqrt{4n+9\,4p^2m^2+p\left[6m\left\{u\,(n-1)+1\right\}\right]}}{2\,(n-1)}$$

$$=\frac{-\frac{1}{2}(4+3\times{\cdot}12)+\sqrt{(8)+(9\,4\times{\cdot}0144^2)+{\cdot}01\left[72\left\{{\cdot}75+1\right\}\right]}}{2\,(2-1)}$$

$$=\frac{-\frac{1}{2}(4{\cdot}36)+\sqrt{(8+0324)+{\cdot}01\left[72\left\{1{\cdot}75\right\}\right]}}{2}$$

$$=\frac{0{\cdot}868}{2}$$

and finally the value of the ratio $x=0{\cdot}434$.

As in this case $h=8$ in., we have $hx=8\times 0{\cdot}434=3{\cdot}472$ in., and the height of the neutral axis above the bottom of the beam $=h-hx=4{\cdot}528$ in.

Calculations for the determination of x might be materially simplified for concrete of constant quality, and further simplification would result from the preparation of separate forms of rule (4) for the four ratios stated, or for any desired values of p.

As an example we append a condensed form of the equation, in which the values of n and m, for the quality of concrete before considered, and p, for one per cent. of reinforcement, are treated as constants. Thus:

$$n=2\ ;\ m=12\ ;\ \text{and}\ p=0{\cdot}01.$$

For all cases complying with these conditions, the condensed formula then becomes:

$$x=\frac{-2{\cdot}18+\sqrt{8{\cdot}0324+0{\cdot}72\,(u+1)}}{2}=(4a.)$$

Here the only variable factor is the value of u which remains to be settled by the designer as may best suit his convenience. Similarly simplified forms of the equation can be prepared for any other proportions of reinforcement and qualities of material.

To resume the present calculation, we have next to compute the values of c, the maximum compressive fibre stress in the concrete, and f, the tensile stress in the reinforcement.

For the purpose of finding c, we take t, the limiting fibre stress of concrete in tension at 300 lbs. per square inch. Then by rule (1), we have

$$c=tnx\div(1-x)$$

$$=(300\times 2\times 0{\cdot}434)\div({\cdot}566)=460\ \text{lbs.}$$

also by rule (2),

$$f=tm\,(u-x)+(1-x)$$

$$=\left\{300\times 12\,(0{\cdot}75-0{\cdot}434)\right\}\div(0{\cdot}566)=2{,}009\text{lbs.}$$

Next, we determine the moment of resistance R, of the section, by rule (5)* Thus:

$$R=tbh^2\left\{\tfrac{1}{12}(1-x)^2+\frac{5nx^3}{12(1-x)}+f\frac{(u-x)^2}{1-x}m\right\}$$

$$=300\times 8\times 64\left\{\tfrac{1}{12}(0{\cdot}566)^2+\frac{5\times 2\times 0{\cdot}434^3}{12\times 0{\cdot}566}+0{\cdot}01\frac{(0{\cdot}75-0{\cdot}434)^2}{0{\cdot}566}12\right\}$$

$$=153600\left\{0{\cdot}13348166+0\,12035+0{\cdot}02117088\right\}$$

$$=153600\times 0\,27501=42{,}241{\cdot}53\ \text{inch-lbs., say}\ 42{,}240\ \text{inch-lbs.}$$

Finally we find the theoretical concentrated load in the following manner:

As $R=M$, it follows that $M=42{,}240$ inch-lbs.

But $M=\frac{Wl}{4}$, and as in this case $l=80$, we have

$$M=20\,W\ \text{inch-lbs.}$$

Hence

$$W=42{,}240\div 20=2{,}112\ \text{lbs.}$$

By reference to Table XXII., it will be seen that this result very nearly agrees with that given for the load at point A, the small difference between the calculated loads being due to our slight modification of the values for n and m.

Similarly the theoretical distributed load would be thus ascertained:—

As $M=\frac{Wl}{8}$ it follows that $M=10\,W$ inch-lbs.

Hence

$$W=42{,}240\div 10=4{,}224\ \text{lbs.}$$

Example Ia. For the purpose of preparing a table or diagram of beams, considerable time will be saved by calculating the moment of resistance per inch width of the section. Then for the beam considered in Example I., we

* In printing rule 5 on p. 253 (*ante*) the symbol *m* accidentally omitted.

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have values of x, c, and f, as before, and the moment of resistance per inch of width becomes

$$R = tbh^2 \left\{ \tfrac{1}{2}\tfrac{5}{12}(1-x)^2 + \frac{5mx^3}{12(1-x)} + p\frac{(u-x)^2}{1-x}m \right\}$$

$$= 300 \times 1 \times 64 \left\{ \tfrac{5}{12}(0.566)^2 + \frac{5 \times 2 \times 0.434^3}{12 \times 0.566} + 0.01\frac{(0.75-0.434)^2}{0.566}12 \right\}$$

$$= 19200\{0.13348166 + 0.12035 + 0.02117088\}$$

$$= 19200 \times 0.27501$$

$$= 5{,}280.19 \text{ inch-lbs., say } 5{,}280 \text{ inch-lbs.}$$

From this value of R, the corresponding concentrated load is

$$W = 5{,}280 \div 20 = 264 \text{ lbs.,}$$

and the distributed load is

$$W = 5{,}280 \div 10 = 528 \text{ lbs.}$$

The corresponding load for any width of a beam 8 in. deep and otherwise complying with the conditions stated in Example I., can now be ascertained by a simple multiplication sum.

Example II. We will next take a beam similar to that for which the essentials are stated in Example I., but with a depth of 12 in.

Then by rule 4a

$$x = \frac{-2.18 + \sqrt{8.0324 + 0.72(u+1)}}{2}$$

In this case, the reinforcement still being 2 in. from the bottom, the ratio $u = (10 \div 12) = 0.833$. Substituting this value in the equation we have

$$x = \frac{-2.18 + \sqrt{8.0324 + 0.72(0.833 \cdot 1)}}{2}$$

$$= \frac{-2.18 + \sqrt{8.0324 + 1.32}}{2}$$

$$= \frac{-2.18 + 3.058}{2} = 0.439.$$

This means that $hx = (0.439 \times 12) = 5.268$ in., and that the height of the neutral axis above the bottom of the beam is $(12 - 5.268) = 6.732$ in.

For the moment of resistance per inch in width of the section we have, by rule (5)

$$R = 300 \times 1 \times 12^2 \left\{ \tfrac{1}{2}\tfrac{5}{12}(1-0.439)^2 + \frac{5 \times 2 \times 0.439^3}{12(1-0.439)} + 0.01\frac{(0.833-0.439)^2}{1-0.439}12 \right\}$$

$$= 43{,}200\{0.131133 + 0.1257 + 0.033\}$$

$$= 43{,}200 \times 0.289833 = 12{,}520 \text{ inch-lbs.}$$

The corresponding loads found in the manner previously indicated, are

(*a*) Concentrated load $W = 12{,}520 \div 20 = 626$ lbs.

(*b*) Distributed load $W = 12{,}520 \div 10 = 1{,}252$ lbs.

As before, the load for any width of a beam, 12 in. deep and otherwise complying with the stated conditions, can now be found by multiplication.

In all the foregoing calculations, we have been dealing with a span of 80 in., that being the distance between the supports in the case of the beams tested by Professor Hatt.

But, having the moment of resistance of any given section, the load can easily be computed for a unit span, and from the values so obtained the load for any other span can be found by a simple division sum.

By Example Ia, we found the moment of resistance per inch width of the 8 in. deep beam, with 80 in. span, to be R = 5,280 inch-lbs., and as R = M, M = 5,280 inch-lbs.

But for a concentrated load $M = \frac{W\,l}{4}$.

Hence for a unit span of 1 in.

$$M = \tfrac{1}{4}\,W \text{ inch-lbs.}$$

Whence

$$W = 5{,}280 \div \tfrac{1}{4} = 21{,}120 \text{ lbs.}$$

For a distributed load

$$M = \frac{W\,l}{8}$$

Hence for a unit span of 1 in.

$$M = \tfrac{1}{8}\,W \text{ inch-lbs.}$$

Whence

$$W = 5280 \div \tfrac{1}{8} = 42{,}240 \text{ lbs.}$$

These loads are per unit width and unit span of one inch in each case, and to test their accuracy we may compare the results to be obtained therefrom with the calculated loads in Example I.

Thus for a clear span of 80 in. the concentrated load becomes 21,120 ÷ 80 = 264 lbs. per unit width of beam, and for a width of 8 ins. the load is 264 × 8 = 2,112 lbs. as previously found.

Similarly the distributed load is 42,240 ÷ 80 = 528 lbs. per unit width, and for a width of 8 in. the load is

$$528 \times 8 = 4{,}224 \text{ lbs., as before.}$$

Again, by Example II., we found the moment of resistance of the 12 in. deep beam with 80 in. span to be R = 12,520 in.-lbs. From this we obtain loads per unit width and span as follows:—

For a concentrated load,

$$W = 12{,}520 \div \tfrac{1}{4} = 50{,}080 \text{ lbs.}$$

For a distributed load,

$$W = 12{,}520 \div \tfrac{1}{8} = 100{,}160 \text{ lbs.}$$

If we wish to find the concentrated load for a 12 in. × 6 in. beam with a clear span of 80 in., the result is soon obtained.

Thus:—

$$W = (50{,}080 \div 80) \times 6 = 3{,}750 \text{ lbs.}$$

And the distributed load for the same beam is

$$W = (100{,}160 \div 80) \times 6 = 7{,}512 \text{ lbs.}$$

This case shows incidentally the advantage derived from increasing the depth of a beam in proportion to its width, as the load here carried is more than 75 per cent. greater than the load for the 8 in. square beam previously considered, while the sectional area of concrete is only 12½ per cent. greater.

By the aid of calculations similar to those already made the essential units may be determined for beams varying in depth over any desired range, and by adopting values of p, for different percentages of reinforcement, a series of tables could readily be prepared for office use so that the proportions of a beam for any required duty could be found without the least trouble or delay.

If tables of the kind were prepared they would only apply to the particular quality of concrete and reinforcement taken as the basis of calculation, but if in practice only one type of concrete were employed, there would be no reason for inaccuracy. By adopting steel reinforcement instead of wrought iron, the altered value of E would naturally cause a proportionate modification of the results.

All the foregoing calculations refer to point A, where the curve first deviates from the straight line, and the load in every case includes the weight of the beam. On reference to Table XXII., it will be seen that the load at this point may be taken for one per cent. of reinforcement at about one-third of the load at the point C, representing failure; and the load at the point of A for 2 per cent. of reinforcement may be taken at about one-fourth of the load at failure. As compared with the load at point B, corresponding with the first crack in the tension flange, the load at point A may be put roughly at two-fifths in the case of 1 per cent. of reinforcement, and one-third in the case of 2 per cent. of reinforcement. For all practical purposes we may regard the first crack as representing failure, and it is evident that some further factor of safety should be applied to results based on point A conditions. No further calculation is necessary in such cases, if tables of beams have been prepared, as the estimated load may be increased by any advisable proportion, and a beam can then be selected to suit the total load so given.

By adding 50 per cent. to the estimated load, a total factor of safety of about 4 will be given for 1 per cent. reinforcement, or of about 6 for 2 per cent. reinforcement; and by doubling the estimated load the factors become 6 and 8 respectively.

The proper factor for adoption must, of course, depend upon the character of the work to be executed.

OBITUARY.

MR. FORD.—We have to announce the death, on September 1, at "Homeleigh," No. 4, South Row, Blackheath, after five days' illness, of Mr. Herbert Ford, aged seventy years. Mr. Ford was a member of the firm of Messrs. Ford, Son, and Burrows, architects, of No. 21, Aldermanbury, and was elected a Fellow of the Royal Institute of British Architects in 1870. Of the more recent architectural works carried out from plans and designs by the firm we may instance the following:—The business premises at the corner of Jewin-street and Well-street, erected after the disastrous fire in 1897 in the vicinity of Aldersgate; new premises on the site of Nos. 121-6, High Holborn, at the corner of Southampton-street, for Parr's Bank (1898-9), at a cost of some 15,000*l*., and the adjoining premises; a warehouse and dwelling-house upon plots 6 and 7 in Boundary-street, between Church-street and Old Nichol-street, Shoreditch, for Messrs. J. Rotherham and Co.; great enlargement for Messrs. J. Carter and Sons, of Nos. 50-62, Kingsland-road, Shoreditch; a factory and business premises in Sylvester-street, Hackney, on the sites of Nos. 35-41, for Messrs. Stapley and Smith; the infants' school and a central hall, at Northumberland Heath, Erith, Kent, for the Erith School Board; and the Board offices and cookery centre at the Picardy Schools, Belvedere, Kent, for the Erith School Board. The firm were the architects of warehouses in the City for Messrs. Cooke, Son, and Co. (Friday-street); Crocker, Sons, and Co. (Friday-street); D. Evans and Co. (Milk and Wood streets); Tubbs, Lewis, and Co. (Noble-street); I. Salaman and Co. (Falcon-square), and many other commercial firms.

GENERAL BUILDING NEWS.

ELDER LIBRARY, GOVAN.—The Free Library which has been presented to the burgh of Govan by Mrs. John Elder, was recently opened. The library is situated in the south-east corner of Elder Park, and is entered from the corner where Thomson-street and Langlands-road intersect. The principal elevation, which is towards the street, contains an entrance colonnade that forms a centrepiece to the building, and is surmounted by a balustrade, in the centre of which is carved the Govan coat of arms, with the burgh motto, "Nihil sine labore." The style of architecture is purely classic, and the aim of the architect, Mr. John Burnett, A.R.S.A., has been to make the library as far as possible part of the park, from which it is cut off by only a light railing. The building consists of three floors. The basement is utilised as a book store, workshop, packing-room, and furnace-room. On the ground floor there are the news-room (53 ft. by 23 ft.), reference libraries for ladies and gentlemen, librarian's room, and a large committee-room. The lending library, which is 45 ft. by 22 ft. 3 in., and capable of accommodating from 30,000 to 40,000 volumes, is also situated on this floor. From the corridor a stair leads to the upper flat, which is to be used as a museum and juvenile room, there being separate compartments in the latter for boys and girls. From the roof and over the main entrance there rises a small dome with flagstaff.

PALACE THEATRE, SUNDERLAND.—The Palace Theatre of Varieties, Sunderland, was recently reopened, after having been closed for several months in order that alterations of an extensive character might be made. The stage which, together with the proscenium, has been brought forward 10 ft. The proscenium arch is supported at each side by two handsome Corinthian pillars, with embellished pedestals, and consoles at the top of each, and the summit of the arch is panelled and enriched with fine mouldings, the whole being crowned with a classic cornice, with medallion incidentals. A large shield, treated in silver and gold, adorns the centre of the arch. The four boxes on either side are surmounted above the second circle level with handsome balustrades, above which have been erected finely proportioned domes, which, when illuminated with their numerous red, white and blue electric lights, add greatly to the beauty of the hall. The prevailing tints in the whole of the decorations are vermilion and gold. Additional dressing rooms have been made for the convenience of the artists, and among the other improvements may be mentioned the up-to-date lighting facilities on the stage, electric lighting for the whole building, increased accommodation for the orchestra, and the reseating of the building. A great change has been made in the modes of exit from the pit, pit stalls, second circle, and gallery, commodious passages leading into the back lane having been made by leasing part of the adjoining property. The new exit from the pit has enabled the management to close up the undergound passages. The alterations were designed by Messrs. W. and T. R. Milburn, Sunderland, and the contractors engaged on other parts of the work were:—Building, Mr. T. P. Shafto; seating, Messrs. Reynolds, Leeds; upholstery, Messrs. Robson, Newcastle; decorating, Mr. George Tawse, Sunderland; electrical enginering, Messrs. Steinthal and Co., and plastering, Mr. John Rule.

ADDITIONAL WING TO THE RICHMOND HOSPITAL.—The increasing number of out-patients treated at the hospital has rendered the accommodation, which for the last thirty-six years has done duty as the out-patient department, totally inadequate for that purpose, and the committee are now building in Shaftesbury-road new accommodation for this branch of the work of the hospital, and making other im-

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portant additions. This building is being erected on the site of several small houses, recently pulled down, adjoining the hospital, and fronting in Shaftesbury-road.—The new building will have a wide entrance, with vestibule, in Shaftesbury-road, and will contain on the ground floor, entrance hall, large waiting hall for out-patients, consulting and examining rooms, dispensary and waiting rooms; on the first floor, approached by stone stairs from entrance hall, will be eye, ear, and throat rooms, and X-ray room, etc.—The new buildings are to be connected to the main building of the hospital by means of a covered corridor. The chief feature of the new building is the large waiting hall for out-patients. The hall is to have an open timbered roof, with enriched plaster panels between roof trusses, and a large glazed lantern light is to run nearly the whole length of the hall. The walls, chimney piece, etc., are to be in glazed ceramic ware, and the floor in polished wood blocks. All the buildings are being erected on the latest hygienic principles. The building is being erected by Messrs. S. N. Soole and Sons, from the designs of Mr. Frank J. Brewer, architect.

NEWPORT (MON.) CHURCH.—The corner-stone of St. Luke's Church, Newport, was laid recently. The new St. Luke's is being built upon the site of the old church in Bridge-street and of four cottages at the back of Railway-street. There will be a considerable extension of the former area. The nave is to be 87ft. long by 33ft. wide, with side aisles 11ft. wide, and the chancel 20ft. long. An organ-chamber, vestry, choir vestry, and morning chapel are also provided. It is being erected in the Early English style of architecture. All the windows are lancet-headed, the west window in Bridge-street above the porch being a lofty, three-light one, and the east window having five lights. The arcading is carried on stone columns, and the roof lined with pitchpine. Local stone, with freestone dressings, is being used in the walls. The floors will be laid with wood blocks, and it is intended to introduce electricity as the illuminant. Messrs. Habershon, Fawckner, and Co., of Newport and Cardiff, are the architects, and the contract, which amounts to 4,300*l.*, is let to Messrs. A. S. Morgan and Co., builders, of Newport.

PARISH HALL, PRUDHOE-ON-TYNE.—On the 7th inst. the foundation-stones were laid for a parochial hall, to be erected on a site near the Vicarage, given by the Duke of Northumberland. The structure will provide accommodation for 500 persons. The hall will be of brick, with stone dressings, measuring 59 ft. in length by 24 ft. 6in. wide. In addition to the main building two cloak-rooms, two retiring-rooms, together with a kitchen and scullery, will be erected. The contract for the work has been placed in the hands of Messrs. Watson & Son, Bridge-end, Stocksfield, the architect being Mr. S. D. Robins, of Newcastle. Irrespective of furnishings, the hall is estimated to cost about 1,500*l.*

STAINED GLASS AND DECORATION.

STRAFFAN CHURCH, CO. KILDARE, IRELAND.—Some memorial fittings of an elaborate character have been added to the chancel of this church. The main feature is a Reredos, containing a sculptured representation of the Last Supper, in white wood, under carved canopies in oak. The plan of the chancel is octagon, and the walls throughout are enriched with carved oak panelling up to the sills of the windows. The work was carried out as a memorial to the late Mr. Lynedock Barton, of Straffan House. The whole was executed by Mr. James Forsyth, of London.

NEW WINDOW, PARISH CHURCH, BO'NESS.—The subject is "The Ascension," depicted with Christ rising from the midst of the Apostles, and supported by two angels. The Apostle figures are grouped in devotional attitudes. The tracery is filled with angel figures, in rich crimson and gold, forming a contrast to the colour in the lower lights. The aim has been to produce a work in pure translucent metal, entirely devoid of any kind of surface pigment, the flesh parts, details of diapers, &c., having been cut and modelled in light and shade out of pure glass, like a cameo, each piece of glass being carefully selected with reference to its position in the design; and the light and shade of the colour is of pure glass, thereby gaining great additional brilliancy, as well as purity of light. The inscription, which reads as follows, "To the glory of God and in loving memory of her most gracious Majesty Queen Victoria, born 24th May, 1819, died 22nd January, 1901, this window is dedicated," is executed in hammered pewter, richly chased, and bearing the royal arms in transparent enamel. The artists employed on the execution of the work were Messrs. J. T. Stewart, J. S. Melville, and R. Monaghan.

FOREIGN.

INDIA.—The Government of Bombay has generally approved of the revised scheme of the Bombay Port Trust.——The Eastern Bengal and Southern Railway are about to construct a new station at Charboni, Dacca Section.——On the Northern section of the same railway a new bridge, south of the Punchabibi Station, is to be constructed.——The proposal for the removal of steel plant and rolling mills from Cossipur has been sanctioned, and they are to be re-established on a larger scale at Ishapur.——The Madras Government has notified its intention to help, as far as possible, the establishment of the proposed industrial exhibition in Madras.——Quarters for the housing of the railway staff at Jafferpur Station, on the Eastern Bengal and Southern Railway have been sanctioned.——Reproductions of a selection of best specimens of Indian art ware and handicraft at the Delhi Exhibition are to be published in the Technical Art series which the Survey of India issues from time to time.——A new bridge is to be constructed over the Barakar river on the East Indian Railway.——The Executive Engineer of the Public Works Department at Taunggyi, the headquarters station of the Southern Shan States, has made arrangements to supply the station with pure water, and the sanitary engineer for Burma has the particulars for the necessary pipes and fittings.——The Hlawga waterworks for supplying Rangoon have now been more than one half completed, and it is hoped to finish the work during the present year. The reservoir when full is estimated to store 13,950 millions of gallons of water.——The topographical survey of the Island of Ceylon will be shortly completed.——The new district traffic office to be erected at Delhi is to be built on land recently purchased by the East Indian Railway Co.——The Central gun carriage factory at Jubbulpore, and the rifle factory at Ishapore will be ready for opening next April.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—The partnership between Messrs. Philip E. Pilditch and S. D. Chadwick, architects and surveyors, practising under the style of Pilditch, Chadwick and Co., has been dissolved, and Mr. Pilditch will continue the practice under the style of Pilditch, Chadwick and Co., at 2, Pall Mall East, S.W.

ASSOCIATION OF HOUSE PAINTERS AND DECORATORS.—Mr. James Higson, of Salford, has been nominated by the Council of the National Association of Master House Painters and Decorators of England and Wales for the position of President for 1903-4, and it is probable that the Convention next year will be held at Manchester. The tenth annual Convention meets at Nottingham on the 21st inst., and Lord Henry Bentinck, M.P., is to open the proceedings.

GRAY'S INN GARDEN.—The Benchers of Gray's Inn having resolved to pull down the high wall along Theobald's-road which concealed the garden from view from that side, the building of a dwarf wall with railing is begun by Messrs. Patman and Fotheringham. Entries in the records of the Society's proceedings go to show that the gardens were originally laid out and planted by Sir Francis Bacon. Orders made in 1597-1600 relate to payments "of a summe of 7*l.* 15s. 4d. due to Mr. Bacon for planting of trees in the walkes," of a sum not exceeding 70*l.* for a further supply of more "yonge elme trees . . . . and a new rayle and quicksett hedge . . . . upon the upper long walke at the good discretion of Mr. Bacon and Mr. Wilbraham," and of 60*l.* 6s. 8d. "payd and allowed unto Mr. Bacon for money disbursed about the garnishing of the walkes." On the upper long walk, by the wall, Bacon, when Solicitor-General, erected a summer-house, which he dedicated, 1609, to the memory of Jeremiah Bettenham, Reader of the Inn. The summer-house, as well as the ninety elm and three walnut trees, of which the situation are exactly specified in the records for 1583, have alike disappeared, but close by the cistern on one of the lawns still stands the catalpa tree which it is said was planted by Bacon. Spedding tells us, in his "Letters and Life of Bacon," that Raleigh, when on the eve of starting for his last expedition to America, held long converse with him in Gray's Inn Walks, which afterwards became a highly fashionable place of resort, and are so mentioned by Howell, Pepys, Dryden, Addison, and other writers in the seventeenth and eighteenth centuries. The grounds have since been encroached upon by the erection of Verulam-buildings, as readers of the "Essays of Elia" will recall, and of Raymond-buildings, on the east and west sides respectively. They are now frequented by rooks, crows, and a great variety of birds not usually seen in London. The "Mr. Wilbraham" cited above is, we gather, Sir Roger Wilbraham, Knight, who was elected a Bencher in 1595, and was appointed Solicitor-General for Ireland in 1599, and Master of Requests in the following year.

PROHIBITION OF EXPORT OF WORKS OF ART FROM ITALY.—An act has just been passed to amend the Italian law of July, 1902, for the preservation of works of art, etc., in Italy. That law, it may be remembered, laid down conditions under which alone the alienation of certain categories of works of art would be permitted, together with a scale of duties payable on exportation. It also set forth the conditions required to be fulfilled before any works of excavation could be undertaken in search of antiquities. The amending or supplementary act now passed enacts an absolute prohibition, to be in force for two years, against the exportation of objects of antiquity derived from excavations which are considered of notable or artistic importance, and of other objects of great value in the history of art.

AN INTERNATIONAL COMPETITION.—In a supplementary report on the trade of South Italy, just received at the Foreign Office, Mr. Berner, the British Vice-Consul at Bari, states that the Bill for the construction, up-keep, and working of an aqueduct for the supply of potable water to the three Apulian provinces, Foggia, Bari, and Lecce, has been approved by Parliament, and meanwhile the Superior Council on Public Works has concluded the examination of the regulations and conditions subject to which tenders from private contractors will be received. The international competition will take place on February 1, 1904, and British contractors wishing to tender should not fail to bestir themselves betimes and obtain particulars from the Italian Consuls in the United Kingdom.

HONDURAS MAHOGANY AND CEDAR.—Mr. Cork, the Acting-Governor of British Honduras, reporting from Belize on the Blue Book for the year 1902, observes that the most important feature of the lumber trade has been the increase of exports to the United States of mahogany and cedar. The quantity of mahogany taken by the States in 1902 was 2,226,337 ft., value 111,027*l.*, as compared with 364,724 ft., value 16,957*l.*, in the year 1901. The exports of cedar to the States increased from 131,643 ft., value 6,662 dols., in 1901, to 271,341 ft., value 13,358 dols., in 1902. Moreover, whereas the mahogany and cedar logs have to be squared for the home market, they are shipped in their natural state to the United States, and the cost of squaring is saved by the vendor, and he loses nothing from remeasurement, his wood being bought and paid for on the spot. This means that less capital than formerly is required in the business, and the result is that wood-cutters are exploiting new districts hitherto untouched. The trade in mahogany with England has greatly fallen off, having decreased from 5,586,120 ft. in 1901 to 3,739,340 ft. in 1902—a drop of 1,846,780 ft.

THE QUIMBY SCREW PUMP.—One of the earliest devices for raising water was the Archimedean screw, and examples of pumps worked on this principle are still to be found in countries where irrigation is practised. A somewhat similar principle is involved in the reverse form of the turbine, as applied for pumping purposes, and in the Quimby screw pump, which is now being introduced into this country from the United States. This appliance is very simple in construction, the internal mechanism being limited to two intermeshing revolving double screws, which are rotated at high speed in a closely-fitting cylindrical chamber, at the bottom of which is a fitting for the suction pipe, and at the top a fitting for the delivery pipe. Motion is communicated to the screws by means of a belt-driven pulley, or by the direct connection of an electric motor, as may be preferred. The absence of valves, buckets, slides, and similar moving parts, and the elimination of reciprocating action, conduce to silent operation and freedom from repairs, and further, the pump can be fitted with an automatic attachment, by means of which it may be run without constant care, attendance, and inspection. This pump is made in sizes suitable for delivering, from five gallons to eight hundred and thirty gallons per minute.

BUILDING IN FROSTY WEATHER.—Our Consul-General at Stockholm observes in his latest report that in winter one hears much about the want of employment for bricklayers and others in the United Kingdom on account of frosty weather. Yet any one residing in Stockholm during the winter months can see bricklaying carried on in hard frost as an everyday occurrence. The art of building, the Consul-General says, stands very high in Stockholm, much of the work done being both ornamental and of excellent quality. It seems that a few years ago a series of experiments were carried out to decide the lowest temperature at which bricklaying might be effectively carried on. Three different temperatures decided on were 23deg., 14deg., and 6deg. Fah. The bricks and mortar were, as to quality and conditions, such as are commonly used in Stockholm. The walls thus erected during winter were allowed to stand till the following autumn, when they were torn down, and the results noted were that those built at 23deg. and 14deg. were perfectly satisfactory, the mortar being quite hard

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and sound and had to be scraped from the bricks. Those laid at 6 deg. were not satisfactory; the mortar did not adher to all the bricks, which lay loosely embedded in it. These results tend to prove that without any special precaution as to material or labour, bricklaying can be carried on in Stockholm at a temperature as low as 14deg. Fah., or 18deg. of frost. Generally, it may be said that the mortar should be made in a room where the temperature is kept well above freezing point. The brick used in Sweden is of a light or porous character, which readily absorbs the moisture from the mortar. Hard pressed or calcined bricks and stone work generally are not suitable for building during frosty weather, but edgings or ornaments, etc., of such material can easily be dealt with by slightly warming them before bringing them into position. This can be done by keeping them a few days in a wooden shed heated by an open coke stove. In some cases it is found advisable to cover in with rough boarding the part of the wall where such stone work is extensive; then a very small coke fire is found sufficient to keep the temperature high enough to prevent any damage to the mortar. But although brick building can be thus carried on safely under any of the temperatures already named, this does not apply to plaster or cement work, which should not be done at or below freezing point, unless proper heating arrangements are made. In Stockholm 15 or 20 years ago almost all building was broken off during four or five months every winter; it is now the exception it is hindered by frost more than a few days or a few weeks annually. Mr. Graham sums up the matter shortly thus:—(1) The bricks should be porous and perfectly dry, that they may readily absorb the moisture in the mortar; (2) the water, sand, and bricks must all be heated.

CAPITAL AND LABOUR.

SUNDERLAND JOINERS' DISPUTE.—The Sunderland joiners held a mass meeting in the Villiers-street Institute, on the 2nd inst., for the purpose of considering the dispute which at present exists between the house joiners and the masters. Eleven weeks ago the men came out on strike for an increase of ½d. per hour, which would bring the rate up to 10d. per hour. Attempts to effect a settlement failed, the men refusing to accept the suggestion of the mayor. The last proposal of the mayor was that an arbitrator should be appointed; but on a ballot the men refused to accept this by a majority of over 100. The masters then decided upon a lock-out over the area of the northern counties federation, and this would have taken place, but on the previous Wednesday, at a conference held at Leeds, the employers agreed, at the request of the men's representatives, to postpone the lock-out for a fortnight, in order that a ballot of the men might be taken on the question of arbitration. At the meeting mentioned, which was largely attended by both shipyard and house joiners, this ballot was taken, and it was agreed by a small majority to submit to arbitration. The men also decided not to resume work until the award is made known.

LEGAL.

WEST-END ANCIENT LIGHT DISPUTE.

THE case of Stevens *v.* Collins came before Mr. Justice Walton in the Vacation Court on Wednesday, on a motion by the plaintiff for an interim injunction restraining the defendant until the trial, or further order, from building so as to obstruct the plaintiff's ancient lights.

Mr. Mulligan, K.C., for the plaintiff, said his client was the lessee of No. 37, South Molton-street, W., and the defendant was building on the opposite side of the street. The plaintiff's lights were admittedly ancient. The width of the street was about 40 ft. or 41 ft., and according to the plaintiff's case the old buildings on the site on which the defendant was now building were 39 ft. 9 in. high. According to the defendant's evidence, these old buildings were 42 ft. high. The defendant had already built to a height of 46 ft. facing the plaintiff's premises, and proposed to build to a height of at least 50 ft. The only excuse the defendant made for obstructing the plaintiff's light was that other buildings adjoining had been pulled down and were not, by reason of a street improvement, to be rebuilt, and therefore the plaintiff would have more lateral light than he had formerly, and should be contented. The learned counsel contended that that fact did not justify the defendant obstructing the plaintiff's ancient lights.

His Lordship said he thought there was recently a case argued in the House of Lords bearing on the subject.

Mr. Mulligan said that was the action against Mr. Colls.

Mr. Bramwell Davis, K.C., for the defendant, said that the only question for his Lordship now was what ought to be done before the trial. Certain very interesting questions might arise at the trial. It was difficult at this stage to say whether there would be any injury to the plaintiff or not. If the defendant's building was put up to the full height it would only depreciate the plaintiff's direct light about 3 deg. or 3½ deg., and by the improvement he had obtained a great amount of extra lateral light. Defendant's case would be that the plaintiff's claim was limited to damages, and that he could not have an injunction. The question was whether his Lordship ought to stop the defendant's building operations now. The building was within 3 ft. or 4 ft. of the top at the present moment.

Mr. Mulligan said he was willing that there should be no order on the motion if the defendant would give an undertaking that he would pull down anything he might build if ordered to do so at the trial.

Mr. Bramwell Davis: Yes, anything built from now, or anything that is held to be an infringement.

In the result, after some further discussion, the motion was ordered to stand till the trial, on the defendant undertaking to pull down any building erected after that day, if, and so far as, the Court might at the trial decide that the plaintiff was entitled to an injunction in respect thereof—the plaintiff to give the usual undertaking in damages, the costs of the motion to be costs in the action.

A RICHMOND BUILDING CASE.

IN the Vacation Court on Wednesday last, Mr. Justice Walton had before him the case of the London Property Investment Trust, Ltd., and the Corporation of Richmond and Gosling and Son, on the application of the London Property Investment Trust, Ltd., for an interim injunction restraining, until the trial, certain building operations by the defendants now in progress.

Counsel, in support of the application, stated that there were two sets of buildings in which the Corporation of Richmond were interested, and other building work which was complained of in which they were not interested at all. The defendants up to the present had not filed any affidavits; but the defendants Gosling and Son, the builders, were willing to give an undertaking over next motion day not to build higher on plots Nos. 3 and 4. The Corporation were willing to give an undertaking not to build on plots of ground in Gordon-square higher than the buildings were at the present moment. On these terms the motion would stand over for one week.

Order accordingly.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

19,817 of 1902.—F. JOTTRAND: *Soldering Irons.*

A soldering iron characterised by the fact that it is provided with an inner combustion chamber and that the combustion of a suitable gas takes place within this chamber under the action of a special supply of oxygen without direct contact between the flame and the outer air, for the purpose of obtaining as complete a utilisation as possible of the heat of the flame serving to heat the bit, and of preventing the presence of any flame outside the apparatus.

22,069 of 1902.—P. MACGREGOR (D. H. Lewis): *Shovels and the like Implements.*

In a shovel and the like implement, the forming of a double socket out of the metal of which the blade is made, of any one piece with the blade, such socket being so formed that the handle of the said shovel may be clipped by one part of the socket close to the blade, and also by another part, placed some distance further from the blade.

22,229 of 1902.—ANTOINE DIAT, called DIAZ: *Method of Glazing Windows and the like.*

A process of glazing windows, in which strips of asbestos are placed against the outer metallic sash, the panes of glass then placed in position against said strips, and secured in position by means of metallic stops.

598 of 1903.—J. BORGARS, jun.: *Chimney Top.*

This invention consists of a chimney top provided with a conical baffler whose body is bell-shaped, tapering in towards the centre and widening out against the top.

1,962 of 1903.—P. G. EMERY: *Window Blinds.*

A blind for windows, doors, and other openings, comprising a blind having a constant upward tendency, and characterised by having a hollow rod with squaring cords passing there through and attached to the casing of the window or other opening, and yielding clamping means carried by the blind between the ends of the rod for frictionally clamping one or both of the cords to hold the blind against its upward tendency.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

10,280 of 1903.—W. B. ROBINSON: *Damp-proof Coating or Paint.*

A damp-proof coating or paint composed of boiled linseed oil, mastic cement, and red oxide of iron mixed in suitable proportions, with or without the addition of colouring matter or matters.

13,557 of 1903.—J. CALLMANN ant R. BORMANN: *Liquid Soldering Composition.*

A liquid soft soldering composition consisting of a mixture of finely-pulverised soft soldering metal, such as tin or an equivalent alloy, triturated to a paste, a deoxidising agent, such as zinc chloride, and a thickening substance, such as cellulose, which will burn without leaving any residue.

21,759 of 1902.—J. W. MOSELEY and S. BROTH: *Chimney Pots and Ventilators.*

A chimney pot or the like with an upper portion producing an annular V edge adapted to cut the wind in all directions, and divert it upwards and downwards, and in such a way as to cause the diverted wind to act syphonically on the chimney.

21,795 of 1902.—G. P. WALLIS: *Machinery for the Manufacture of Artificial Stone Goods, such as Flags, Paving Stones, and the like.*

In apparatus for the manufacture of artificial stone slabs and the like, the combination with the press, of a pivot and bearing secured thereto, a beam adapted to revolve in the pivot round the said press, and a lifting device connected to said beam, whereby the made stone can be handled before it is set.

17,942 of 1902.—G. ALLAN: *Window Fittings.*

This invention relates to windows both sashes of which work in the ordinary way with ropes and weights, and consists in providing means for opening them inwards and building them when open.

22,197 of 1902.—G. D. INNES: *Curb Fenders for Tiled and Other Hearths.*

A curb fender made in three or more parts bolted or otherwise connected together so as to render the curb fender adjustable in length or projection, or both, to suit varying sizes of tiled or other hearths.

22,500 of 1902.—J. MELLOWES: *Roof Glazing.*

This invention consists in providing the sash-bars of glass roofs with grooved springs adapted to form gutters to catch and carry off the water of condensation.

24,974 of 1902.—A. BRYAN: *Tiles for the Floors of Filter Beds Used in Connexion with the Bacterial Treatment of Sewage and for Analogous Purposes.*

In tiles for use in connexion with the treatment of sewage, the filtration of the water and trade effluents, and for analogous purposes, providing or forming in one or both of the edges of the tile, a shallow recess or gap, or two or more shallow recesses or gaps separated by intervening projections, bearing studs or abutments, whereby, when a series of such tiles are placed in rows and edge to edge, drainage slots, openings or channels are provided between them.

2,011 of 1903.—J. CZERMAK and A. BUKBAUM: *Process of Manufacturing Artificial Marble.*

A process of manufacturing artificial marble by splashing or coating soft masses of damp and freshly prepared plaster of Paris, cement, and so on with liquid paints, the special features of which are that small portions of the soft mass are dipped separately into any of the variegated colouring liquids of different descriptions and contained in different receptacles, these portions thereupon being placed on a smooth surface, for instance a plate of glass, with irregular interspaces between them, said interspaces being afterwards filled up with soft masses of plaster of Paris or cement, which may be unstained, the whole mass then presses down, distributed and flattened with a lath or other suitable tool.

6,558 of 1903.—J. EVANS: *Chimney Pots and Ventilators for the Prevention of Down Draughts and Cure of Smoky Chimneys.*

This invention has reference more particularly to chimney pots and ventilators to stop the down draughts and prevent smoke nuisance, the object and effect of the present invention is to provide a chimney pot of the kind referred to that under no circumstances will allow a down draught, which sends smoke out of the wrong end of the chimney, by making them as large as the present invention will allow, and by removing almost all obstruction, in the interior of these chimney pots, and in all cases having the narrowest part inside these pots broader than the flue they have to cover, leaving an open and free course for the smoke or foul air to get away, at the same time having them as low as this invention will allow.

6,756 of 1903.—F. BELLCHAMBERS: *Cowl for the Prevention of Down Draughts in Chimneys and for Ventilating Shafts and the Like.*

A fixed cowl having four separate flues formed by four brackets or wings, fixed inside a cylindrical shaft which has louvre-openings at its lower

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end between the said brackets, the whole working in conjunction with a shaft and cone or series of cones surmounted by a conical cap.

7,875 of 1903.—J. E. HOSKINS and A. C. HAYCOCK: *Door and Analogous Hinges.*

In a two-part detachable hinge the combination with the seperable flaps and the collared hinge-pin, which is fixed to the knuckle of the one flap and engages in a hole in the knuckle of the other flap, of a bearing socket such as found in the inner end of the one knuckle and having the collar of the fixed hinge located at the bottom thereof, and an annular and extending bearing dowel, surrounding the entrance to the axie whole and adapted to engage with the socket on the two parts of the hinge being brought together, said dowel being of such a depth that when its inner end bears on the hinge-pin collar within the said socket, it keeps the opposite ends or edges of the knuckles and flaps out of contact.

11,020 of 1903.—W. LUBBECKE: *Compressive and Tensile Bars for Bridges, Pillars, and Other Iron Structures.*

U or Z formed iron bars to form girders, having the middle part thicker than tht flanges and holes or recesses being provided at the ends. U or Z formed iron bars having the flanges situated at an obtuse or acute angle to the middle part.

12,635 of 1903.—A. JENKINS: *Window Sashes.* The window constructed to open inwards for cleaning purposes the outer portion of the sliding frame moving in the ordinary grooves of window frame, the opening sashes being locked to sliding frame.

15,511 of 1903.—J. H. DIERKICKX: *Doors or Shutters.*

A door or shutter having diagonally divided panels in which one of said panels is pivotally suspended from the other panel, and the two panels are adapted to be rotated together about a common axis of rotation so that the opening and closing of the door are effected by means of a movement composed of an oscillation of one panel and an oscillation in the same direction of the two panels connected.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 27.—By THORNBORROW & Co. (at Ulverston).

Hawkshead, Lancs.—Holmeshead and Mireside Farms, 279 a. 0 r. 39 p., f. £3,360

Blawith, Lancs.—Appletreeholm Farm, 40 a. 0 r. 25 p., f. 895

Hawkshead, Lancs.—Linstey Hall Wood and Coppice, 10 a. 2 r. 21 p., f. 155

Torver, Lancs.—Knapping Tree or Harrison Coppice, 10 a. 2 r. 21 p., f. 255

By WM. DEW & SON (at Llangefni).

Llanegrad, etc., Angleseey.—The outlying portions of the Trescawen Estate, comprising farms, tenements, and cottages, 154 a. 1 r. 29 p., f. (in lots) 6,914

August 31.—By PROTHEROE & MORRIS (on estate).

Newhaven, Sussex.—Mount Pleasant Estate, 58 freehold plots; an enclosure of grassland, 9 acres; also a cottage (in lots) 1,367

September 1.—By H. J. WAY & SON (at Newport).

Newport, Isle of Wight.—78 and 79, Trafalgar-rd., f., yr. 26*l* 330

32, South Mall-st., f., w.r. 7*l* 16s. 115

35 and 37, Chapel-st., f., y.r. 26*l* 435

6 to 9, Royal Exchange, u.t. 942 yrs., g.r. 2*l* 9s. w.r. 29*l* 18s. 205

Carisbrooke, Isle of Wight.—Gunville, two freehold houses, area 0 a. 2 r. 16 p. y.r. 13*l*. 140

By TABERNACLE & SON (at Masons' Hall Tavern).

Tilbury, Essex.—The World's End p.h., area 4 a. 0 r. 15 p., u.t. 47 yrs., g.r. 50*l*., with goodwill 3,300

September 2.—By E. J. CARTER.

Tunbridge Wells, Kent.—Bishops Down Pk., Warberry House, and 3 acres, f., p. 4,000

September 3.—By HATCH & HATCH (at Catford).

Catford.—59, 61, and 63, Rosenthal-rd., u.t. 94½ yrs., g.r. 18*l* 18s., y.r. 76*l* 1,030

165, 167, and 169, Laleham-rd., u.t. 94½ yrs., g.r., 16*l* 10s., w.r. 128*l* 14s 950

122, Laleham-rd., u.t. 94½ yrs., g.r. 5*l* 5s., y.r. 30*l*. 315

Davenport-rd., Homedale, f., p. 1,100

82a to e. 85 to 131 (odd), 86 to 130 (even), and 134, Farley-rd., u.t. 94½ yrs., g.r. 278*l*. 5s., w.r. 1,989*l*. 12,710

136 Farley-rd., u.t. 94½ yrs., g.r. 4*l*, w.r. 37*l* 14s. 270

113 to 119 (odd), 133 and 135, Davenport-rd., u.t. 94½ yrs., g.r. 30*l*., w.r. 226*l*. 4s. 1,645

64 to 74 (even), Davenport-rd., u.t. 94½ yrs., g.r. 30*l*., w.r. 226*l*. 4s. 1,500

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; l. for leasehold; p. for possession; c.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; e. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 15 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 12 6	" " "
Facing Stocks....	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 8 6	" at railway depôt
Red Wire Cuts ..	1 12 6	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	20 6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s	od. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d.		per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road wagons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill " ..	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield " ..	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1¼ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	deld. rly. depôt. per ft. super. deld. rly. depôt
" " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry.dep.
20×12 " " " ..	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc ..	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green....	15 2 6	" "

PRICES CURRENT (*Continued*).

SLATES.

in. in.	£ s. d.	
20×12 best Eureka unfading green....	17 2 6	per 1000 or 1200 at ry.dept.
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles...	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles 52	6	" " "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do. 60	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do. 54	6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do. 50	0	" " "
Hip tiles	4 0	per doz " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

White Sea: First yellow deals,	At per standard.	
3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10
" " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	. . .
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—		
Per ft. cube	0 4 0	. .

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

[*See also page 283.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Designs for a Free Public Library	Borough of Tamworth	20*l.*, 10*l.*, 5*l.*	Nov. 14

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Cottages	Lunavady (Ireland) R.D.C.	W. Crawford, Council Offices, Lunavady	Sep. 14
Additions to Schools, Barkerend	Bradford School Board	J. Garbutt, Manor-row, Bradford	Sep. 15
Two Houses, Aspatria, Cumberland	.....	Surveyor, 45, Lawson-street, Aspatria	do.
C.I. Pipes	Chorley (Lancs) Corporation	J. W. Allin, Gas Engineer, Chorley	do.
C.I. Pipes	Rochdale Corporation	J. Leach, Town Hall, Rochdale	do.
Sinking Pit, Bank Hall Colliery, Burnley	Exors. of Colonel Hargreaves	Manager, Bank Hall Colliery Offices, Burnley	do.
Police Station, Ascot	Berkshire Standing Jt. Committee	J. Morris, County Surveyor, Broadway-buildings, Reading	do.
Sewage Disposal Works, Kyo	Annfield Plain (Durham) U.D.C.	T. J. Trowsdale, Surveyor, Council Offices, Annfield Plain	do.
Road Metal (one year)	Wilton (Wilts) R.D.C.	G. M. Wilson, 12, Bridge-street, Salisbury	do.
Paving Works (four contracts)	Merthyr Tydfil U.D.C.	T. A. Rees, Town Hall, Merthyr Tydfil	do.
Paving Works, Lansdowne-terrace, &c., North Shields	Tynemouth Corporation	J. F. Smillie, Borough Surveyor, Tynemouth	do.
Two Cottages, Irthlingborough Grange	Wellingborough U.D.C.	J. E. H. de Key, Surveyor, Park-road, Wellingborough	do.
Public Washhouses, Pryme-street, Hulme	Manchester Corporation	City Architect, Town Hall, Manchester	do.
Shed, &c., at Foundry, Albert-road, Halifax	.....	Jackson & Fox, Architects, 7, Rawson-street, Halifax	do.
Shop, Anlaby-road, Hull	N.E.R. Co.	W. Bell, Architect, Paragon Station, Hull	Sep. 16
Greenhouse and Pavilion, Woodvale and Falls Park	Belfast Corporation	Sir S. Black, Town Hall, Belfast	do.
Two Cottages, Mersea-road, Colchester	.....	J. W. Start, Architect, Colchester	do.
Conveniences, West-lane and Leeds-street	Keighley Corporation	W. H. Hopkinson, C.E., Keighley	do.
Additions to Store Premises, Kirby-in-Furness	.....	Newby, Architect, Cartmel	do.
Five Cottages, &c.	Kinsale (Ireland) R.D.C.	R. Evans, Surveyor, 53, South Mall, Cork	do.
Renewing Farm Steading, Ardmeddan, nr. Aldmeldrum	.....	W. Clark, Architect, Methlick	do.
Drainage Works, Loughlinstown, Ireland	Rathdown Guardians	P. F. Comyer, C.E., Union Offices, Loughlinstown	do.
Schools, Simthles, near Barnsley	Wesleyan Reform Trustees	Wade & Turner, Architects, 10, Pitt-street, Barnsley	do.
Asphalt Paving	Trowbridge U.D.C.	H. G. Nicholson-Lailey, Surveyor, Town Hall, Trowbridge	do.
Road Metal, Stow Hill	Newport (Mon) Guardians	T. Thomas, Queen's Hill, Newport Mon.	do.
Additions to Schools, Coedybrain, Llanbradach	Eglwysilan School Board	J. H. Phillips, Architect, Windsor-place, Cardiff	do.
Sanitary Works at Dispensary, Claire	Naas (Ireland) Guardians	D. J. Purcell, Boardroom Workhouse, Naas	do.
Additions to Schools, Church-street, Banbridge, Ireland	Select Vestry of Parish Church	W. W. Larmor, C.E., Banbridge	do.
Station Buildings, Hessle, Ferriby, and Brough	N.E.R. Co.	W. Bell, Architect, Railway Offices, Hull	do.
Library, Cromwell-grove and Barlow-road	Levenshulme U.D.C.	J. Jepson, Architect, Guardian Chambers, Tiviot Dale, Stockport	do.
Street Works, Patterson-street and others, Earlestown	Newton-in-Makerfield U.D.C.	C. Cole, Town Hall, Earlestown	do.
Sewers, Cemetery-road	Carlton (Notts) U.D.C.	R. Whitbread, Surveyor, Station-road, Carlton	do.
*Destructor Buildings, &c., at Sewage Farm	Epsom U.D.C.	Council's Surveyor, Bromley Hurst, Church-street, Epsom	Sep. 17
Additions to Farm Buildings, The Glebe, Ermington	.....	Adams & Son, Plympton	do.
C.I. Pipes (900 tons)	Birmingham Corporation	J. D. Watson, Engineer, Tyburn, near Birmingham	do.
Granite Road Metal (broken, 1,500 tons)	Felixstowe U.D.C.	S. E. Fisher, Surveyor, Town Hall, Felixstowe	do.
Road Works, Wood street and others, Wallington	Croydon R.D.C.	R. M. Chart, Surveyor, Town Hall, Croydon	do.
Sewers, &c., Essington, Staffs	Cannock R.D.C.	H. M. Whitehead, Surveyor, Pankridge, Stafford	do.
Sewerage Works	Lichfield R.D.C.	W. E. Rogers, Engineer, Rugeley	do.
Chapel, Nantyfyllen, Maesteg, Wales	.....	Rev. H. S. Thomas, Garnwern Terrace, Nantyfyllen	do.
Bacteria Beds	Devizes U.D.C.	Beesley, Son & Nichols, Engineers, 11, Victoria-st., Westminster, S.W.	do.
Road Metal	East Barnet Valley U.D.C.	H. York, Civil Engineer, Station-road, New Barnet	do.
Road Works	Ashford (Kent) U.D.C.	W. Terrill, Surveyor, 5, North-street, Ashford	Sep. 18
Sewerage Works, &c., Dringhouses	Bishopsthorpe (Yorks) R.D.C.	Fairbank & Sons, Civil Engineers, Lendal, York	do.
Bridge Works, &c., Worthing, Norfolk	Mitford and Launditch, R.D.C.	W. M. Barton, Guildhall, East Dereham	Sep. 19
Rebuilding Shops, Aberaman	Crombach Co-operative Society, Ld.	T. Roderick, Architect, Aberdare	do.
Main Drainage Works (Contract No. 2)	Harrogate Corporation	E. W. Dixon, Civil Engineer, Town Hall, Harrogate	do.
Broken Granite Road Metal (2,500 tons)	Tamworth R.D.C.	H. J. Clarkson, Surveyor, 22, Church-street, Tamworth	do.
Sewerage Works, Carperby, Yorks	Aysgarth R.D.C.	Rodwell & Sons, Surveyors, West Witton, Leyburn, R.S.O.	do.
Sewers, &c., Priests-lane, Shenfield	Billericay R.D.C.	F. H. Jones, Engineer, Parliament Mansions, Victoria-street, S.W.	do.
Additions to Stables, &c.	Scarborough Town Council	Borough Engineer, Town Hall, Scarborough	do.
Broken Granite (2,500 tons)	Tamworth R.D.C.	H. J. Clarkson, Surveyor, 22, Church-street, Tamworth	do.
Drainage Works, Harrogate	.....	E. W. Dixon, 5, Prospect-crescent, Harrogate	do.
Greenhouse, Quay-road	Bridlington Corporation	E. R. Matthews, Civil Engineer, Town Hall, Bridlington	do.
Public Convenience, Crane Wharf	do.	do.	do.
Bridge Works, and Retaining Wall, Clough Bridge-rd.	do.	do.	do.
Schools, Marton-road	Middlesborough Corporation	J. M. Bottomley & Son, Architects, 28, Albert-road, Middlesborough	Sep. 21
Public Library	Motherwell Town Council	Greig & Co., Architects, Edinburgh	do.
Rebuilding House, Butcher-row, Ratcliff, Stepney, E.	Messrs J. Symons & Co., Ltd.	C. Dunch, Architect, St. Clement's House, Lombard street, E.C.	do.
Engine House, &c. at County Asylum, Knowles, Fareh'm	Committee	W. J. Taylor, County Surveyor, The Castle, Winchester	do.
Reservoir, White Loch, Mearns	Stewarton (N.B.) Town Council	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	do.
Street Works, North Bank-road, &c.	Batley Town Council	O. J. Kirby, Surveyor, Branch-road, Batley, Yorks	do.
Sewers, &c., Back-street, and Other Roads	Billericay (Essex) R.D.C.	R. J. W. Layland, Surveyor, Billericay	do.
Sewerage Works, Billing-road	Northampton Corporation	A. Fidler, Civil Engineer, Guildhall, Northampton	do.
Broken Granite	Newhaven (Sussex) U.D.C.	E. Knightley, Council's Offices, Newhaven	do.
Manse, King Edward-street, Fraserburgh, N.B.	West U.F. Church	W. Wilson, Architect, Frithside-street, Fraserburgh	Sep. 22
*New Sorting Office, Muswell Hill, N.	Commissioners of H.M. Works, &c.	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	do.
Additions to Laundry at Hospital, Poulton	Dover Town Council	H. E. Stilgoe, Civil Engineer, Biggin-street, Dover	do.
*Road-making and Paving Works	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	do.
Cast-iron (Contract 1) 271 tons	Irthlingborough (Northants) U.D.C.	J. Waugh, Civil Engineer, Sunbridge Chambers, Bradford	do.
Sewage Works	Denbigh Corporation	Bailey, Denton, & Co., Civil Engineers, Palmer Chbrs., Westminster	do.
Road Works, Lytchel Minster, Dorset	Sir Elliott Lees	R. T. S. Seymour, Surveyor, Wimborne	do.
*Floor over Swimming Bath, Wandsworth	Wandsworth Borough Council	Council's Surveyor, High-street, Wandsworth, S.W.	do.
*Paving Works	Hammersmith Council	Borough Surveyor, Town Hall, Hammersmith	Sep. 23
*Sewerage Works	Sevenoaks R.D.C.	T. Hennell, Engineer, 6, Delahay-street, Westminster, S.W.	do.
Sewerage Works, Sutton-on-the-Forest, Yorks	Easingwold R.D.C.	Fairbank & Sons, Civil Engineers, Lendal, York	do.
Schools, Oldknow-road, near Small Heath	Birmingham Education Committee	A. Rowse, Surveyor, 3, Newhall-street, Birmingham	do.
Columnar Basalt (14,000 tons)	Blackpool Corporation	J. S. Brodie, Borough Surveyor, Town Hall, Blackpool	do.
*Alterations, Repairs, &c., Southfield House, Dartford	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
Street Works, North Bank-road	Batley (Yorks) Town Council	C. J. Kirby, Architect, Branch-street, Batley	Sep. 24
*Sewage Disposal Scheme, Wymington	Bedford R.D.C.	The Clerk, 1, Harpur-street, Bedford	do.
*Sundry Works to Infirmary, Old Gravel-lane	St. George-in-the-East Guardians	Guardians' Offices, Raine-street, Old Gravel-lane, E.	Sep. 25
Stone Wall, Gates, &c., at Cemetery	Radcliffe (Lancs) U.D.C.	W. L. Rothwell, Surveyor, Council Offices, Radcliffe	Sep. 26
Works, &c., Mile Cross, Halifax	Mr. Chas. Horner	Walsh & Graham, Architects, Museum Chambers, Halifax	Sep. 29
Drainage Works at Workhouse	Buntingford (Herts) Guardians	E. G. Thody, Surveyor, High-street, Buntingford	do.
*New Sorting Office, Ealing Dean	H.M. Office of Works	J. Wager, H.M. Office of Works, Storey's Gate	do.
*Ealing Telephone Exchange	do.	do.	do.
Drainage Works, Formby (Lancs)	West Lancashire R.D.C.	C. A. Atkinson, Engineer, 11, Tithebarn-street, Liverpool	Sep. 30
Office, Store, &c., Gouthwaite Lodge, nr. Pateley Bridge	Bradford Corporation	J. Watson, Civil Engineer, Town Hall, Bradford	Oct. 1
Reservoirs, &c.	do.	do.	do.
Masonry Dams, &c., Angram	do.	do.	do.
*Central Public Library, Barry	Barry U.D.C.	Hutchinson & Payne, Architects, 11, John-street, Bedford-row, W.C.	Oct. 2
*New Coast Guard Buildings, Isles of Scilly	Admiralty	Superintending Civil Engineer, H.M. Dockyard, Devonport	do.
*Repairing, &c. Bldings., Abbey Mills Pumping Station	London County Council	Engineer's Department, County Hall, Spring Gardens, S.W.	Oct. 6
*Underground Convenience in Falcon-square	Corporation of London	Office of the Engineer, Public Health Department, Guildhall, E.C.	do.
*Underground Convenience, St. Martin's-le-Grand	do.	Engineer, Public Health Department, Guildhall, E.C.	do.
*Erection of Lodges, South Park, Fulham	Fulham Borough Council	Borough Engineer, Town Hall, Fulham, S.W.	Oct. 7
*Alterations to Cider Stores, &c., Stepney	John Symons & Co., Ltd.	C. Dunch, Architect, Clements-lane, Lombard-street, E.C.	No date.
Sinking Shaft, Gorseinon, near Swansea	.....	D. W. A. Saunders, Civil Engineer, Worcester Chambers, Swansea	do.
Public Library, Lake-road, Branksome, Dorset	.....	S. J. Newman, Architect, Branksome, Parkstone, Dorset	do.
Additions to Bridge End Inn, Pontnewydd	Messrs. W. Handcock & Co.	N. M. Brown, Architect, Dock-street, Newport, Mon.	do.
Additions to Premises, 8, Prices-street, Truro	Mr. O. Blackford	S. Trevall, Architect, Truro	do.
Additions to House, Shadwell-lane, Moortown, Leeds	.....	—. Mosleys, 6, Wormald-row, Leeds	do.
Shops and Flats, Uxbridge-road, Shepherd's Bush	.....	Palgrave & Co., Architects, 28, Victoria-street, S.W.	do.

[See also next page.

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Foremen Carpenters	Govt. of S'thern. Nigeria, W. Africa	20*l.* per month	Sep. 21
*Borough Surveyor	Bethnal Green Council	350*l.*	Sep. 25
*Additional Manual Training Instructors in Woodwork	School Board for London	See Advertisement	Sep. 26
*Civil Engineering Draughtsman	Admiralty	Not stated	No date.
*Architectural Draughtsman	do.	do.	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvii.

PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 8 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 8 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
,, ,, galvanised	16 0 0	. . .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	. . .
,, ,, to 24 g.	10 15 0	. . .
,, ,, to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	. . .
,, ,, 22 g. and 24 g.	16 10 0	. . .
,, ,, 26 g.	18 0 0	. . .
Galvanised Corrugated Sheets :—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	. . .
,, ,, 22 g. and 24 g.	12 15 0	. . .
,, ,, 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 0 0	. . .
Pipe in coils	14 10 0	. . .
Soil pipe	17 0 0	. . .
Compo Pipe	17 0 0	. . .
ZINC—Sheet—		
Vieille Montagne ton	26 0 0	. . .
Silesian	25 15 0	. . .
COPPER—		
Strong Sheet per lb.	0 0 10½	. . .
Thin ,,	0 0 11½	. . .
Copper nails ,,	0 0 11	. . .
BRASS—		
Strong Sheet per lb.	0 0 10	. . .
Thin ,,	0 0 11	. . .
TIN—English Ingots ,,	0 1 4	. . .
SOLDER—Plumbers' ,,	0 0 6	. . .
Tinmen's ,,	0 0 8	. . .
Blowpipe ,,	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	2¾d. ,, ,,
21 oz. thirds	2¾d. ,, ,,
,, fourths	3¼d. ,, ,,
26 oz. thirds	3¼d. ,, ,,
,, fourths	3¾d. ,, ,,
32 oz. thirds	3¾d. ,, ,,
,, fourths	4¼d. ,, ,,
Fluted sheet, 15 oz.	4¼d. ,, ,,
,, 21 oz.	2¾d. ,, ,,
½ Hartley's Rolled Plate	3¾d. ,, ,,
½ ,, ,, ,,	1¾d. ,, ,,
¼ ,, ,, ,,	2d. ,, ,,
	2¾d. ,, ,,

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 10
,, ,, in drums	,,	0 2 2
Boiled ,, ,, in pipes or barrels	,,	0 2 1
,, ,, in drums	,,	0 2 5
Turpentine, in barrels	,,	0 3 7
,, in drums	,,	0 3 9
Genuine Ground English White Lead	per ton	29 10 0
Red Lead, Dry	,,	29 10 0
Best Linseed Oil Putty	per cwt.	0 2 0
Stockholm Tar	per barrel	1 10 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 12 6
Superfine Hard-drying Oak, for Seats of Churches	0 10 0
Fine Elastic Carriage	0 14 0
Superfine Pale Elastic Carriage	0 12 6
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 16 0
Extra Pale French Oil	0 18 0
Eggshell Flatting Varnish	1 1 0
White Copal Enamel	0 18 0
Extra Pale Paper	1 4 0
Best Japan Gold Size	0 12 0
Best Black Japan	0 10 6
Oak and Mahogany Stain	0 16 0
Brunswick Black	0 9 0
Berlin Black	0 8 6
Knotting	0 16 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 1s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence.

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Each additional line ..... 1s. 0d.

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FOUR lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

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*** Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

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READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post.*

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish annou cements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ABERBEEG.—For the erection of 20 houses, for the building club. Mr. P. Vivian Jones, architect, Hengoed:—

D. Lewis, Aberbeg* ..... £4,280.

BASFORD (Notts.).—For the execution of road works, Newthorpe, for the Rural District Council. Mr. G. W. Hawley, Surveyor, York-chambers, King-Street, Nottingham:—

Thraves & Son	£196 14 0
S. Richmond	164 5 10
Cope & Raynor, Lenton, Nottingham*	154 2 5

DARENTH ASYLUM.—For cleaning and painting work at the Darenth Asylum, for the Metropolitan Asylums Board:—

T. Carr	£3,700	Vigor & Co.	£4,765 0 0
W. C. Collingwood	7,500	M. Batchelor	4,580 0 0
Gardner & Hazell	7,235	T. Cole	4,459 0 0
R. McCarthy	5,891	Titmas & Sons	4,333 0 0
Munn & Son	5,727	Proctor & Sons	3,775 0 0
Page, Ltd.	5,670	E. G. Rogers	2,994 12 9
J. Lonsdale	5,490	P. McCarthy	2,977 0 0
Wollaston & Co.	5,133	A. H. Innes*	2,841 9 0
Enness Bros.	4,844		

[Engineer's estimate ..... £3,450.]

DEWSBURY.—For the supply of broken granite for the Soothill Nether Urban District Council. M. J. H. Ward, Surveyor, Earlsheaton, Dewsbury:—

For Cliffe Hill.

	s. d.
Thos. Feather*	12 2

For Ingleton.

Leonard Cooper*	10 1

EPSOM.—For the erection of new depot, &c., Churchstreet, for the Urban District Council. Mr. E. R. Capon, Town Surveyor, Bromley Hurst, Epsom:—

W. Roberts	£4,579	Ferguson & Co.	3,700
Higgs & Outhwaite	4,250	R. Atkinson	3,700
Cropley Bros.	4,094	Roll & Taylor	3,650
M. G. King	3,923	Willmott & Son	3,636
Rowland Bros.	3,904	Jones & Son	3,620
R. Wood	3,900	Stewart & Son	3 608
Foster Bros.	3,837	F. J. Shopland	3,589
Akers & Co.	3,837	Smith & Sons, Croydon*	3,550
C. Jackson	3,715		

Farm Buildings.

W. Roberts	£379 0 0	C. Jackson	£572 0 0
Higgs & Outhwaite	668 0 0	Foster Bros.	564 0 0
Ferguson & Co.	613 0 0	Stewart & Son	562 0 0
Cropley Bros.	612 0 0	Jones & Son	550 0 0
R. Wood	590 0 0	F. J. Shopland	547 0 0
Willmott & Son	580 0 0	Roll & Taylor	545 0 0
Akers & Co.	579 0 0	Smith & Sons	543 0 0
Rowland Bros.	578 0 0	R. Atkinson	540 0 0
		M. G. King*	531 10 11

Post-Mortem Room.

W. Roberts	£559 0 0	Higgs & Outhwaite	£498 0 0
R. Atkinson	533 0 0	Akers & Co.	494 0 0
Cropley Bros.	533 0 0	Rowland Bros.	490 0 0
M. G. King	525 6 6	Smith & Son	475 0 0
Foster Bros.	524 0 0	Stewart & Sons	470 0 0
Ferguson & Co.	506 0 0	Jones & Son	470 0 0
Willmott & Son	505 0 0	F. J. Shopland	467 0 0
R. Wood	500 0 0	Roll & Taylor*	465 0 0
C. Jackson	499 0 0		

Surveyor's Estimates.

Depot	£4,276
Farm Stables	550
Post Mortem Room	426

[*See also next page.*

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FOUNTAIN HOSPITAL.—For the execution of fire-resisting works, alterations, and additions to Fountain Hospital, for the Metropolitan Asylums Board. Messrs. Aldwinckle & Son, architects:—

Ferguson & Co.	£15,300	Johnson & Co., Ltd.	£13,450
Lawrence & Son	14,392	E. Chamberlain	13,050
Wall & Co.	14,049	Roberts & Co. Redhill*	12,950
F. & H. F. Higgs	13,800		

[Architect's estimate..... £15,400.]

GRIMSBY.—Accepted for the erection of an underground station at the electricity works, Doughty-road, for the Corporation. Mr. W. A. Vignoles, M.I.E.E., Grimsby:—

Hewins & Goodhand, Grimsby £589

HIGHAM'S PARK.—For U. M. F. School Church, Higham's Park, E. Messrs. George Barnes & Sons, Architect, 5, Clement's Inn, Strand, W.C. The following tenders have been received for the above:—

Gough & Co.	£2,364	Battley, Sons & Holness	£2,097
C. North	2,313	Sands, Palmer & Co., Walthamstow*	1,990
S. J. Scott	2,220		
Mattock Bros.	2,200		
F. J. Coxhead	2,139		

HORNCASTLE (Lincs.).—For rebuilding a bridge, Asterby, for the Rural District Council. Mr. W. H. Holmes, Surveyor, 4, Church-lane, Horncastle:—

Burman	£201 17
Hensman & Son	153 0
Miller, Minting*	128 0

INGATESTONE (Essex).—For additions and alterations to the malting, for M. Quinn, Esq. Messrs. Clare and Ross, architects, 1, West-street, London, E.C., and Westcliff-on-Sea:—

Smith & Sons	£265
Johnson, Chelmsford*	198

KELLING (near Holt, Norfolk).—For the erection of a doctor's house and lodge for the Kelling Sanatorium Committee. Messrs. Clare & Ross, architects, London and Westcliff-on-Sea:—

Blyth, Norfolk* (house)	£619
Blyth, Norfolk‡ (house)	241

‡ Deferred.

KELLING (near Holt, Norfolk).—For the erection of a new 12 bed pavilion at the Consumptive Sanatorium for the Building Committee. Messrs. Clare & Ross, architects, London and Westcliff-on-Sea:—

Blyth, Norfolk*	£591 13 6

For a second 12 bed pavilion.

Blyth, Norfolk*	£637 3 0

LYNTON (Devon).—For the execution of water-supply works, for the Urban District Council. Mr. W. H. Chowins, engineer, Town Hall, Lynton:—

Rafarel & Co.	£3,237 8 8	B. Jones	£2,331 12 10
F. Mills	2,953 11 0	G. L. Gunn, Lynton*	2,235 7 10
R. Neal	2,505 0 0		

MACCLESFIELD.—For the erection of a provision shop, for the Equitable Provident Society, Ltd. Mr. Jabez Wright, architect, Macclesfield:—

Gorton & Wilson	£1,240 0	J. Clayton	£1,045 0
Roylance & Co., Ltd.	1,170 0	J. Dakin	1,031 0
E. & A. Frith	1,070 0	Cooke & Sons, Burton-road*	999 15

NORBURY.—For the erection of six houses, Fair view Road.

C. Whillier	£2,100
Sims & Wood	2,040
J. Wright Hallett*	2,010

PAKEFIELD.—For the erection of Rectory House.

Sims & Wood*	£2,150

TEDDINGTON.—For the erection of a detached villa, Broom-road, for Mr. T. Bailey:—

R. Ferris	£749 0	E. Cooper	£650 0
Tolton	700 0	E. Seeber	650 0
C. A. Drake	700 0	F. Child*	562 10

TOOTING BEC.—For wiring, for electric light, the children's home at the Tooting Bec Asylum for the Metropolitan Asylums Boards:—

Hayman, Tyler & Co.	£503 16 6	Wenham & Waters	£407 0 0
Drake & Gorham	496 0 0	Buchanan & Curwen‡	398 0 0
Eastlakes, Ltd.	450 0 0		
V. G. Middleton	443 0 0		

‡ Accepted, subject to the sanction of the Local Government Board.

UPTON-ON-SEVERN.—For the erection of an isolation hospital, for the Rural District Council. Messrs. Sheppard & Son, architects, 51, Foregate-street, Worcester:—

Lewis & Co.	£7,650	Sapcote & Sons	£6,348
Bromage & Evans	7,550	Wood & Sons	6,172
Panter & Sons	7,248	Giles & Son	6,155
Broad, Ltd.	6,697	Wm. Hopkins	6,100
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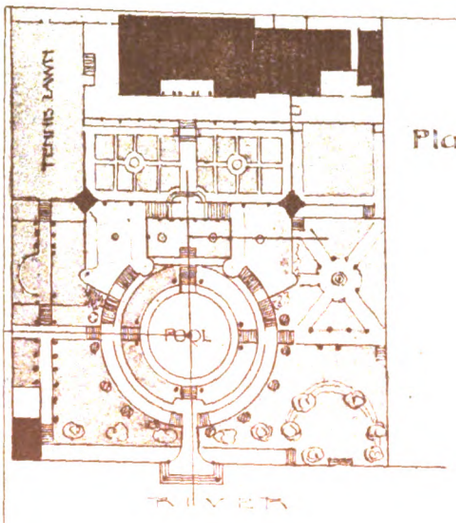
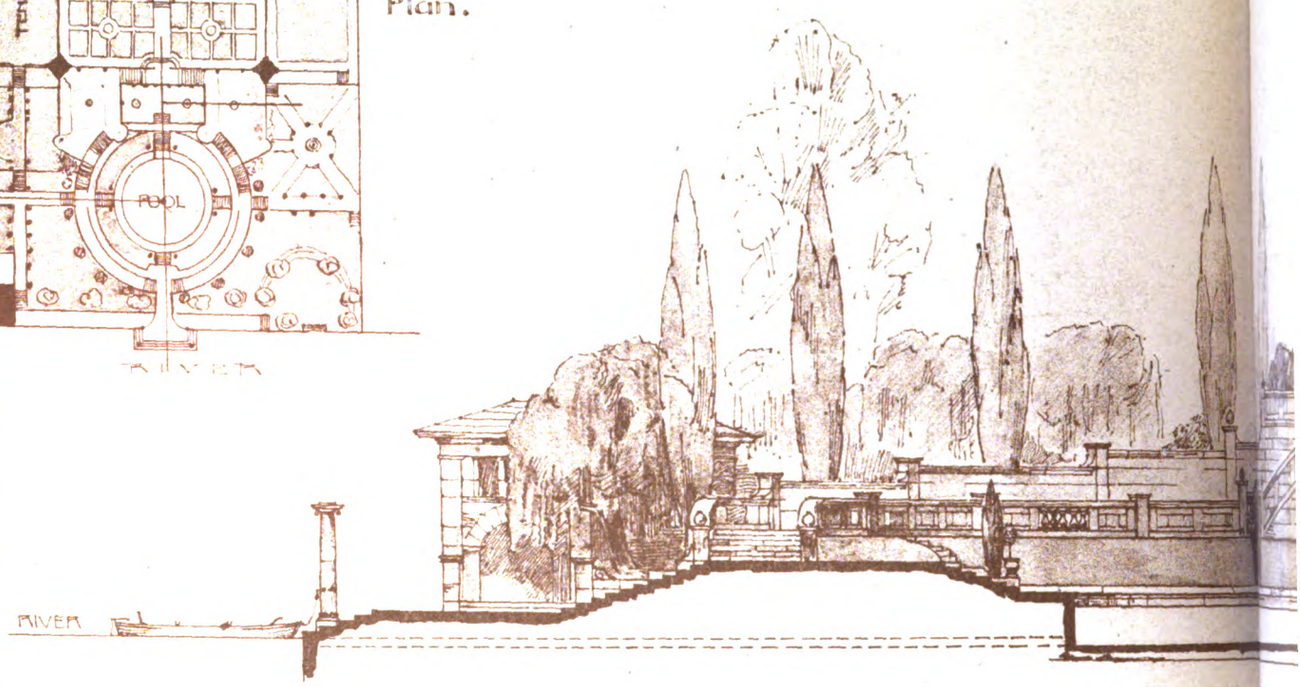
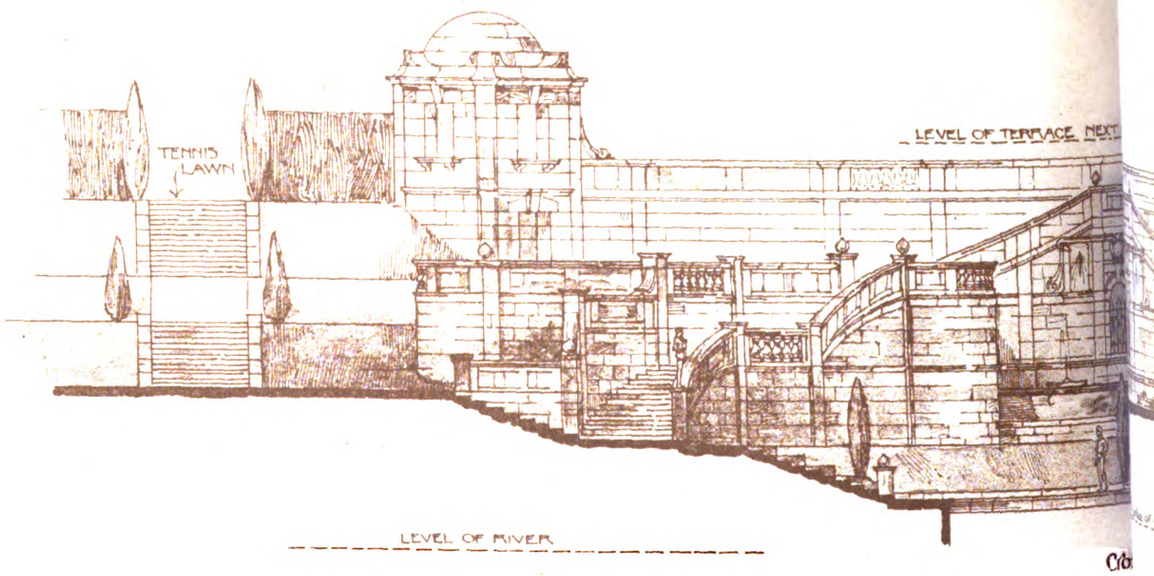


Plan.



Longitudinal Section.



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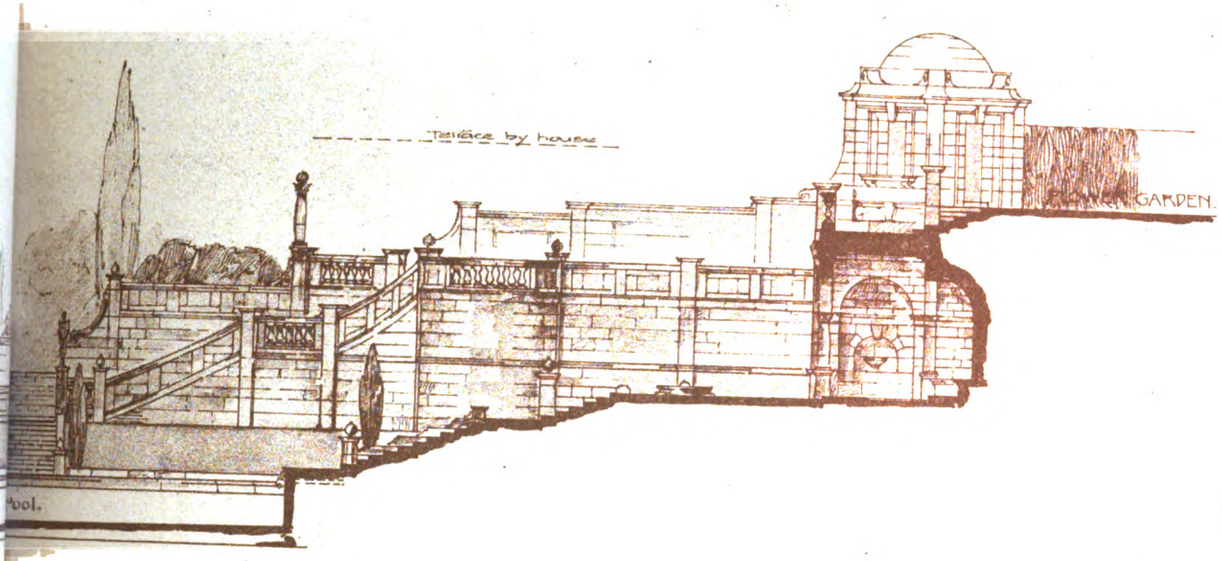
DESIGN FOR A GARDEN BY A RIVER



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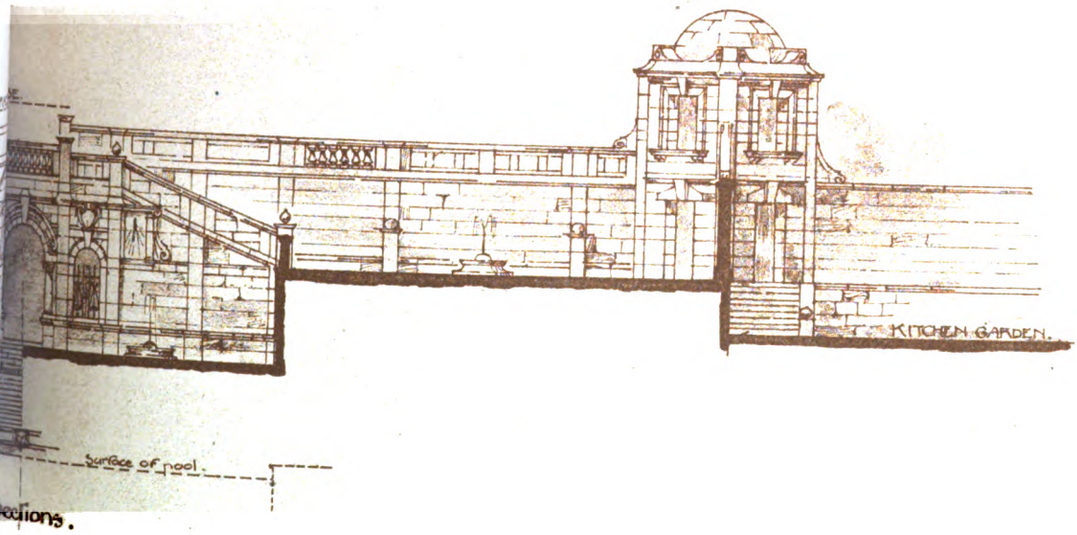

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MARCH 1898.

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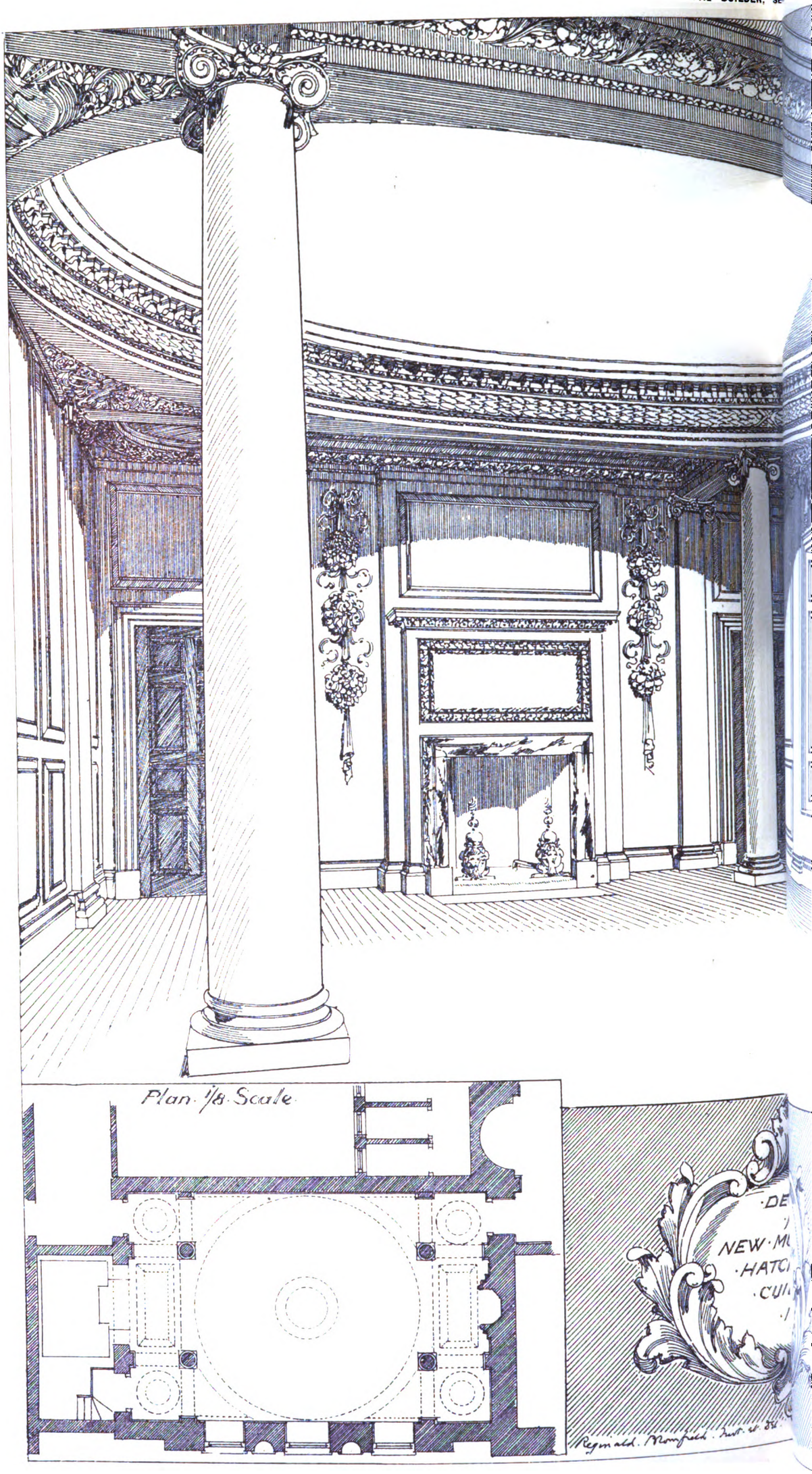

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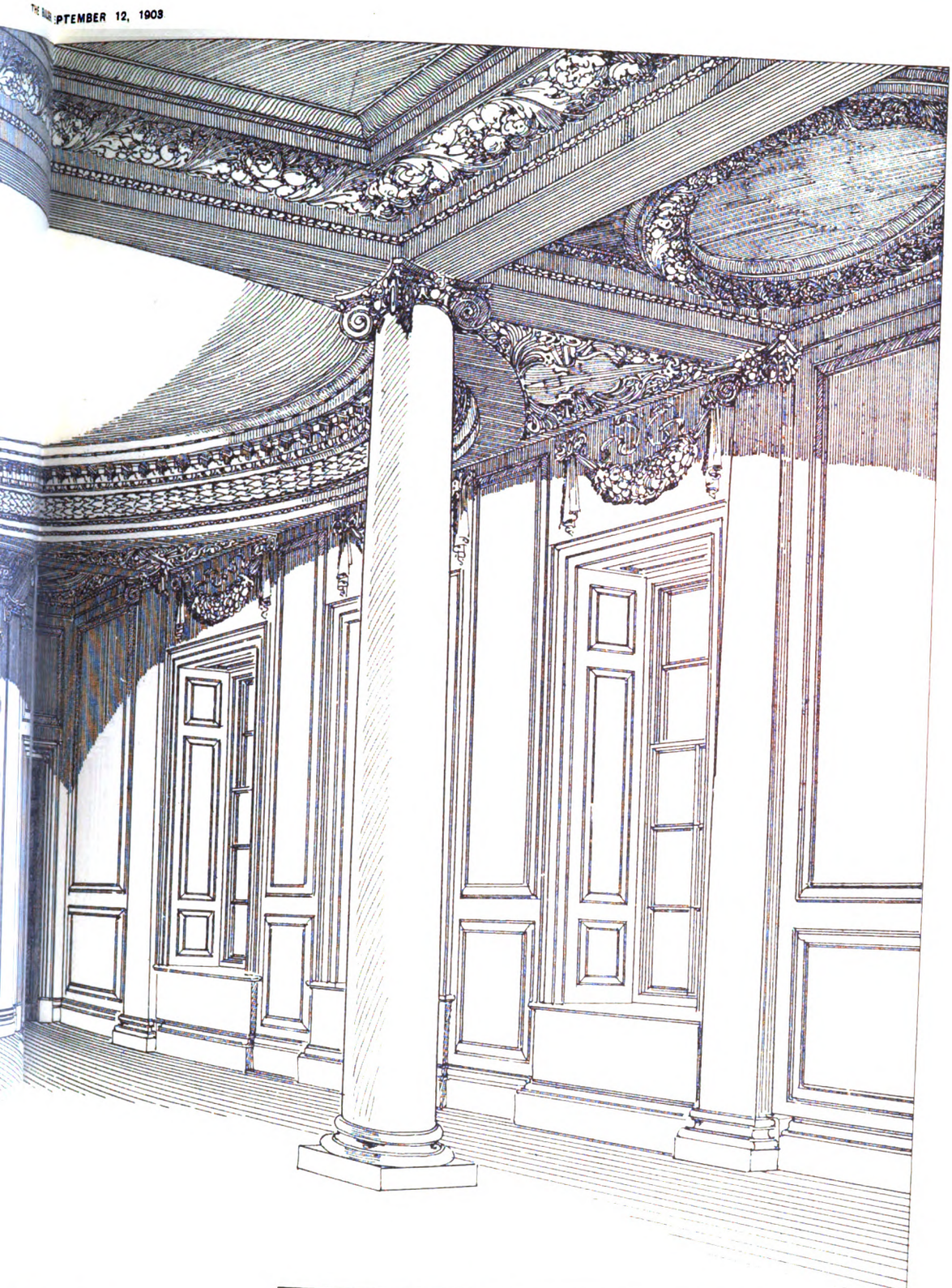

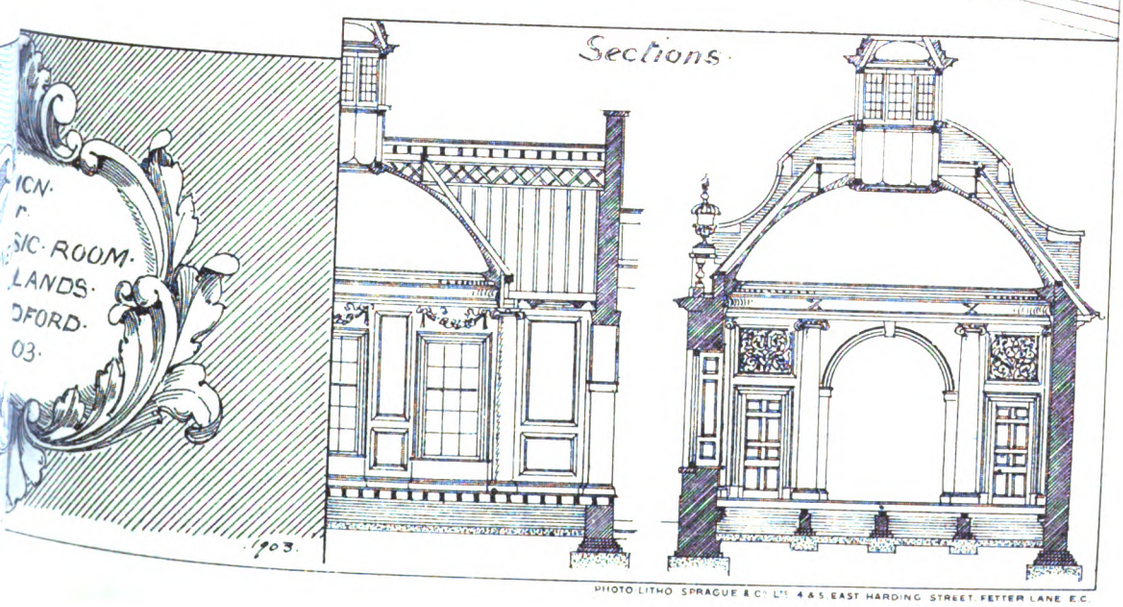

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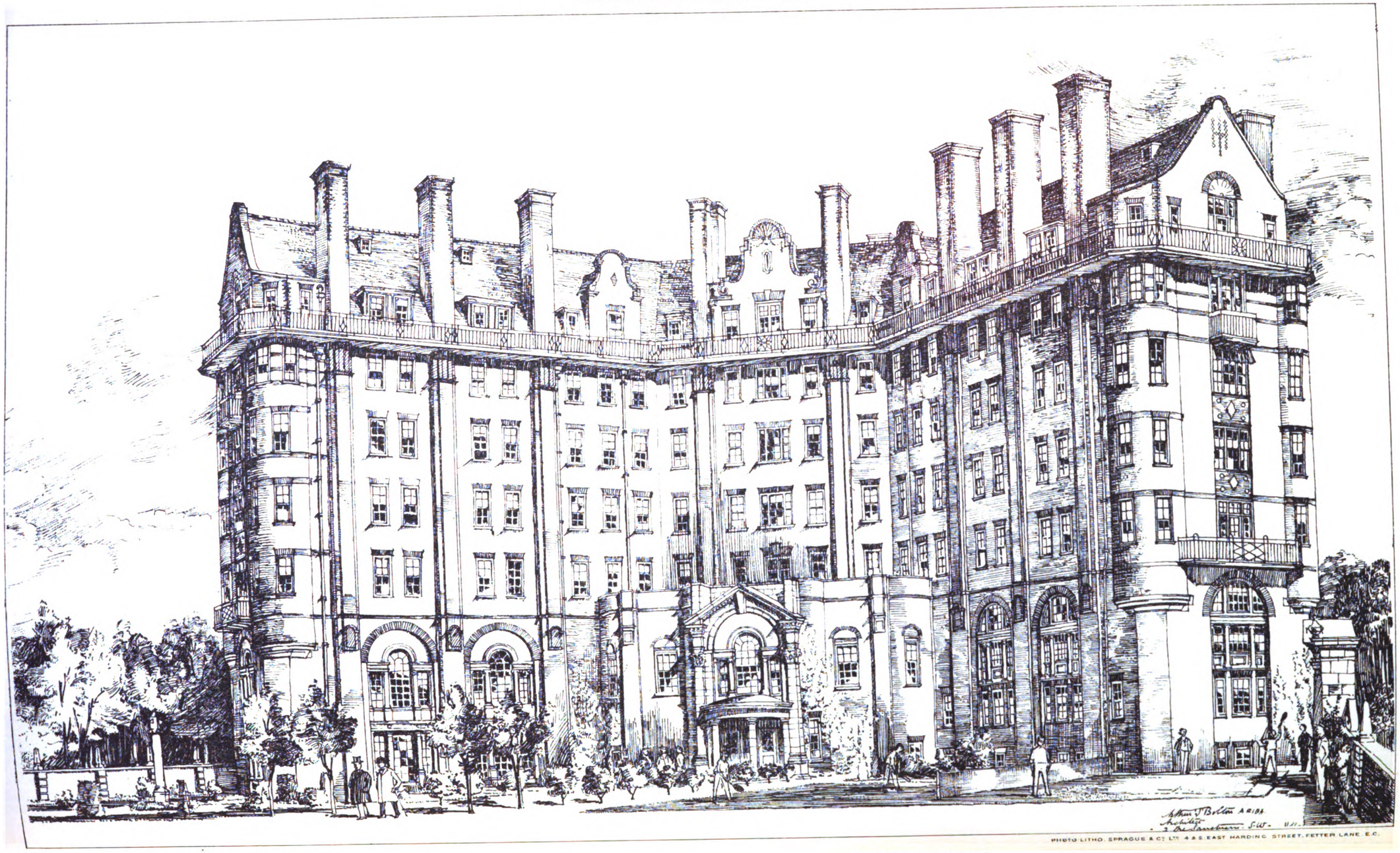

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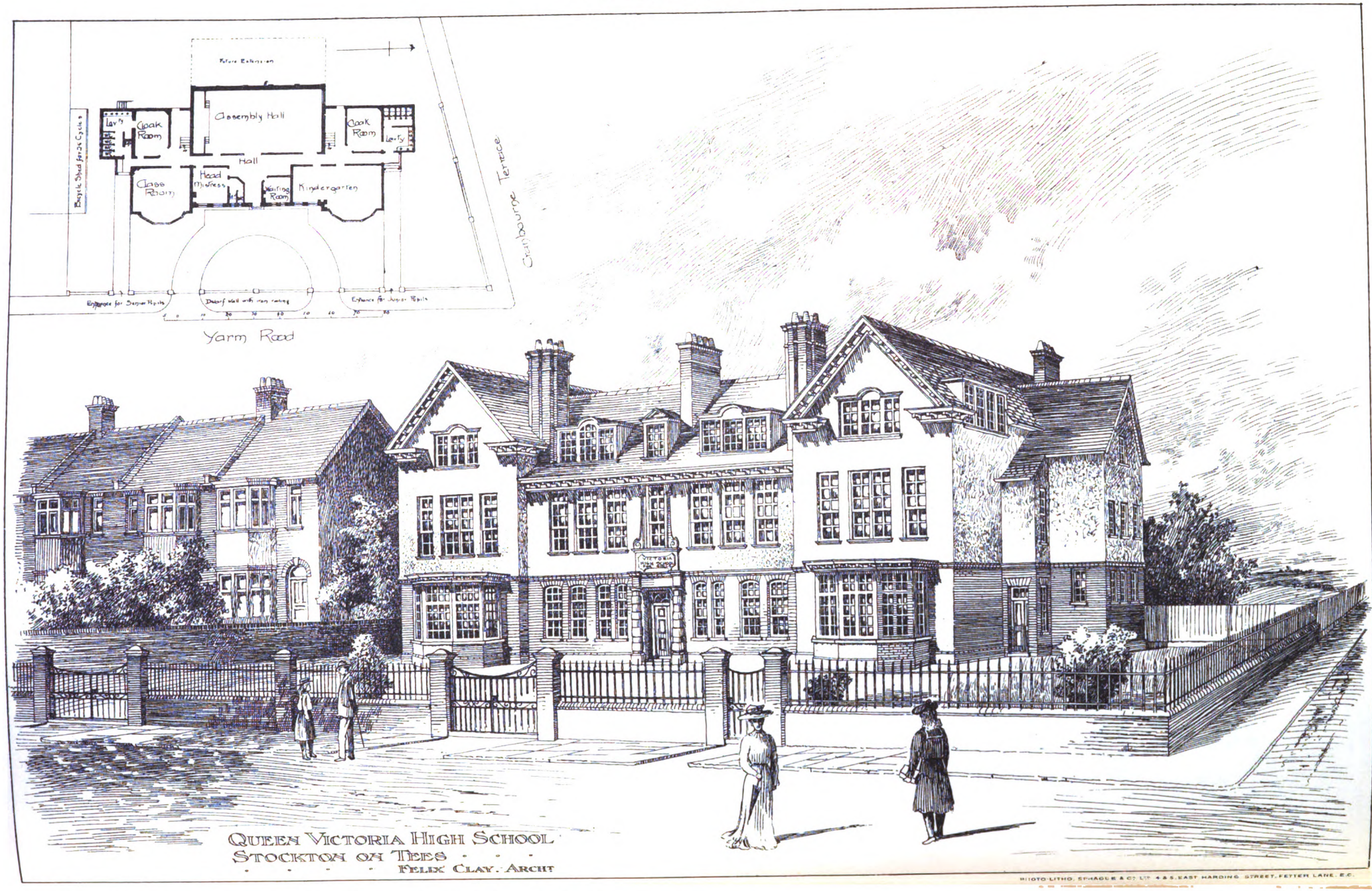

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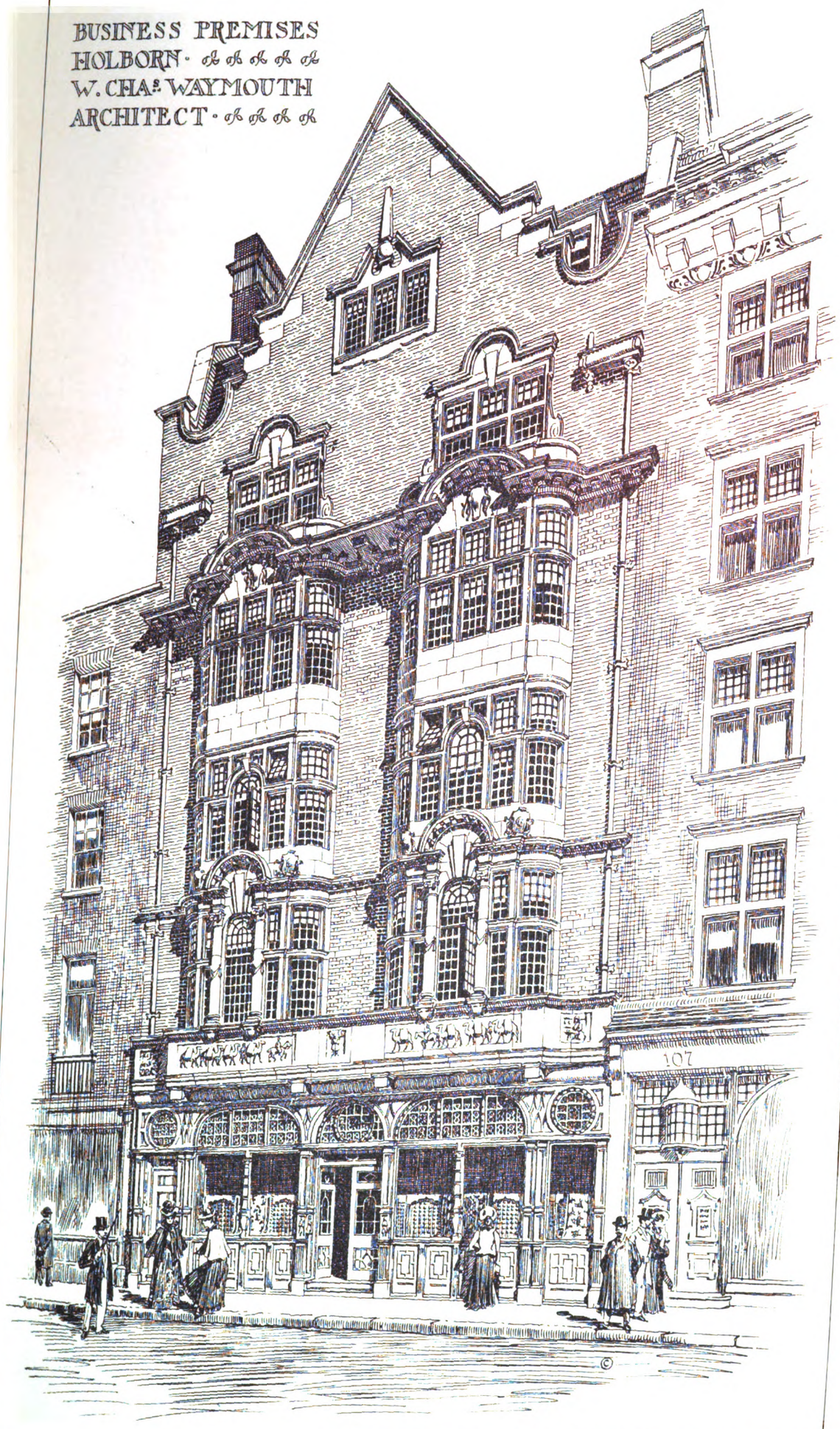

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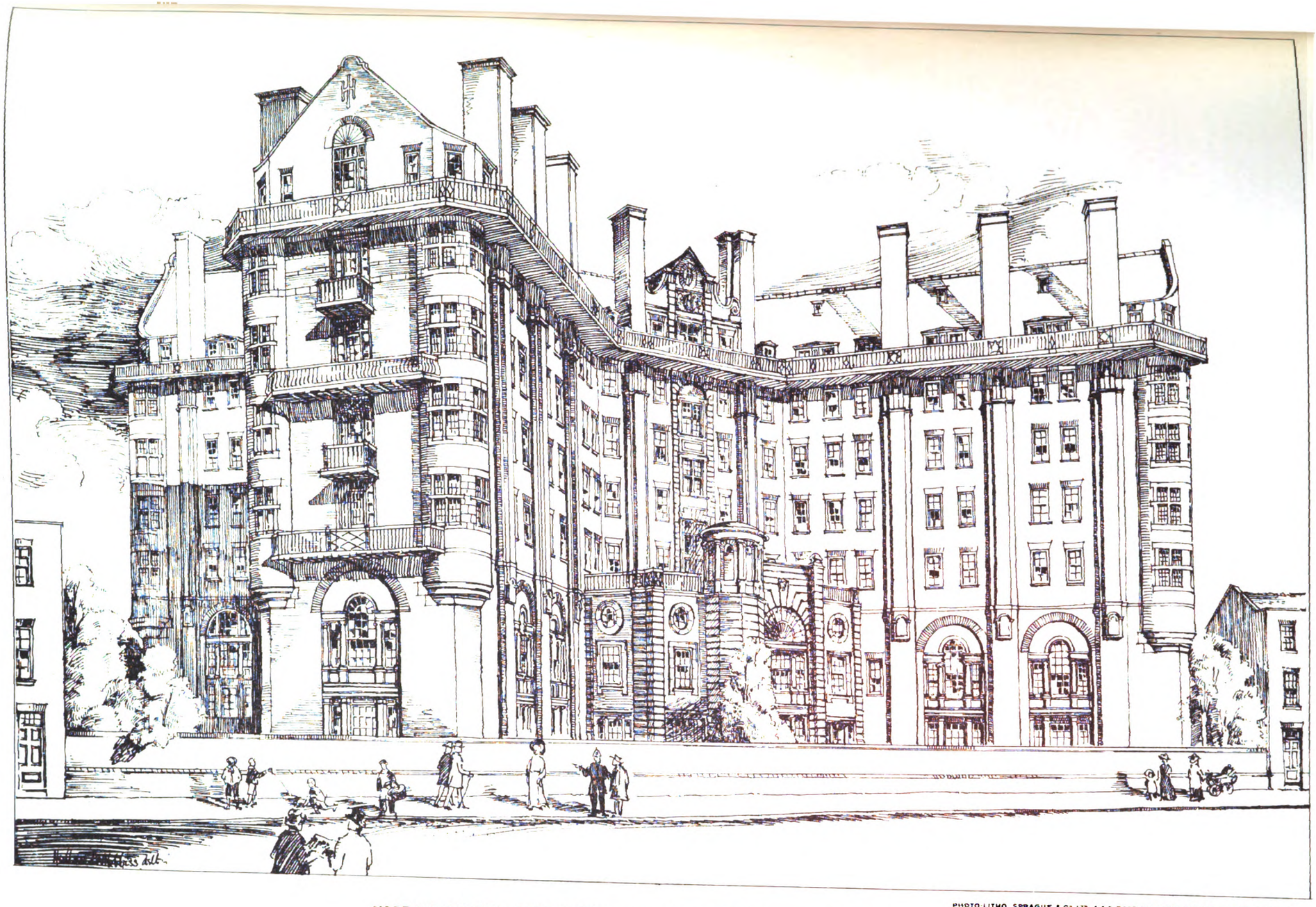

INGRAM HOUSE, STOCKWELL.—Mr. Arthur T. Bolton, A.R.I.B.A., Architect

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The Builder.

VOL. LXXXV.—No. 2762. SEPTEMBER 19, 1903.

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House, Hadley Road, Middlesex ..... Mr. Alfred H. Hart, A.R.I.B.A., Architect.
South Herts Golf Club House ..... Mr. A. C. Dickie, A.R.I.B.A., and Mr. W. Curtis Green, Architects.
House, Farnboro' ..... Mr. Paxton H. Watson, Architect.
Sanatorium, Shrewsbury School ..... Mr. Keith D. Young, F.R.I.B.A., Architect.

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Ancient Chaldean Irrigation.

SO persistently does modern literature, both technical and general, force itself upon the attention of the world, that things of the past are almost crowded out. Men of the present day are too apt to forget great deeds wrought and great works done in early days, and proud in the enjoyment of privileges bestowed by modern engineering science, are almost persuaded that they, as individuals, have had some share in creating, or are in some way responsible for, the marvels of the twentieth century. Even if it were right for those of the rank and file to identify themselves in this facile way with the results of modern science, it would still be a mistake to believe that human intelligence in itself is essentially greater than it was thousands of years ago. Knowledge has certainly increased, bringing in its train vastly increased resources, so that a task may now be accomplished in a few days that formerly would have required as many years. Yet, many works that are now regarded as masterpieces of modern engineering skill have been equalled, if not surpassed, in nearly forgotten ages. Within recent months volumes have been written upon Nile irrigation works in papers of all kinds, from serious technical journals down to fashion books, probably leading the average man or woman to form the opinion that no works of similar magnitude were ever before conceived or realised. It is forgotten, or has never been known, by such people that basin irrigation, as practised in Egypt and elsewhere 7,000 years or more ago, is even now the most efficacious method of treating some lands, and that perennial irrigation, sometimes thought to be a modern invention, is of great antiquity. Moreover, some of the most gigantic engineering works of former times are unknown to many people, even by repute. As examples of comparatively unknown achievements, we may cite some remarkable engineering works of which the remains are still to be found in Yemen, the ancient home of the Sabæans. One of these is the ruined masonry dam at Mareb, or Sheba, the original capital of the country. This work is supposed to have been built by Lokmán, in the year 1700 B.C., and according to M. d'Arnaud, a well-known French traveller, it consists of a great masonry wall, 2 miles long and 175 paces wide, connecting two hills. In another account, it is said to be 2 miles long by 500 ft. thick by 120 ft. high. Its object was the storage of water for irrigation, and regulation was effected by sluices at different heights, so that supplies might be maintained irrespective of the water levels in the reservoir. At Hirran, in the same region, there exist the ruins of an ancient masonry dam, connecting two spurs of a hill, this work being 150 yds. long, 20 ft. high, and wide enough to permit the passage of a carriage and pair along the top. There are also the remains of several deep wells, whose object was evidently the provision of water for the garrison of an early fortress.

Interesting as these remains undoubtedly are, the ancient irrigation works of Chaldea are still more noteworthy, and they acquire additional importance from the fact that the Bagdad railway, which it is proposed shall be built along the Euphrates and Tigris valleys, will have the effect of throwing open the country to Western civilisation. Bagdad, the ancient capital of the Kaliphs, inaptly named "The Abode of Peace," lies in the midst of a desolate waste that was once a densely populated and highly-cultivated region. To the north at Dura, was the upper intake of the ancient Nahrwân Canal, and there the golden image was set up by Nebuchadnezzar. Tel Alig, where died the Emperor Julian, lies in ruins a few miles to the south of Dura. Next come Opis, once the wealthiest emporium of the East; the ruins of Ctesiphon, where the great arch of Nausherwan's palace still stands in witness to the faded magnificence of the Sassanian kings; Cuxana, where Xenophon and his 10,000 Greeks commenced their historic retreat through a land cut up by innumerable canals; and lastly Babylon, "The Gate of God," once captured after some smart hydraulic engineering by the Persian besiegers.

On one side of the Tigris the delta was formerly irrigated by the great Nahrwân Canal and an extensive system of smaller canals, and between the Tigris and the Euphrates the country was watered by main and branch canals running more or less parallel with the river, and by a vast network of canals extending from river to river. The lives and property of cultivators were secured on one hand by the Median Wall, and on the other by the towering bank of the Nahrwân Canal, these ramparts being guarded by soldiers to prevent the incursions of wandering tribes. The river Tigris, that silent witness of the rise and fall of Assyrian power, flows to-day past the ruins of Nineveh, and breaking through the Hamrin Hills, enters the high-lying plateau at their feet, and passes in a trough some 60 ft. deep over a shingly bed, the velocity of the stream being 7.5 ft. per second, and its average width 1,500 ft. Near Opis, the Atheim river flows into the Tigris, and at this point the delta is entered. The character of the river bed then changes, shingle giving way, first to argillaceous marls, and then to fine alluvium, both well suited for irrigation and agriculture. Below Bagdad the Dyâleh river joins the Tigris, and thenceforward the fine alluvial deposits of the delta, accompanied by salt, continue to the sea. The annual flood commences about the end of the winter season, and is augmented with the advance of spring and summer by the melting of snows in the hills, the supply of water increasing as temperature rises. Still, as the rainfall is generally insufficient for agriculture, uniform and adequate supplies cannot be ensured without irrigation works. That part of the country with which we are chiefly concerned is the delta of the Tigris, in which Opis is the natural starting point for a great system of irrigation. Above this place the engineers of a remote period established the intakes of their most important canals the Nahrwân on the eastern bank, the Ishaki and others on the western bank. In order to ensure the better supply of water to the canals, rubble weirs were formed across the Tigris downstream of the canal heads, very much as the Asyût barrage has been built below the head of the Ibrahimiyeh Canal on the Nile. Each of the great canals acted as the

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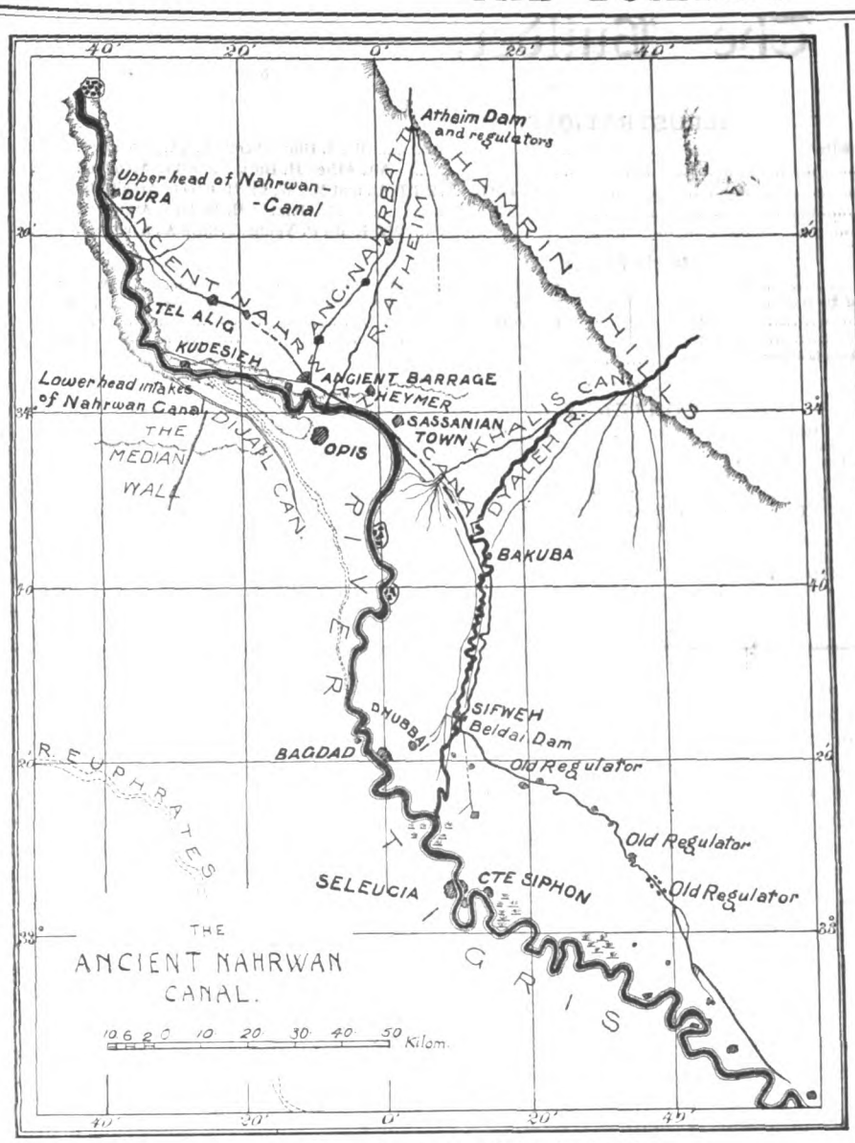

Fig. 1.—Map of the Ancient Nahrwân Canal.

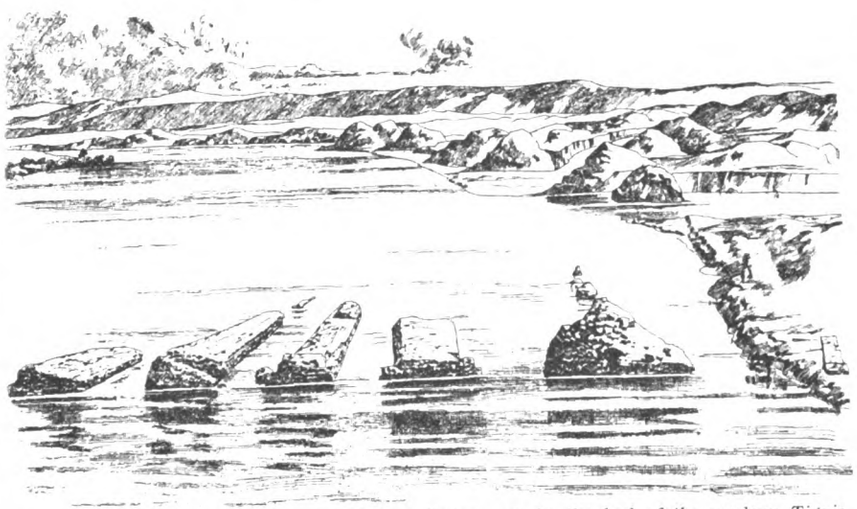

Fig. 2.—The Nahrwân Canal Regulator: Ruins now in the bed of the modern Tigris.

feeder for a huge system of smaller channels serving the country on either side of the river.

Reference to fig. 1 will tend to make more clear the following description, but it should be noted that when these canals were constructed, the Tigris flowed in its ancient bed, and Opis stood on the eastern bank. Reference will be made later to the transference of the river to its present course, an event that brought desolation to one of the most populous and fruitful countries in the whole world. The Nahrwân, known in its upper reaches as the Katul-el-Kesrawi, the "Trench of the Kaiser," originally served the purpose of supplying a large system of canals between Opis and a point some hundred miles below, where the main canal rejoined the Tigris. Like many canals that require silt clearances at intervals, the Nahrwân had two heads. The upper head, about 40 miles in length, took water from the Tigris just above Dura, where are the remains of the Kantara Resasa, a large masonry weir built of massive stones clamped with lead. The lower head at Kudesieh had two intakes, each 360 ft. wide, and a grand regulator, the ruins of which are now in the modern bed of the river. In fig. 2 we reproduce a sketch of these interesting remains, which have resisted the ceaseless flow of the river and the floods of countless centuries. At the junction of the canal heads once stood a flourishing city, and the massive barrage known as Kantaret-el-Kesrawia, the Bridge of the Kaiser, the remains of which still exist.

The total length of the Nahrwân Canal was about 250 miles. For the first few miles its channel was 65 ft. wide by nearly 50 ft. deep. It then attained an average width of nearly 400 ft., while the depth was reduced to about 36 ft. Below the Dyâleh river, which carried a large part of the supplies, the canal was reduced in width to 130 ft., but when Sifweh was passed it again widened out to about 360 ft. It is interesting to compare the dimensions of this giant waterway with the largest of Egyptian canals—the Rayan el-Menufiyeh, of which the width is 174 ft., and the depth 20 ft. in flood, and 10 ft. in summer. Speaking last year of this canal, Sir Benjamin Baker said that even in the exceptionally dry time of June, 1900, it was carrying a volume of water one and a fourth times greater than the Thames in mean flood. Hence in flood time it would be quite capable of conveying two and a half times the quantity of water carried by the Thames. But the Nahrwân Canal had a section four times that of the Menufiyeh, and its maximum capacity was fully ten times that of the Thames in mean flood! Just below the confluence of its two main feeders, the Nahrwân Canal is severed by the Atheim river, and has disappeared for a length of more than a mile. In ancient times injury by this river was guarded against by some remarkably well-designed engineering works at the foot of the Hamrin Hills. A masonry dam, about 800 ft. long by 55 ft. high, was built across the river, connecting the spurs of two hills, and masonry regulators were provided at the same point. By these means the waters of the Atheim were divided between two canals, the Nahr Batt, and the Nahr Rathan, irrigating the country on either side of the river, and discharging into the Nahrwân through masonry regulators. The present course of the Nahr Batt may be seen in fig. 1. The Nahr Rathan has long since disappeared. The general design and construction of the Atheim Dam are sufficiently indicated by the plan and elevations reproduced in fig. 3. Below the ruins of Heyme, the Nahrwân has been totally destroyed for a distance of several miles by the diversion of the Tigris. In consequence of the injuries already described, other damage naturally followed. The tail waters of the Khalis Canal, being no longer swept along by a powerful current, filled the Nahrwân channel with silt, and it ultimately became cultivated land, through which passes the modern Khalis, serving a system of smaller channels. Between the ruins of Bakuba and Sifweh, the ancient course of the Nahrwân runs parallel with the Dyâleh river, but the canal itself has practically disappeared. Along this stretch the Nahrwân was formerly at such a level that it was able to deliver water to the higher lands below Sifweh, whereas the Dyâleh could only

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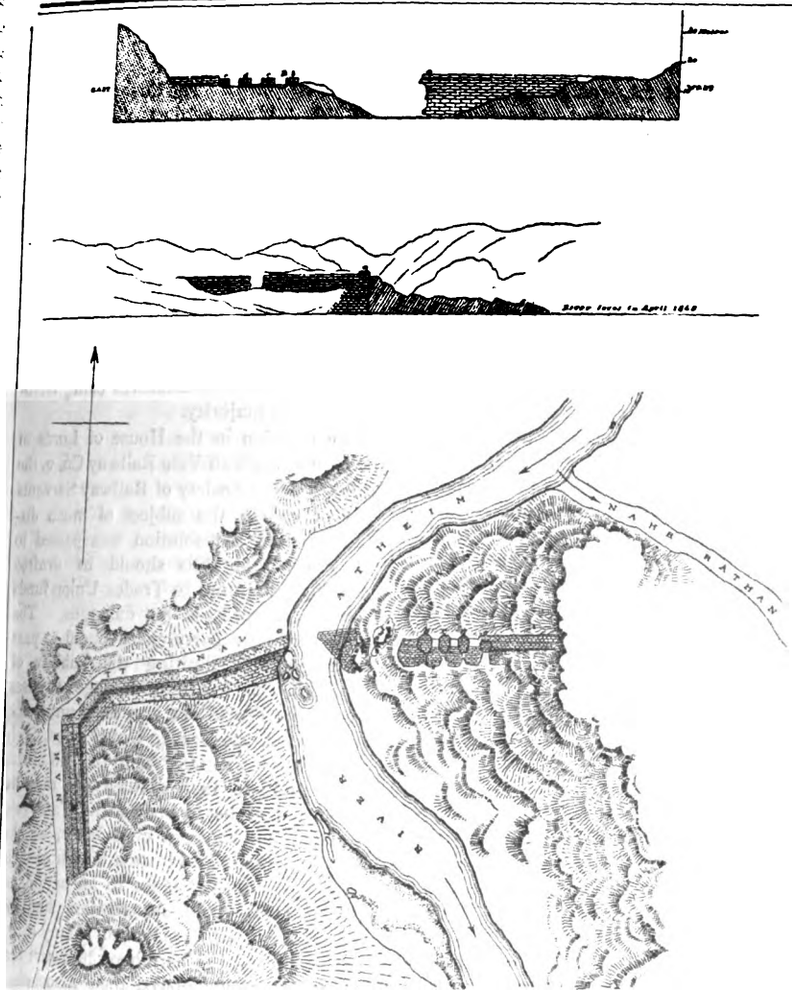

Fig. 3.—The Ruined Atheim River Dam.

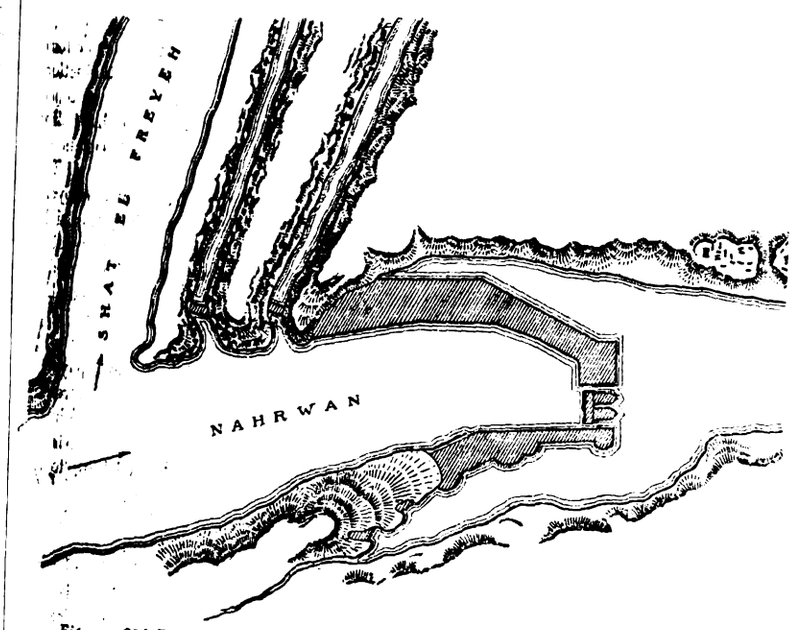

Fig. 4.—Old Regulator and Branch Canal Heads on the Nahrwân Canal.

serve the low-lying lands. Beyond Sifweh are the ruins of the Beldei Dam, once holding up the waters of the Dyâleh and delivering them into the Nahrwân, but in the present day the river effects a junction with the Tigris.

Between Beldei and the point at which the Nahrwân finally discharges into the Tigris there are numerous remains of ancient cities, main regulators, and branch canal heads, all testifying to the wonderful prosperity and civilisation that characterised this now deserted region. Fig. 4 is a plan showing an old regulator and branch canal heads in this reach of the Nahrwân. Even with the scanty materials available, it would be easy to paint a glowing picture of the ancient wealth and prosperity of Chaldea, but we prefer to turn to actual records. Accounts written nearly a thousand years ago described the Nahrwân Canal as "flowing amid continuous extensive villages, date-groves, and well-cultivated lands, and finally discharging into the Tigris a little below Badrai." It is further said, "It had well-constructed buildings on its banks, it flows amid cultivation and villages, and, in like manner, many branches emanating from it irrigate the country between it and the east bank of the Tigris. These copious branches reach unto the Tigris."

On the western bank of the Tigris were the Ishaki and Nahriyat canals, and a vast system of other and smaller channels irrigating the country above flood level, but of these watercourses few traces remain. Their ruin was compassed when the Tigris left its ancient bed, and since that event the modern Dijeil Canal was made, the term Dijeil being an old name of the Tigris, and its application to the canal system signified that the new waterways were intended to fulfil the duties of the departed river. But the "modern" Dijeil Canal is now an ancient work. The present state of a bridge over the Dijeil, at Harbeh, shows how the canal has withered away. The bed is choked with huge mounds of silt, and the little water that flows barely fills a single arch of the old bridge. This is typical of the whole country, where decay and desolation are everywhere apparent. Viewed from the high ground above Opis, the land presents an almost inconceivable picture of wreck. The dismembered walls of the great city lie at the feet of the beholder, while the mounds of many other cities and towns are dotted like islands over a vast plain, utterly bare of vegetation, and smooth as a calm sea. This aspect of the country clearly denotes bygone disaster, a sudden and overwhelming onslaught, prostrating everything in its way. Commander Felix Jones, in his interesting Memoirs, says that "The Tigris, as it anciently flowed, is seen to have left its channel and to have taken its present course through the most flourishing portion of the district, severing in its mad career the neck of the great Nahrwân artery, and spreading devastation over the whole district around. Towns, villages, and canals, men, animals, and cultivation, must thus have been engulfed in a moment, but the immediate loss was doubtless small compared with the misery and gloom that followed. The whole region, for a space of 400 kilometres, averaging about 30 kilometres in breadth, was dependent on the conduit for water, and contained a population so dense, if we may judge from the ruins and great works traversing it in its whole extent, that no spot in the globe perhaps could excel it. Of those who were spared to witness the sad effects of the disaster, thousands, perhaps millions, had to fly to the banks of the Tigris for the immediate preservation of life, as the region at once became a desert where before were animation and prosperity." These views as to the cause of the ruin that overtook Chaldea are confirmed by examination of the plans and levels of the country. When the main stream of the Tigris deserted its ancient bed, sweeping away the Nahrwân regulator, cutting out a new channel for itself, eating into one feeder canal, and finally biting away a huge slice of the Nahrwân itself, the ruin of that magnificent work and of all its dependent channels was complete and irreparable. Above Sifweh the canal was abandoned, and only

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the lower reaches were thenceforward used. The dam at Beldei was strengthened, and a new head for the Nahrwân was constructed at the same place. Little benefit could follow the execution of these works, for the scanty supplies of the Dyâleh river were utterly inadequate, and no help was afforded from the plenitude of the Tigris. On the western bank the damage was little less disastrous. The old river bed silted up, the weirs that had held up the waters to feed the main canals no longer fulfilled their function, the canals dwindled away and the region became a desolate waste. As the ruin of the Nahrwân was the greatest blow the country has ever received, so its restoration would be the greatest blessing that could be bestowed.

A scheme for the restoration of the ancient irrigation works on the Tigris has recently been propounded by Sir William Willcocks in a lecture delivered at a meeting of the Khedivial Geographical Society, Cairo. The rehabilitation of Chaldea is a most interesting subject, and discussion is opportune at the present time in view of the attention that is being devoted to the Bagdad Railway scheme. With politics, Sir William Willcocks disclaims all connexion. His ambition is simply that of an irrigation engineer, "to see ten blades of grass growing where none are growing to-day." His lecture is addressed solely to the engineering and economic problems involved in the re-creation of Chaldea by the restoration of her ancient irrigation works. The first works recommended are the reopening of the ancient channel of the Tigris, and the construction of a weir at the head of each branch, so that both the ancient and the modern Tigris may be maintained and properly controlled, just as the branches of the Nile are maintained and controlled by the Cairo barrage. The Nahrwân Canal would be renewed and remodelled throughout, and provided with a new head. The treatment of the Atheim river would be of similar character to that already described, and it is significant that Sir William Willcocks, one of the most competent hydraulic engineers of the twentieth century, has no improvement to suggest upon the principle adopted by Chaldean engineers who flourished thousands of years ago. A new course is proposed, to carry the canal round the bend of the Tigris opposite Opis, and powerful spurs would prevent further encroachment by the river. A super-passage is proposed for the Khalis Canal to prevent interference with the Nahrwân; the Dyâleh river would serve the low-lying lands in the direction of Bagdad, while the higher lands would again be watered from the Nahrwân, flowing at a high level in a new channel traversing a new course. This chain of works could be executed within reasonable time, and although not covering everything necessary, would suffice as the basis upon which the complete system of irrigation could be rebuilt. To enable a precise estimate of cost to be made, information would necessarily have to be gathered by experts —such as could only be attained by months, and perhaps years, of patient observation and field work. By way of affording a general idea as to the financial success of a modern irrigation system, a preliminary estimate of costs and results was presented by Sir William Willcocks, from which we abstract the following figures.

It is stated that the area of the lands requiring nothing but water to yield an immediate return is 1,280,000 acres, and that the cost of the necessary works would be about 8,000,000*l.* On this basis the cost of irrigation works would not exceed 7*l.* per acre. The value of the irrigated land is taken at 30*l.* per acre, and the return for an expenditure of 8,000,000*l.* is therefore calculated at 38,400,000*l.* The swamped and generally barren tract lying between the Tigris and the Euphrates, and away from the immediate vicinity of the former river, has an area of 1,500,000 acres, and the necessary expenditure is estimated at 13,000,000*l.*, the value of the reclaimed and irrigated land being put at 15*l.* per acre. Consequently the return to an irrigation company is estimated at 22,000,000*l.* It is further stated that if the rates prevailing in India were adopted, every figure representing cost should be divided by 4, and those expressing land values should be divided by 2. On this basis the figures would stand thus :—

District.	Acres.	Cost of Works.	Value of Land.
Upper Chaldea..	1,280,000	£2,000,000	£19,000,000
Lower Chaldea..	1,500,000	3,250,000	11,000,000
Totals.....	2,780,000	£5,250,000	£30,000,000

In the present state of knowledge with regard to Chaldea, it is impossible to express any definite opinion upon these figures, but it may be remarked that, as compared with records afforded by practical work of a similar nature in other Eastern countries, they appear to be perfectly reasonable. Further, it may be observed that every acre of land reclaimed and brought under cultivation would bring revenue to the new railway, for Chaldea lies in the very path of this projected communication between the East and the West. In turn, the railway would augment the value of the land by opening up new markets for agricultural produce. In this connexion it cannot be too strongly urged that railway and irrigation schemes should be regarded as mutually dependent, for it would be a lamentable mistake if the railway were to traverse a barren part of the country, leaving regions that are destined to include highly cultivated lands without facilities for transport.

We have now briefly glanced at the ancient irrigation works of Chaldea, and the suggestion made for their rehabilitation. Conceived by old-world engineers of high intelligence and ability, these great undertakings constituted the source of the teeming wealth that made Chaldea the object of all Eastern conquerors, and her possession the crown of their conquests. As their inauguration was followed in ages long since past by wonderful fertility, flourishing population, and boundless wealth, so would their restoration be followed, re-creating the ancient glories of Chaldea, so that, as of old, men might journey from the East—and even from the West—to find a resting-place in the plain of Shinar.

THE TRADES UNION CONGRESS.

THE Trades Union Congress, in sittings extending over several days, has discussed a variety of subjects, many of which involve purely political questions which would appear outside the scope of debate by the Congress, and on the opinions expressed on such subjects it is unnecessary for us to comment. The Congress entered a strong protest against the composition of the Royal Commission appointed to inquire into the position of Trades Unions, and confirmed a resolution recommending all representative workmen not to give evidence before the Commission, or to assist inquiry by giving any information to that tribunal; and this resolution may be taken as the keynote to the whole proceedings of the Congress, the moderate party being throughout outvoted, and extreme measures being advocated by the majority.

The decision in the House of Lords in the case of the Taff Vale Railway Co. *v.* the Amalgamated Society of Railway Servants was of course the subject of much discussion, and a resolution was passed to the effect that Bills should be drafted securing immunity to Trades Union funds from legal process for damages. The more moderate party endeavoured to pass an amendment limiting the liability of Trades Union funds for damages to cases where the illegal act was done under the authority of the Trades Union rules. Such a restriction was inserted in the Bill of last year, and we then pointed out that its effect would be to render the Taff Vale decision practically a dead letter, as the Trades Unions could use a breach of their own rules as a defence to an action for illegal acts, which nevertheless had the full approval of the Unions. Many of the speakers had the hardihood to assert that the present law placed their associations in a worse position than associations of employers. It is hardly necessary to state that this is certainly not the case, and this confusion of ideas seems to be founded on an inability to grasp the distinction between the rights of an employer to protect his interests in relation to those directly employed by him, and the rights of an independent body, such as a Trades Union, to interfere between employer and employed. That the Congress did not put much faith in its own resolutions may be gathered from the presidential address, where it was suggested that an overwhelming labour representative party would have to be created for them to attain their ends, for which purpose payment of members of Parliament was strongly to be advocated. This country, we imagine, has seen sufficient of the methods of the paid agitator, without wishing to create the paid parliamentarian.

The Congress carried a resolution for an eight-hours' day in all trades and occupations. That this body should advocate a compulsory eight-hours' day is not surprising; and in itself the desire of the workmen only to work eight hours would be perfectly legitimate were they contented to receive eight hours' pay, but it is notorious that the individual members of the working classes are by no means anxious to forego the advantages of overtime, and strongly resent separate labour being used for overtime. So as it stands the resolution is one wholly impracticable. The trade of this country, with the stress of foreign competition every year more keenly felt, can certainly be placed under no artificial restrictions.

A Bill to amend the Workmen's Compensation Act was discussed, and referred

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back for further consideration. We have frequently commented on Bills to amend this Act, and it is well-known that the Government intend at an early date to legislate further on this question. The Bill before the Congress has for its object the extension of the principle of workmen's compensation to all employments. It contains many clauses which we have before pointed out were either unworkable or unnecessary. Thus it seeks to render employers liable to pay compensation for injury "by accident or otherwise." "Otherwise" can only apply either to negligence on the part of the employer amounting to wilful injury, or to wilful misconduct on the part of the workmen; for an injury supervening on ordinary negligence is invariably an accident. The Bill further purposes that it shall be impossible for an employer to "set up contributory negligence or any other defence," but contributory negligence is no defence under the present Act. There is apparently a desire to set up a right to compensation according to the grade of employment, apart from the actual employment of a workman at the time that he sustains injury; but Clause 7 is entirely incomprehensible. It provides that in the case of a minor employee permanently disabled, "regard shall be had to the full wages earned by a workman in the highest grade of the same employment." There are other clauses rendered unnecessary by recent decisions, and it seems surprising that the interval which has elapsed since this subject was discussed by the Trades Unions had not sufficed to enable a more workable measure to be presented to the Congress.

Resolutions were passed with a view to facilitating housing of the people and cheap means of access to crowded centres, but a resolution setting up courts of compulsory arbitration was lost; it was, however, resolved to draft a Bill amending the Conciliation Act, whereby either disputant, or a public governing body, were to have the power to call for investigation into a dispute and to issue a report to the public. We had occasion recently to comment on the Return on Strikes and Lockouts, and the pleasing features it disclosed of a better understanding which seemed to be arrived at between employers and employed in the settlement of disputes; but public intervention would hardly seem likely to further this end.

NOTES.

Local Indebtedness. THE publication of the Local Taxation returns again furnishes an opportunity for calling attention to the serious question of local indebtedness. We showed at this time last year that the amount of the local indebtedness was equalling the amount of the National Debt, and the two classes of indebtedness may well be considered together. The National Debt is jealously watched, yet the burden of local indebtedness is allowed to be steadily increased almost without comment, although the increase in the rates which it necessitates is fully as burdensome as the national taxation, and falls, moreover, on classes which are exempt from taxation. The present Government will be more celebrated for its zeal in granting Committees of Inquiry than for its effective legislative action, and there can be little doubt that such inquiries are an excellent means of silencing inconvenient opposition and of shelving difficult questions. But it is time the public asserted its opinion that inquiry is not everything, and that the proper body to deal with matters of national importance is Parliament itself, and not various Select Committees. As an example, we may cite the Select Committee appointed to inquire into the subject of municipal trading. The country called decisively for an inquiry as to whether such a system was good for the nation in itself. This agitation was silenced by the appointment of a Select Committee of both Houses of Parliament, yet the Report of that Committee expressed no opinion on the merits of the system which has sprung up almost unheeded in our midst, but owing to the lack of time at its disposal confined itself to recommending a system of audit of the accounts; a recommendation which, if followed, would, we submit, only tend to sanction the principle of municipal trading by impressing upon it the seal of Parliamentary sanction, before the country has been satisfied that such a system is in the least desirable in itself. The returns now published show continued increase in the growth of local indebtedness, and we trust that agitation on this question will speedily be renewed.

The Victoria Falls Scheme. ONE of the largest engineering projects in the world is now under consideration by the African Concessions Syndicate. The details of the undertaking will not be settled until the site has been further surveyed, an operation for which the sum of 10,000*l.* has been allocated. The proposition to which we refer is the utilisation of Victoria Falls, in Rhodesia, a far greater scheme than the harnessing of Niagara Falls in the Western Hemisphere. The total height of the Niagara Falls is about 160 ft., whereas at the Victoria Falls the height is more than 400 ft. Again, while the total power running to waste at Niagara is estimated at 7,000,000 h.-p., the available power is put at 35,000,000 h.-p. Of course, it will not be possible to find a market for this enormous amount of energy for many years to come, but no one who has studied the resources of the country around the Falls can doubt that the project is one fraught with the most tremendous possibilities. The country within a considerable radius of the Falls is probably more richly endowed than any equal area of the world with minerals—and particularly with gold, copper, iron, and coal. Moreover, the country is fertile, well-watered, and possessed of an excellent climate. These conditions suggest a great increase of population, and the development of important manufacturing industries. The trunk railway is already within seventy miles of the Falls, and early next year it will probably be completed to that point. As electricity is now recognised as the most economical agency for traction, it is believed that the Rhodesian railways will afford an opening for the supply of large quantities of energy when the proposed works have been established. Various mining centres already established should also be responsible for a very considerable consumption, while the development of the iron, copper, and coal industries, together with the concurrent increase of miscellaneous manufacturing industries and the growth of cities and towns, will afford further scope for the absorption of power. A few years ago it was not possible to transmit power to any great distance, but in the present day long distance transmission lines are being worked in the United States by the aid of which energy is transmitted for distances of nearly 300 miles, and proposals have been seriously made to connect New York and Chicago with the Niagara power-station, the distances being 450 miles and 500 miles respectively. If a radius of 600 miles could be served from the proposed power-station at Victoria Falls, the whole of the goldfields of South Africa would be included in the area, and a large proportion of its railways. In other words, the area would comprise 1,500,000 square miles, including the whole of Rhodesia, Bechuanaland, and the Transvaal, as well as the greater part of Portuguese Mozambique, German South-West Africa, Portuguese West Africa, and the Congo State.

Breakdowns on the Central London Railway. TWO or three recent mishaps on the Central London Railway, although causing considerable inconvenience to passengers, have demonstrated the capacity of the officials for dealing with emergencies. The first accident occurred on Tuesday last week, near the Bank Station, and the second took place on Thursday evening in the same week at almost the same spot, during the shunting of a motor train. It appears that one of the cars jumped the points, and coming into contact with the live rail caused a slight explosion. Current between the Bank and the British Museum Stations was immediately cut off, and an emergency circuit was simultaneously connected, lighting up the tunnel and stations as far as the latter point. The stations in the section were closed for traffic and all bookings suspended. One train was on the line between the Bank and Post Office Stations, and this being brought to a standstill the passengers were informed of the reason, and, guided by the conductors, they walked along the whitewashed planks, provided at each side of the permanent way, to the Bank Station, where they were speedily raised to the surface. There was not the slightest disorder or panic, and ten minutes after the occurrence of the mishap the whole of the passengers had been transferred to the street above. In response to a telephone message, a breakdown gang was promptly despatched from Shepherd's Bush, and the obstruction was removed in time for the complete resumption of traffic on Friday. A second accident took place later in the some evening at the British Museum Station, where another car jumped the rails at the crossover, and was derailed. Although these minor mishaps afforded opportunities for the officials to show their preparedness for emergencies, they also appear to indicate that something is radically wrong with the design of the rail junctions at the crossover roads of the line, and it is to be hoped that this matter will receive careful attention from the responsible engineers,

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Dover Harbour Works. REPORTS in the daily Press relative to the damage caused at Dover by the recent storm appear, as usual in such cases, to have been considerably exaggerated. The suggestion that portions of the national harbour works had been swept away, involving a loss of some 70,000*l.*, rested on no substantial basis, and the fact is that no injury whatever occurred to the permanent work, the damage being confined to the destruction of one span of an isolated staging, belonging to the contractors. The loss, which is fully covered by insurance, is estimated at about 7,000*l.*, but no serious hindrance to the works is anticipated on this account. The staging was erected for temporary purposes in April last, on the site of the eastern entrance to the new harbour, and it is worthy of note that none of the contractors' plant on the easterly arm, or on the extension of the Admiralty Pier, has been in any way injured by the storm. Since the recent severe weather, careful examination of the permanent works has been made, with the result that not the slightest evidence of damage is forthcoming. This is satisfactory proof of the strength possessed by the new harbour walls.

The Motor Car Act. THE letter recently published from an important firm of motor car manufacturers expressing strong approval of the Motor Car Act, as being calculated to further the interests of the trade, is instructive when compared with the outcry against this measure raised by the Automobile Club. It points the marked difference of opinion which exists between those who have the interests of this trade really at heart, and those who merely use the argument of its importance in order to secure their own ends. If those persons who use the cars, and whose opinions have so freely been voiced by the Automobile Club, had shown the same spirit which is now displayed by the manufacturers, motor cars would never have incurred the odium which now attaches to them; but the motorists, while loudly condemning the "road hog" in words, by their attitude towards this Act have conclusively proved that they object to any legislative hindrance to his proceedings; and the public have naturally drawn the deduction that in consequence they are as a body anxious to emulate his example. We congratulate the manufacturers on their commonsense, and trust that their customers will profit by the lesson thus taught them.

Electrical Fire Insurance Rules. WE have received from the Liverpool, and London, and Globe Insurance Company, and also from the Royal Insurance Company, copies of their electrical installation rules. In both cases we are glad to see that the general rules are practically identical with those issued by the Institution of Electrical Engineers a few months ago. It is unnecessary therefore to criticise them, as we should merely have to re-state those points where we think the latter could be improved. Both insurance companies also give a "special risk" supplement, which gives some hints which will be useful to contractors and consulting engineers. The rules in a few cases are very awkwardly expressed, and they could easily be made much plainer. We are told, for example, on page 46 that wires "should not be arranged in a vertical plane one over the other, as sparking contacts between the two are then more likely to occur." We suppose this means that accidental short circuits are more likely to occur when the positive and negative wires are in a vertical plane than when they are in a horizontal plane. Great stress is laid in both sets of rules on the value of an earth leakage detector of a very primitive nature. It seems to us, however, that this device can only be used in a few very special cases, and that even in these cases an indicator which rang a bell would be preferable to a device which merely showed one lamp burning brighter than another, and that only in the case when one main remained sound. If both mains were equally bad no indication would be given that anything was wrong.

Evaporation of Metals. SOME interesting results recently obtained by means of the electric furnace afford further information as to the behaviour of various metals under the influence of heat. In the experiments to which we refer, the fact that many substances boil quite regularly, and at a definite temperature, under the pressure of a column of their own vapour in the vacuum of the cathode light, was applied to various metals. The metals selected were placed in quartz vessels, tight joints being made with wax to maintain the cathode light vacuum, and the required temperature was furnished by an electric furnace. The latter appliance is not only convenient for the exact regulation of temperature, but it is essential for such operations, for it is necessary that the wax joint should not be melted, as would occur if any other type of furnace were employed. During the course of the investigation it was found that in the vacuum of the cathode light zinc sublimed rapidly even at 300 deg. C., actual boiling occurring when the temperature outside the tube was about 640 deg. C., and the rapidity of the process may be gathered from the fact that five grammes of the metal were distilled in about thirty minutes. Lead commenced to evaporate at about 1,000 deg. C., and boiled vigorously at 1,180 deg. C. Tin appeared to be much less volatile, showing no sign of evaporation at 1,100 deg. C. Copper evaporated at 1,300 deg. C., but the exact point of boiling was not ascertained, as the temperature of the furnace did not extend beyond 1,400 deg. C The other metals included in the experiments were cadmium, selenium, tellurium, antimony, bismuth, silver, and gold. It appears that cadmium sublimes at 322 deg. C., and boils when the temperature of the oven is 474 deg. C. Selenium distils rapidly at 380 deg. C.; tellurium sublimes at 430 deg. C., boiling at 555 deg. C.; antimony evaporates at 670 deg. C., and distils with some rapidity between 775 deg. and 780 deg. C. Bismuth evaporates at 540 deg. C., and boils at 1,045-1,050 deg. C. Silver evaporates rapidly near its boiling point, but at the temperature of 1,340 deg. C. gives no evidence of boiling. The actual temperatures at which metals boil depends upon the temperature of the oven, as well as upon the height of the vapour column, and it is worthy of note that the boiling points are in the order of the valencies, and not of the atomic weights of the metals.

Natural Magnetic Water. MOST people are somewhat sceptical as to the accuracy of reports relative to naturally magnetic waters, but it appears from an article in the *Engineering News*, by Mr. Leighton, hydrographer to the U.S. Geological Survey, that there are three waters in the State of Indiana which actually impart magnetic powers to needles, knife blades, and other steel articles immersed therein. One is at Cartersbury Springs, another is derived from a well at Lebanon, and the third is from a well at Fort Wayne. All these waters contain large proportions of carbon dioxide, which is slowly released on exposure to the air. So long as the water retains this gas it appears to impart magnetic properties to steel, but as soon as the gas has escaped a precipitate of magnetic oxide of iron forms at the bottom of the containing vessel. Experiments made at Cartersbury Springs showed that after a knife had been immersed for a period of five minutes needles were readily held edge to point, while two needles immersed for two minutes were mutually attached by the points, and held for four minutes in the face of a strong breeze. The knife in question is said to have retained its magnetic properties for about thirty hours. The well at Lebanon was driven for the purpose of feeding locomotive boilers on the Big Four Railroad, and it was found to be the most corrosive water along the whole line of railway. Examinations by Dr. Hurty, chemist to the company, made evident the existence of strongly developed magnetic properties, and suggested the remedy of injecting steam into the water tank for the purpose of precipitating the magnetic oxide. Water from the well at Fort Wayne is said to be even more strongly magnetic than the other waters mentioned.

Concrete Steel in Dam Construction. STEEL diaphragms have already been employed in substitution for puddle walls in the construction of earth dams, and the proposal is now made in the United States to adopt a concrete-steel facing for a rock-fill dam. This does not appear to be a method by which the properties of concrete-steel can be most advantageously utilised. The proper place for such material is certainly in the centre of the section, where it might be invaluable as an efficient barrier to the passage of water through a dam of masonry or of earth. The concrete-steel diaphragm should be built up vertically in the centre of the dam in the form of a wall from 4 in. to 6 in. thick, and firmly anchored in cement masonry at the foundation as well as at the abutments. If properly designed and constructed, a core diaphragm of this character would be impermeable, tough, and flexible, and should give excellent results.

The Steam Pile-Driver. WHEN the principle of the steam hammer was first applied to pile-driving, predictions were freely made that the last days of the rope-hoisted "monkey" were approaching. The steam pile-driver is undoubtedly a most efficient machine, but

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as a matter of fact in ordinary pile-driving operations a comparatively small portion of the time spent by the workmen is devoted to actual driving. For instance, the piles have to be got into the leaders, straightening up and bracing have to be done, as well as levelling and nailing on guides for sawing, sawing off, and sundry minor operations. Under such circumstances it may easily happen that only a few minutes in every hour are occupied in driving the piles. The need of the present day is less for improved driving-machinery than for improved methods of preparing work for the pile-driver. In some cases, no doubt, considerable advantage may be derived from the use of the steam-hammer principle, but for every-day work the ordinary old-fashioned apparatus appears likely to hold its own.

Welsh School Boards and Architects.

SOME time since we commented on the action of the Abergavenny School Board in advertising for an architect and requesting architects to "state their terms." Another Welsh School Board, that of Blaenavon, has followed suit, having advertised for an architect to prepare plans, advise, and superintend the erection of a school proposed to be built in the town of Blaenavon, applicants to reply "stating terms and qualifications." The natural result of this appears in the report of the appointment of the architect. We regret to find that twenty-eight architects had sufficient lack of professional dignity to reply to this kind of advertisement, and we read that one of them, "whose price of 3 per cent. was the lowest," was appointed. Anything more degrading to the profession of architecture, both on the part of those who advertised and those who replied, can hardly be imagined. No Board would dare to treat the legal or medical profession in that way; that they will presume to do it with architects is due to the want of self-respect and *esprit de corps* on the part of some members of the profession.

Great College-street, S.W., and the Westminster Improvements.

As a part of the scheme for local improvements, the Ecclesiastical Commissioners, as owners of the freeholds, have taken for their own purposes so much of the land as is bounded by Great College-street (north), Wood-street (south), Little College-street (west), and Millbank (east). Subject to the widening of Great and Little College streets the site we indicate is appropriated for the Commissioners' new offices, with suites of other offices and chambers, for which Mr. W. D. Caröe, architect to the Commissioners, will make the plans and designs. The demolition of property in the immediate vicinity is being proceeded with. The houses in Millbank between Romney-street and Horseferry-road are gradually being pulled down, and a further clearance is made at the western end of Great College-street by the demolition of Nos. 21-28, between Barton and Tufton streets, where, we hear, will be erected a settlement-house for the Cowley Fathers; another site has been allotted for new offices of the Lancashire and Yorkshire Railway Company. Thus an old-world street of singular charm and interest will be quite transformed. Black Dog-alley, leading into Tufton, formerly Bowling, street, marked the site of the garden of Abbot Benson, who became first Dean. Along the north side of the street, once known as Dead Wall, stands the wall as rebuilt by Abbot Litlington (1362-84), of the Infirmary, since the College, Garden. The street itself follows the course of the Mill Ditch, an effluent of the Aye Brook, that drove the Abbots' Mill standing at what is now the corner by Millbank. Little College-street was in 1720 Piper's Green, and was built, together with Barton, Cowley, and Wood streets, in the latter years of George I.'s reign. Barton Booth, the actor, built Barton-street, and Cowley-street commemorates his country seat at Cowley, in Middlesex. Wood-street, the home of John Carter, the "Antiquary" of the *Gentleman's Magazine*, was built in 1720. North-street, where lived Elliston, the actor, is coeval in date, and presents a very pleasing vista towards Archer's Church of St. John. Many of the houses retain their fine old iron-work and interior decoration and panelling. Though somewhat fallen from their once high estate, the streets constitute a very uncommon group of what might be called the Mayfair of that part of the town.

The Cope Bequest, South Kensington Museum.

AN addition has recently been made to the Oriental Collection of the Victoria and Albert Museum by the bequest of the late Mr. W. H. Cope. The cases containing the new exhibits are five in number, situate in the Cross Gallery adjoining the Indian section. The first case contains marvellous carvings in jade, crystal, and other stones from China and India; a bowl and a teapot cut out of crystal inlaid with gold wire-like ornament, forming a setting for rubies, emeralds, and diamonds; some turned and carved dark green; jade candlesticks from India; two agate cups; a beautiful carving in lapis lazuli, and a rosary of wood jade, gold, pearls, and crystals are some of the most valuable and interesting specimens. In the second case is a miscellaneous collection of Chinese enamels of great beauty both in colour and in simplicity of shape, some plain but excellent lacquer work, and some very ugly Japanese netsukes. The third case is devoted to glass of various dates and from various countries, amongst them some tall Venetian glasses with stems of marvellous and fantastic shapes, which Mr. Cope acquired at the Magniac sale. The remaining cases contain examples of Chinese porcelain; in one some rather ugly but very rare vases—hitherto not represented in the Museum—of splashed glazes; wine pots in mythical forms, bottles and jars of shapes and colours indescribable; in the other a considerable collection of egg-shell cups and saucers and plates of the Chien-lung period (1736-1795) of daintiest colours, showing painted flowers, figures, and animals. This case shows the greatest care and judgment in the choice of the specimens. Such a collection of porcelain as this speaks better than words of the wonderful art of the East, the art which is even now decaying, probably from the unnatural demand made by foreigners upon the sources of supply. Such art is beyond imitation, it is the piled-up tradition of centuries and of generations of the most skilful craftsmen the world has probably ever produced.

Whistler and the Royal Academy.

THE correspondence of contradictions which has been going on in the *Times* as to whether the late Mr. Whistler might, could, would, or should ever have consented to become a member of the Royal Academy, has been clenched by a letter to Mr. Harry Quilter from an artist (name not given) who was with Whistler and a Royal Academician (whose name is also withheld) at the Arts Club one evening, when the R.A. asked Whistler point-blank if he should propose him as an Associate, and Whistler "consented somewhat eagerly, and did not let the point drop." This plain statement, which no one has ventured to question, is an amusing commentary on the assertions of the Whistler clique to the effect that their idol would never have condescended under any circumstances to become a member of the Academy.

The Promenade Concerts, Queen's Hall.

THE managers of Queen's Hall have paid us the compliment of assuming that we are interested in all forms of art, by sending us a season invitation to the Promenade Concerts now going on every evening at the Hall. An architectural journal, of course, deals really with the arts of visible form and line, and we cannot go so far beyond that field as to include musical criticism in our scheme, though the present Edltor has been largely concerned with that subject in other pages. But we are very glad to take the opportunity of calling attention to the musical interest and importance of these concerts, where the public can hear, at an almost nominal price, finer orchestral playing than is to be heard at any other set of concerts in London, the constant relations between the same conductor and the same players leading to that complete mutual understanding which is necessary to the most perfect execution by a large phalanx of players. The progress in public musical taste of late years, in London at all events, is strikingly illustrated by these concerts. When promenade concerts were first started in England the programmes were almost entirely of the lighter kind of music, and a bit of classical music was only admitted now and then as an experiment. Now we find the greatest orchestral works of the great composers listened to with devout attention by an audience content to stand quietly throughout a long symphony, the liberty to "promenade" being practically abandoned. Mr. Wood is also making this an opportunity for introducing new works by English composers—a feature of great interest, although we may think that some of them are rather trying to express something than having anything really to express. The contrast with the works of the great masters is instructive in the matter of balance of form, design, and detail; for music is also design as well as expression. The characteristic of the most perfect musical composition—as for instance Beethoven's Concerto in E flat—is perfect form, finish in all the details, and nothing introduced which has not a definite relation to the whole design; a principle equally applicable to all forms of

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art. As to such pieces of musical grotesque as Strauss's "Till Eulenspiegel," where the whole resources of the orchestra are used to produce an elaborate joke, one can only apply to them the question in Mr. Rudyard Kipling's poem—

"It's clever—but is it Art?"

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A HOME Counties District Meeting of the members of the Association of Municipal and County Engineers was held at Hastings on Friday and Saturday, September 11 and 12. The members assembled at the Town Hall, where they were received and welcomed by the Mayor and members of the Corporation. Mr. W. Weaver, C.E., of Kensington, President, was in the chair, and among those present were Messrs. A. T. Davis, Shrewsbury (Vice-President); Norman Scorgie, Hackney; P. H. Palmer, Hastings; R. J. Thomas, Aylesbury; A. D. Greatorex, West Bromwich; W. Harpur, Cardiff; C. H. Cooper, Wimbledon; T. G. Taylor, Ramsgate; P. G. Killick, Finsbury; E. Willis, Willesden; C. C. Smith, Sutton; J. Parker, London; T. Walker, Croydon; W. L. Bradley, Tonbridge; and others.

The Mayor of Hastings heartily welcomed the members of the Association, and thought after they had seen the engineering works of the town they would agree that Hastings was not altogether wanting in the carrying out of works necessary, for a town of some 70,000 inhabitants. Unfortunately, they would have an object-lesson of another kind, and one which probably many of them had not to contend with. He referred to the results of the previous night's gale. The gale was one of the worst experienced for twenty or twenty-five years, and it had done a certain amount of damage which looked on the face of it rather severe, for it had left their beautiful parades in a somewhat dilapidated state.

The President, in acknowledging the Mayoral reception, said he only came down that morning, but driving through the town he noticed that the wind had left its mark on some portions of it. Of course, it was a drawback to a seaside place that sometimes the healthful breezes, which gave a charm to a place, blew a little too strongly. But it did not often occur in the neighbourhood of Hastings, which was noted rather for its bright sunshine and equable temperature.

On the proposition of Mr. W. L. Bradley, Tonbridge, Mr. R. J. Thomas, of Aylesbury, County Surveyor for Bucks, was re-elected honorary secretary for the Home Counties district.

Mr. P. H. Palmer, M.Inst.C.E., Borough Engineer, Hastings, read a paper on the water supply of Hastings. He said Hastings was perhaps situated for the purpose of obtaining water within a few miles of the town as badly as any town in the kingdom. The district round Hastings was known under the general geological name of the Wealden. When considering these formations in regard to their capacity for yielding water supplies on a large scale, it must be borne in mind that they were not solid masses of great thickness, like the chalk or the new red sandstone, but were alternating beds of pervious and impervious materials in which the water was as a rule confined to the particular bed by which it was imbibed at the outcrop, the exceptions being the rare cases where an up or down throw fault might bring a higher and lower pervious bed together. Where the dislocations brought a pervious against an impervious bed no circulation of water could occur, and it was due to these circumstances, and the fact that the Hastings beds were so often broken up by dislocations of the strata, and interrupted by the presence of anticlinal and synclinal folds, that it was difficult and uncertain to obtain a very large quantity of water at one particular spot. The Borough has an area of 4,857 acres, and its population at the last census was 67,000; during the summer months this population was increased by visitors to upwards of 90,000. Years ago, and up to within the last ten years, the water supply was derived from surface-water reservoirs, situated in the Old Roar Valley, which was the centre valley running through the town, and Ecclesbourne Valley to the eastward; but owing to their proximity to the town, and the fact that the area immediately adjoining the reservoirs was highly cultivated, these sources were abandoned. These and several other smaller surface-water reservoirs were now kept entirely for the supply of water for street-watering and sewer-flushing purposes. About twenty-four years ago, owing to the difficulty in obtaining fresh water, the Corporation installed a separate system of pumping plant reservoirs and mains, for the distribution of salt water for street watering and sewer flushing; and when the surface-water reservoirs before alluded to were thrown out of use for drinking-water purposes, the use of salt water was discontinued, and fresh water from these reservoirs pumped through the mains. The plant in connexion with this supply was situated at Rock-a-Nore, at the east end of the town, and adjoining the refuse-destructor works. The pumps were entirely driven by steam generated at the destructor works, and had been from the time the destructor was erected fourteen years ago, and was one of the first instances in this country where power from a destructor was put to a useful purpose in connexion with municipal undertakings. The mains in connexion with the street-watering supply were principally 4 in. and 6 in.; they were however, considerably corroded through the action of the salt water, and in some cases were somewhat leaky. The Hastings Corporation were, he believed, the first Corporation in the kingdom to adopt the use of sea water for municipal purposes; they were also the first to discontinue its use. Some time ago the author made investigations in connexion with the use of sea water, and it was found unquestionably that it went much further than fresh water, and was very beneficial in damping down the dust in macadam roads; it was, however, found that people using carriages strongly objected to it on account of the fact that it damped the varnish. Greengrocers and others who exposed goods to view in their shops objected on account of damage done to their wares by the dust containing salt. It was also found that when a road had been watered for a fortnight or three weeks that it was necessary to thoroughly wash and broom the roads to get off the coat of salt; a week or so of watering with salt water had the effect of leaving a thin coating of salt on the road, and as soon as a damp day came (not rain, but moisture from the sea in the shape of sea fogs), the surface of the road used to be picked up by the wheels of vehicles in a very unsatisfactory manner. It was also found that the corrosion and the wear and tear of the machinery and mains was very great. From time to time the Corporation had taken steps to improve their water supply, and as far back as 1875 they obtained the advice of the late Mr. W. Topley, of the Geological Survey, as to establishing further works. In due course the Corporation put down wells, which were sunk to a depth of about 120 ft. in the Old Roar Valley, a few hundred yards south of the existing reservoir. The yield resulting from these wells and headings amounted to about 250,000 gallons in twenty-four hours. About the same time they took over the private works belonging to Mr. Burton, from which the supply to St. Leonards was obtained; St. Leonards at the time being a distinct and separate authority. The additions to the water supply sufficed for the time being, but again in 1882 the requirements due to the growth of the town necessitated an increased supply of water. Mr. Edward Easton was consulted, and following upon his recommendations wells and headings were sunk and driven at Filsham, at the extreme west end of the borough. The yield from this source was at first over 500,000 gallons per twenty-four hours, but the test pumping was not, in the author's opinion, sufficiently drastic. In due course the Corporation were advised to erect a large pumping station. This station was erected, and the plant put to work in the year 1885. The results, however, had been disappointing, as the yield had gradually fallen off, until at the present time it was not more than 250,000 gallons in the twenty-four hours. In the year 1892 it became evident that a further supply of water would have to be obtained for the town, and the author reported to the Corporation on several occasions as to the suitability of various sites and the amount of water which should be obtained to give the town a constant supply. After making searches in the neighbourhood within ten or twelve miles of the town, the author advised the Corporation to put various boreholes to the valley of the Brede, lying about eight miles north of Hastings. There were several good springs in the district, some of them yielding as much as 40,000 gallons in twenty-four hours; and after gauging the small River Brede and its tributary, the Forge stream, it was apparent that there was a considerable amount of spring water which found its way into the bed of these two small streams. The prospecting operations consisted of the putting down of five or six boreholes to various depths, and the sinking of two pilot wells. The results obtained from some of them were very satisfactory and from others poor; those obtained, however, from the pilot well at Redlay farm, and the one known as No. 6, close to the junction of the Forge stream valley with the Brede valley, were very good; the former after ten months' test pumping yielding close on 250,000 gallons in twenty-four hours, and the latter after several months of test pumping yielding upwards of 230,000 gallons. The yield from No. 4 borehole was also tested for the same period, and gave a yield of about 260,000 gallons in twenty-four hours. The results of the test pumping were so far satisfactory that the Corporation decided to commence permanent works in the Brede Valley. Negotiations with the landowners, however, having failed through their decision not to accept any other settlement than a royalty on the amount of water raised, the Corporation were fortunate enough to be able to secure a farm in the valley, having its longest frontage bordering upon the River Brede itself. In due course plans were prepared, and approved by the Local Government Board, for a permanent scheme of water supply, and in the autumn of 1899 the sinking of the permanent wells was commenced. The two wells had been sunk on the northern side of the valley to a depth of 270 ft.; and the well on the southern side to a depth of 210 ft. The wells were each 9 ft. in diameter, and lined with cast-iron tubing for a depth of 60 ft. below ground surface; below that point to the bottom they were lined with 9 in. of brickwork built in Portland cement. Behind the brickwork was filled in with clean rubble, and proper apertures were left at various points to allow the water to enter the well. The two pumping wells were connected 10 ft. above the bottom by a heading 6 ft. high and 4 ft. in width. The sinking of the wells was very slow and tedious work, the stratum excavated being of a very treacherous nature, full of water. A very large quantity of water was met with in the No. 2 well, and on several occasions weeks elapsed before the well could be pumped out to allow the sinkers to resume work. The wells and headings had taken nearly four years to complete, and owing to the length of time which the work had taken, it had been necessary to erect a temporary pumping-station at the No. 4 borehole to pump as much water as could be obtained for the supply of the town. Compressed air rock drills were used wherever possible in the boring of the headings, and electric light was installed throughout the works. The water from the Brede works would be pumped through a 16-in. main nearly six miles in length, to two circular covered service reservoirs immediately to the north of the town, and situated at an altitude of 510 ft. above O.D. The covered service reservoirs were each 150 ft. in diameter and 12 ft. in depth, each holding 1,500,000 gallons. They are built of concrete lined with blue Staffordshire bricks, and covered over with concrete. Owing to the two years' very serious drought which Hastings and the district suffered from a few years ago, the work of laying the main and constructing the reservoirs was pushed on as speedily as possible, and a temporary station put up at the No. 4 borehole adjoining the Brede works, and water pumped from there to the town. Although the permanent works would not be finished for probably another twelve months, the town had been receiving for over two years about 350,000 gallons a day from the temporary station at the No. 4 borehole, pumped through the permanent main and into the Fairlight reservoirs. The machinery which was being supplied for the pumping station consisted of two sets of pumps and engines, each capable of delivering 90,000 gallons of water per hour from the well, and discharging the same into an aerating chamber at a height of 20 ft. above the engine-house floor, and the rams capable of delivering 80,000 gallons per hour to a total vertical height of 515 ft. through a 16-in. main. The engines were triple expansion surface-condensing, having a high pressure cylinder 23½ in. diameter, intermediate 30 in. diameter, and low

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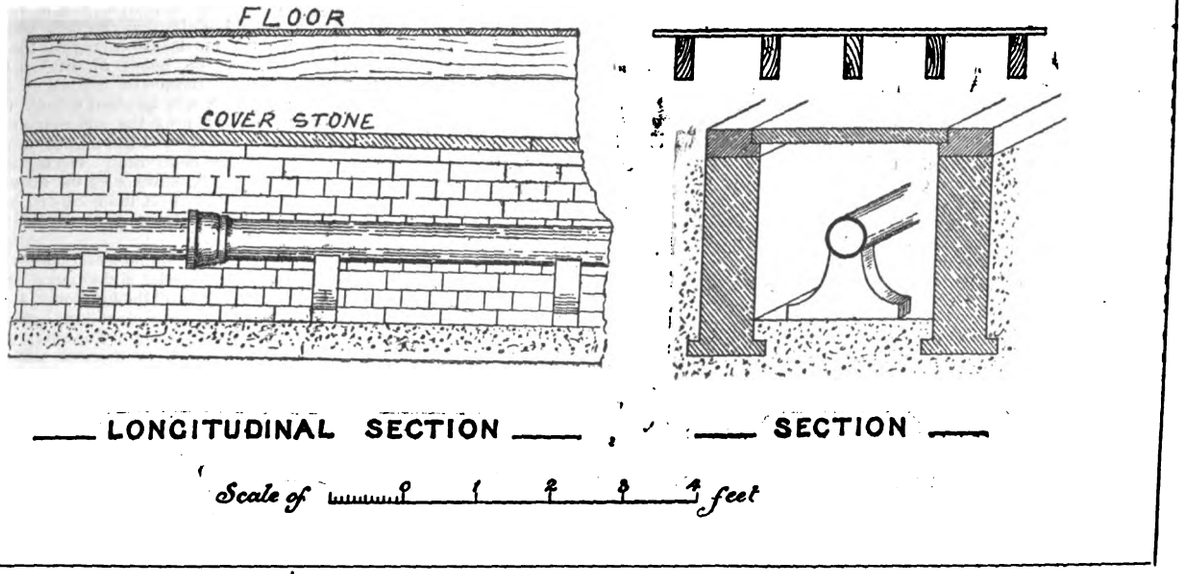

pressure 62 in. diameter, with a stroke of 48 in. The machinery was being made by Tangye's, Limited, of Birmingham, and was practically completed and ready for delivery. Owing to the presence in the water obtained of oxide of iron, both in solution and suspension, the well pumps would deliver into an aerating chamber, 36 ft. in diameter through a trumpet-mouthed pipe, with a second overfall basin. The water from the aerating chamber would flow over a gauge into a valve chamber and would be filtered through four polarite filters, working under a head of 12 ft. Cottages for two workmen had been erected near Brede Bridge, and a house for the engineer in charge of the machinery would be built on the site adjoining the pumping-station. The quality of the water derived from the wells and headings at Brede was everything that could be desired. The quantity of water which could be obtained from the works already undertaken would be ample for the present requirements of the town, and every provision had been made for future extension, which would consist of additional length of headings. The total cost of the works would reach about 125,000*l.*, and in addition to this the amount spent in prospecting and testing the district, rent, and compensation, before the permanent works were undertaken, amounted to close on 20,000*l.* Before closing the author would like to mention that no doubt the particularly low death-rate of Hastings (which does not exceed fourteen per thousand of the population), and the almost total absence of typhoid fever, was due to the purity of the water supplied to the consumers, and the care taken in adequately flushing the sewers of the town. Hastings could certainly boast of being the sunniest town in the kingdom; last year the amount of sunshine recorded was 1,761 hours against 1,734 at Falmouth (which place was recorded as the next highest); the sunshine for London last year was 1,240 hours. In 1901 the amount of sunshine recorded at Hastings was 2,061 as compared with 1,394 recorded at London, and 1,896 hours at Brighton.

Mr. P. H. Palmer, M.Inst.C.E., read a paper on "East Hill Water-Balance Passenger Lift." He said the construction of the lift, although not involving a very large outlay—the total cost being under 6,000*l.*—involved considerable niceties in the matter of engineering. It was, of course, necessary that the proper inclination should be obtained in order to get the proper pitch on the cross-over drums and the arrangement generally of the machinery. The lift was not of a type frequently met with, but there were others of somewhat similar construction in the country, viz. at Folkestone and Lynton, but the angle of either was not so acute as in the case of this one. The work was designed and carried out by him, the details of the machinery were worked out and supplied by Messrs. Easton and Co., of Erith, and the two stations erected by contract. The stations were fitted with electric-bell communication, and communicators for indicating to the man in charge of the machinery the number of passengers in the ascending car; and the two stations were also in telephonic communication. The lift was opened for general traffic on April 9 last; 73,131 persons had been carried up to the end of August, and the amount received in tolls had been 307*l.* 9*s.* 1*d.* The Corporation were working the lift with their own staff. The working expenses were comparatively small, averaging about 4*l.* 10*s.* per week, and on no single week since it had been open had the receipts fallen below the expenditure. A loan was obtained under the Act of Parliament for its construction, the repayment of which would be spread over a period of twenty-five years. That the lift had been greatly appreciated by the general public and visitors, and was required, was clearly shown by the number of passengers carried, and no doubt during the winter months it would be considerably used by persons desirous of getting on to the hill to take part in or to view football matches, and in ordinary dry weather to obtain the bracing and delightful air which was to be got on the summit. It was estimated that there would be a surplus of about 300*l.* per annum after paying working expenses, interest, and sinking fund; and on a small undertaking of this kind it could be said to be a successful municipal undertaking.

The President said the papers were principally of a descriptive character. Possibly they might lead to criticisms as to what might be done under difficult circumstances in different places, and so on, but unless the members had some idea of the locality and the difficulties to be encountered, the criticisms could only be of a tentative character.

Mr. E. P. Hooley, Nottingham, proposed a vote of thanks to Mr. Palmer for his excellent paper.

Mr. H. Card, Lewes, who seconded, said he knew the difficulties which had attended the water scheme from 1892. He thought no one could have any idea of the difficulties that had to be encountered in experimenting in that valley.

Mr. Dickenson, Long Crendon, said he would like to congratulate Mr. Palmer on the condition of his macadam roads.

Mr. Brown, Southall, was sorry to see that the order for pipes went to an American firm, because he thought English manufacturers would have been able to supply pipes at an equally low rate.

Mr. Norris, Godalming, remarked that the conditions with which he had to deal, so far as water was concerned, were somewhat similar. With regard to foreign pipes on several occasions when he had had to lay mains the French pipes had been offered at a less cost than the English pipes.

The President, in submitting the votes of thanks, said he thoroughly endorsed it.

The vote of thanks having been passed, Mr. Palmer replied to the various questions raised.

On Friday Mr. Palmer entertained the members to luncheon at the Albany Hotel, and on the afternoons of both days visits were paid to the Brede Waterworks, in course of construction, the destructor, the water-balance lift, and other municipal engineering works in the borough.

MANCHESTER WATER SUPPLY.—The rain has interfered seriously with the laying of the second pipe from Thirlmere. It has, however, completely filled the Longdendale reservoirs.

THE INEFFICIENCY OF MODERN HOUSE DRAINAGE.

A GREAT deal of discussion has lately taken place, notably, at the Sanitary Congress recently held at Bradford, in respect to the defects, and also durability of stoneware pipe drains.

Will you kindly permit me to make a few remarks on this important subject from a practical point of view.

With regard to the present form of drainage there is, I believe, a consensus of opinion amongst sanitarians and others that the stoneware pipe as a material for house drains has proved a failure, and that it is useless to continue to construct drains with this material.

The best of these drains, however well the pipes are selected and laid, have only a comparatively short life, and although in theory the stoneware pipe forms a perfect drain, and should last for all time, yet, owing to its composition, and the physical agencies surrounding it, it has proved a decided failure.

In my experience as a building inspector to a Borough Council, I have had on an average some three or four hundred new drains to test and approve each year for the past twelve years, and careful observations made during that period has fully confirmed this view.

Is it not now time this fact was looked straight in the face, and more reliable material substituted in place of the stoneware pipe?

It is admitted that the introduction of the stoneware pipe drain many years ago has greatly improved sanitation, and thereby the health of the community, but the drain of the future will undoubtedly be as much in advance of the stoneware pipe as the stoneware pipe of its predecessor, the old brick drain.

It has been held as an axiom "that in the improvement of general hygiene the mortality has decreased, and the wellbeing and health of the community has increased in a corresponding ratio." Again, the late Sir B. W. Richardson says—"Cleanliness covers the whole field of sanitary labour, it is the beginning and the end, practised in its entirety, it would banish all disease from the world."

In the suggestion I have to offer, I shall endeavour to show to some extent how this may be in part accomplished, namely, by having clean drains internally and externally, sound and free from defects; this result, however, can only be obtained by entirely altering the present system of house drainage.

I do not claim originality in this suggestion, a somewhat similar idea was formulated by one of our leading sanitarians some few years since, but nothing more has been heard of it.

My suggestion is that the drain of the future will be of metal or glass, laid in a culvert built of brick or concrete, with stone cover, and chambers for access, and large enough to admit a man for the purpose of periodical inspection, the whole properly ventilated; in this culvert also the mains for water, gas, and electricity for the house can be laid.

It is admitted that this will add to the first cost, but it is a small matter compared with the advantage to be gained in having the drain at all times accessible and visible, and

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also to know it is doing its work safely and well.

At the least intimation or suspicion of anything being wrong with the drains an examination can be made in a very short time and without cost.

What is the state of things at the present time? The drains are buried deep in the ground, and unless a hydraulic test be made, it is not known whether they are sound or defective, when defective the ground has to be opened up, the defect located and made good, and so this goes on from year to year, and all the time the ground surrounding and beneath the pipes is polluted with filth, making it a nursery for fevers and other disorders.

This applies more particularly to terrace houses, where drains are of necessity laid under the house.

Dr. Poore says—"It is highly probable that the culpable fouling of the soil practised by our forefathers and continued by ourselves has more to do with the propagation of disease than any property in the virgin soil itself."

But to resume,— the best material we have at the present time for drains is the cast-iron water pipe, the joints of which can be made absolutely water tight, the pipe, however, is not as satisfactory as it may be, owing to the surface inside being rough, and full of little inequalities of mounds and pits left from the casting; this, too, is emphasised when, for prevention of oxidation, it is treated with Dr. Angus Smith's solution, or subjected to the Barff process.

The pipe, to be successful, should be quite smooth inside, so that no mucus or film of excreta could attach itself, and for this reason it is suggested that the cast-iron pipe be bored through its entire length, to an even surface, and to a standard gauge, and then lined with a coating of white porcelain enamel properly burnt on, so that when finished the surface is perfectly smooth.

The jointing material to the pipes should be run lead properly caulked.

It is also suggested that terra cotta blocks or bearers be prepared for fixing or laying the pipes on, as shown in the sketch. These may be 3 in. or 4 in. wide and about 9 in. high, this arrangement keeps the pipe in its place, and well above the floor of the culvert, the blocks being fixed about 3 ft. apart.

Costly as this suggestion may be, it is undoubtedly cheaper to incur this expense than to incur the expense of re-instating drains every few years, as at present found to be necessary.

As an instance of one failure in particular out of many that have come under my notice, the drainage of a detached house built under an eminent London architect, the drains laid in the best possible manner with tested stoneware pipes, and under the constant supervision of a clerk of works, approved also by the local authorities, had to be taken up through defects, and re-instated a second and a third time within the space of 5 years at a cost of over 100*l.* each time. This cost, nuisance, and inconvenience would obviously have been saved had the system here suggested been adopted.

If it is held that it is impossible at the present time to produce enamelled iron pipes I would reply—that surely we have not arrived at the end of our discoveries in metallurgical and kindred sciences.

Is there no cheap form of obtaining aluminium, the compounds of which occur so abundantly around us in the rocks and soils? This metal could be made into pipes without inside enamelling, having no perceptible oxidation.

Then, too, there is the toughened, flexible, unbreakable glass (Bastie's process), introduced within recent times, with apparent success; this would be an ideal material for drain pipes if it could be got to fulfil these conditions economically.

But whatever material is ultimately selected for drain pipes, the laying or fixing should be in a culvert as before described, this being only a part of the whole scheme, as, in our "Model City" subways will be formed under the roads for sewers, water, gas, and electricity mains, which will be accessible at all times for the purpose of inspection, alterations, or repairs; and although we are not likely to have subways for some considerable time yet to come, there is no reason why the drainage of houses under this proposed new system should not be commenced almost at once.

Fame, if not fortune, should await the man who successfully initiates this system of house drainage, and he will undoubtedly render greater benefits to the community than even a Crœsus with all his wealth.

WM. R. PURCHASE.

THE SANITARY INSPECTORS' ASSOCIATION IN BELGIUM.

IN connexion with the International Health Congress recently held at Brussels, this Association paid a visit to several towns in Belgium, viz., Antwerp and Malines before the Congress, and Louvain, Ghent, and Bruges during and after the Congress. The President of the Association, Sir James Crichton Browne, LL.D., &c., the Chairman of the Council (Mr. Isaac Young), the hon. secretary (Mr. E. Tidman), and hon. treasurer (Mr. T. G. Dee) formed a special committee to carry out the arrangements.

The party, which included over sixty members of the Association, started for Antwerp via Dover and Ostend on Saturday morning, August 29, and in the evening they had a cordial reception at the Hotel de Ville by the Deputy Burgomaster. M. Victor Dequin and the chief members of the City Council, on behalf of the Burgomaster, M. Van Ryswick, who was seriously ill. After a very cordial welcome, M. Dequin referred with pleasure to a previous visit of the Association to Antwerp. Since that visit they had tried to profit by the good example shown to the world by English sanitary administration. Considerable progress had been made, and he trusted the members of the Association would give Antwerp credit for endeavouring to improve.

Sir James Crichton Browne thanked the Deputy-Burgomaster for his cordial welcome. They felt it a great compliment to have been received at so late an hour and they were all charmed with their entertainment in that beautiful building. Mr. Isaac Young also briefly responded and invited the Burgomaster and Deputy-Burgomaster to attend the annual banquet of the Association to be held in London in February next, at which it was hoped they would meet the Lord Mayor of London. Sunday and Monday were spent in visits to the monuments, museums, dispensaries and hospitals, and the sanitary and engineering works of the city under the guidance of the city engineer and M. Gustav Melius, chairman of the health department. The tour closed with the inspection of a Sewage Collector (System Harven), which has given very satisfactory results. Within forty-eight hours, nineteen-twentieths of the liquid portion of the sewage collected daily is returned to the river with all suspended matter abstracted and in a disinfected condition. The fæcal matters are preserved and applied from time to time as manure to the land. The economy effected is estimated at 12 fr. per head of the population per annum.

The most interesting of the series of visits was that made to the ancient city of Malines, the See of the Cardinal Archbishop, Primate of all Belgium. The visit commenced with an official reception at the Town Hall by M. Le Blus, Alderman for Public Works, members of the Council, the Town Clerk and the City Architect, M. Van Boxmeer, the latter conducting the visitors to see a number of the archæological masterpieces of which, as the City Architect declared at the luncheon, Malines contains a far larger number than many cities of much greater importance. The principal sanitary undertaking visited was the works that have been constructed to stop the inundation of the lower parts of the town by the River Dyle, which at certain parts of the year continually overflowed into the lower streets. The course of the river was turned by constructing sluices, one at a high level and one at a low level. By means of these sluices the flood waters are kept back, the height of the water being so regulated as to be prevented from entering the low-lying streets without in any degree hindering the entrance and departure of ships.

Of great interest was a visit to the works being carried out under the direction of the guide of the party (M. Philippe van Boxmeer) in the restoration of one of the most famous buildings of the sixteenth century, the palace of the Grand Council, erected by the Emperor Charles V., for a Supreme Court of Justice for the seventeen provinces of the Low Countries, the plans of which were made by the Imperial Grand Architect, Reldermans. The ruins of this ancient palace have long been objects of the deepest interest to visitors to the Grand Palace at Malines, where they occupy the north-eastern angle. The restoration, under the hands of M. Van Boxmeer will not be completed for five or six years yet; the cost will be about 60,000*l.*, the funds being provided by the administration of the State Railways; and it is intended to be utilised as the Hotel des Postes. The facade towards the Grand Place occupies the old site of the Palais de Justice at the north-east corner, but it will have a frontage to the Rue de Beffer of over 200 ft.

The visit to Malines concluded with an inspection, by special authorisation of M. Francotte, Minister of Public Works, of the extensive locomotive and railway-carriage works of the Belgian State Railways. All the repairs and much of the new work connected with the network of State Railways in Belgium are effected at this great establishment, which covers an area of about 1,100,000 square yards, and employs on the average 3,400 workmen, about one-half in the locomotive department (which comprises forges, grinding, fitting, and erecting shops), and the other half in the carriage department. Under the guidance of M. Guillaume de Blieck, the chief engineer, the party spent two hours in the various departments, some of the chief objects of interest shown being a miniature locomotive with tender and train of passenger carriages to actual size, which will be sent to the New Orleans International Exhibition. At the end of one of the shops is a model in wood of an early English locomotive. It is a facsimile of the famous "Rocket," and was constructed in 1835 by an English engineer, the pioneer of the great firm of Cockerill and Sons, of Seraing, who settled in Belgium about seventy years ago.

During the sittings of the Congress the sanitary inspectors were among the most assiduous of the members attending, but they found time for another official visit on Sunday, the 6th. Congress not being in session on that day the party, under the guidance of Sir James Crichton Browne, took an excursion to Louvain, where they had an official reception at the Hotel de Ville, and were entertained with the same hospitality they had met with at Antwerp. After the close of the Congress similar official visits were made to Ghent and Bruyes, the party returning via Ostend to London.

ARCHITECTURAL SOCIETIES.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—On Thursday, the 10th inst., the President (Mr. Butler Wilson) and Council of the Leeds and Yorkshire Architectural Society entertained the members of the Library Association, who are holding their annual conference in Leeds, to a smoking concert at the Queen's Hotel, to meet the members of the Leeds Savage Club. Among those present were the Lord Mayor of Leeds (Mr. John Ward), Professor Macneile Dixon (President of the Library Association), the Vicar of Leeds (Dr. Gibson), Sir W. H. Bailey, Lieutenant-Colonel Robinson, Mr. Edmund Bogg (chief of the Leeds Savage Club), the Rev. N. Egerton Leigh, Dr. Coleman, Mr. F. H. Barr, and Councillor S. A. Hirst.

NORTHERN ARCHITECTURAL ASSOCIATION.—The past-President, Mr. W. Glover, has presented the Association with 1,000*l.* of Consols, invested in the names of the President and Hon. Secretary as trustees. Not less than one-quarter or more than one-half of this capital may be withdrawn at a future date towards the cost of a building for the Association. The annual interest is to be used for the Society's educational work.

KING'S COLLEGE, LONDON.—The Division of Architecture, which was separately constituted a year ago, will resume work on October 1, when the various courses of lectures and the studio for day students will be opened. A feature of the past session has been a visit paid by the students for measuring and sketching to Oxford, and it is intended to arrange a similar week's visit to some centre of architectural interest during the Easter vacation of the new session. The evening lectures and the studio for evening students supported by the Carpenters' Company will open on Monday, September 28, when there will be a short opening lecture by the Professor, and new students can be enrolled. The evening fees have been somewhat reduced in most of the evening classes, and the Carpenters' Company are prepared to grant nominations to deserving students as in previous years.

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Decorative Panel: "Music." By Mr. J. Allan Hughes.

DECORATIVE PANEL: "MUSIC."

THIS pretty and original decorative panel is reproduced from a small water-colour drawing which was in the last Royal Academy Exhibition, and was referred to in our review of the Architectural Room exhibits.

It is one of a number of panels for the music-room of a house at Kew, a few miles from Melbourne (Australia), in which neighbourhood the artist, Mr. J. A. Hughes, of London, is represented by a good deal of stained glass and other decorative art.

A MONUMENT TO MILTON IN ST. GILES'S, CRIPPLEGATE.

A COMMITTEE appointed by the Vestry of St. Giles's Without, Cripplegate, have received promises from the parishioners, and the Goldsmiths' and Clothworkers' Companies, who are the ground landlords of some property in the vicinity, towards a fund, estimated at 3,500*l.* in all, in respect of a proposed local improvement. The project embraces a restoration of the north wall of the church which is now revealed by the recent demolition (for a widening of Fore-street) of the Quest House and the "Four Shoppes" which blocked in the church on that side, and the laying out of the ground thus cleared. The Ecclesiastical Commissioners have agreed to sell for 1,400*l.* a portion of the surplus land with a condition that it shall not be reconverted for building purposes, and the Committee seek to collect another sum of 1,500*l.* to enable them to buy from the Corporation of the City the remainder of the land lying at the north-west side of the Church for the erection thereon of a statue in honour of Milton. We may mention that a bust by John Bacon the elder was placed in the nave of the church in 1793 by Samuel Whitbread, of the brewery in Chiswell-street, and just forty years ago the bust was set up in a canopy, erected by public subscription, in the south aisle. The Committee, however, wish to avail themselves of the offer, lately made by Mr. Deputy Baddeley, of a more worthy memorial to stand outside, where it can be always seen. Milton was buried on November 12, 1674, in, or close by, his father's grave in the upper end of the chancel. The gravestone was displaced five years afterwards; the popular belief that the poet's remains were exposed to view and subjected to desecration during the repair and raising of the chancel floor in August, 1790, has been discredited by subsequent investigations. In our columns of March 30, 1901, and February 21, 1903, we illustrated and described the old buildings that were pulled down seven months ago. The gatehouse, built in 1660, will, it is stated, be re-erected near the church. In 1885, under the supervision of Edmund Woodthorpe, the external stonework of the south and west walls of the church was restored, and a facing of Kentish rag-stone was substituted for the brickwork of the south-east octagon tower containing the staircase entrance to the galleries (now removed) and of the clear-story, which is, together with the tower, now surmounted with battlements; subsequent repairs have been carried out under Mr. F. Hammond's superintendence. A similar tower, which contained a staircase leading to the roof, standing against the western end of the north wall of the church is now exposed to view, as also is the former entrance into the church on that side, where two of the aisle windows are at present filled in with brickwork.

THE ASSOCIATED PORTLAND CEMENT MANUFACTURERS.—The report to be submitted to the fourth meeting of the company on the 23rd inst. states that upwards of 220,000 tons of cement have been produced by the new rotary kiln plant at Swanscombe since its erection. It is stated that this cement conforms to the most stringent specifications. An installation has just been completed at the Arlesey Works, and the erection of another plant is in progress on the Thames.

TRADE CATALOGUES.

MR. THOMAS W. CAMM sends us a pamphlet containing illustrations of stained glass windows carried out by himself "with the assistance of craftsmen under his direction," at his studio at Smethwick (Birmingham). This must be placed under the head of "Trade Catalogues," but it is in a different spirit from many of them; the work shown is pervaded by artistic feeling and aim, and the preliminary essay on "Technique and General Principles" contains a great deal of useful information and criticism on the conditions of stained glass art. As far as one can judge of stained glass from small photographs, Mr. Camm's productions produce a good impression, and he suggests some new fields in the way of subjects; for instance, "The Assault on the Town of Mansoul," from Bunyan's "Holy War," which, however, there is a little too much of background and perspective for stained glass, a fault which most of the designs keep clear of. Both the "Holy War" and Bunyan's greater and better known allegory might be far more drawn upon than they are, for religious decorative art both in painting and stained glass.

The London Drawing and Tracing Office send us a pamphlet giving reduced illustrations of the work they can supply in drawing, making models, and photographic copying of drawings and tracings. The drawings, as far as one can judge from small reductions, are (as might be expected) rather hard and mechanical in style, but they are evidently carefully and correctly executed, and answer their practical purpose of showing the building perfectly well. No scale of charges is given for the execution of perspectives, but estimates can be furnished for each case, if required.

Messrs. Claughton Bros. (Bramley, Leeds) send us their illustrated price list of cast-lead rain-water heads, sockets, and ornaments.

We have received a comprehensive list of standard continuous current dynamos from the General Electric Company, of Queen Victoria-street. We are pleased to see that considerable progress has been made in the "standardisation" of this type of machine. Two types of dynamos are made, the "open protected pattern" for small outputs, and the "open multipolar pattern" for large outputs. They are built on modern lines, and all parts are interchangeable and made to gauge. The catalogue gives a concise specification to which they conform, and tables of weights and shipping dimensions are given. The General Electric Company has also laid down complete plant for the manufacture of arc-lamp carbons, and from personal experience we have found these carbons satisfactory. They burn with an even light, even when they are arranged in five lamps in series across a 220 volt circuit, and they make very little ash.

BOOKS RECEIVED.

WATER SUPPLY: A STUDENT'S HANDBOOK. By Reginald E. Middleton, M.Inst.C.E., etc. (C. Griffin and Co.) 8s. 6d.

GOVERNORS AND GOVERNING MECHANISM. By H. R. Hall. (The Technical Publishing Co. 2s. 6d.)

THE MANUFACTURE OF IRON AND STEEL TUBES. By E. C. R. Marks. Second edition. (The Technical Publishing Co. 5s.)

ECONOMIC NOTES ON INSULAR FREE TRADE. By the Right Hon. A. J. Balfour, M.P. (Longmans and Co. 1s.)

MICHAEL ANGELO BUONAROTTI. By Lord Ronald Sutherland Gower, F.S.A. (Geo. Bell and Sons. 5s.)

STRENGTHENING LEADED GLAZING.—We have had an opportunity of examining a new system for strengthening leaded windows, patented by Messrs. W. James and Co., of Kentish Town. The object is to do away, except in the case of very large windows, with the saddle-bar; and with this object the leading is strengthened at convenient points by thin steel bars soldered into the lead, and following its lines. The main advantage is that the straight line of the saddle-bar, cutting through the design, is avoided, and when the window is seen against the light the steel slips, which follow the line of the leading, are entirely invisible. There is also the advantage, for domestic glass especially, of getting rid of the copper ties, which are often an inconvenience and which require renewing. It is for domestic stained glass, in fact, that the system is more especially intended; and for this it possesses some very manifest advantages.

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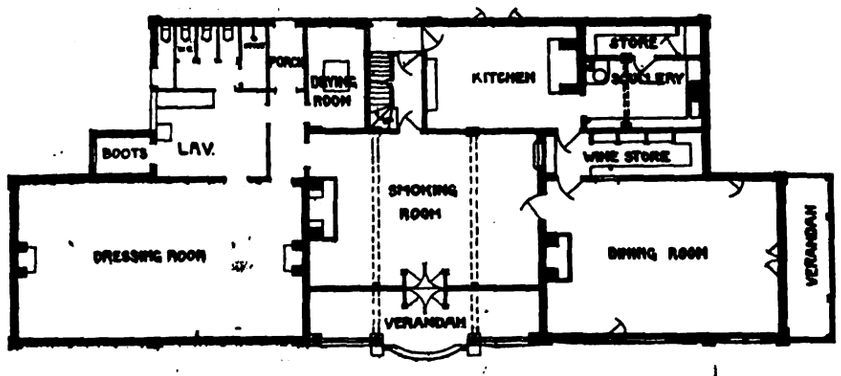


South Herts Golf-Club House.

Illustrations.

WEST FRONT, HEREFORD CATHEDRAL.

THE new west front of Hereford Cathedral, which is here illustrated, is in course of erection from the designs and under the superintendence of Mr. J. Oldrid Scott, in substitution for that which was designed by Wyatt after the great collapse which happened towards the end of the eighteenth century.

The west window is a memorial to the late Queen, provided by the ladies of Herefordshire; the remainder of the work is being done partly by the Dean and Chapter and partly by public subscription.

Brown Hollington stone is being used for the work. The west window and gable above are now completed, and the projecting porch below, with the new west doorway, is in progress. The aisles, with their turrets, will be proceeded with as soon as funds are available. The total cost of the work will probably be about 17,000*l.*

The contractors are Messrs. Thompson, of Peterborough.

The drawing was exhibited at the last Royal Academy Exhibition.

HOUSE, HADLEY-ROAD, MIDDLESEX.

THIS house, now in course of construction, commands good views of the well-wooded country in Hertfordshire and the north of Middlesex. Ham Hill stone is employed in conjunction with a reddish-brown brick, and the roof is covered with a sand-faced tile. The effect produced is quiet in colour and in harmony with the rural surroundings.

The house is warmed by low-pressure hot water, and is lighted with acetylene gas.

The builders are Messrs. Allen Fairhead and Son, of Enfield Town, and the architect is Mr. A. H. Hart.

The drawing was exhibited at this year's Royal Academy.

SOUTH HERTS GOLF-CLUB HOUSE.

THIS house, erected for the South Herts Golf Club from the designs of Messrs. A. C. Dickie and W. Curtis Green, is of brick and roughcast, with a tile roof, and is built to accommodate 325 members. The verandah is of wood painted white.

It is a satisfactory attempt to give a certain degree of architectural character to an erection of this kind.

SANATORIUM, SHREWSBURY SCHOOL.

THIS building consists on the upper floor of three wards of one bed each, and one ward for two beds, nurses' room, bathroom, water-closet, and slop sink. On the ground floor are sitting-room and bedroom for housekeeper, servants' bedroom, storeroom for medical officer, kitchen, scullery, &c.

The iron ward was intended to meet the possible occurrence of an epidemic, while the small wards in the permanent building were for isolating the initial cases.

The building was erected by Mr. Bowdler, of Shrewsbury, and the cost was just over 2,000*l.*

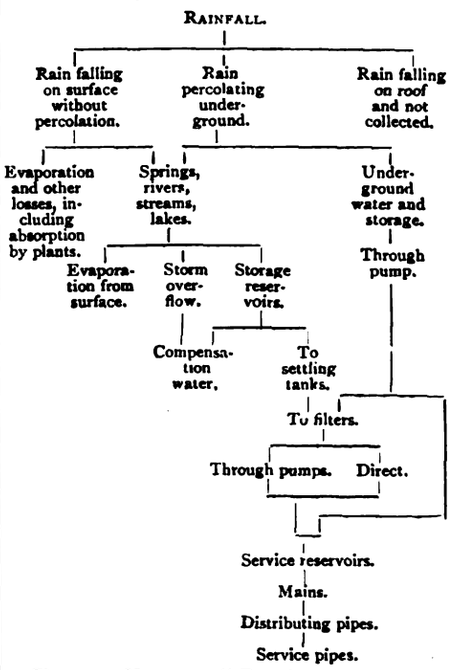
KEITH D. YOUNG.

Books.

Water Supply: A Student's Handbook on the Conditions Governing the Selection of Sources and the Distribution of Water. By REGINALD E. MIDDLETON, M.Inst.C.E., M. Inst. Mech.E., F.S.I., with numerous illustrations, plans, and tables. London: Charles Griffin and Co. 1903.

IN this treatise the author, whose name is intimately associated with the new reservoirs at Staines, has more than fulfilled the promise contained in the title as quoted above, and although the volume now before us contains less than 200 pages, it includes, in addition to a consideration of the conditions governing the selection of sources and the distribution of water, some chapters relative to engineering details that will be found of practical service to engineers and engineering students.

Chapter I. serves as an introduction to the various points to be considered in arranging and elaborating a scheme of water supply, and the gist of this preliminary discussion is thus summarised by the author:—



Chapter II., on "Requirements as to Quality," commences with a statement, the accuracy of which is fully borne out by experience, to the effect that even if it were possible to obtain chemically pure water, this would not be an unmitigated advantage, as the presence of certain impurities, in the sense of foreign matters, might prove desirable, rather than objectionable. The chief point for the water engineer is to know precisely which impurities are harmless and admissible, and which are harmful and inadmissible. This chapter sets forth with clearness the points to be remembered, and indicates the sources of supply that, as a general rule, are most advantageous for adoption; but the most useful advice given is perhaps that to be found in a paragraph wherein the engineer is recommended to obtain the opinion of a competent analyst before deciding upon any particular source.

"Requirements as to Quantity" receive adequate treatment in Chapter III., wherein are collected useful data as to consumption, and methods are described for estimating the increased demands that may arise from the growth of population, and the quantities of water available from given catchment areas and wells. In the two chapters succeeding, devoted to "Storage Reservoirs" and "Masonry Dams" respectively, we enter upon matters of constructional interest. After dealing with questions affecting capacities and sites Mr. Middleton illustrates the method of designing earthwork dams, giving preference to the British practice of employing a puddle wall of clay, for the purpose of preventing the percolation of stored water through the dam. As he points out, concrete or rubble walls, as sometimes used in the United States, often leak to a serious extent, and in some types of such construction there is risk that the wall may fail at or above ground level. Another American expedient, that is not mentioned in the present treatise, is the substitution of a steel plate in lieu of the puddle wall. This may be justifiable on temporary work, but for permanent dams it is scarcely to be recommended, and Mr. Middleton is wise in adhering to methods that have been proved by long experience to be trustworthy in every sense of the word. As an instance of an earthen bank, the Staines Reservoir is cited, and a section is given showing the details of the construction adopted in that work. Masonry Dams, forming the subject of the second of these chapters, are considered in sufficient detail; simple rules are given for the calculation of all essential loads and stresses, and a worked example makes the application of the rules perfectly clear. The next part of the subject approached is the "Purification of Water," and we note that the author favours the method of slow filtration, through sand, which after all seems to be the best suited for this country, and gives results that are fully equal, and perhaps superior, to the various processes that are favoured elsewhere. In the case of hard waters, the adoption of a softening process ought certainly to be considered by water companies, but in other respects it is very unlikely that any radical alteration is advisable in methods of purification on a large scale. Mr. Middleton makes brief mention of Clark's process of softening, but does not in any way emphasise the advantages to be obtained by its employment. "Service Reservoirs" are briefly considered in Chapter VII., and the main essentials of construction are discussed. A chapter of service to all concerned in water supplies is that devoted to "The Flow of Water Through Pipes," a subject upon which much has been written, and which is more or less shrouded by the mists given off by many mathematical formulas. Mr. Middleton here performs a service for which students have reason to be grateful. After showing that the theoretical basis of all such computations in itself presents little difficulty, and that the existing confusion arises from variable experimental co-efficients, expressed in different terms by different writers, he commences consideration of the subject at the beginning and gives, in simple terms, all the rules necessary for calculation. Following this demonstration we find rules for the strength of pipes, mains, and fittings. The last three chapters make brief reference to "Distribution Systems," "Pumping Machinery," and some "Requirements in Connexion with Waterworks."

It is not suggested by the author that this work constitutes a complete course of study for the waterworks engineer. On the contrary, it is professedly intended to set forth the general scientific principles upon which this department of engineering is based, and to serve as an introduction to more elaborate treatises. These objects appear to be admirably attained. The treatise is most clearly written, well illustrated, and every page carries with it sufficient proof that it has been written by an engineer who is practically and intimately acquainted with his subject.

Practical Masonry: A Guide to the Art of Stone Cutting. By WILLIAM R. PURCHASE. Fourth edition, enlarged. London: Crosby Lockwood and Son. 1903.

As in previous editions of this eminently practical work have already been reviewed in our

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columns, it is only necessary to refer to the additional matter now included. This comprises new sections relative to masonry estimating and quantity surveying, and to building stones. In the first of these sections the author emphasises the assistance afforded to the estimator by familiarity with constructional drawings and specifications, by a sufficient knowledge of mathematics, and finally, by a "neat and methodical way of taking off quantity." As our readers are aware, there is considerable diversity of opinion as to the best system for adoption in estimating for stonework, and it appears to us that the author is right in advocating the claims of what is known as the "London system." After some necessary definitions, complete examples of taking-off quantities are given, and in the first example an abstract is prepared, put into bill form, and priced. This mode of treatment serves to make very plain the method to be followed by the mason in actual practice.

The section on building stones contains a discussion of the chief points with which the mason should be acquainted, and following this is a very serviceable list of the principal quarries, chiefly in Great Britain, furnishing stone of various kinds for building purposes. The list gives the characteristics of the different stones mentioned, weights, prices, and other useful particulars. It is not quite so complete as could be wished, but this circumstance is attributed by the author to the reluctance of some merchants and quarry owners to afford information. The additions to which we refer add considerably to the value of this useful treatise.

The Engineer in South Africa. A Review of the Industrial Situation in South Africa after the War, and a Forecast of the Possibilities of the Country. By STAFFORD RANSOME, M.Inst.C.E., Westminster. Archibald Constable and Co., London, 1903.

ALTHOUGH the greater part of the matter contained in this volume has appeared in the columns of our contemporary the *Engineer* in the form of articles, entitled "South Africa, from an Engineer's Point of View," the present book is not a reprint in the ordinary sense of the term. Much of the original matter has been eliminated, while the remainder has been rearranged, and to a considerable extent rewritten, by the author. The early portion of the work is occupied with a consideration of various problems such as the cost of living and travelling, the prospects of employment, the labour question and intercolonial relations, and the influence of politics upon industrial questions. In the later chapters the author treats of the more important engineering industries of South Africa as carried on in the present day, and gives his opinion as to their prospects and possibilities. It is interesting to observe an expression of the opinion that there is no foundation for the attacks sometimes made on the methods of the British manufacturer, and in support of this conclusion the author points to the fact that the imports from Great Britain for 1902 are just double those for 1898, which was the last normal year before the war.

In Chapter XIII. we have a discussion of "The Theory and Practice of the Railways," showing, among other things, that railway design in the past has been dictated almost entirely by political, rather than by commercial, considerations, and that even now railway routes form the subject for fiery controversy in the self-governing Colonies of South Africa. Mr. Ransome properly emphasises the fact that Johannesburg, "the centre of all things South African," should be the centre of all the railway systems, or, to use his own words, "It is essential above every other consideration that all roads should lead to Johannesburg, and by the shortest routes."

The opinion is sometimes expressed that South Africa is badly provided with harbours. This may be correct in one way, but the deficiency is due to human and not to natural causes. Although the author devotes only two short chapters to this important subject, he succeeds in making tolerably clear the influences that have militated in the past against the development of South African harbours. At the same time, it is singular that all mention of the extensive harbour works now in progress at Cape Town should be entirely overlooked by Mr. Ransome. The reason may be that these works were not authorised at the time of his visit to South Africa; but as his book has only just been issued by the publishers, there has been plenty of time for obtaining recent information and for correcting comments and criticisms that are no longer applicable to the port in question. Passing over three chapters relating to diamond and gold mining, we come to some serviceable remarks upon "Well Boring in Cape Colony" and "Irrigation." The opinion of the author is that there will be a very considerable extension of well-boring in the near future, as beneath the greater portion of the drought-stricken area in the interior of South Africa there are plentiful supplies of water that only require tapping to be brought to the surface. With regard to irrigation, the author says the position is disappointing, apparently not because irrigation is impracticable, but for the reason that it could only be successful on a large scale if sweeping alterations were made in laws relating to water throughout the South African Colonies. While dealing with this important subject, Mr. Ransome makes reference to the report by Sir W. Willcocks on irrigation in South Africa, which he justly describes as the "only work worth reading on the subject."

The volume is well illustrated with photographs, maps, and drawings, and should be of considerable service to those who desire reliable information with regard to South Africa.

The Elements of Electrical Engineering. By T. SEWELL, A.I.E.E. Second Edition, Revised and Enlarged. London: Crosby Lockwood and Son. 1903.

THE author has considerably improved the original part of this work by rewriting certain portions of it, and so some of our previous criticisms no longer apply. He has added three chapters on alternating current theory, and has endeavoured to cover nearly all the field now explored in these three chapters.

In the preface he says: "I have made free use of vector diagrams in the new chapters. By their aid the student is often able to perceive readily what would otherwise involve a difficult or tedious mathematical demonstration." Whilst quite willing to grant that vector diagrams are a practical necessity for engineers in works, we do not at all agree that they are superior to "difficult or tedious mathematical demonstrations," as a student reading the preface would naturally infer. As a matter of fact, they are merely a shorthand way of expressing the mathematical equations, and to advanced electricians they are practically useless. The Heyland diagram for an induction motor, for example, is built up of a large number of vectors, but it is far from accurate.

The references to "dielectric hysteresis" and to "splashing" are misleading. In our opinion, neither phenomenon occurs, and the true explanations as given by Rayleigh and Heaviside are something very much simpler than the involved explanations recently given in the "Journal of the Institution of Electrical Engineers." It is wrong to state that "the field created by the current in a conductor springs from the centre as a number of expanding rings." A little further on it is stated more correctly "the current will grow in the outer portion of the conductor first," and it is stated that with high frequencies, there is practically no current, and surely therefore practically no "expanding rings" in the centre portion of the conductor.

It would be possible for a non-mathematical student to acquire a considerable knowledge of alternating current theory from the new chapters. Many of the every-day phenomena are described and clear diagrams are given. We doubt, however, whether his knowledge would be a great help to him. We are old-fashioned enough to believe in giving tedious proofs when no others are available, in worrying out difficulties, and in stating clearly the limitations in our methods, and the assumptions involved in our proofs.

NEW STREETS, ABERDEEN.—At a meeting of the Streets and Roads Committee of the Aberdeen Town Council on the 10th inst.—Lord Provost Walker presiding—the plan of the new street to be carried from Marywell-street to Portland-street—as prepared by Mr. P. M. Barnett, engineer-in-chief of the Great North Railway—was submitted. The new street takes the place of Wellington-road, which is to be absorbed by the widening of the railway. A new sewer has also to be constructed in the street. The plan, having been approved by the burgh surveyor, was passed.

Correspondence.

THE CAMBRIAN ARCHÆOLOGICAL MEETING.

SIR,—Might I be permitted to make a few corrections on three subjects touched upon by the writer of the interesting account of the Cambrian Archæological Association meeting at Portmadoc, which appeared in your issue of August 29?

In his survey of the day's excursion into the Beddgelert district, he refers to Sir John Williams as goldsmith to King Charles II. I would point out that a certificate (21 James I., 1623) was granted by the Earl of Suffolk and Sir Henry Cary "that there is no evidence that John Williams, the King's goldsmith, hath sold deceitful plate to the King"; and in further proof, I would add that the silver chalice and paten, still in use at Beddgelert church, were given in 1610 by this same Sir John Williams; and also that, assuming your correspondent's reference to the friendship existing between Sir John Williams and the poet Drayton to be correct, the date of Drayton's death, 1631, would establish the fact that Williams was not goldsmith to Charles II.

The ancient British boat, exhibited at Portmadoc, was not, as your correspondent remarks, illustrated in "Archæologia Cambrensis" (4th series, vol. V.). It was merely described, not illustrated. The drawing referred to was of another boat. The two triangular supports were added a few years ago, and are not therefore original, as would be inferred from your writer's description of the boat.

There are several errors in his paragraph describing the church plate exhibited. A student of old English silver, reading his account, would naturally expect to find an early and rare example of old church plate when certain specimens are placed in the forefront and referred to in this manner: "Standing out from the general collection were a silver cup and dish, the later used as a paten, from Treflys." To my mind, these were the least interesting of the pieces exhibited, for the chalice bears neither inscription nor hall-marks, and judging from its form, is obviously of late date, probably eighteenth century. The dish is not even silver, and is an ordinary dinner-plate, made of "Sheffield plate."

The Criccieth chalice was hall-marked at Chester in 1770, and was the gift to the church of John Jones, of Brynhir. Its form alone is sufficient evidence of the fallacy of your writer's assignation of it to the previous century.

Your correspondent refers to the Llanarmon chalice as being the gift of John Thomas Wynne. This is an error, for this chalice is not inscribed, and no record of its donor can be discovered in the parish. The chalice from the mother-church of Llangybi was given by one Wynne, and this perhaps was the vessel your writer had in mind.

The double-handled pewter cup from Llanengan church is not to be compared for rarity and interest to the pewter cup, of earlier date, from Llanfrothen, which is not mentioned.

The two small pewter cups with covers, which he considers probably pax cups, are in all probability mustard pots of early nineteenth century manufacture.

E. ALFRED JONES.

Queen's Hotel, Portmadoc.

*** The writer of the report observes:—"I am much obliged by Mr. E. Alfred Jones's corrections of certain errors which crept into the account of the Cambrian Archæological Association's meeting at Portmadoc. That account was written far from any books of reference of even the most elementary character. The temporary museum was also examined under unfavourable circumstances, and after some of the objects had been removed, and others apparently disarranged."

GERMAN PATENTS.

SIR,—Although Germany acceded to the International Convention on May 1 last, with the result that anyone who has applied for a patent in Great Britain (and other States of the Union) can claim twelve months priority in Germany from the date of the first filed applications, we would point out that no such priority can be claimed in respect of patent applications filed prior to May 1 last, and that in all such cases the German patent must be applied for before any printed publication of the invention has taken place in any country.

E. P. ALEXANDER AND SON,
Chartered Patent Agents.

PROPOSED FREE LIBRARY, PONTEFRACT.—The Pontefract Town Council have approved the plans presented by Messrs. Garside and Pennington, honorary architects, for the proposed Free Library for Pontefract. The building will occupy a site in Salter-row, on the present lawn in front of the Municipal Offices. The cost is estimated at 2,000*l*.

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The Student's Column.

CONCRETE STEEL.—XII.

MR. JOHNSON'S THEORY OF BEAM DESIGN.

ANOTHER series of formulæ for calculating the strength of concrete steel beams, in which due attention is given to the effects of the co-efficients of elasticity for concrete and steel, was made public in 1901 by Mr. A. L. Johnson at a meeting of the American Society of Civil Engineers.* The formulæ are perfectly suitable for general use, as they have no relation to any of the specific styles of concrete steel construction favoured by various patentees. They are based upon the assumption that the concrete in tension is of no value in the moment of resistance of the cross-section, and the following is the notation adopted :—

E_s = Coefficient of elasticity of steel, in pounds per square inch ;
E_c = Coefficient of elasticity of concrete in compression, in pounds per square inch ;
F = Elastic limit of steel, in pounds per square inch.
f_c = Compressive strength of concrete, in pounds per square inch ;
b = Width of section considered, in inches ;
a^2 = Area of reinforcement, in square inches ;
d = Spacing of reinforcement, in inches ;
$\frac{a^2}{d}$ = Amount of metal per inch in width of beam, in square inches ;
M_o = Moment of ultimate resistance of cross-section, in inch-pounds, for failure in tension ;
M^1_o = Moment of ultimate resistance of cross-section, in inch-pounds, for failure in compression ;
M = Bending moment of external forces, in inch-pounds ;
W = Total load on beam, in pounds ;
w = Uniformly distributed load, in pounds per square foot ;
P_s = Total stress on metal in width b ;
P_c = Total stress on concrete on width b ;
λ_1 = Unit strain of extreme fibre in compression ;
λ_2 = Unit strain of steel ;
c = Distance from the bottom of the concrete to the middle plane of the reinforcement, in inches ;
y_1 = Distance between the top of the beam and the neutral axis, in inches ;
y_2 = Distance between the middle plane of the reinforcement and the neutral axis, in inches ;
t = Total depth of the beam, in inches ;

As at the maximum load, the stress developed in the metal cannot be much greater than its elastic limit, Mr. Johnson advocates the employment of steel with an elastic limit as high as may be consistent with the ductility desirable in any particular construction.

We have already shown that it is possible to break the metal reinforcement in a beam, but it should be remembered that the intensity of stress involved cannot be developed until the construction as a whole has far exceeded its maximum load-carrying capacity. Under these circumstances it is quite correct to assume that the co-efficient of elasticity of the steel is constant up to the development of the value F, which represents the elastic limit, and when this point is reached the construction as a whole has practicaly attained its maximum resistance.

A similar condition does not obtain so far as concerns the concrete in compression, for the maximum carrying capacity is not reached until the extreme fibre stress becomes equal to the compressive strength of the material. Whether the maximum capacity can be so attained depends upon the strength and amount of the reinforcement. In the case of the beams tested by Professor Hatt, to which reference has previously been made, the reinforcement was not adequate for developing the maximum strength of the concrete. Assuming such development to be attained, Mr. Johnson finds the stress diagram above the neutral axis to be shown in Fig. 20, and he states that this representation was deduced from the examination of numerous stress diagrams for both stone and cinder concretes of average proportions. On this diagram the total stress P_c, equal to the area of the shaded part, is about 25 per cent. greater than the area between the lines $o\ n$, $o\ s$, $n\ s$.

Similarly, it was ascertained that the co-efficient of elasticity as represented by the tangent of the angle $n\ o\ s$ is only two-thirds the value of the original co-efficient for stone concrete and only one-half the value of the original co-efficient for cinder concrete, the original value being represented by the tangent of the angle $m\ o\ s$.

* *Proc. Am. Soc. C.E. Vol. XXVII., No. 6.*

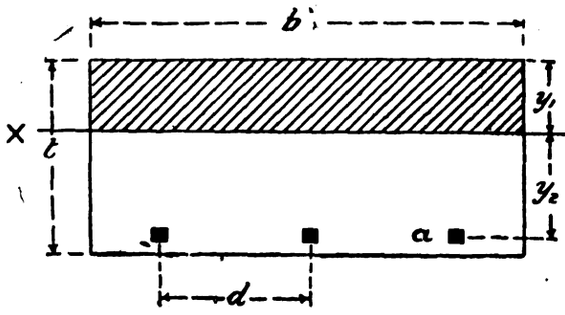

Fig. 19. *Fig 20.*

Illustrations to Student's Column.

The following demonstration relates to formulæ for single-span beams supported at the ends, and reference to Figs. 19 and 20 will assist the reader in following the line of reasoning pursued.

In the first place, the total tensile stress on the metal in width b is

$$P_s = \frac{F a^2 b}{d} ;$$

when the unit strain or extension of the metal is

$$\lambda_2 = \frac{F}{E_s},$$

and

$$P_s = E_s \lambda_2 \frac{a^2 b}{d}.$$

Taking next the compression side, the unit strain of the concrete is

$$\lambda_1 = \lambda_2 \frac{y_1}{y_2},$$

with the following resulting stresses :—

$$f_c = \lambda_1 \frac{2E_c}{3} = \lambda_2 \frac{y_1}{y_2} \frac{2E_c}{3} \text{ for stone concrete ;}$$

and

$$f_c = \lambda_1 \frac{E_c}{2} = \lambda_2 \frac{y_1}{y_2} \frac{E_c}{2} \text{ for cinder concrete.}$$

The total stress on the concrete in width b is

$$P_c = \frac{5 f_c b y_1}{8} \text{ for both stone and cinder concretes.}$$

Then

$$P_c = \frac{5b y_1^2 \lambda_2 E_c}{12 y_2} \text{ for stone concrete,}$$

and

$$P = \frac{5b y_1^2 \lambda_2 E_c}{16 y_2} \text{ for cinder concrete.}$$

As, however, $P_c = P_s$, it follows for stone concrete that

$$E_s \lambda_2 \frac{a^2 b}{d} = \frac{5b y_1^2 \lambda_2 E_c}{12 y_2} ;$$

whence

$$y_1^2 = \frac{12 a^2 y_2 E_s}{5 d E_c} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Similarly, for cinder concrete it follows that

$$E_s \lambda_2 \frac{a^2 b}{d} = \frac{5b y_1^2 \lambda_2 E_c}{16 y_2}$$

whence

$$y_1^2 = \frac{16 a^2 y_2 E_s}{5 d E_c} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

In computing the moments of ultimate resistance of the cross-section, the axis of compression is taken by Mr. Johnson in the position that it would occupy if the shaded area in Fig. 20 were a triangle. Although not precisely accurate this assumed position leads to no appreciable error.

The result is that for the moment of resistance for failure in tension

$$M_0 = P_s y_2 + \frac{2 P_c y_1}{3}$$
$$= \frac{P_s}{3} (3y_2 + 2y_1)$$
$$= \frac{F a^2 b}{3d} (3y_2 + 2y_1) \quad \ldots\ldots\ldots\ldots (3)$$

and for the moment of resistance for failure in compression,

$$M_0^1 = P_s y_2 + \frac{2 P_c y_1}{3}$$
$$= \frac{P_c}{3} (3y_2 + 2y_1)$$
$$= \frac{5 b f_c y_1}{24} (3y_2 + 2y_1) \quad \ldots\ldots\ldots\ldots (4)$$

The total depth of the beam is

$$t = y_1 + y_2 + c \quad \ldots\ldots\ldots\ldots (5)$$

The distance represented by e can, of course, be varied by the designer according to the thickness and character of the metal employed, and to the position and intended purpose of the construction. In using the formulas (3) and (4) the smaller of the two values for the moment of resistance should be employed, but in designs where the quantity of metal can be varied, it is always desirable that the construction should be of equal strength in tension and compression, so that $M_o = M_o^1$, or that,

$$\frac{F a^2 b}{3d} = \frac{5 b f_c y_1}{24}$$

From this equation is obtained the amount of metal in square inches per inch in width of the beam, or

$$\frac{a^2}{d} = \frac{f_c y_1}{1{\cdot}6 F} \quad \ldots\ldots\ldots\ldots (6)$$

The combination of formulæ (1) and (6) gives

$$y_2 = \frac{2 F E_c y_1}{3 f_c E_s} \text{ for stone concrete} \quad \ldots\ldots\ldots (7)$$

and the combination of formulæ (2) and (6) gives

$$y_2 = \frac{F E_c y_1}{2 f_c E_s} \text{ for cinder concrete} \quad \ldots\ldots\ldots (8)$$

These values introduced into formula (4) give for stone concrete

$$M_0^1 = M_0 = \left[\frac{5 b F E_c}{12 E_s} + \frac{5 b f_c}{12}\right] y_1^2 \quad \ldots\ldots (9)$$

and for cinder concrete

$$M_0^1 = M_0 = \left[\frac{5 b F E_c}{16 E_s} + \frac{5 b f_c}{12}\right] y_1^2 \quad \ldots\ldots (10)$$

If it be desired to adjust the moment of resistance of a beam so that it may be equal to a predetermined bending moment we have $M_0^1 = M$ and from (9) for stone concrete

$$y_1 = \pm \sqrt{\frac{M}{\frac{5 b F E_c}{12 E_s} + \frac{5 b f_c}{12}}} \quad \ldots\ldots\ldots (11)$$

and from (10) for cinder concrete

$$y_1 = \pm \sqrt{\frac{M}{\frac{5 b F E_c}{16 E_s} + \frac{5 b f_c}{12}}} \quad \ldots\ldots\ldots (12)$$

The foregoing equations can be considerably simplified for general use when the physical properties of the reinforcement and the concrete have been settled, and in the case of (11) and (12) the factors are readily reducible to numerical fractions. In using the formulæ for beams of equal strength above and below the neutral axis, the value of y_1 is determined from (11) or (12) ; y_2 from (7) or (8) ; and $\frac{a^2}{d}$ from (6).

The thickness of the concrete and the spacing of the bars then depends upon the size of the bars used.

Let us assume F, the elastic limit of the steel to be used, at 54,000 lbs. per square inch ; E_c, the co-efficient of elasticity of concrete, at two-thirds the original value, or, say $\frac{1}{3}$ ×

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3,000,000 lbs. = 2,000,000 lbs. per square inch; and f_c the compressive strength of the stone concrete adopted, at 2,400 lbs. per square inch.

Then formula (11) for stone concrete may be reduced thus—

$$y_1 = \pm \sqrt{\frac{M}{\frac{5b \times 54,000 \times 2,000,000}{12 \times 30,000,000} + \frac{5b \times 2,400}{12}}}$$

$$= \pm \sqrt{\frac{M}{(b \times 1,500) + (b \times 1,000)}} \quad \ldots\ldots\ldots\ldots (11a)$$

For the purpose of illustration we will apply this formula to the case of a beam 8 inches wide, supported at each end with a clear span of 80 inches, and subjected to a concentrated centre load of 10,000 lbs.

We then have $b = 8$ inches, and for the bending moment

$$M = \frac{Wl}{4} = \frac{10,000 \times 80}{4} = 200,000 \text{ inch-lbs.}$$

Inserting these values in the formula we obtain

$$y_1 = \sqrt{\frac{200,000}{(8 \times 1,500) + (8 \times 1,000)}} = \sqrt{10} = 3{\cdot}16 \text{ ins.}$$

This is the distance of the extreme fibre in compression from the neutral axis as represented in Fig. 19.

To find the distance between the neutral axis and the centre of the reinforcement, y_2 Fig. 19 we use formula (7), and inserting the values stated above, and the value of y_1 it becomes

$$y_1 = \frac{2 \times 54,000 \times 2,000,000 \times 3{\cdot}16}{3 \times 2,400 \times 30,000,000} = 3{\cdot}16 \text{ ins.}$$

From formula (6) the amount of metal in square inches per inch in width is obtained. Thus

$$\frac{a^1}{d} = \frac{f_c\, y_1}{1{\cdot}6\, F} = \frac{2.400 \times 3{\cdot}16}{1{\cdot}6 \times 54,000} = 0{\cdot}0877 \text{ sq. ins.}$$

This is equal to a total area of steel reinforcement for the width b amounting to $8 \times 0{\cdot}0877 = 0{\cdot}7016$ square inch, and if we adopt a spacing of 2 inches there will be four bars, each with an area of $0{\cdot}7016 \div 4 = 0{\cdot}1754$ square inch.

The depth of concrete below the centre line of the reinforcement may be fixed at about 1·5 inch, or say 1·68 inch, which, by rule (5), will give for the total depth of the beam

$$l = y_1 + y_2 + c = 3{\cdot}16 + 3{\cdot}16 + 1{\cdot}68 = 8 \text{ ins}$$

Finally, the moment of ultimate resistance may be calculated by formula (9)

$$M_0 = M_0{}^1 = \left[\frac{5bFE_c}{12\,E_s} + \frac{5bf_c}{12}\right] y_1{}^2$$

$$= \left[\frac{5 \times 8 \times 54,000 \times 2,000,000}{12 \times 30,000,000} + \frac{5 \times 8 \times 2,400}{12}\right] \times 10$$

$$= [12,000 + 8,000] \times 10 = 200,000 \text{ in.-lbs.}$$

Therefore, the moment of resistance agrees with the stated bending moment.

The general result of the foregoing calculation indicates that 10,000 lbs. is the maximum centre load for a concrete-steel beam, 8 inches square, with a clear span of 80 inches, containing about 1.1 per cent. of steel reinforcements, and otherwise conforming with the stated conditions. Making due allowance for the relatively high elastic strength of the steel here considered, and also for the percentage and position of the reinforcement, this result is fairly in agreement with the records as to the ultimate strength of the beams of similar dimensions tested by Professor Hatt.

In using the foregoing formulæ any desired factor of safety may be applied at the discretion of the designer to suit the requirements of the work to be carried out.

COMPETITIONS.

PROPOSED CASINO, MADRID.—We have received the particulars of an international competition for a new casino, to be built at Madrid, at a cost of two million pesetas (about 40,000*l.*). Three premiums will be given, and designs are to be sent in by December 15. The pamphlet which has been sent to us gives no secretary's address, nor does it state clearly where the drawings are to be sent; apparently to the President of the Casino, Madrid, from whom we suppose that the instructions can be obtained. We do not, however, at all recommend English architects to compete, as we doubt if they will gain anything by doing so.

OBITUARY.

MR. RICHARDS.—We regret to learn that Mr. Edward Richards, of No. 7A, Strand, Torquay, died a few days ago, aged sixty-one years, from the results of an accident. Mr. Richards, who was architect and surveyor to the Haldon Manor estate, South Devonshire, had a good practice in Torquay and the neighbourhood. He prepared the plans and designs for the Cottage Hospital at Totnes, the Conservative club-house at Brixham, erected on a site adjoining the Market Hall, and his designs were selected in competition for a proposed pavilion and concert-rooms at Torquay, for which, however, the scheme was for some cause relinquished.

GENERAL BUILDING NEWS.

DAME MARGARET'S HOME, NEWCASTLE.—On Saturday afternoon last the newly-erected Memorial Cottage, situated at the south-east corner of the grounds of Dame Margaret's Home, Washington Hall, was formally opened in the presence of a fairly large assemblage of visitors, including Mr. Robt. K. Sinclair, London; Mr. and Mrs. James Sinclair, Newcastle; and others. The cottage, which is built of Birtley brick, with stone facings at doors and windows, is one story in height, and was designed by Mr. A. B. Plummer, architect, Newcastle. It contains two bedrooms, a sitting-room, nurses' room, a kitchen, bathroom, with necessary conveniences, and will accommodate twelve children. The contractor for the whole of the work was Mr. Hunter, Washington. The inscription at the front notifies that the cottage is erected to the memory of Robert and Isabella Sinclair, Newcastle, by their family.

NEW BUILDINGS, ABERDEEN.—The plans of the following buildings have been sanctioned by the Plans Committee of Aberdeen Town Council:—Six dwelling-houses on the south-west side of Hammerfield-avenue, for Mr. John Craigen, solicitor, per Messrs. Sutherland and Pirie, architects; dwelling-house on the north side of Belmont-road, for Mrs. Elizabeth Duthie, Powis-terrace, per Messrs. Cameron and Watt, architects; warehouse on the north side of Maberly-street, for Richards, Limited, manufacturers, per Mr. R. G. Wilson, architect; dwelling-house on the east side of Duthie-terrace, for Mr. James G. M'Donald, manager, per Mr. Wm. Davidson, architect, Ellon; four dwelling-houses on the south side of Victoria-road, for Messrs. Main, Robertson, and Ritchie, fishermen, and Mr. John Webster, fishcurer, per Mr. John Milne, architect; four dwelling-houses on the north side of Cedar-place, for Mr. Alexander A. Smith, house proprietor, Elgin, per Mr. Harvey Mennie, architect; dwelling-house on the south west side of Broomhill-avenue, for Mr. John S. Stuart, accountant, per Messrs. Sutherland and Pirie, architects; four dwelling-houses on the north side of Carlton-place, for Mr. T. W. Hector, solicitor, per Mr. James Scott, jun., joiner; dwelling-house on the east side of Burns-road, for Mr. Wm. Leith, cycle agent, per Mr. Thomas Reid, Bieldside; dwelling-house on the north-west side of Erskine-street, for Mr. Sylvester Strachan, contractor, per Messrs. Sutherland and Pirie, architects.

NEW MASONIC HALL, HEATON.—A block of buildings, comprising a Masonic Hall, four shops, a restaurant, assembly-room for dances, banquets, receptions, and hall for Freemasons' lodges, together with caretaker's rooms, has been erected at Heaton. The building has its chief front in Shields-road, with an entrance, and extends for a distance into Edwin-street. The building comprises five stories, the shops being situate on the ground floor, with the Masonic Hall, etc., above, and the cafe restaurant and billiard saloon in the basement. The rooms are elaborately furnished throughout. Messrs. Farthing and Dunn, of Newcastle, were the architects, and the general contractor was Mr. Thomas Weatheritt, Newcastle. The decorations were carried out by Mr. T. S. Butterwick, Newcastle, and the electric light was installed by Messrs. P. G. Hazelhurst and Co., also of that city. An improved system of ventilation was introduced by Messrs. Stott, of Newcastle and Wolverhampton; the furnishings were supplied by Mr. L. H. Gullachsen, of that city; the lifts by Messrs. Waygood and Otis, London; the parquet floor, with a sub-floor of springs, in the ballroom by Messrs. Waring and Gillow, Lancaster and London; the plumbing by Mr. Stewart, Newcastle; and the heating arrangements by Messrs. Hastie and Duncan, also of that city.

NEW REFORMED PRESBYTERIAN CHURCH, BELFAST.—A new Reformed Presbyterian church, situated in Cregagh-road, Belfast, was recently opened. The new building, which has been erected at a cost of 1,250*l.*, includes a lecture hall on ground floor and a church above. It faces Cregagh-street. The outside dimensions are 56 ft. by 36 ft. On entering the building, the door of the lecture hall is opposite, with the stairs on either side leading up to the church. The dimensions of the lecture hall are 44 ft. by 34 ft. by 14 ft. high. It is ceiled diagonally in panels with yellow pine and varnished. The wainscotting also is of yellow pine varnished, and rises to the height of window sills. At one end is a platform, 22 ft. by 7 ft. by 1 ft. 3 in. high. Off this hall are the lavatories, heating chamber, etc. These can be approached also from without by a side door. There are two sets of stairs leading to the church, each consisting of two flights. They are of pitch pine throughout, with mahogany hand rails and 6 in. newels. At top of stairs is the vestibule, from which the church is approached by two doors leading into either aisle. The floor of the church is supported by two 15in. by 12in. pitch pine beams, which project into the lecture hall below, and are supported in the centre by 7 in. columns (cast iron). On these beams are the joists, 11 in. by 2 in., every third joist being 11 in. by 3 in., carrying 1¼ in. flooring. The church is of the same dimensions as the lecture hall; but the ceiling is coved at the beam, which gives it a greater height (24 ft.). The ceiling is ceiled with pitch pine sheeting, panelled diagonally and varnished. Part of roof trusses show through this. The wainscotting also is of pitch pine, 4 ft. high, and varnished. The pulpit is of platform style, and is entered at one side alone. The pulpit is panelled. It is square, with a three-sided projection in front. On the centre panel is the book bracket. In front of the pulpit is the choir seat. The whole seating, with pulpit, is of pitch pine varnished. The aisles are 3 ft. 6 in. broad, and carpeted. The church has a seating accommodation of 260 adults. The entire building is lighted with incandescent light, and is heated on the high pressure system with small pipes. The heating apparatus was supplied by the Ravenhill Iron Company; Mr. R. Hewitt, Ballyhackamore, Belfast, was the builder; and the architect is Mr. Jas. Scott, Annadale-avenue, Belfast.

NURSES' HOME, BIRKENHEAD BOROUGH HOSPITAL.—The Nurses' Home built in connexion with the Borough Hospital was recently opened. The Home has been erected on land adjacent to the hospital which was purchased a year or two ago from the Corporation of Birkenhead. The building, which fronts Livingstone-street, is L-shaped in plan, and consists of ground and first floors. It contains on the ground floor entrance porch and vestibule, with lavatory, etc., off same, dining hall, nurses' day room, head nurse's room, and nine bedrooms for nurses, access to these being obtained from a spacious and well-lighted corridor, at one end of which is placed the sanitary tower, containing bath-room, housemaid's sink, etc. At the back of the dining hall are the usual administrative offices, including still-room, store-room, and pantry. The first floor contains a nurses' sitting-room, ten bedrooms for nurses, and a large bedroom for servants, the sanitary tower being directly above that on the ground floor, and is similarly fitted up. Ample provision is also made on this floor for stores and linen. Special provision has been made for egress in case of fire. The dining-hall and day-room on ground floor are convertible, if required, into one room by means of a folding partition, these two rooms being dedicated to the memory of the late Mr. William Laird. The building is lighted throughout by electricity, and special attention has been given to the sanitary fittings, drainage, and ventilation. Externally the buildings are faced with grey bricks, relieved by red Ruabon moulded brick strings and bands. The contract for the building has been entrusted to Mr. Peter Rothwell, of Birkenhead, and that for the oak-work in connexion with the dining-hall and day-room to Messrs. Waring and Gillow, of Liverpool, the whole being carried out from the drawings prepared by and under the superintendence of Mr. Edmund Kirby, architect, of Liverpool.

NEW BANKING PREMISES, BELFAST.—A new branch has been erected for the Ulster Banking Company. The new premises are situated on a site at the corner of Shankill-road and Agnes-street, having a frontage to both south and west of 50 ft. The elevations are built of white Giffneuk stone and compressed bricks, with a base course up to the ground-floor windows of Aberdeen granite from whence up to the first-floor windows it is entirely composed of ashlar. The next two stories are carried out in compressed bricks, with stone dressings. The banking hall, which is 46 ft. long by 21 ft. wide, is entered through a mahogany-panelled porch, with swing-doors to match, the entrance door being of dark oak, handsomely panelled. The ceiling is 14 ft. high, and is divided into paneis by projecting beams, each of which rests on two ornamental and enriched trusses at each side; the wide cornice returning round the beams, and below which is a deep-raised frieze. The manager's office, which is panelled in polished mahogany, as are also the counter, fittings, desk, etc., is situated at the opposite end from the porch, and is screened off from the banking hall by mahogany framing panelled

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to correspond, the upper portion being filled with leaded glass. The counter, which is about 30 ft. long, extends from this to the porch, the front being divided into panels with raised mouldings, by projecting pilasters rising from the skirtings, and terminating under the counter-top, with carved trusses, and ornamented between with raised panels and mouldings. The space for the public is laid with a design in encaustic tiles, by Messrs. Craven, Dunnil, and Co., and the portion at the rear of the counter and manager's office is laid with pitch pine parquet flooring, by Messrs. Ebner. The strong-room is situated at the rear of the office, the interior being lined throughout with white glazed bricks and divided in the centre by a wrought-iron grille. The entire bank is heated by Messrs. Musgrave and Co.'s high-pressure hot-water system, and lighted throughout by electricity, which was carried out by Mr. Stanley Johnston, who also supplied the electric fittings. The whole of the manager's residence is situated over the offices, with the exception of the kitchen, which is on the ground floor. The office fittings were supplied by Mr. Mitchell, of North-street; the wrought-iron work by Mr. William Greer, of Great George's-street, and Mr. Jones, of York-street. The contractors for the building were Messrs. Courtney and Co., who have carried out the work under the superintendence of the architects, Messrs. Blackwood and Jury, Belfast.

METHODIST CHURCH, SUTTON, BELFAST.—The foundation-stones of a Methodist church, to be erected at Sutton, Belfast, were recently laid. The new church will provide seating accommodation for 300 persons, and will be erected at a cost of 1,130*l.* The scheme, when completed, will also include a school-house, manse, and church parlour. Mr. James Beckett is the builder, the architect being Mr. George Beckett.

CHURCH, SHOTLEY BRIDGE.—The church of St. John, Shotley Bridge, has been re-opened after the rebuilding of the chancel at the expense of Mr. I. W. Walton-Wilson, of Shotley Hall, Northumberland. The chancel has an open roof, and the east end is terminated by a pentagonal apse containing five single light windows. The organ chamber has been built on the north side of the nave, with the vestry behind. The old vestry has been removed, as well as the entrance lobby, in which stood the font, and the space added to the church, so that baptisms may be in sight of the congregation. The five single windows of the apse have been painted by Messrs. Bell and Beckham, of London. They contain figures of two Apostles, Saints John and Thomas, and of St. Lucy and the Virgin Mary, standing on bases and under canopies. Each figure bears its emblem—St. John the poisoned chalice, St. Thomas the builder's rule, St. Lucy the lighted lamp, and the Virgin Mary the lily. The centre light contains the figure of our Lord enthroned. The chancel has been built from the designs of Mr. Walton-Wilson, the stained glass and carved oak reredos having been executed under the direction of Mr. E. R. Robson, architect, of Westminster.

BAPTIST CHURCH AND SCHOOLS, BRIGHTON.—The memorial-stones of this building were laid on September 16 last. The building is to be faced with whole white flints, with red dressings. The seating to be in Orham wood, wax polished. Lead lights to all windows. Heating by low-pressure hot-water pipes and radiators. Electric light fittings of wrought iron and copper. Ventilation by means of an electric fan. The baptistry is to be lined with white marble. The accommodation will be for 443 adults on ground floor, 282 in galleries, total 725, or a mixed congregation of over 800 persons. The seating is arranged on a semi-circular plan, each hearer directly facing the minister. The schools are under the church, and will contain accommodation for about 500 scholars in a large schoolroom, infants' room, church parlour, and four class-rooms, with kitchen, etc. The architects are Messrs. George Baines and R. Palmer Baines, of London. The builders are Messrs. Batley, Sons, and Holness, also of London. The present contract is for 5,381*l.*, exclusive of galleries (except choir gallery).

WORKMEN'S DWELLINGS.—Considerable improvements continue to be made in many districts in the houses of the working classes, says Dr. Hill, Medical Officer for the County of Durham, in his Report for 1902. Old dwellings, consisting of one rooms downstairs and an ill-ventilated attic, are in some parts of the county being rapidly replaced by more commodious dwellings. In some of the older colliery districts there is still, however, much need for improvement in the dwellings of many of the inhabitants. It is considered that it is most important that not only should all back-to-back houses be abolished, but that every dwelling should have adequate bedroom accommodation separate from the day-room or kitchen. In Hartlepool, Consett, Hebburn, and Spennymoor, and in the Auckland, Chester-le-Street, and Houghton rural districts, a large number of insanitary dwellings are reported to exist, which require to be dealt with under the Housing of the Working Classes Act. The sanitary authorities have difficulty in enforcing that Act, owing to the great overcrowding of dwellings already prevailing in these districts, which would be aggravated by the closing of the insanitary dwellings.

PROPOSED KURSAAL AT WHITLEY BAY.—A meeting of tradesmen was held on the 10th inst. to consider the proposed Kursaal, which it is intended to build adjacent to Whitley Links. There was a large attendance. The Chairman explained that the object of the meeting was to consider the proposal of the promoters of the Kursaal that they should have exclusive use of the bandstand on the Links at the same terms which are at present paid by the pierrots, as, in their opinion, the presence of such entertainments in front of their building would be detrimental to the success of the scheme. After an animated discussion, it was decided that Messrs. Forbes, Wedderburn, R. H. Armstrong, and Menzies be appointed to wait on the Council and express the opinion of the meeting that, while every encouragement should be given to the promoters, they will see that provision is made elsewhere on the Links for open-air entertainments.

CHURCH HALL, WALLSEND.—In spite of the unfavourable weather, there was a numerous assemblage on the 10th inst. at the ceremony of laying a corner-stone in a new parochial hall at Wallsend. The ceremony was performed by Lord Armstrong, who delivered an address. The hall is situated in Durham-street, and is in connexion with St. Peter's Parish Church, of which the Rev. Canon Henderson is rector. There will be sitting accommodation for 500 persons. On one side will be a number of class-rooms, and an institute, with reading and billiard-rooms, will be attached, together with sitting-rooms, vestry, and accommodation for the caretaker. The total cost will be about 2,600*l.*, of which nearly 1,000*l.* has been received or promised. The architect for the hall is Mr. B. F. Simpson, of Newcastle, and the contractor is Mr. John Potts, of Wallsend. The site was given by Mr. R. R. Dees.

HIGH LEVEL BRIDGE, NEWCASTLE-ON-TYNE.—On the 10th inst., some members of the Newcastle Association of Engineers visited the works of the new high level bridge the North-Eastern Railway Company are building across the river Tyne. At the same time, the unpleasant weather did not divest the occasion of either its interesting or informative character, for the making of the new bridge is an enterprise of such magnitude and skill as to be attractive to most people, whether they be engineers or not. The viaduct, which is to link the main railway lines on both sides of the Tyne in a more direct fashion than hitherto, and so relieve the increasing congestion of traffic on the present High Level Bridge, has been described in detail on several occasions. That it is to be some 1,500 ft. in length; that it will be a steel girder bridge supported on many arches and four piers—three of which are to be founded in the river bed; that it will cost half a million pounds; that it constitutes the biggest bridge contract since the erection of the Forth Bridge; and that it is anticipated it will lead to a saving of 20,000*l.* a year in locomotive power when it is finished, are all statements which have a ring of familiarity about them. What is perhaps more to the point is the progress made with the undertaking, and that the engineer students had the opportunity of seeing, under the guidance of Mr. Charles Harrison, the designer of the bridge and chief engineer of the North-Eastern Railway; Mr. C. F. Dixon, managing director of the Cleveland Bridge and Engineering Company—the constructors of the bridge; Mr. F. W. Davis, another director of the company; and Mr. C. R. S. Kirkpatrick. The latter are the builders' resident representatives. The visitors started from the north side, where the piers to carry the girders through the Forth Goods Warehouses are up practically to the level of the girder beds. The cellars of the warehouse had to be underpinned, and this little bit of business consumed five million bricks—all within the narrow space bounded by the Carlisle line and the south wall of the warehouse. Preparations are going on now for taking down the necessary portion of the warehouse south wall, which is on the site of the abutment for the Pottery-lane approach. From Pottery-lane down to the land abutment—which is on the verge of the slope to the river edge—the ten arches required have been finished up to the top. As to the north pier in the river, the temporary staging for constructing and dealing with the caisson that plays so important a part in the foundation work has been begun. So far as the centre pier is concerned, the staging is up, and the huge steel caisson—113 ft. by 35 ft., and having a shape which has been not inaptly described as that of an inverted pie-dish—is being constructed. It is to be sunk to a depth of 69 ft below high-water level. That for the south pier foundation has already been sunk 59 ft. below high-water mark, and it is progressing downwards, through the operations of the excavators who work in its ingenious air chambers, its own cutting powers, and the assistance of hydraulic jacks, about 10 in. a day. Each caisson will weigh about 500 tons, but the pressure of compressed air in the working places tends to keep it buoyant, and so its progress to the bed rock of the river is aided by filling it with concrete. The south caisson at the present time contains 7,500 tons of this compound, and when it has advanced sufficiently it will be completely filled with cement concrete, on the top of which the granite pier is to rise 83 ft. That process will, of course, be adopted in the case of the other pair of caissons. Originally there were to have been eight arches on the Gateshead side, but four are to be substituted by a pier. The discovery of faulty strata has led to this modification. Then, too, some very ancient coal workings—supposed to be of Roman origin—were found, though they were not disclosed by the borings first taken. However, they had to be dealt with, and something like 700,000 bricks put in to make things secure. That fact accounts for the delay there has been in raising outward signs of the work on the south bank of the Tyne. All the same, very valuable labour has been going on, and some of the arches are beginning to receive attention now. A novelty for Tyneside will be supplied by the contractors in the shape of a transporter cable railway with 1,520 ft. span. This will be supported on two towers, on opposite shores of the river, each 120 ft. high. The main cable, which weighs 10 tons, and is to carry 10 tons weight in the centre, is being made by Messrs. T. and W. Smith, Newcastle. When loaded the cable, which will be used for sending out materials to the river piers, will sag 75 ft. out of the horizontal. Next week the building of the towers will be started.

LIVERPOOL.—The Harbreck Estate at Fazakerley, on which the Corporation are building a hospital at a cost of 130,000*l.*, is perhaps one of the most interesting in the vicinity of Liverpool. A mansion on the grounds, which has been considerably extended in order to form an administrative department for the smallpox pavilions already existing, was long in the occupancy of the family to which Mr. Justice Walton belongs. There are still a spacious kitchen garden and a vinery. The garden is enclosed by high walls, which are covered with neatly trained and trimmed fruit trees; and, for the purpose of bringing the products of these to perfection, hot-water pipes are embedded in the walls. A complete change has been effected on the land attached to the institution in Mill-road, Old Swan.

COTTAGE HOMES, PONTELAND.—The opening of the new cottage homes erected at Ponteland by the Board of Guardians of the Newcastle Union was fixed to take place on the 17th inst. At 3 o'clock in the afternoon the guests were received at the entrance gates. The opening ceremony was afterwards performed in the schoolroom.

SANITARY AND ENGINEERING NEWS.

FORESHORE WORKS, SANDOWN, I.W.—The Works Committee recommended that the surveyor should be instructed to prepare plans and estimates for raising the Herne Hill groin level from the existing break in the height and for lengthening it either 25 or 50 yards.—The Chairman said the first intimation they had that it would be a benefit to raise the groin was when they heard about the Board of Trade making an order prohibiting the removal of sand from the shore. The impression in the town was that members wished to make the groin higher so as to collect more sand on the shore for builders to remove. It could not be contradicted that the shore was being very rapidly denuded of sand in certain places. One of the cries on which some members came to the Council was that of economy. Nobody had raised a question as to the inefficiency of the groin.—Mr. F. Colenutt argued that the groin had saved considerable expense in repairs to the Esplanade, which but for it would have been down. It was not quite safe even now, and he had always advocated carrying the groin further to sea. When the wind blew sand now went round the end of the groin by tons. It would be an advantage to lay out money there. The town got the benefit of the work done by the builders and of the material for making blocks. If the builders had to pay more for sand and shingle they would have to charge more for it.—The Chairman proposed the rejection of this recommendation, but it was not seconded.—Mr. Duff said if the builders used the material for houses they were mortgaged to the town as soon as built.—The recommendation was then adopted. —*Isle of Wight County Press.*

THE LONDON WATER SUPPLY.—From the recently published report on the metropolitan water supply, it is evident that the Thames water at the three intakes in the Hampton district was in good condition throughout the whole

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of the month of July. The average daily supply delivered from the Thames was 133,513,576 gallons; from the Lea, 47,115,216 gallons; from various springs and wells, 58,417,329 gallons; and from the ponds at Hampstead and Highgate 261,438 gallons, the latter being used for non-domestic purposes only. Estimating the population at 6,522,642, the daily consumption per head amounted to 36.69 gallons for all purposes. It is satisfactory to observe from the results of analysis that supplies furnished by the Southwark, Grand Junction, and Lambeth water companies contained smaller percentages of organic impurity than were present in June. Of supplies largely obtained from the River Lea, that of the New River company was clear, and contained only a small amount of organic matter; while that of the East London company was clear and of good quality, containing a smaller proportion of organic impurity than in June. The deep-well water furnished by the Kent company was perfectly clear and of high organic purity. As might be expected, the heavy rainfall of the month unfavourably affected the condition of the Thames for the operations of the companies deriving supplies therefrom, and the proportions of organic impurity were somewhat higher than are ordinarily found during the summer months. In the case of some companies, small amounts of suspended matters were occasionally present, these consisting chiefly of rust-stained particles, sometimes accompanied with diatoms and other minute organisms. On the whole, however, it appears to be clear that the metropolitan water supply was by no means in an unsatisfactory condition during the month in question.

FOREIGN.

FRANCE.—The municipality of Neuilly has lately organised a competition among the gardeners of the locality, premiums being given the most beautifully kept and laid-out gardens. ——A new Mairie, from the designs of M. Langlois, has been opened at Orly.——The remains of a Gallo-Roman villa, decorated with fresco, have been discovered in the neighbourhood of St. Flour.——The Government has scheduled among Monuments Historiques a small fort at Camaret (Finistère), which was constructed by Vauban.——M. Virello has been appointed the architect to carry out some important alterations to the municipal Casino at Nice.——A large lunatic asylum is to be built in the Department of Saône-et-Loire.——The jury in the competition opened by the municipality of Limoges for a new Circus has awarded the execution of the work to M. Emile Robert, of Clamart; and the second premium to M. Deperthes (Paris).——The authorities of Auxerre have opened a competition for a new savings-bank building.——M. Kruger, the City Architect of Montpellier, has been commissioned to carry out a new lycée at an estimated cost of 2 million francs.——The Musée des Monuments Historiques at Mans has been opened. It occupies the crypt of the ancient chapel of the Comtes des Mans, which has been carefully restored.——A statue to Berlioz has been erected at Grenoble; the sculptor is M. Urbain Basset.——At Lille all the fortifications are to be demolished between the Porte d'Ypres and the Porte Louis XIV., in order to enlarge various barracks, the general hospital, and the railway station.——The "Autumn Salon" is to open at the end of October, in the ground-floor galleries of the Petit Palais.——M. Jules Pray has been appointed architecte-en-chef to the Prefecture of Police, in place of the late M. Bunel. M. Pray already held an important place in the service of the Prefecture.——A monument to Renan was inaugurated last Sunday at Tréguier. It is the work of M. Jean Boucher, whose fine group, "Antique et Moderne," was published in the *Builder* of July 15, 1899. Renan is represented seated, in a meditative attitude, on a stone bench. Behind him is a figure of Pallas holding above his head a branch of laurel. The pedestal, in green Kersanton granite, has been designed by M. Sénot.——An old house at Alençon, known under the name of "Maison d'Ozé," has been scheduled among Monuments Historiques.——The Municipal Council of Cherbourg has decided on undertaking some important operations with the object of bringing into the town the waters from the spring in the valley of Cherbourg, to replace the supply from the waters of the Divette. The cost of the work is estimated at 2,600,000 francs.——M. Berlier, the engineer, has submitted to the Municipal Council of Lyons a scheme for a city railway which will cross the Rhone twice, starting from and returning to the Gare de Perrache.——We have to record the death of M. Hector Riondel, architect, of Grenoble, a former pupil of Questel, with whom he worked in the carrying out of the Grenoble Museum. He took part also, under M. Daumet, in the building of the Palais des Facultés, and carried out the restoration of the Palais de Justice at Grenoble. M. Riondel carried out a good many buildings in the Department of the Hautes Alpes, and was the founder of the architectural societies of Dauphiné and Savoy, of which he was at one time President. He had been for twenty years a member of the Société Centrale des Architectes. ——The death is announced also of the following French painters: Louis Auguin, landscape-painter a pupil of Cogniet and Corot, who died at Bordeaux at the age of 79; Paul Gaugain, landscape-painter (at Tahiti, aged 52): Charles Klein (at Lunéville); and Alphonse Montluçon, flower-painter (aged 42).

MISCELLANEOUS.

RECLAMATION WORKS IN THE IONIAN ISLANDS.—Dr. Napoleon Zambelli, a distinguished lawyer, and one of the principal inhabitants of Corfu, died a few years back, and bequeathed a sum of 20,000*l.* for the purpose of draining several small lakes and swamps in the vicinity of the town, and also nominated a committee to carry out his wishes. It was decided to commence the work at lakes Krevatsoula and the Val di Ropa, the former to cost 1,000*l.* and the latter 5,000*l.*, the original idea being to reclaim 25 acres at Krevatsoula and about 1,500 acres at the Val di Ropa, besides considerably larger areas which from an agricultural point of view would, it was hoped, be rendered more fit for cultivation. The work was greatly delayed owing to rainy seasons, but it is now considered probable that it will be completed before another year is entered upon. Mr. Frederick Simmons is the resident chief engineer of Zambelli's Trust, and he reports progress up to date as follows:—At the Val di Ropa, which is the largest plain in the island, the work of draining is completely finished, only a masonry bridge remaining to be built to carry an important highway over the canal. The drainage of this pestilential swamp is perfect, and has considerably improved the climate of the surrounding country. No single case of malarial fever has appeared as yet this year in the many villages in the vicinity, whereas for many years past the suffering has been great. By this work about ten square miles of good land has been made available for cultivation; about half of this is splendid land for cotton growing, and the remainder for cereals. I have reason to believe that there is a scheme in Corfu for cotton cultivation at this place. This business, if properly managed, is bound to be successful, and would employ a great deal of labour. Altogether about 28 miles of canals have been made at the Val di Ropa for drainage purposes, and, to connect the land cut up by the canals, 29 bridges of iron and stone have been constructed, besides basins for cattle to drink at, and masonry work of other descriptions. Ropilla Basin, situated about one hour's drive from Corfu on the Val di Ropa road, consists of six distinct swamps, all highly dangerous to health. Work is now proceeding at these swamps, and will, I estimate, be finished at the close of the present year (1903). There is no outlet to the sea at any of these places, and the drainage is difficult on that account; but by boring into the surrounding hills I have been fortunate enough to discover natural fissures in the rock, called in Greek Katavothras, into which the water will be led by canals. The drainage of this basin will free a large area of land for cultivation, and improve the general conditions of health. The Krevatsoula (Govino) swamp has proved very difficult to drain, on account of its small elevation above the sea. When the water was let off last year the whole area of the bottom sank some two feet. This has made it necessary to fill it in with earth, and this work is being now proceeded with, and will be finished probably in October. This earth covering will not prevent malarial exhalations for a year or two yet, so the local climate will not be entirely free from fever for that period. The land is favourable for cotton cultivation.

THE "HISTORICAL ENGLISH DICTIONARY" MEMORIAL.—The setting up of a memorial in honour of the labours of a lexicographer, however eminent, in his own life-time, is an event of rare occurrence. We are glad to hear, however, that Mr. T. E. Collcutt, who, we believe, is an "Old Mill-hillian," has made the plans and designs of a memorial that is being erected in the grounds of Mill Hill school, near Hendon, Middlesex. The memorial occupies the site of the original scriptorium in which Dr. Murray, of Oxford, when a master in the school, applied himself to the inception and first beginnings of the New (Historical) English Dictionary.

A NEW METHOD OF JOINTING AND SUPPORTING TRAMRAILS.—In ordinary practice some form of the well-known fish-plate joint is adopted for tramway rails, but electrically-welded joints are now being introduced with satisfactory results in Leeds and elsewhere. With either type of joint the use of tie-bars is necessary to preserve uniformity of gauge, and considerable care has to be taken to prevent the lateral movement which is so detrimental to the life of the rails, besides tending to cause the displacement of street paving. The method to which we now direct attention has been patented by Messrs. W. C. Sample and W. R. Binney, both of whom are members of the City Surveyor's staff, Sheffield, and have had considerable experience in laying out tramway rails in that city. The system may be thus described:—A transverse girder carrying two plates passes across the under side of the tram rails at every joint and at an intermediate point in each length of rail. The plates in turn support and are secured to the tram rails at the joints, and also at the centre of the rails, which may be of any length and laid to any required gauge. The plates on the transverse girders are bolted or rivetted thereto before delivery on the site of the works. The necessary bolt or rivet holes are drilled or punched in the plates, girders, and tram rails in their correct positions at the maker's yard, so that no drilling of holes on the site of the works need be necessary. In double junctions and on curves, where the joints of the tram rails do not come opposite one another, each transverse girder need not be longer than may be requisite to provide for a double rail joint, or for one joint only. Similarly, when the plates have to support points as well as rails, they may be varied in shape and size, and the transverse girder may be arranged to carry more than two plates. As the girders are of I-section they are of great rigidity, and afford a secure support for the rails, both at the joints and at intermediate positions. The girders are embedded in concrete in the bed of the track, and it is believed by the patentees that their system will tend to remove some of the practical difficulties connected with permanent way construction.

LONDON UNITED ELECTRIC TRAMWAYS.—Important as the existing developments of electric tramways in the west of London may be, the extensions authorised and proposed will have a much greater influence upon the traffic facilities in the metropolitan district. As our readers are aware, the sections of the system already open for traffic include the lines between Shepherd's Bush and Southall; Shepherd's Bush and Hounslow; Shepherd's Bush and Twickenham, Hampton, and Hampton Court Palace; Hammersmith Broadway and Hounslow; Hammersmith and Twickenham, Hampton, and Hampton Court Palace; Richmond Bridge and Twickenham; Teddington, Kingston Bridge, and Hampton Court Palace; and Kew Bridge and Richmond. The authorised extensions include lines from Acton to Willesden; Southall to Uxbridge; Hammersmith to East Acton; Richmond to Hammersmith Bridge, via Barnes and Mortlake; Hounslow to Cranford; Hounslow to Kempton Park; Twickenham to Kempton Park; Hampton to Molesey, Thames Ditton, Surbiton, Talworth, and Hook; Kingston to Surbiton; Kingston to Kingston Hill; and Kingston to Tooting, via New Malden, Raynes Park, and Wimbledon. Further, it is proposed to continue the line from Cranford as far as Slough and Maidenhead, and the line from Hounslow to Staines and Virginia Water. Although the routes in question may not be altogether pleasing to residents in the districts named, they will undoubtedly be of immense service to the population of London as a whole, and will act as valuable feeders for the various branches of the Metropolitan District Railway, and the existing as well as projected electric subways, thereby affording direct means of communication between places which are at present connected by the most circuitous and inconvenient routes.

SOME ITALIAN IMPORTS AND EXPORTS.—The accounts of the port of Genoa, just published officially, show that in the year 1902, 11,668 tons of bricks and tiles were imported from the United Kingdom. On the other hand, 120 tons of worked marble and alabaster were exported from Genoa to the United Kingdom. At the port of Spezia the imports included 225 tons of firebrick and tiles from the United Kingdom, whilst the exports to the United Kingdom included 1,235 tons of marble, 638 tons of stone for building and paving, and 909 tons of terra-cotta tiles and hollow bricks. At the port of Savona the imports of bricks and tiles from the United Kingdom fell from 854 tons in 1901 to 427 tons in 1902, and this decline is attributed entirely to German competition. The exports from Savona included 1,695 tons of granite squared blocks to Gibraltar for use in some special buildings there.

ANTIQUARIAN DISCOVERY.—A prehistoric British barrow was opened recently at Martinstown, Dorset, under the supervision of Mr. St. George Gray, curator of the Taunton Museum. There were disclosed worked flints and several interments. In the centre of the barrow was found a large British urn inverted on a slab of stone, covering some cremated remains which had been wrapped in a rough material of cloth or rushes, the texture of the weaving being still

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traceable. A quantity of other pottery was also unearthed. In another barrow close by have been found a vase and a bronze knife with a portion of a willow handle.

ST. THOMAS' CHURCH, PORTSMOUTH.—The parish church of St. Thomas, Portsmouth, which, owing to its condition, had some time since to be closed, has been inspected by Mr. Jackson, the diocesan architect, upon whose recommendation an extensive scheme of renovation is to be carried out. It is anticipated that the approximate cost will amount to upwards of 4,000*l.* The church, a portion of which was built in the twelfth century, possesses numerous features of historic interest, and in the chancel is a monument to George Villiers, Duke of Buckingham, who, in August, 1628, was assassinated at the entrance to a house in High-street, Portsmouth.

DISCOVERY OF CINERARY URNS.—A discovery of considerable interest has been made at Braintree in the course of excavating a field for building purposes. A workman's pickaxe came in contact with some pottery, about 2ft. below the surface, which proved to be two cinerary urns of great antiquity. One, which was unfortunately broken by the pickaxe, contained a quantity of fragmentary bones, undoubtedly human. This urn is of elongated form and unornamented. The second urn is globular in shape, and ornamented with ribbed bands, and bears an inscription which has yet to be deciphered. The second urn, which contained nothing, was taken out of the earth in an excellent state of preservation. In the absence of expert opinion, the period to which the urns belong is problematical. It is significant, however, that the spot from which they were taken is quite close to the supposed site of an ancient lake dwelling. —*The Times.*

ARCHITECTURAL EDUCATION IN LEEDS.—Following the example of Manchester and Liverpool, Leeds is making an endeavour to constitute itself a centre of architectural education. The movement is owing mainly to Mr. Butler Wilson, the present energetic president of the Leeds and Yorkshire Architectural Society. There are no funds at present to found a Chair of Architecture in Leeds, but a combined course of architectural studies has been framed by utilising the classes of existing institutions and making their teaching part of a system under the conduct of the Leeds and Yorkshire Architectural Society. Engineering subjects will be taught at the Yorkshire College, the preliminary course of design will be taken at the Leeds Institute, and the advanced course of design at the Architectural Society's rooms. A definite programme of studies has been made out, and classes are provided for the whole of the subjects included in the Institute of Architects' Intermediate Examination. The Leeds and Yorkshire Architectural Society and the architectural students of the district ought to feel grateful to Mr. Butler Wilson for the enlightened efforts which he has made to promote the study of architecture.

CAPITAL AND LABOUR.

NEWCASTLE BUILDERS' LABOURERS' WAGES.—A meeting of the Town Improvement Committee of Newcastle Corporation was held on the 9th inst. A deputation representing the Labourers' Union waited on the Committee with reference to the wages allowed to their members for demolishing houses on the Quayside for the purpose of widening that part of the city. At present the Corporation were paying 5¾d. per hour, whilst for similar work, it was declared, the Master Builders' Association of the city were paying 6½d. per hour. On the other hand, the City Engineer intimated that he was informed 5¾d. per hour was the standard wages. It was decided by the Committee to make inquiries of the Builders' Association, and ascertain definitely what really was the amount paid by the members for the work.

SUNDERLAND JOINERS' DISPUTE.—At a conference of the Northern Centre of Building Trade Employers and the executive committees of the Amalgamated and the Associated Societies of Carpenters and Joiners held at Leeds, both parties agreed to ask the Board of Trade to nominate an arbitrator to adjudicate upon the Sunderland joiners' dispute.

LEGAL.

ANCIENT LIGHT DISPUTE, RICHMOND.

THE case of the London Property Investment Trust (Limited) v. the Corporation of Richmond and Gosling and Son came before Mr. Justice Bucknill, in the Vacation Court, on the 16th inst. on the application of the plaintiffs for an interim injunction to restrain the defendants from building so as to obstruct the plaintiffs' ancient lights. The case was reported in the issue of *The Builder* for September 12.

On the case being called on, his Lordship said he had read the papers, and should like to ask the learned counsel appearing for the plaintiffs what the urgency of the matter was.

Mr. Mulligan, K.C., in support of the motion, said that the defendants gave an undertaking last week not to build higher between then and that day. The matter was urgent. If his learned friend appearing for the defendants was willing to extend that undertaking till the trial, he was willing to allow the present motion to stand till the trial.

Mr. Bramwell Davis, K.C., for the defendants, said he had a complete answer to the plaintiffs' case. He wished, however, time to answer the plaintiffs' affidavits which had been filed, and suggested that the motion should stand over till next Wednesday.

His Lordship assented to this.

Mr. Bramwell Davis said that if his learned friend was right on the point of law which was raised there could be no doubt that there was some interference with the plaintiffs' light The defendants' case, however, was that the plaintiffs' lights were not ancient lights at all. Another point was that certain open spaces were Crown lands, and that plaintiffs could not get any rights to light as against the Crown.

His Lordship intimated that if the plaintiffs pressed on the application he would fix a special day for hearing the motion if need be.

AT Westminster, the London County Council recently proceeded by summons against Alfred Curphey, of 28, Victoria-street, Westminster, for erecting a building without first having obtained the approval of the central authority. Mr. Daldy was counsel for the L.C.C.; Mr. Lawless for the defendant. A temporary wooden structure was put up in June last at the rear of the defendant's premises to shelter a railway model with a system of automatic signalling. The defendant obtained the usual certificate from the Westminster City Council, but the County Council intervened and said that body was the authority in such matters. The defendant had written expressing his willingness to take out any licence that might be required, and stating that he had every desire to abide by the requirements of the Building Act. After consulting a cited case, his Worship dismissed the summons, with 10*l.* 10s. costs against the London County Council. Mr. Daldy asked for a case to be stated, and the magistrate agreed.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

25,548 of 1902.—J. PERRY: *Chimneys.*
A ventilator for use with chimneys and for other ventilating purposes, consisting of a rotating top having a vane at one side and an open mouth at the other, with an extension directed upwardly or downwardly inside the top, the mouth being directed always against the wind.

18,308 of 1902.—R. STANLEY: *Apparatus for Use in Connexion with the Manufacture of Sanitary and other like Pipes.*
This invention relates to the manufacture of sanitary pipes, cable conduits, or the like, moulded from plastic clay by an extrusion press, and it consists of apparatus for grooving the interior of the socket of the pipe for keying the cement at the junction of the pipes when being laid. For the purpose of forming these grooves in the socket, rings are employed inside the inner die ring of the socket die, said rings, according to one form of this invention, being continuous rings, or according to another being divided each into any convenient number of segments—from two upwards; which rings by suitable means are caused to be forced into the substance of the pipe socket which is still within the socket die from slots in the die ring. It is desirable that the pressure applied to the clay cylinder above should be released before this stage, such as by withdrawal of the catches holding up the table (if the latter has not yet descended). The operation of impressing the die rings into the pipe socket might, however, be performed either during the extrusion of the pipe or after the same.

18,607 of 1902.—A. MUSKER: *Hydraulic Machinery for Making Artificial Paving Slabs and similar Blocks.*
Machinery for manufacturing artificial paving slabs of cement, concrete, or the like, wherein the pressing of the concrete is effected by a hydraulic ram, the pressure water to the cylinder of which is directly forced by a pumping-engine; and wherein a revolving or reciprocating multiple mould or mould carrier is employed, the operating means of which, and the means for effecting the return stroke of said ram, or either of them, being operated by means separate from and other than said hydraulic service; whereby a rapid action and output is claimed to be obtained, and at the same time obviating the employment of an "accumulator" and "intensifier," or like hydraulic apparatus.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

19,397 of 1902.—F. RUSSELL: *Weather-casing Bricks.*
A brick for building in new walls or casing of old or new walls, made of any material for either outside or inside walls, with or without alternative dovetailings, notchings, and groovings to secure the adherence of mortar, with a specially-shaped base top and angle brick, and to be fixed with or without nails and with or without a projecting ledge for insertion in the mortar course of existing brickwork, to be built into or upon any wall with alternative top and finishing course and alternative provision for the angle pieces, to be made with or without closure pieces attached.

20,222 of 1902.—W. F. STANLEY: *Means for Fixing Stone Skirtings to the Walls of Buildings.*
The use in combination with stone skirtings for buildings of a metal tongue fitted into a groove made for its reception in the stone and screwed to a metal plate fixed in the wall behind, for the purpose of fixing the said stone skirtings.

22,546 of 1902.—G. DE LA PUENTE: *Apparatus for Raising Water.*
Apparatus for raising water by means of compressed air, consisting essentially of a submerged closed chamber containing a float, and provided with non-return water admission and water delivery valves, and means for the supply of air under pressure, in combination with a relief valve for the air adapted to be closed and opened by the rising and falling of the float.

22,734 of 1902.—H. K. G. BAMBER: *Manufacture of Portland Cement, and an Apparatus therefor.*
The object of this invention is to effect the more speedy evaporation of the water in the slurry and also to absorb the heat of and to cleanse the gases escaping from the rotary kiln, thereby economising fuel. According to this invention, the slurry is delivered in an atomised condition into the upper or drying end of the rotary kiln, where it comes in contact with the escaping gases, absorbing heat and cleansing them of coal dust or other suspended matter, which is thereby carried to the combustion end of the kiln. This may be accomplished by forcing the slurry through a tube, preferably water jacketed, at the end of which is a spreading nozzle, or the slurry as it is delivered from the tube may meet a jet or jets or air, or may be projected from a nozzle against a spreader.

22,805 of 1902.—O. HEISE: *Impregnation of Wood.*
A process for the uniform impregnation of wood with any desired quantity of tar oil, which consists in forcing the desired quantity of oil into the wood, and subsequently causing it to penetrate by the application of steam pressure.

23,286 of 1902.—L. SCHLENTHEIM and DIESPEKER, LTD.: *Wood Blocks for Flooring.*
A wood block for flooring, having inclined sides and ends each side and each end consisting of two planes inclined to one another (the corresponding plane of each side and of each end being parallel) and either with or without an inclined groove in its under surface by which a block may be keyed down by mastic.

23,422 of 1902.—C. NATHAN: *Bricks for Building and Other Purposes.*
A building system characterised by the interlocking of each endways contiguous and also each sideways contiguous stretcher with the header in such a manner that each header receives in its basal groove the contiguous end projections of two stretchers and the middle projection of one stretcher, and in its upper transverse grooves the tongues of the sideways contiguous stretchers of the next row whereby every brick is absolutely locked in its place independently of the mortar.

10,529 of 1903.—A. W. COOKSEY: *Radiators and the Like for Heating Buildings.*
This invention relates to radiators and the like in which the heated air is delivered through more or less vertical pipes or conduits into the room or space to be heated, the outlet ends of the said pipes or conduits being at the upper part of the apparatus, but it is also applicable to other forms of radiators. When radiators (more especially those of the kind above referred to) are situated near the wall of the room, the part of such wall above the outlet of the radiator soon becomes discoloured and unsightly, and the principal object of this invention is to obviate this objection. For this purpose the top of the radiator is furnished with a deflector or hood, consisting of a segmental or other conveniently shaped plate of iron or other metal, with closed ends, and furnished with flanges or other suitable means of removable connexion with the upper part of the radiator, the mouth or opening of the hood being more or less at right angles with the top of the radiator.

14,075 of 1903.—J. KEUSEN: *Adjustable Stove Pipes.*
This invention relates to stove pipes constructed in such a manner that the stove pipe can be easily adjusted to any required length without cutting it off. The invention consists in the combination of two pipes of different diameter one

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telescoped into the other, an outwardly bent flange at the other end of the inner pipe, and an inwardly bent edge at the corresponding end of the outer pipe, and semi-circular outcuts in the flange and edge.

22,640 of 1902.—C. SHOWELL: *Casement Opening and Closing Mechanism.*

This invention relates to casement opening and closing mechanism, and refers more particularly to the construction and controlling of the arm by which the adjusted position of the casement is secured. Usually this arm is toothed on the inside, while its upper side has been held downwards by means of a flat roller. This has permitted an undesirable amount of side play and looseness, which this invention is intended to remedy. In this invention the back of the arm is made V shaped, or it may have a central V or similarly shaped groove, and with either of these, a controlling pulley is carried upon framework of the fitting; consequently the usual side-play to the arm is entirely prevented.

22,403 of 1902.—T. W. ROGERS: *Trapped Gullies.*

This invention relates more particularly to that type of water gullies that are known as yard gullies, namely, gullies that are fitted with a grid and are set at or near the level of the ground, and are adapted to receive one or more waste pipes from a house. This invention consists mainly in constructing the grid of the gully so that all the waste or other pipes pass vertically through the grid instead of horizontally through the sides of the pan or box of the gully, thereby enabling the gully to be placed close to the sides of the house or wall, and to give the waste pipes a vertical discharge into the trap, which makes the trap selfcleansing, and to construct the gully-box or pan without any branches. To this end the grid of the gully is constructed in two parts, one part, namely, the part next to the house or wall, is provided with lugs to fit lugs on the other part, and on the centre or meeting line of the two parts holes are provided adapted to receive the various waste pipes or waste pipe as the case may be.

MEETINGS.

SATURDAY, SEPTEMBER 19.

Northern Architectural Association. — Excursion meeting, Sunderland. Members to assemble at Sunderland Station at 3.11 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

September 8.—By A. E. GREEN & Co.

Shipley, Sussex.—Batchelor's Farm, 41 a. 3 r. 31 p., f.	£1,250
Billingshurst, Sussex.—Five Oaks, enclosure of land, 10 a. 2 r. 23 p., f.	300

By HAMMERSLEY, KENNEDY, & Co.

Peckham.—55, 57, 59, and 61, Toppesfield-rd., u.t. 73 yrs., g.r. 16*l.* 16*s.*, w.r. 145*l.* 12*s.*	900

By FRED. WARMAN.

Highbury.—102, Highbury New Pk., u.t. 46 yrs., g.r. 22*l.* 10*s.*, p.	1,186
Canonbury.—13, Marquess-rd., u.t. 41½ yrs., g.r. 10*l.*, e.r. 70*l.*	550
Highgate.—7, Whitehall Pk., u.t. 84½ yrs., g.r. 9*l.* 9*s.*, p.	800

By AMEY BROS. (at Catford).

Brockley.—68, Darfield-rd., u.t. 74¼ yrs., g.r. 4*l.*, w.r. 36*l.* 8*s.*	278
Catford.—137, Glenfarg-rd., u.t. 992 yrs., g.r. 3*l.* 16*s.* w.r. 27*l.* 6*s.*	190
103, 105, and 107, Sandhurst-rd., u.t. 992 yrs., g.r. 11*l.* 8*s.*, w.r. 74*l.* 2*s.*	515

September 9.—By MARK LIELL & SON.

Bromley-by-Bow.—39 to 49 (odd), Gale-st., u.t 56 and 38½ yrs., g.r. 17*l.* 5*s.*, w.r. 140*l.* 8*s.*	360
14 to 20 (even), Box-st., u.t. 39½ and 67 yrs., g.r. 13*l.*, w.r. 114*l.* 8*s.*	240
Canning Town.—1, West-rd. (S.), u.t. 77 yrs., g.r. 3*l.* 7*s.* 2*d.*, y.r. 40*l.* 6*s.*	145

By A. PREECE & SON.

Islington.—8, Vincent-ter., f., y.r. 45*l.*	680
St. John's Wood.—14, Loudoun-rd., u.t. 22 yrs., g.r. 12*l.*, y.r. 80*l.*	600
Clapham.—22, Wirtemberg-st., u.t. 54½ yrs., g.r. 5*l.*, w.r. 36*l.* 8*s.*	335

By SIDDONS, WADE, & Co.

Erith, Kent.—4 to 8, Glendale-rd., f., w.r. 110*l.* 10*s.*	1,250
23, 24, 27 to 30, Erith Villas, u.t. 45 yrs., g.r. 3*l.* 10*s.*, w.r. 187*l.* 4*s.*	1,200
1 to 5, Crayford Villas, u.t. 45 yrs., g.r. 2*l.* 14*s.*, w.r. 156*l.*	975
Belvedere, Kent.—15 to 21, 31 to 39 (odd), 18 to 24 (even), Poplar Mount, f., w.r. 304*l.* 4*s.*	3,475
46 to 50 (even), Stanmore-rd., f., w.r. 156*l.*	1,810
25 to 59 (odd), Horsa-rd., f., w.r. 448*l.* 8*s.*	4,710
Brook-st., Ivy Cottage, f., e.r. 27*l.* 6*s.*	260

September 10.—By H. V. CHEW.

Leytonstone.—6, Queen's-rd., f., y.r. 36*l.*	525
Lemna-rd., Mosborough, u.t. 79 yrs., g.r. 12*l.*, e.r. 66*l.*	525

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 0	per 1,000 alongside, in river
Rough Stocks and Grizzles.....	1 13 0	" " "
Facing Stocks....	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 10 0	" at railway depôt
Red Wire Cuts ..	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6	9 per yard, delivered.
Thames Ballast	6	0 " "
Best Portland Cement	30	0 per ton, delivered.
Best Ground Blue Lias Lime..	20	6 " "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	12s. 6d. per yard, delivered.
Stourbridge Fire-clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1	6½ per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1	8½ " "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2	1 " "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2	2½ " "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt
Beer in blocks	1 6	" "
Grinshill " ...	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1¼ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry.dep.
20×12 " " " ..	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc ..	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green....	15 2 6	" "

PRICES CURRENT (*Continued*).

SLATES.

in. in.	£ s. d.	
20×12 best Eureka unfading green....	17 2 6	per 1000 or 1200 at ry.dept.
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	£ s. d.	£ s. d.	
	At per standard.		
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0	
Deals: best 3 by 9.....	14 10 0	15 10 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0	
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.	
Deals: seconds	1 0 0	less than best	
Battens: seconds	0 10 0	" "	
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0	
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0	
Foreign Sawn Boards—			
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.	
¾ in.	1 0 0	"	
	At per load of 50 ft.		
Fir timber: Best middling Danzig or Memel (average specification	4 10 0	5 0 0	
Seconds	4 5 0	4 10 0	
Small timber (8 in. to 10 in.)	3 12 6	3 15 0	
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0	
Swedish balks	2 15 0	3 0 0	
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0	

JOINERS' WOOD.

	At per standard.		
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0	
3 in. by 9 in.	21 0 0	22 10 0	
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0	
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0	
" " 3 in. by 9 in.	17 10 0	19 0 0	
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0	
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0	
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0	
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0	
Do. 3 in. by 9 in.....	18 0 0	19 10 0	
Battens.....	13 10 0	15 0 0	
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0	
Do. 3 in. by 9 in.	14 10 0	16 0 0	
Battens.....	11 0 0	12 10 0	
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0	
Do. 3 in. by 9 in.	13 0 0	14 0 0	
Battens	10 0 0	11 0 0	
White Sea and Petersburg:—			
First white deals, 3 in. by 11 in.	14 10 0	15 10 0	
" " 3 in. by 9 in.	13 10 0	14 10 0	
Battens.....	11 0 0	12 0 0	
Second white deals 3 in. by 11 in.	13 10 0	14 10 0	
" " " 3 in. by 9 in.	12 10 0	13 10 0	
" " " battens.....	9 10 0	10 10 0	
Pitch-pine: deals	16 0 0	18 0 0	
Under 2 in. thick extra	0 10 0	1 0 0	
Yellow Pine—First, regular sizes ..	33 0 0	upwards.	
Oddments	22 0 0	24 0 0	
Seconds, regular sizes	24 10 0	26 10 0	
Yellow Pine Oddments	20 0 0	22 0 0	
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6	
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6	
Small " "	0 2 3	0 2 6	
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6	
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8	
¾ in. do. do.	0 0 6½	- - -	
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11	
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0	
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0	
Teak, per load	17 0 0	21 0 0	
American Whitewood Planks— Per ft. cube	0 4 0	- - -	
Prepared Flooring—	Per square.		
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6	
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0	
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6	
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6	
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0	
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6	
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6	
1 in. by 7 in. do. do. do.	0 14 0	0 18 0	
¾ in. by 7 in. white do. do.	0 10 0	0 11 6	
1 in. by 7 in. do. do. do.	0 11 6	0 13 6	

6-in. at 6d. to 9d. per square less than 7-in.

[*See also page 305.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITION.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Reconstruction of Cattle Market	Governors Wakefield Charities	50 guineas and 25 guineas	Dec. 1

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
*Rebuilding House, Butcher-row, Ratcliff, Stepney, E.	Messrs J. Symons & Co., Ltd.	C. Dunch, Architect, St. Clement's House, Lombard street, E.C.	Sep. 21
*Road-making and Paving Works	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	Sep. 22
Laundry, &c., at Hospital, Poulton	Dover Town Council	H. E. Stilgoe, Civil Engineer, Town Hall, Dover	do.
Street Works	Andover Corporation	T. E. Longman, Town Hall, Andover	do.
House, Sedbergh	Lancaster Banking Co., Ltd.	J. Parkinson, Architect, 67, Church-street, Lancaster	do.
Reservoir, White Loch, Mearns	Stewarton (N.B.) Town Council	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	do.
Forty-three Houses, Abertridwr	.....	G. A. Lundie, Architect, Queen-street, Cardiff	do.
Three Houses, Hullen Edge-lane, Halifax	.....	F. H. Beaumont, Architect, Southgate Chambers, Halifax	do.
Tenements, Adelphi and other streets	Glasgow Corporation	City Engineer, 64, Cochrane-street, Glasgow	do.
Police Station, St. Andrew's-square	do.	do.	do.
Schoo's, Maindy, near Cardiff	Llandaff School Board	G. E. Halliday, Architect, 14, High-street, Cardiff	do.
Schools	Llangincke School Board	J. D. Rees, Architect, Ystalyfera, Wales	Sep. 23
Three Cottages, 72, 74, 76, Silk-street, Oldham-road	Manchester Corporation	City Architect, Town Hall, Manchester	do.
Road Works, Airedale-avenue and Compton-crescent	Chiswick U.D.C.	J. Barclay, Surveyor, Town Hall, Chiswick	do.
Paving Works, Back Wickham-street and others	Leeds Corporation	City Engineer, Municipal Offices, Leeds	do.
Road Works, Binchester Whins	Auckland Joint Hospital Board	C. Johnston, Surveyor, Cradock-street, Bishop Auckland	do.
Road Works, Marlborough-road	Cardiff Corporation	W. Harpur, Civil Engineer, Town Hall, Cardiff	do.
Additions to Lodge, People's Park	Limerick (Ireland) Corporation	W. M. Nolan, Town Hall, Limerick	do.
Twenty-nine Houses, Rowles-square, Rhymney, Wales	Victoria Building Club	W. H. Trump, Rhymney	do.
*Supply of White Flare Burnt Chalk Lime	Commercial Gas Company	Engineer, Company's Offices, Stepney, E.	do.
*Purchase of Retort Carbon	do.	do.	do.
*Purchase of Surplus Breeze	do.	do.	do.
Works at Schools, Saltash	.....	J. H. Pooley, 104, Fore-street, Saltash	Sep. 24
Road Works, Craig-Berthlwyd, Treharris	.....	W. Dowdeswell, Architect, Treharris	do.
Hall, Middleton, King's Lynn	.....	S. H. Hewings, 38, Saddlebow-road, King's Lynn	do.
Drainage Works, Lime Tree-place	.....	G. W. Lingwood, Surveyor, Station-road, Stowmarket	do.
Drainage Works, Wymington	Stowmarket (Suffolk) U.D.C.	Mark Sharman, 1, Harpur-street, Bedford	do.
R building Chimney at Dispensary	Bedford R.D.C.	K. Comerford, Union Offices, Kilkenny	do.
Street Works, &c. (Contracts 1, 2, 3.)	Kilkenny (Ireland) Guardians	T. J. Thomas, Surveyor, Drill Ground, Ebbw Vale	do.
Schoolroom at Chapel, Hendrefelin (Wales)	Ebbw Vale U.D.C.	T. Morgan, Penffyon, Pontrhydygroes	Sep. 25
Street Works, Lowther-street	.....	B. Ball, Civil Engineer, Town Hall, Nelson	do.
Road Works, New-street, near Barnsley	Nelson (Lancs) Corporation	P. A. Hinchcliffe, Architect, 14, Regent-street, Barnsley	do.
Schools, Crossness, Abbey Wood, Kent	Dodworth U.D.C.	W. Egerton, Architect, 12, Queen's-road, Erith	do.
Sewers, &c., New Swannington	Erith Education Committee	S. Turner, Surveyor, Avenue-road, Ashby-de-la-Zouch	do.
Converting St. James' Manse into Schools, &c.	Ashby-de-la-Zouch District Council	Geo. Reavell, Junr., Architect, Alnwick	Sep. 26
Wesleyan Church and Schools, Saltburn	.....	Garside & Pennington, Architects, Pontefract	do.
Reconstruction of Morton Bridge	.....	C. S. Allott & Son, Engineers, 46, Brown-street, Manchester	do.
Rebuilding the Cross Keys Inn, Skewen, Wales	Eccles (Lancs) Corporation	J. Cook Rees, Architect, Neath	do.
Two Cottages, Shenfield, Essex	Mr. E. E. Bevan	L. H. Marshall, Surveyor, Chippenham	do.
Broken Granite	.....	F. Slaughter, Surveyor, West-street, Shoreham	do.
Granite Road Metal, &c.	Shoreham (Sussex) U.D.C.	do.	do.
Pumping Station, Pigeon House-road	do.	G. Chatterton, Civil Engineer, 6, The Sanctuary, Westminster	do.
Ten Houses, Fochriw, Wales	Dublin Corporation	W. Walters, 5, Dynevor-street, Fochriw	Sep. 28
Seventeen Houses, Gilfach Bargoed	.....	W. Harris, Architect, Gilfach, Pengam	do.
Broken Granite Road Metal (600 tons)	Park Place Building Club	C. G. Mason, Civil Engineer, Tansgate, Guildford	do.
Sewerage Works, Ripley (Surrey)	Guildford Town Council	J. Anstee, Civil Engineer, Commercial-road, Guildford	do.
Private Improvement Works, Ivy-ter. & Terminus-rd.	Guildford R.D.C.	D. J. Bowe, Borough Surveyor, Town Hall, Eastbourne	do.
Clock Tower at Market Hall	Eastbourne Corporation	B. Ball, Civil Engineer, Town Hall, Nelson	do.
Portland Cement, &c.	Nelson (Lancs) Corporation	J. W. Webster, Engineer, High-street, Cowes	do.
Sewers, Clifton, York	Cowes (Isle of Wight) U.D.C.	Fairbank & Son, Civil Engineers, Lendal, York	do.
Schools, Maesycwmmer School Board	Visiting Committee	J. H. Phillips, Architect, Windsor-place, Cardiff	do.
Water Supply Works, Martock	Bedwas School Board	Bailey, Denton, & Co., Civil Engineers, 9, Bridge-st., Westminster	do.
Paving Works	Yeovil R.D.C.	G. W. Holmes, Civil Engineers, Town Hall, Walthamstow	Sep. 29
Fencing, &c., Whitefield Farm, Ogbourne St. George	Walthamstow U.D.C.	A. J. Hamp, Borough Surveyor, Town Hall, Swindon	do.
*Broken Granite	Swindon Corporation	Council's Offices, Hanwell, W.	do.
Wrought Iron Fencing	Hanwell U.D.C.	C. J. Gunyon, Civil Engineer, Town Hall, Wood Green	do.
Additions to Boiler House, Elec. Light Sta., Pine-grove	Wood Green U.D.C.	B. J. Wolfenden, Civil Engineer, Town Hall, Bootle, Lancs	do.
Chapel, Longwick, near Princes Risborough	Bootle (Lancs) Corporation	F. Taylor, Architect, Temple-street, Aylesbury	do.
*New Sorting Office, Ealing Dean	.....	J. Wager, H.M. Office of Works, Storey's Gate	do.
*Ealing Telephone Exchange	H.M. Office of Works	do.	do.
*Corrugated Iron Sheds	do.	Council's Engineer, Town Hall, Walthamstow	do.
*New Coast Guard Buildings, Isles of Scilly	Walthamstow U.D.C.	Superintending Civil Engineer, H.M. Dockyard, Devonport	Oct. 2
*Repairing, &c. Bldings., Abbey Mills Pumping Station	Admiralty	Engineer's Department, County Hall, Spring Gardens, S.W.	Oct. 6
Cottage Homes for Disabled Soldiers, Blackburn	London County Council	M'Call & Robinson, Architects, 7, Tacketts-street, Blackburn	No date.
House, Clacton-on-Sea	.....	G. Gardiner, Architect, 11, Marine Parade, Clacton	do.
House, Evenwood, Durham	Mr. J. T. Lack	Pegg & Farrow, Architects, 7, Market-place, Barnard Castle	do.
Kerbing Water, High Street, Lavenham	Mr. A. Maddison	E. W. Veale, Civil Engineer, Bildeston	do.
Twenty Cottages, Purfleet, Essex	Coseford R.D.C.	V. Millett, 72, Bishopsgate-street Within, E.C.	do.
Farmhouse, Parmal Ash, Harrogate	.....	Bolshaw & Stevens, Architects, 1, Princes-street, Harrogate	do.
Additions to Schools, Maesycwmmer	.....	Not stated	do.
Flags, Kerbs, &c.	Bedwas School Board	G. W. Thompson, Surveyor, Hipperholme	do.
	Hipperholme (Yorks) U.D.C.		

PUBLIC APPOINTMENT.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Superintendent of Works	Herne Bay U.D.C.	Not stated	Sep. 30

Those marked with an asterisk (*) are advertised in this Number. *Competition*, iv. || *Contracts*, iv. vi. viii. & x. || *Public Appointments*, xvii. & xix.

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PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders „ „	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
„ „ galvanised	10 0 0	- -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	- - -
„ „ to 24 g.	10 15 0	- - -
„ „ to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
„ „ 22 g. and 24 g.	13 5 0	- - -
„ „ 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
„ „ 22 g. and 24 g.	16 10 0	- - -
„ „ 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
„ „ 22 g. and 24 g.	13 5 0	- - -
„ „ 26 g.	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	12 15 0	- - -
„ „ 22 g. and 24 g.	12 15 0	- - -
„ „ 26 g.	14 0 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 0 0	- - -
Pipe in coils	14 10 0	- - -
Soil pipe	17 0 0	- - -
Compo Pipe	17 0 0	- - -
ZINC—Sheet—		
Vieille Montagne ton	26 0 0	- - -
Silesian	25 15 0	- - -
COPPER—		
Strong Sheet per lb.	0 0 10½	- - -
Thin „	0 0 11½	- - -
Copper nails „	0 0 11	- - -
BRASS—		
Strong Sheet per lb.	0 0 10	- - -
Thin „	0 0 11	- - -
TIN—English Ingots „	0 1 4	- - -
SOLDER—Plumbers' „	0 0 6	- - -
Tinmen's „	0 0 8	- - -
Blowpipe „	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

	s. d. per ft. delivered.
15 oz. thirds	2½d. per ft. delivered.
„ fourths	1¾d. „ „
21 oz. thirds	3½d. „ „
„ fourths	2½d. „ „
26 oz. thirds	3½d. „ „
„ fourths	3¾d. „ „
32 oz. thirds	4½d. „ „
„ fourths	4¾d. „ „
Flatted sheet, 15 oz.	2½d. „ „
„ 21 oz.	3½d. „ „
½ Hartley's Rolled Plate	1¾d. „ „
⅝ „ „ „	2d. „ „
¾ „ „ „	2½d. „ „

OILS, &c.

	£ s. d
Raw Linseed Oil in pipes or barrels.. per gallon	0 1 10
„ „ „ in drums	„ 0 2 2
Boiled „ „ in pipes or barrels..	„ 0 2 1
„ „ „ in drums	„ 0 2 5
Turpentine, in barrels	„ 0 3 8
„ in drums	„ 0 3 10
Genuine Ground English White Lead	per ton 19 0 0
Red Lead, Dry	„ 19 0 0
Best Linseed Oil Putty	per cwt. 0 8 0
Stockholm Tar	per barrel 1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
Wrench and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ALNWICK.—For the execution of sewerage works, &c., South Main-road, for the Urban District Council. Mr. Geoffrey Wilson, town surveyor, Green Bat, Alnwick:—

McLaren & Co. £123 0
J. & G. Green, Acklington* 114 10
[Pipes in stock to be allowed for, if used.]

AYLESBURY.—Accepted for the construction of sewage disposal works for the Urban District Council. Mr. G. Chatterton, C.E., 6, The Sanctuary, Westminster, S.W.:—

Cooke & Co., 16, Victoria-street, S.W. £11,546

BRISTOL.—For the erection of the Bell Inn, Two Mile Hill, for Messrs. W. J. Rogers, Ltd. Messrs. C. & C. Thompson, architects, Athenæum-chambers, Nicholas-street, Bristol. Quantities by Mr. H. G. Pearson, Bristol:—

J. James	£3,100	Eastabrook & Sons...	£2,718
H. A. Forse	3,089	E. Love	2,700
James & Hill	2,885	S. Williams	2,550
M. Durnford	2,820	Denby & Co.*	2,528
F. Chown	2,749	[All of Bristol.]	

COWPEN (Northumberland).—For reconstructing about 2,170 lineal yards of 12-in., 9-in., and 4-in. earthenware pipe sewers and drains, building manholes, lamp-holes, flushing chambers, &c., at Bebside, within the district of Cowpen Urban District Council. Robert Grieves, engineer and surveyor:—

D. W. Richards	£840 0 2	Tough Bros.	£554 1 10
J. Hollings	754 6 0	G. E. Simpson	548 17 9
J. Coxon	558 3 7	J. Shannon	531 19 4
Johnson Bros.	633 0 9	Maclaren & Co.	516 6 6
W. Carr	626 7 4	J. Robson, New-castle-on-Tyne*	513 5 0
J. Maclaren	562 7 10		

CROYDON.—For new cookery and laundry centre at the Ecclesbourne-road Schools for the Croydon School Board. Mr. Robert Ridge, surveyor to the Board, architect. Quantities by Mr. Mansfield Price:—

Funnell & Co.	£1,853 18 6	W. Smith & Sons*	£1,743 0 0
J. Smith & Sons	1,784 0 0	Bulled & Co.	1,739 0 0

CROYDON.—For alterations and additions and providing 404 additional places in the boys', girls', and juniors' departments at the Whitehorse-road schools for the Croydon School Board. Mr. Robert Ridge, architect. Quantities by Messrs. Downing & Haskins:—

J. Smith & Sons	£3,947 0	W. Smith & Sons	£3,890 0
Funnell & Co.	3,942 15	Bulled & Co.*	3,625 0

GOLDTHORPE (Yorks).—Accepted for the erection of schools and caretakers' house for the Bolton-upon-Dearne School Board. Mr. R. Higginbottom, Thurnsco, and Mr. W. H. Wagstaff, A.M.Inst.C.E., Chesterfield, joint architects:—

Thornton & Son, Rotherham.

GUILDFORD.—For the construction of an underground convenience, North-street, for the Town Council. Mr. C. G. Mason, C.E., Tuns Gate, Guildford:—

R. Smith	£1,298 0	Streeter & Todhunter	£1,158 10
A. & F. Gammon	1,298 0	Mitchell Bros.	1,138 0
W. G. Edward	1,237 0	Swayne & Son, Guildford*	1,035 0
Tribe & Robinson	1,205 0		
R. Wood	1,182 0		

HALIFAX.—For the erection of a three-storied warehouse, shop, &c., King-street. Messrs. Jackson & Fox, architects, Rawson-street, Halifax:—

Masonry.—T. Pickles, Luddenden Foot	£927 0
Joinery.—S. Greenwood, Boothtown, Halifax	374 5
Ironfounders' Work.—J. Berry, New Bank, Halifax	160 0
Plumbing.—J. Naylor & Son, Cheapside, Halifax	100 0
Plastering.—Lumb Bros, King Cross, Halifax	99 10
Painting.—S. Ackroyd, Queen's-road, Halifax	19 10

NEEDHAM MARKET (Suffolk).—For laying concrete paving, &c. Mr. H. Miller, C.E., 16, Museum-street, Ipswich:—

G. Burgoyne, Ipswich, 3s. 6d. per sup. yd. for slabs.

NORBURY.—For the erection of six houses, Fairview-road. Mr. Herbert Bignold, architect and surveyor, 242, Lavender Hill, London, S.W.:—

C. Whiller	£2,100	J. Wright Hallett*	£2,040
Sims & Wood	2,040		

PAKEFIELD.—For the erection of rectory House. Mr. Herbert Bignold, architect and surveyor, 242, Lavender Hill, London, S.W.:—

Sims & Wood* £2,150

PETERHEAD (N.B.)—Accepted for additions to North Public School, for the School Board. Mr. A. Clyne, architect, 123½, Union-street, Aberdeen. Quantities by the architect:—

Masonry.—W. West	£768 15 0
Carpentry.—A. & J. Webster	778 0 0
Plumbing.—J. Ferguson	263 2 5
Slating.—A. Fordyce	127 19 0
Plastering.—Stuart & Co.	292 18 6
Painting and Glazing.—W. G. Calder	14 0 0
	£2,280 14 11

[All of Peterhead.]

[*See also next page.*]

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PONTYPRIDD.—For the erection of public offices, Morgan-street, for the Urban District Council. Mr. H. T Hare, architect, 13, Hart-street, London W.C. Quantities by Mr. R. B. Hogg, 10, John-street, Adelphi :—

W. Davis	£16,317	Lattey & Co.	£13,372
D. Davis	15,500	Hughes & Stirling	12,960
Holloway Bros.	15,050	Willcock & Co.	12,950
Turner & Sons	14,988	W. Williams, Cardiff*	12,490
Morgan & Co.	13,500		

PRESTON (Lancs.).—For the erection of a power-station, car sheds, Holmrook-road and Sussex-street East, for the Corporation. Mr. W. H. Tittensor, engineer, 25, Burrow-road, Preston—

T. B. Garnett, Preston £11,272 19 4

SELLY OAK (Warwicks).—For the erection of a boiler-house, for the King's Norton Union Guardians. Messrs. C. Whitwell & Son, architects, Temple-row, Birmingham :—

Whitehouse & Sons	£3,145	W. Robinson	£2,920
G. Goodwin	3,119	H. Dorse	2,865
Sapcote & Sons	3,098	W. Harvey Gibbs, King's Heath*	2,840
A. Colin Hughes	2,992		
Dallow & Sons	2,980		

SIDBURY (Salop).—For the erection of a house, for the Rev. J. B. Clutterbuck. Messrs. Barrett & Driver, architects, 23, York-place, Baker-street, W. :—

Wilcock & Co.	£2,450	Estcourt & Sons Gloucester†	£2,100
Morris & Sons	2,280		
H. Smith	2,144		

STOURBRIDGE.—For the erection of Cottage homes. Mr. A. Marshall, A.R.I.B.A., Nottingham, architect :—

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W. Pattinson	12,243	W. H. Gibbs	10,900
Vickers	12,170	Guest & Son	10,800
Simmons	12,000	Dallow & Son	10,550
J. A. Meredith	11,964	Moss & Son	10,456
G. H. Marshall	11,700	Fish & Son	10,356
T. Hardy	11,395	Hadley & Son	10,205
H. Dorse	11,150	Griffiths, Lye, Stourbridge*	10,180
Hutchinson	11,100	F. Evans	10,100
W. North	10,981	W. Hopkins	10,000
Willcock & Co.	10,970	Vickers & Son	9,800
J. & A. Brazier	10,900		

STOURBRIDGE.—For the erection of a workhouse. Mr A. Marshall, A.R.I.B.A., Nottingham, architect :—

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S. Chambers	727 17 7	141 16 5	393 14 3	395 6 9
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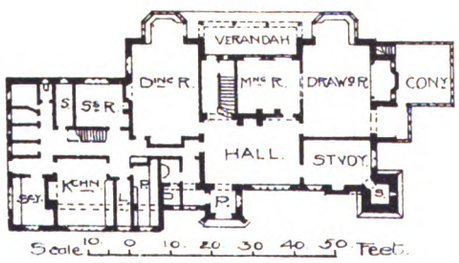

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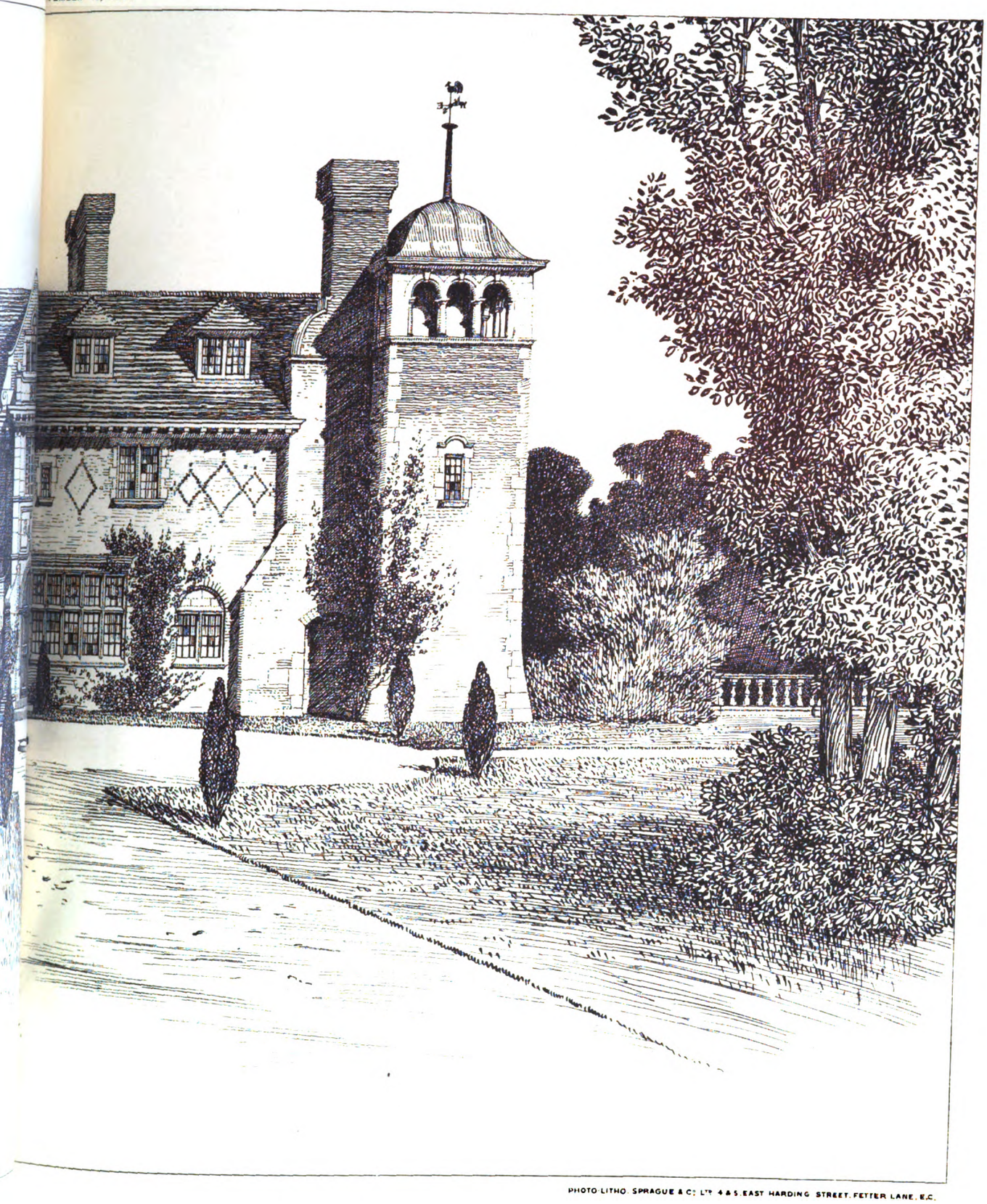

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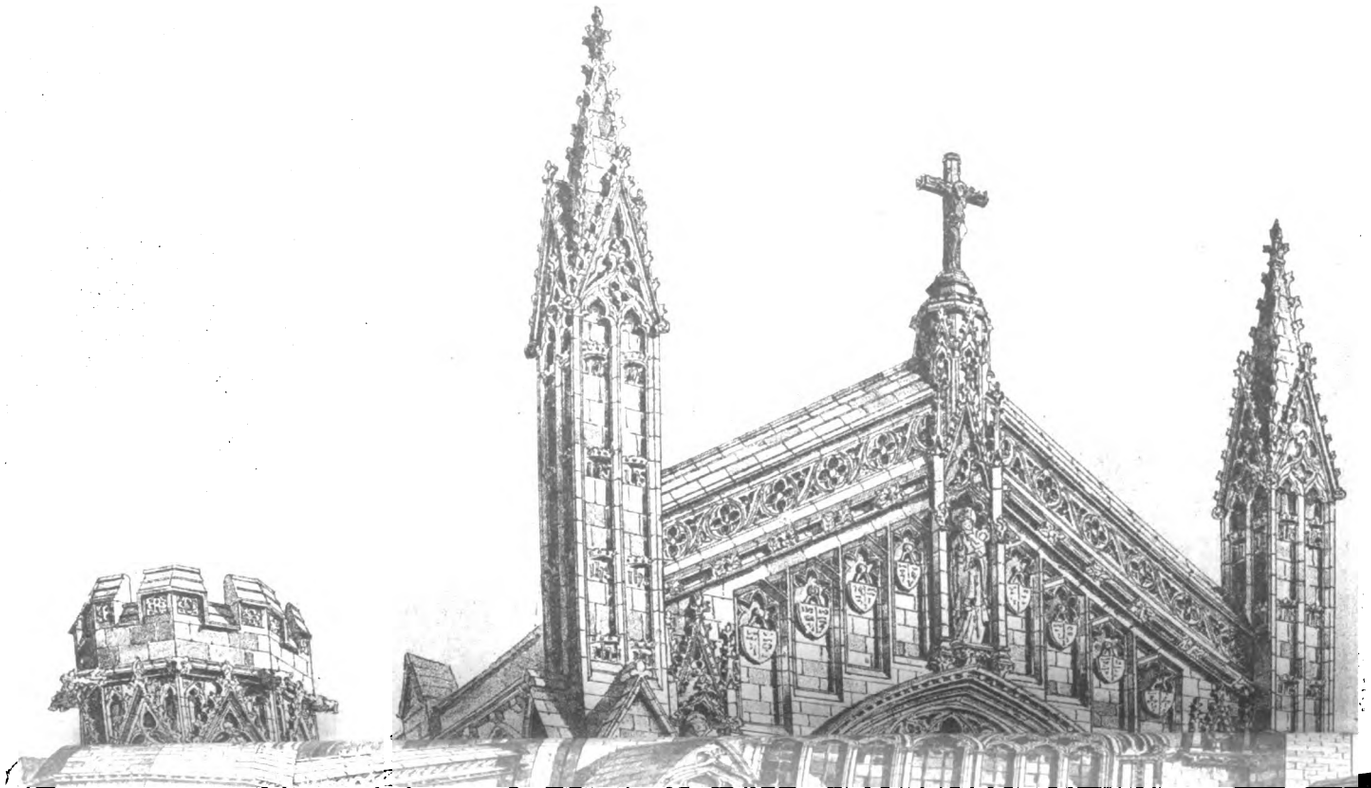
Design for New West Front



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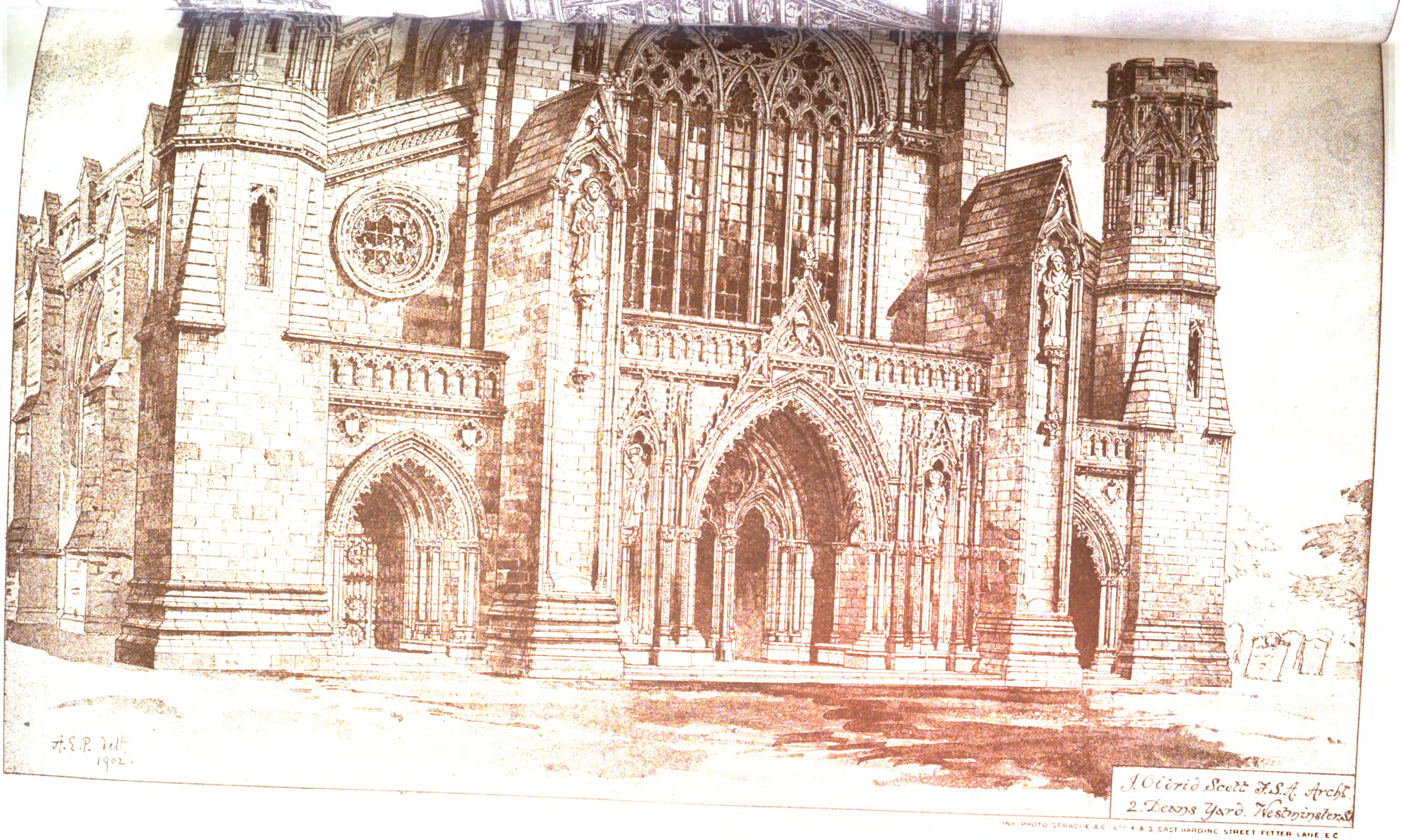

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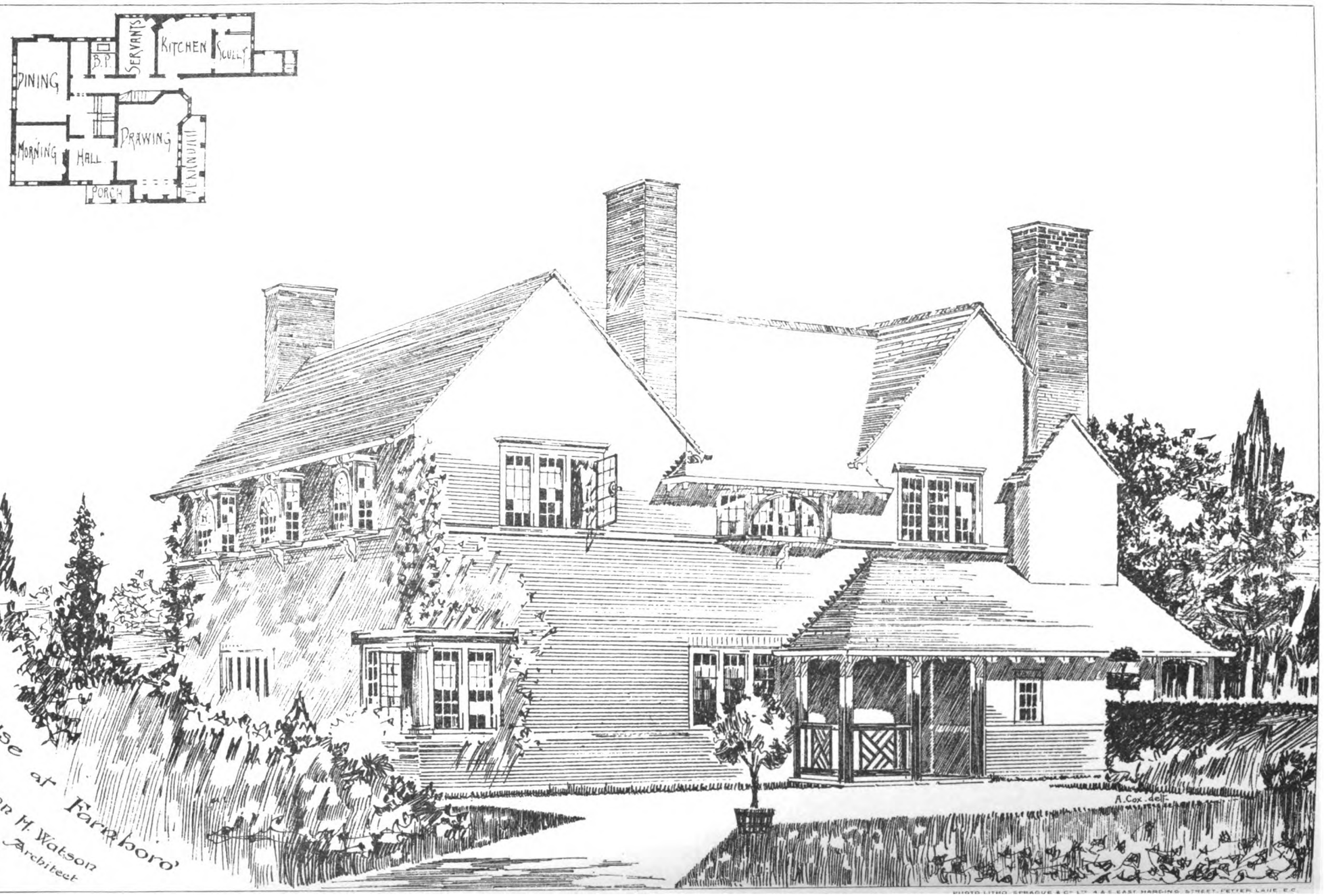

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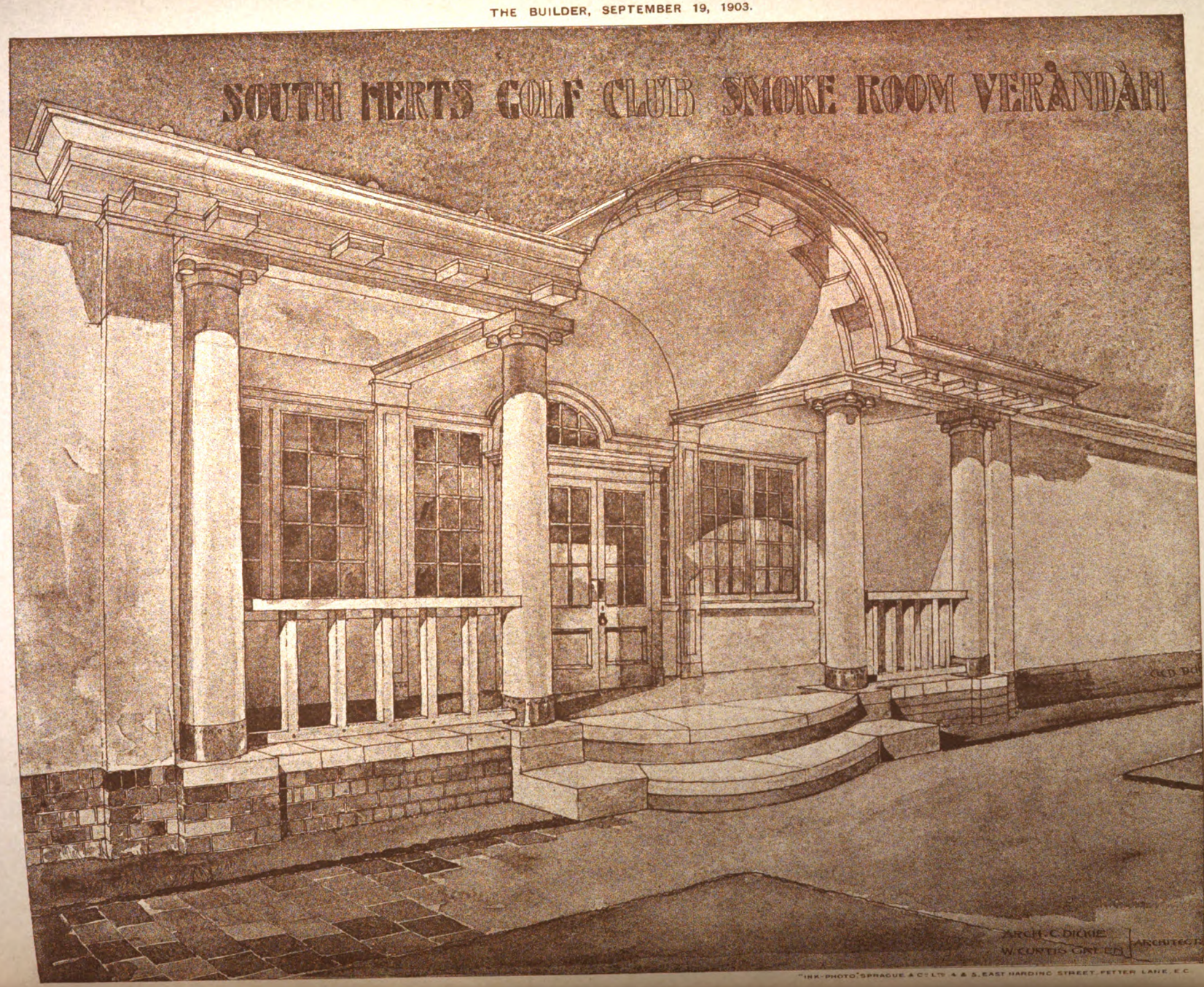

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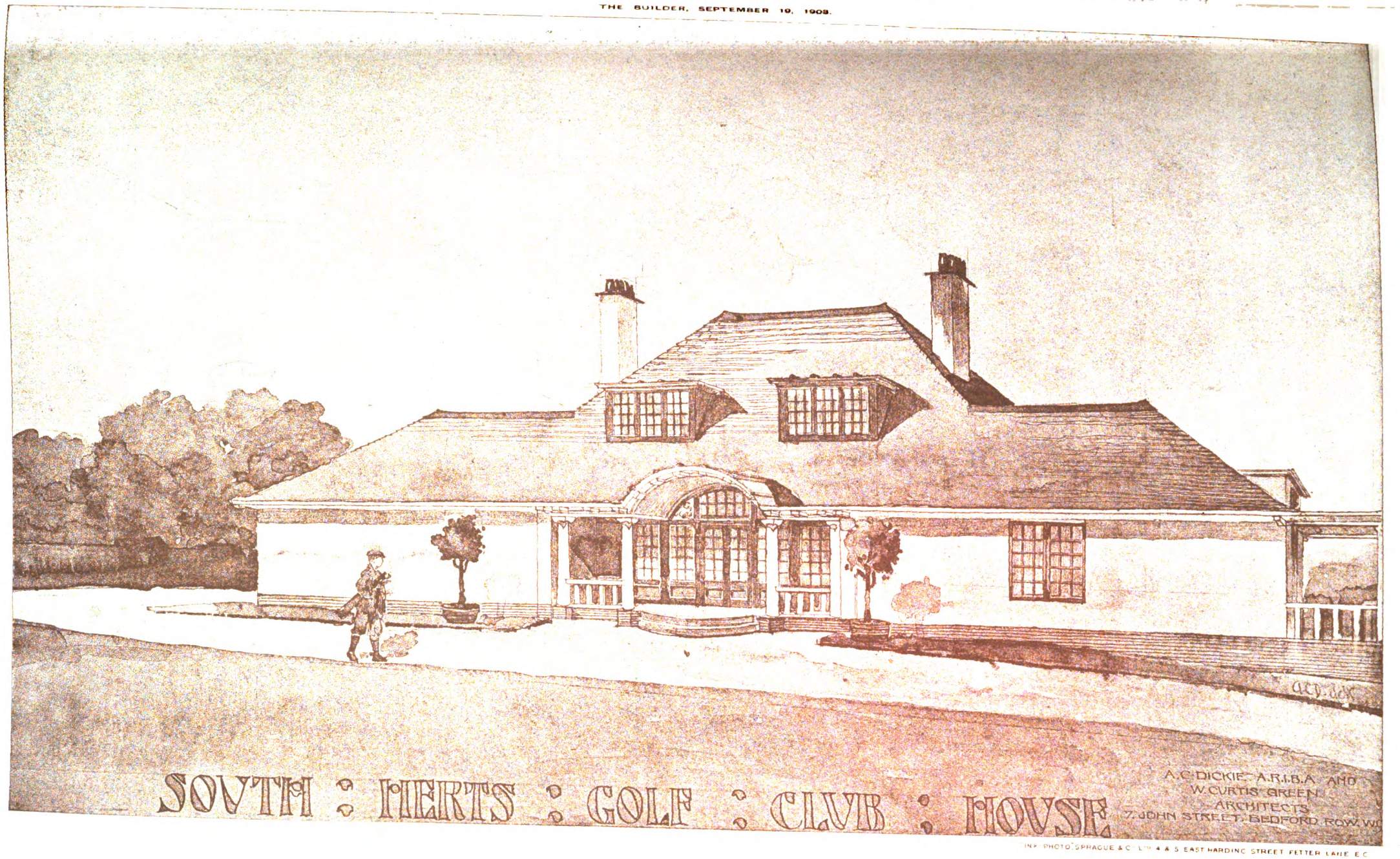

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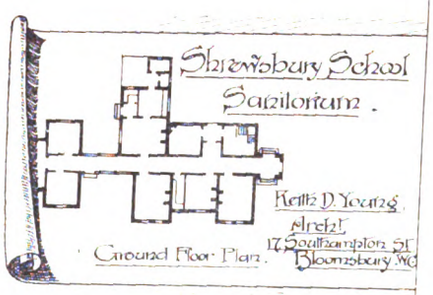

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The Builder.

VOL. LXXXV.—No. 2764. SEPTEMBER 26, 1903.

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Tower and Porch, St. Mary's Church, Yate, Glos. ..... Mr. W. D. Carôe, F.R.I.B.A., Architect.
Casket and Official Chain for the Corporation of Preston ..... Designed by Miss Florence Steel.
Design for a Small Country House ..... By Mr. J. Henry Sellar.
Gate House and Masters' Lodgings, Abingdon School ..... Mr. Harry Redfern, Architect.

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Engineering Subjects at the British Association: A Retrospect.

IN opening the proceedings of the Engineering Section at the recent meeting of the British Association, Mr. Charles Hawksley made reference, in his presidential address, to technical education—a subject that is discussed at almost every meeting of scientific bodies in the present day. Mr. Hawksley was commendably brief in dealing with this question, and the most noteworthy feature of his remarks was an expression of the hope that in the future training of engineering students, increased attention would be paid to the combination of artistic merit with excellence of structural design. With this aspiration we are most heartily in accord. It may or may not be true that, as we are sometimes told, architects are taught design without adequate training in construction, but it is tolerably certain that engineers receive practically no instruction with regard to artistic design. Undoubtedly, it is a fact that the main outlines of an engineering structure are dictated by principles that inevitably lead to correct results, but engineers very frequently go astray when dealing with final details, which cannot be designed by the aid of mathematics. There are many forms of engineering construction in which any attempt to improve upon the absolute simplicity of pure structure would only lead to grotesque absurdity; and on the other hand, there are many types of engineering work, especially bridges and other structures of monumental character, where complete harmony and correct effect are only attainable by the combination of science with art. Considering the many subjects that must be mastered by the engineering student, we do not for a moment believe that it would be possible for him to acquire a sufficient knowledge of artistic design, so as to enable him in after practice to dispense with the co-operation of the architect when important structural works have to be erected in public places. Still, the idea brought forward by Mr. Hawksley is a good one, and we should like to hear more of the suggestion.

After mention of the valuable work now being conducted by the Engineering Standards Committee, the subject of intercommunications was taken up by the president of the section. Road traffic, self-propelled vehicles, electric tramways, light railways, and railways were in turn reviewed. Referring to what we are now almost compelled to term "steam railways," Mr. Hawksley showed that several of the leading railway companies are now turning their attention to improved methods of traction, and he instanced the Mersey Railway as the first example of a British railway converted to the use of electric traction. It is interesting to note that on this line adequate precautions have been taken against fire. The electrical equipment is thoroughly fireproof, the motor compartment being cased in asbestos slate, cutting it off completely from the remainder of the train.

The address was further devoted to canals, shipbuilding, wireless telegraphy, and sewage disposal, and after some remarks on the Liverpool Docks and the Nile Irrigation Works, it concluded with a somewhat technical consideration of waterworks engineering and management. As an introduction to the discussions to be anticipated at a meeting of engineers of all classes, this address was in every way suitable. Practically every department of engineering received due notice, and the author did not omit to speak fully on the subject—that of water supply—with which he is most intimately associated. It is rather a pity that this spirit of catholicism was less evident in the business afterwards coming before the section. Although many instructive papers were read, too large a proportion referred to electrical apparatus and traffic problems, while constructional engineering scarcely received the attention that might have been expected. It is true that Mr. Cuthbert Brereton gave a short description of the new bridge at Kew, but this was the only communication relative to structural work.

Mr. J. Harrison followed with a paper of purely mathematical character, illustrating the application of graphical methods to engineering computations, and more particularly to such as are necessary in machine design. This, again, was the only paper in its class, a circumstance not altogether to be regretted, for although the science of mathematics is of paramount importance, we are not quite sure that it is a subject that can be usefully and sufficiently discussed during so brief a session as that of the British Association.

At the next day's meeting attention was almost exclusively devoted to the question of road locomotion and motor traffic. A report was received from a committee, of which Sir John Thornycroft is chairman and Professor Hele-Shaw is secretary, appointed to consider the resistance of vehicles to traction. In this report were described experiments made with different kinds of tyres on different forms of roadway and at varying velocities of travel. From diagrams given, it appears that tractive effort diminishes proportionally with the increase of velocity. The explanation of this suggestive fact is probably that the faster a wheel travels the less time it has to fall into the hollows in the roadway, with the result that it skims along the tops of ridges and irregularities. Some further experiments, made with the object of ascertaining the most suitable design of wheel for heavy traffic, were also described in the report, the general conclusion being that little advantage is to be gained by adopting tyres of more than 9 in. wide in the direction of reducing road resistance and damage to the surface. We observe that further experiments are proposed for the purpose of testing the accuracy of this conclusion. At the same time it would be desirable to inquire into the best means of preventing the clouds of dust which are the usual accompaniments of self-propelled vehicles travelling on macadam roads in dry and even in moderately dry weather. It is no doubt de-

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sirable that the expenditure of mechanical power should be kept within proper limits, but to the community at large it is more important that the dust-producing power of mechanically-propelled vehicles should be reduced to a minimum.

This point was discussed in connexion with a paper by Mr. Clarkson on "Locomobile Design." Mr. Worby Beaumont then stated that trials were about to be made with the view of ascertaining the best means of preventing dust, and he appeared to be of opinion that the dust question could probably be settled by improved road construction. We cannot agree with this view so far as macadam roads are concerned, for a low-bodied motor-car is capable of raising large volumes of dust from the very best forms of surface. The nuisance might be mitigated in some measure by enacting that no part of the body of any self-propelled vehicle should be nearer the ground than, say, 3ft.; but it seems probable that the only real remedy would be the universal adoption of tar macadam or asphalt. Such a proposal would at once suggest difficulties of economic and fiscal character which we cannot now pause to discuss. It is evident, however, that so long as road surfaces are formed of friable materials, merely bound together with powdered stone and water, there will always be dust that must inevitably be raised by wind, vehicles, and other disturbing elements.

The last paper contributed at the sitting to which we now refer was by Colonel Crompton, R.E., on "The Problem of Modern Street Traffic." It was pointed out by the author that, notwithstanding the improved means of communication now available, the average speed of travel in large cities does not exceed about five miles an hour. This anomalous and highly unsatisfactory condition is largely brought about by the enormous amount of traffic conducted at a walking pace, and also by the obstruction of streets by vehicles standing at the kerb, or aimlessly wandering from place to place. Foot passengers also add to the difficulty, as they are at present entitled to the use of the roadway or footway just as they please. In order to deal satisfactorily with these and other difficulties, the author advised the establishment of a department of the police to take special control of street traffic. This department would be empowered to determine what classes of vehicles were fit and proper to be employed, and to advise authorities as to by-laws and regulations, and upon street improvements, crossings, railways, subways, and tramways.

Those who have observed the peculiarities of London traffic know how lamentably deficient are the existing means of control. The utmost latitude is extended to obstruction, and very little endeavour is made to sort traffic according to its character and speed. Omnibus and cab drivers seem to think the streets belong to them; the drivers of heavily-laden drays and wagons dreamily pursue their way regardless of the delay they cause to people in a hurry; and those delivering goods at buildings block up the thoroughfares for hours at a time. No doubt there is very great scope for an able board of experts of the kind proposed by Colonel Crompton, and it is to be hoped that the paper to which we refer may have some practical result. In the discussion which followed, Mr. Hawksley made the useful suggestion that roadways should be made with less camber, so that heavy vehicles could more easily be driven close together, and he very properly deprecated the placing of lamp-posts down the centre of streets, a bad practice that has been perpetuated by several local authorities during recent years.

On the following day, the report of a committee on screw gauges was received, and some papers were read dealing with details of electrical engineering, but being of somewhat abstruse character, they did not appear to attract much attention from the members present. This fact serves to emphasise the remark that a miscellaneous gathering, such as may be found at a sectional meeting of the British Association, does not want to be troubled with papers relating to highly specialised branches of any one department of engineering, especially when the arguments of the authors can only be followed by the careful examination of mathematical formulæ and reasoning. A much more suitable paper was brought forward at the next sitting by Mr. F. B. Behr, who read a communication on "High-speed Express Mono-rails, and the Manchester and Liverpool Express Railway." The system originated by Mr. Behr has already been discussed in the technical Press, and there can be little doubt that when one or two successful installations have been made this new means of locomotion will be adopted in various parts of the country. At present there is an idea in some quarters that the public will never consent to be whirled along an electric railway at a speed of something like 150 miles an hour, but, as happened in the case of the existing steam railway system, this feeling of timidity will soon wear off, and the practical annihilation of distance from town to town will in due time be fully appreciated by the public. Whether, however, habitual travelling at such speeds will not have an effect injurious to health, and calculated to shorten the lives of those who indulge in it, is still a very serious question, to which experience alone, perhaps, can supply the answer. Nor can one avoid the reflection how terrible would be the nature of a "railway accident" to a train travelling at such a speed. Not a single passenger in it would survive."

In a subsequent paper, Mr. A. M. Bell gave some interesting facts relative to the progress recently made in the application of liquid fuel for steam raising. It was stated that four vessels of the Hamburg-American line had already been equipped for burning oil, with the result that the consumption for twenty-four hours was about 32 tons of fuel oil, as compared with 45 tons of coal. In an Austrian-Lloyd steamer of 9,000-h.p. 23½ tons of oil replaced 43 tons of Welsh coal, or 74.7 tons of Dalmatian coal. The Holden burner described by the author appears to be capable of a very varied adoption, and, further, it can be applied for the consumption of oil in conjunction with solid fuel. With this apparatus an equivalent evaporation of 15.5lbs. of water per pound of oil has been secured, but it must be noted that to burn oil satisfactorily, the suitable design of the furnace is equally important with the proper design of the burner.

A somewhat kindred subject was brought before the meeting by Mr. R. Pearson, who read a paper on "The Discovery of Natural Gas in Sussex." The presence of natural gas in that county has been known for many years, but it is only quite lately that this form of combustible has been utilised for light and power. The Heathfield Station on the London, Brighton, and South Coast Railway is already lighted by means of natural gas, which is also employed for lighting and heating purposes in many houses at Heathfield. It has further been applied for driving gas engines in the same district. At present it is not definitely clear whether the gas fields of Sussex are of sufficient capacity and extent to revolutionise the character of this and adjoining counties. Mr. Pearson expressed the opinion that a good supply of gas at great pressure would be available, and stated that inquiries were already being made for land with underlying supplies of gas, with the object of establishing manufactories in Sussex. It is a well-known fact that iron is plentiful in the district, and if fuel can be provided at sufficiently low rates, there may be wonderful changes in a part of England now regarded as a stronghold of agriculture, and as a place in which people may escape, temporarily or permanently, from the busy hum of the metropolis.

Two or three papers read during the ensuing meeting dealt with the application of certain problems of physical science to mechanical engineering. One of these, by Mr. C. H. Wingfield, on "Permanent Set in Cast Iron Due to Small Stresses," was of considerable interest. The author showed that piston rings, each consisting of an inner and outer ring of uniform section, differed materially in the quality of their outward pressures per square inch of circumference, whereas by the formulæ generally published they should agree in this respect. Other experiments described by him made clear the fact that when spring-rings had been forced into circular gauges, they suffered material permanent set during the first fifteen minutes. It was also found that a measurable degree of set was producible by merely squeezing a ring of this kind between the hands. The amount of spring in a cast-iron ring appears to be much greater than is generally realised. According to the author, a spring-ring about 5⅜in. in diameter, and with its ends 1⅛in. apart, after deducting the permanent set, can be bent until they meet, and when released they spring back again to 1¼in. apart. It is to be regretted that very little time was available for the discussion of this paper, and the same remark applies to a subsequent communication by Mr. E. G. Izod, on "The Brittleness of Steel."

After other papers had been read upon "Experiments with Air Friction," "Single Phase Repulsion Motors," and "A New Form of Mirror Extensometer," Mr. J. W. Thomas brought before the meeting the subject of "Ventilation in Tube Railways," dealing chiefly with the physical conditions necessary for securing adequate ventilation in such systems. The author expressed the undoubtedly correct opinion that the forces due to the moving

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trains, and the natural heat of the subways, would be ample for the required object if properly directed. This is a view we have more than once expressed, and we are glad to find it has been clearly brought before the British Association. Mr Thomas proposes a triple-station arrangement, and his scheme will be understood from the following brief outline:—If the three stations of the group be called A, B, and C, a down train travelling from A to B would draw air from the station A, and expel it in station B, and an up train travelling from C to B would draw air from station C and expel it in station B. Owing to the elasticity of air, the outlets for expelling the vitiated atmosphere must be situated not far from the points of greatest compression, and should begin in the centre of each underground station, and end in the open air above the surface station. For a similar reason the fresh air intakes should be near the points where the sudden expansion of the air will take place. These points are just inside the ends of the tubes entered by the moving trains. Airtight doors should be fitted at the ends of the two tubes, and by closing these doors behind the last trains at night the fresh air brought into the end of the tube immediately beyond the doors would continue to act during the night, driving the foul air into the next station by natural ventilating pressure. By closing the doors after some of the trains as they left the stations, it is suggested that fresh air would be drawn into the tubes during the day time. This system does not seem to be entirely adequate for the purpose of effecting the ventilation of a tubular railway. One great difficulty on the lines already in operation is caused by intercommunications between the up and down tubes, and the only satisfactory arrangement would be the complete and absolute separation of each station into two parts, one for up and the other for down traffic. Then, by the suitable provision of doors, it would be possible to ensure a complete and thorough renewal of the atmosphere along the whole line. As all the trains in each tube would move in one direction only it would be possible to provide for a regular current of air from a main inlet at one end, to a main outlet at the other, or to arrange for fresh air to be drawn in at some stations and ejected at others. Low level railways now in operation appear to have been designed entirely without regard to ventilation, and their condition grows daily worse. In the design of new lines, however, there should be no difficulty, and those responsible for their construction certainly ought to take the advice of ventilating experts, so that the state of things existing in the City and South London and Central London Railways may not be reproduced.

We have not attempted to refer to all the papers presented before the recent meeting of the British Association, but it will be gathered that some of the most important departments of engineering work were practically ignored. It is true that many useful papers were read, and that those relative to traffic problems were especially valuable. Nevertheless, the success of the engineering section might have been far greater if the subjects for discussion had been more varied. Another feature tending to detract from the usefulness of the session was to be found in the excessive number of papers crowded into each sitting, with the result that little or no time was available for discussion of the subjects opened. Consequently, members became wearied by the reading of paper after paper; and finding practically no opportunity of taking part in the proceedings, or of profiting by listening to the expression of varied opinions upon the problems brought forward, they had little inducement to continue in attendance. The fact that many of the papers were read to meetings comprising no more than five or six members is conclusive evidence that the organisation of the section was far from satisfactory. Those upon whom devolves the arrangement of the proceedings would do well to remember that the complete discussion of one subject is of far greater value than the accumulation of numerous papers, which have to be hurried through owing to the limited time at disposal, and so do not receive anything like the attention that they may frequently deserve. On the whole, while fully recognising the merits of many papers read and discussed, it must be said that this year's meeting of the engineering section has been somewhat disappointing to those who look upon the British Association meeting as a function at which the views of the leading scientists in the country will be expressed for the advantage of the nation at large.

NOTES.

Technical Education. It is to be regretted that the Board of Education do not preface the annual return as to the funds expended by local authorities on technical education by a comprehensive survey and criticism. The large number of figures are, no doubt, important, but we should like to see the results of them formulated. The total amount expended during the year 1901-2 in technical education in England and Wales was 1,057,000*l.* The question at once arises, is this large sum expended to the best advantage? In perusing the returns, one point which is striking is the large amount spent in small sums handed to small local places. We find, for instance, and we take these examples as they occur, that 5*l.* was granted to Irlam, in Lancashire, for technical education; 8*l.* 13s. to Great Harwood; and so on. In other words, there is all over the United Kingdom a large sum annually spent on what for a better word we call "amateur" technical education—that is, teaching which will not lead to any real results, but is rather in the nature of a winter pastime. It is to be hoped, however, that the County Councils will take steps to prevent this waste of money, and will try to create local centres for the purposes of technical education, as well as links between the elementary schools and the centres of technical instruction, so that the latter may be placed on a systematic basis.

London Statistics. The Report issued by the County Council of London Statistics contains matter of much interest to Londoners. The population of London or Greater London—that is, including parishes within fifteen miles of Charing Cross—is returned as 6,581,402, and in the face of this gigantic total it is some satisfaction to find that during the last decade the percentage of increase is diminishing. Another satisfactory feature is that in the administrative County of London the number of tenements is increasing faster than the population, and that the number of the population described as "overcrowded," that is to say where more than two persons live in one room in tenements of from one to four rooms, has decreased by 3.7 per cent. But the expenditure involved in clearing insanitary areas is very large compared with the number of people displaced and rehoused, and since the County Council came into being 4,326,000*l.* has been expended in housing 89,000 persons. A sum of 48*l.* per head would seem stupendous were it not for the consideration of the gain to the whole community in carrying out these operations. Some statistics on traffic in the Strand and Holborn will be read with interest by the public and by the Commission on the means of communication in London. During twelve daylight hours 19,724 vehicles passed a fixed point in the Strand and 15,590 in Holborn. The stoppages of over half a minute necessitated by traffic regulation over this number of vehicles represented respectively seven hours and a half, and five hours and a quarter—a loss of time of only a little over one second for each vehicle, but as a matter of fact the whole delay fell on only 9,511 vehicles, and those accustomed to endure what appears such constant delay in traversing those thoroughfares will be surprised to find it work out at so small a figure—some 2¼ seconds for each vehicle thus held up. The Report contains some 800 pages, and the statistics on finance and local government will repay careful study.

A Piece of the Old London Wall. The clearing of the site of Newgate Prison has brought to light some remains of the Roman wall of London, which on that side was built, standing north and south, along the crest of the slope at the foot of which ran the turbulent Fleet. Whilst the prison was in use the wall could be seen along the east side of a passage that communicated between the jail and the Central Criminal Court, and a continuation of it, southwards, still forms the western boundary of the garden appertaining to the houses in Amen-court of the Canons of St. Paul's. The wall, in the prison, was covered with plaster, in which were scratched the initials of the names of condemned felons who had been buried in quick-lime beneath the flag-stones of the passage. The passage, open to the sky, and having the high wall of the "Women's Side" along its west side, was commonly known as "Birdcage-walk," because it was guarded overhead with strong bars and cross-rails. Some other vestiges of past times have been also discovered—amongst them being remains of the earlier prison, of which the gate that stood across Newgate-street formed part, and the sewers, which were originally passages leading out of an underground vault beneath the street. In the basement story of the prison as reconstructed after the Great Fire were the Keeper's House (beneath which lay the Condemned Hold) and the Lodge, to the

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north and south, respectively, of the gateway; the Stone Hold (Felons' Common Side); the Stone Hall and Tangier (Common Debtors' Side); Hall Ward (Master Debtors' Side); and other rooms; and the Press Yard, to the east. There is record of the escape on more occasions than one of prisoners by way of the sewers into the channel of the Fleet. A deep well that has just been found amongst the ruins is supposed to be that which formerly supplied the prison with water.

The "Fatigue" of Cement Products.

IN the current issue of the "Proceedings of the American Society of Civil Engineers" an account is given of the first results obtained from an investigation undertaken to determine the behaviour of Portland cement mixtures when subjected to repeated loads of less intensity than would cause failure when once applied. There is every reason for thinking it probable that concrete is liable to fatigue under repetitions of stress, such as is experienced by iron and steel under similar conditions, but so far as we are aware no previous systematic attention has been paid to this characteristic. The experiments to which we now refer were conducted at Washington University upon 2 in. cubes composed of neat cement. Altogether, some ninety-two blocks were tested by repetitions of compressive stress, and the average results in the following table are taken from a diagram reproduced in the "Proceedings":—

No. of repetitions causing failure.	Load applied in terms of ultimate strength.
1	100 per cent.
75	90 "
150	80 "
400	70 "
1,500	60 "
5,500	55 "

These figures indicate that failure occurs under repeated loadings of much less intensity than that necessary to cause failure when applied once, and that the number of repetitions necessary to cause failure increases proportionately with the diminution of load. Similar tests upon concrete have not yet been conducted upon a systematic scale, but eighteen tests on 7 in. cubes show that the same general law of gradual failure applies equally to concrete. The investigation will be continued as rapidly as circumstances will permit, and we hope to present some further information on the subject in due course.

Concrete-Steel Lattice Girders.

A SOMEWHAT novel system of constructing beams in concrete-steel has recently been devised by Mr. Franz Visintini, a Zurich architect. Briefly described, it may be said to consist in the application of the principle of the Warren girder to concrete-steel beams. The framework is of concrete, reinforced with iron or steel rods in the tension members, while the members subject to compression only are formed of concrete alone. In the upper and lower flanges or booms the concrete is reinforced with cylindrical rods. So far as carrying capacity is concerned, there is no necessity for reinforcement in the compression booms, but its addition affords a simple and satisfactory means of connexion between ties and flanges. When employed in floor construction, small girders, made in the manner described, are laid side by side, and the recesses can be filled with concrete if desired. In order to prevent any of the individual girders from abnormal bending, thereby causing cracks in the ceiling, the girders are provided with longitudinal recesses of such shape as to produce dovetail grooves. Reinforcement is placed in these, and they are then filled up with cement mortar. The system is suitable for the construction of columns, walls, and other parts of a building, and it is claimed that the air-flues formed by the latticed webs of the members are useful as heating flues, or as conduits for pipes and wires. There seems to be reason for anticipating great rigidity in members designed on this system; the materials are clearly utilised in a most economical manner, and weight is reduced to a minimum.

Water Supply, Thorne (West Riding).

THE Local Government Board has issued a Report by Dr. Reece on the water supply, sanitary circumstances, and administration of the Thorne Rural District (West Riding of Yorkshire), which discloses an exceedingly discreditable state of things. The main source of the water is a navigable canal, which receives the refuse of a large floating population, and is fed by the waters of the Don, which is itself polluted by sewage and other refuse matters in its course through Rotherham, Sheffield, and Mexborough districts. The remainder of the supply is from shallow wells, liable to contamination from privy middens, which are the usual arrangement for excreta in the district. Coarse filters are provided between the canal and the drinking supply, but Dr. Reece found the water at the time of his visit passing directly over the top of the filtering material to the town, and in any case it is reported that the filter is in itself too inefficient to effect any great improvement in the condition of the water. It is stated that the Reports of their Medical Officer of Health have warned the local Council from year to year of the sanitary needs of the district, but "whenever anything requiring the expenditure of money on sanitary reform has come before the Council, the matter has been almost invariably shelved." Unfortunately, the rural districts of England are still full of such incompetent and neglectful public authorities, as the Local Government Board Reports continue from time to time to demonstrate.

Sanitary Condition of Denbigh.

DR. WHEATON'S Report to the Local Government Board on the subject of an outbreak of diphtheria in the Borough of Denbigh conveys the impression that the water-supply is less open to suspicion than is often the case in connexion with such epidemics; but serious fault is found with the condition of the sewerage, and with the prevalence of badly constructed privies in the higher parts of the town, to which the water supply does not extend. At the time of his visit several sewers were blocked or partly blocked by deposit; the sewers were "in a most unsatisfactory condition"; and there is practically no provision for flushing them. Dr. Wheaton makes the following recommendations, amongst others, at the close of his Report:—

"The sewerage of the town should be completely remodelled under the advice of a competent engineer. When the sewers are reconstructed all the old sewers which will retain accumulated deposit should be removed, all house drains should be examined and any defective ones replaced, and old disused drains removed. The new sewers should be duly ventilated, and provided with means for flushing and inspection.

All the midden privies should be removed, and where water is not available for flushing purposes some form of pail closet should be provided, the contents of which should be collected weekly by officers of the Town Council.

The Council should devote increased attention to the condition of dwellings; yards and open spaces around dwellings should be covered with some impermeable material so as to prevent soakage into the ground of water falling on the surface around houses; other causes of dampness of dwellings should be removed and damp courses should be provided. The lime-washing of all dwellings the interiors of which are in a dirty and foul condition should be required."

The Pottery Industry.

IT is a somewhat curious thing that natural supplies of the best china and blue-ball clays should be confined almost exclusively to Cornwall, Devonshire, and Dorsetshire. It is true that similar deposits have been found elsewhere, but not on a sufficient scale to justify their commercial development. In many industries the tendency has become more and more marked for manufacturers to produce, or to control the supply of, their own raw materials. This, however, does not appear to be the case in the pottery industry, which is largely centred in Staffordshire. In that county there are probably at least five hundred potteries, while those in other counties number little more than a hundred collectively. Yellow-ware is produced to a certain extent in Burton and Newcastle-on-Tyne. Earthenware is also made in Glasgow, and by a few firms in Yorkshire, while Bristol furnishes stoneware. All these are alike dependent upon Cornwall and Devon, with the exception of the yellow-ware firms, who are able to obtain the greater part of their supplies from local sources. It may seem anomalous that Staffordshire should be the centre of the pottery industry when the supplies are largely to be found in the extreme west of England, but the fact is that coal is cheap in the former district, and that it is less costly to bring the raw material to the coal than vice-versa. Therefore Cornwall and Devonshire continue to send china clay by sea to Liverpool, whence it is conveyed by canal into Staffordshire. The superior quality of British fireclay goods is chiefly due to the excellent quality of the raw material furnished by the district named, and the recent rumour of an American scheme to secure the control of our natural sources of supply serves to suggest that it would be well if steps could be taken to provide for the protection of the china clay mines from foreign influence. We understand that the Midland manufacturers are already in communication, through the North Staffordshire Chamber of Commerce, with the West of England mine owners, and that should further overtures be made from the United States, the pottery manufacturers will receive early information with the object of giving them an opportunity of securing the clay mines.

The Photographic Salon.

WE have seen better and more interesting collections at the Photographic Salon than this present eleventh one, now open at the Dud-

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ley Gallery. We have so often expressed our opinion as to the mistake of trying to claim for photography the place of an art in the true sense of the word, that we need not insist on this point further, but take the Exhibition as we find it. That there is room for artistic judgment in composition, in selecting the best point of view for a landscape photograph, is shown in such a plate as Mr. C. Job's "A Foot-Track after Rain" (48), which almost produces the impression of being a deliberately composed picture. Nature does sometimes lend herself in this way to landscape composition, and the judgment of the photographer is shown partly in knowing what to leave out. Dr. Crump's "Sea Treasures" (184), where a young girl has been photographed as the single figure on a wide expanse of beach, is another very happily selected picture. In the groups, entitled "A Serious Matter" (123), and "Extenuating Circumstances" (147), Miss Constance Ellis has been fortunate in securing sitters who could really act the pose and expression required by the subject; generally speaking one is struck by the futility of these attempts at grouping real people into an ideal subject-picture; but these two are much more successful than usual. Mr. Craigie's large portrait of Mr. Hermann Vezin (42) is very successful in catching expression and character, and avoiding realistic hardness. "Gorse" (31), by Mr. Hinton, is a successful landscape and foreground study, and in this and other examples we may see how photographers are able now to substitute breadth and a certain degree of atmospheric effect for the old style of mechanically printed landscape views in which everything is cut out with steel-like sharpness. How much photography there really is in Dr. Bachmann's "Am Parkthor" (10), we cannot judge; it looks like a large and rather coarse washed drawing in brown monochrome. Architectural subjects, as usual, are little in favour; there is a picturesque view of "Bell Tower, Santa Barbara Mission, California" (99), by Mr. A. L. Coburn, and "An Open Door, Ely Cathedral" (129), by Mr. F. H. Evans, in which a good light effect is caught. Both these are small subjects. Mr. Benington's large view of St. Paul's under the title, "The Church of England" (83), seems to be a purpose-made smudge, as if photographed in a fog; it almost appears as if there were a satirical meaning in this, taken in connexion with the title.

THE BRIDGEWATER CANALS AND TRUST: A FEW HISTORICAL NOTES.

On October 10 next, Francis Egerton, third Earl of Ellesmere, will succeed to the sole ownership of a remarkable trust, of which he became the beneficiary upon attaining his majority thirty-five years ago. The trust was set up by the testamentary dispositions of his collateral predecessor, Francis Egerton, third and last Duke of Bridgewater, who died unmarried on March 8, 1803, when the Earldom of Bridgewater passed to his cousin, General Egerton, who died *s.p.* in 1823. The Duke Francis settled all of his real, and most of his personal, estates under certain trusts whereby the first appointed beneficiary was his nephew, George, second Marquis of Stafford and first Duke of Sutherland, whose father had married Louisa, daughter, and eventually co-heir, of Scroope, first Duke of Bridgewater. As provided in express terms the benefits of the trust devolved, in 1833, upon the Duke of Sutherland's second son, Francis, who in 1846 was elevated to the peerage as Earl of Ellesmere, co. Salop, and Viscount Brackley, and was grandfather of the present holder of that title. The duration of the trust was rendered as long as the law would allow by the choice of a large number of persons and their then living issue, together with the legal extension of twenty-one years in addition; the named persons comprised 359 Peers of the House of Lords in the Session of 1802-3. The Duke declared in his will that he desired, in agreement with the law, to suspend the right to the inheritance so as to keep the works and their trade and the estates thereto annexed as one joint fund under competent management, in order that the public might profit thereby as by the plan adopted in his will for their benefit. The trust property included the Bridgewater canals, the Duke's estates in Cheshire and Lancashire, Brackley, in Northamptonshire, and Bridgewater House, St. James's, together with his collections of MSS., pictures, and other art treasures.

Since the reopening, *temp.* Henry II., of the Roman Foss-dyke, no water conveyance for purposes of commerce cut out of the solid earth was made in England till the beginning, in 1755, of the Sankey Brook navigation, descending from the collieries around St. Helens to the Mersey. It is true that in pursuance of an Act of 1720 the Mersey was rendered navigable for barges of from 60 to 70 tons burthen by the aid of an artificial cut from Warrington to the mouth of the Irwell, and that in 1727, under an Act of 1719, the Douglas was rendered navigable from the Ribble as high as Wigan. Those minor enterprises excepted, we may justly consider the Duke of Bridgewater to be the founder in more modern times of inland navigation in this country, as distinguished from the making of a so-called canal parallel to the bed of the stream that fed it, and as closely as possible to which it was constructed. His canals had their origin in a scheme initiated by his father, Scroope, for rendering navigable the Worsley Brook in the vicinity of his own seat Worsley Hall, Lancashire. The father did not proceed with an Act he had obtained to that intent. The son procured an Act in 1758 enabling him to construct a canal, about 10 miles in length, from Worsley, through Patricroft and Barton, to Salford, and also to Holling Ferry on the Irwell, his chief object being to provide transport of coal from his property to Manchester. As engineer for the work he employed James Brindley, whose acquaintance he made in 1754. Beginning from Worsley Mill, Brindley proceeded as far as the high road from Manchester to Warrington, then, finding it would be more advantageous to carry the canal by an aqueduct over the Irwell at a spot near Barton Bridge, he advised the Duke to apply for another Act (1759) to sanction a departure from the course at first planned, with a continuation to Manchester, and to empower also the construction of a branch canal to extend as far as Longford Bridge, in the township of Stretford, where the high road from Northwich to Manchester crosses the Mersey. The work was completed in 1761. In the following year statutory powers were granted to the Duke for another canal—called by his name—from a junction at Longford Bridge, and so southwards across the Mersey to Timporley and Dunham in Cheshire, and thence westwards through the northern parts of that county to the Hemp-Stones in Halton, below Bank Quay, entering the Mersey at Runcorn Gap, and available for vessels at neap tides; the total distance being about twenty-eight miles. From a junction with that canal at Norton, near Runcorn, Brindley began, under an Act obtained in 1766, the Trent and Mersey, or Grand Trunk, Canal, which by traversing Cheshire, Staffordshire, and Derbyshire, for a length of some 90 miles between Preston Brook and Wilden Ferry, brings the Humber and the Trent into communication with the Mersey, and so joins the North Sea and the Irish Channel.

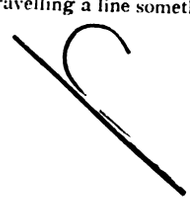
It were beyond the scope of this short article to describe how skilfully Brindley conquered the many physical difficulties he encountered; still, we may cite, in passing, the formidable work of the Harecastle Hill tunnel on the Trent and Mersey canal, the works across Sale Moor Moss for the canal to Runcorn, and his crowning triumph of the aqueduct that carries the Duke's canal over the Irwell at Barton Bridge at a height of 39 ft. above the navigable Irwell. His employer overcame difficulties of another kind; he had for coadjutors the brothers Thomas and John Gilbert—the former the founder of the Gilbert unions and for a while Lord Gower's steward at Trentham, the latter his agent at Worsley. But for some period the whole county regarded his projects with incredulity, and the Duke, though potentially a wealthy man, had so low a credit that he could not cash a 500*l.* bill at Liverpool. With a single-hearted devotion to his cause he reduced his personal expenses to, it is said, 400*l.* a year, and placing his resources at Brindley's disposal ultimately reaped his reward even in a pecuniary sense. He could in later days subscribe 100,000*l.* to the Loyalty loan, and return his income to the property-tax Commissioners at 110,000*l.* per annum. During a long period after Brindley's death in 1772 he continued untiring in his efforts to improve a system with which his fame will always be associated. He formed more than forty miles of underground canals with inclined planes from one level to another for lifting coal which still serve for purposes of drainage; and he devoted much time, trouble, and money upon endeavours to establish steam-haulage for the Worsley canal by means of paddle-wheel boats invented by Robert Fulton. The canals, having been taken over in 1872 by the Bridgewater Navigation Company, were acquired by the Manchester Ship Canal Company fifteen years subsequently. A scarce little book (anonymous), published by Lowndes in 1766, contains a highly interesting account of the engineering and navigation of the several undertakings.

The Duke had but indifferent health in his youth; on his return from the grand tour which he made under the tutorship of Robert Wood, the Irish scholar, and archæologist of Baalbec and Palmyra, he kept race-horses, and became a patron of sport. His early abandonment of fashionable life in London and of Newmarket Heath for retreat at Worsley is commonly attributed to chagrin that he had felt constrained, for reasons that in no wise reflected upon the lady in question, to break off his intended marriage with Elizabeth, *née* Gunning, the beautiful widow of James, sixth Duke of Hamilton. He died at his mansion in St. James's, which he bought (and afterwards altered) as Cleveland, formerly Berkshire, House, which had been the residence of Thomas Howard, elevated Earl of Berkshire in 1626, of Lord Clarendon, and of Barbara, Duchess of Cleveland, *temp.* Charles II. In the "Crowle" Pennant are a drawing of the house as in 1795, and a copy of Faithorne's plan of 1658. It was rebuilt in 1847-50, after Sir Charles Barry's plans and designs, for Francis, Lord Ellesmere, and contains the famous collection of "Old Masters" gathered by Francis, Duke of Bridgewater, mainly from the Orleans Collection.*

A PHILADELPHIAN ARCHITECT'S VIEWS ON ARCHITECTURE.

THE following pointed and original remarks in regard to the modern position and practice of architecture are taken from a paper read by Mr. W. L. Price, of Philadelphia, at the annual meeting of the Ontario Association of Architects at Toronto, and printed in the published proceedings of that Association:—

"Much of what I am going to say may appear reactionary, but I want you to notice one thing, that the man lost in the wilderness (and we are just a little lost in the wilderness in art matters), if he has not some guiding point, will go around in a circle—at least I am so told. So while the line of progress may be something like that—an upward slope—we may be travelling a line something like that,



believing all the while that we are on an upward course.

And we must not measure the line by what we can see of it; we do not see enough to make one part of it look different from another part at any time. We have to consider a great many outside things; to look at history and experience. To the architect especially that is

* Messrs. Constable will shortly publish a volume, to cost 52*l.* 10*s.*, containing reproductions in photogravure by Mr. Walter L. Bourke of 120 of the finest paintings at Bridgewater House, with a descriptive and historical text by Mr. Lionel Cust, Director of the National Portrait Gallery.

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essential. There is only one thing worse in my judgment, than ignoring precedent, and that is following it.

Now I want to take you with me in a little practical talk—we are up against a serious proposition. Having secured our client, the first question for us is, what next? Shall we build around that client our shell or his fitting shell? Now when we stop to think of it, how often are we trying to build the best possible monument to ourselves, and not the best possible house or building for that man?

During a first interview with a client a year or more ago, after talking to him about an hour, he said, I would like to see the house you would design for me, Mr. Price, and I said I would too. Being agreed on that he then said: 'Now I have told you the things that I want, the size of the rooms and the number of them; you know the site, make me a sketch of the house you think will fit these requirements.' I said, 'Mr. ———, I will gladly do that; I can do that, I think, but if you take that design and build it you will be a fool.' And then I went on to say, 'for I do not know you well enough to draw a house for you.' I had not the slightest expectation that I would get that job, but right there I got it, because that man began to see something different in architecture from what he had ever seen before; he began to realise that this was to be his house, not an architect's house merely. Afterwards, sure enough, to show you how the good work took effect, one of the leading finishers of the city went to him and said: 'Mr. ———, you are a busy man, you don't want to bother with the designs for the inside of your house; I will refer you to So-and-So—we did the work for him—47,000 dols. worth of interior work, and we did not take up two hours of his time.' This gentleman said, 'Well that settles it, you could not decorate my house or do my interior woodwork because I can see that that is your interior woodwork and not his, it does not fit him.' I simply tell you that to point out that what we have to do if we are going to have real architecture is to make our product more than beautiful, more than fitting to the situation, primarily fitting the man that is to live in it, or the purpose for which it is to be used. That means a pretty savage thing sometimes; it means that if we are going to build a house for a vulgar man, that we must build a vulgar house. It would not be architecture if we did not. It must be better than that man; it must be what that man might be, it must represent that, but unless it has in it some element of that thing which makes him the vulgar man, in my judgment, it is not architecture at all. We are up against difficulties and limitations of that kind, and it does not seem to me to be such a bad thing after all. Fortunately, the vulgar man usually goes to a vulgar architect, so that we need not often be seriously troubled that way. But the fact remains that it must fit the man in some way or other, and I think the most of us (even if we do not analyse these questions of design) naturally tend to draw a vulgar house for a vulgar man. But we must be mighty careful of what we mean when we call a man vulgar. A difference in taste does not constitute vulgarity, or the reverse. My client will say: 'I like this or that house at 40th street.' And instead of falling dead I go out and try to find what it is he likes about that house; very often it is a bay window on the side of it, or it faces this way or that way, or it has some other feature absolutely irrespective of design or drawing that fits the man. If, for instance, you take a man that likes brilliant colours, and set him down as being ignorant and vulgar because you have put two things before him; one good, in low tones that you care for, and one bad in high colours that you loath, and that attracts him because he loves colour, you make a great mistake, for that is not a fair test; you ought to put before him things good and bad in both bright and quiet colours, and you will find ninety-nine times out of a hundred he will choose the good thing. Find out what it is he likes about the bad thing, give him a chance and he will choose the good thing rather than the bad. If that were not true there would be no civilisation; we would have devoluted back into oysters by this time, because we have done so many foolish things and so neglected the laws of nature that it must be some principle in us that seeks the right rather than the wrong, to keep us going at all. As Professor Shortt said to us yesterday, we have gotten away entirely from the mainsprings of the art and architecture of the past, we have come to a time when neither the civic nor the religious is the ideal around which we build our civilisation, but the individual, the domestic. Take all these high buildings with which you gentlemen are wrestling in pain and trouble (and it is a serious trouble), what are they for? After all are they not merely the places that we go to (to get away from as soon as we can), that we may have enjoyable surroundings in our home life? That is the sole object, and while we should make them as little obnoxious as possible, and keep them as quiet as possible, because they tend to ramp and rave—while we should do that, it seems to me that our greatest effort should be put upon the making of the object of all this beautiful, and that is, after all, our homes. Therefore, I am talking mainly about house design. I want to say, though, that your President yesterday pointed out what seems to me the only logical materials in which to design the office building, and that is a skeleton of steel clothed with a plastic material of some kind. I cannot conceive, though I admit I have done it myself, that it is proper to clothe a steel frame by putting brick or stone around it, or any real building material. It is a lie on the face of it, for it would not stick there and stand unsupported. If we must have that kind of building, let us encase it with some plastic material like cement. The engineers are looking after the bones, and we are, after all, only the planners and decorators of it.

The most serious question, as I see it, in designing a house that we have to meet with, is what shall the concrete thing be made of, and how shall it be made? Or, perhaps, how shall it be made, and what shall it be made of? We will treat what shall it be made of first. The material must be moderately cheap. We do not often have palaces to build; we are not working for Gould or J. Pierpont Morgan, but for each other, the average community which we find around us; therefore the buildings which we build must be cheap. They must not, or should not, require any great amount of ornament; and I want to point out that the bulk of the ornament that we use is used purely to get surface, and not for the value of the ornament itself. The pressed brick of good old Philadelphia was so horrible that after we once waked up and got past the marble steps and marble lintels, we flew to the other extreme and brought in the tortured mud (the terra-cotta man), with his substitutes for surface; and we put wriggles all over it to make up this surface—that is what it amounts to, most of the ornament is just that, wriggles—and we smear that over it for no other reason than that we want surface. I do not think that the lack of ornament enters our mind one time in twenty when we put that kind of stuff on. I do not refer especially to terra-cotta, but to all senseless ornament. It is because we are afraid the surface will look flat without the ornament, and that is a mighty poor excuse for putting it on. As I say, texture should be the first consideration, because the bulk of our building will depend for its beauty on texture and on the disposal of its masses, and not on ornament. In the first place real ornament that really beautifies the building is too expensive to spread all over it; and in the second place you cannot see it if you do so. It becomes merely surface, and here is where fortune favours us, as it so happens that the cheaper and rougher materials naturally have the better textures. I remember when building a house some years ago, I arrived on the scaffold just as the bricklayer was starting to build a high kitchen chimney—it was my own house, and I could do as I pleased—and he had there two piles of bricks, very nice bricks. One pile was of quite smooth, beautiful bricks, the other pile was of the roughest bricks that he could get. I said, 'What are you going to do with those bricks?' He said, 'I am going to use these rough bricks for the lining, and the others for the outside.' I said, 'Reverse it.' He nearly fell off the scaffold. I said, 'Won't those smooth bricks make a good lining for the flue?' He said, 'Yes, very good, excellent lining.' I said, 'I am quite sure the other bricks will make a much better-looking outside, and that is the part I am interested in, apart from its drawing qualities.' So he put the chimney up wrong side out; and when he had his scaffold down he said to me, 'That is the best looking chimney in this town.' The bricks on the inside cost probably 11 dols. a thousand, and those on the outside 6.50 dols.; and those rough, hard bricks are the only kind, in my judgment, of which to build a country house—the roughest ordinary hard brick that you can get. I will stand fight with a client on that before I will utilise anything else, because it is the brick with texture and colour—the brick that has the burnt head on it—not to be picked into a pattern necessarily, but put there to have its influence on the texture and colour of the building. What is true of brickwork is true also of stonework, with us. When we really want to get expensive stone, then we get Avondale stone, which is as white as the driven snow and as uninteresting as anything in God's creation; or we use rubbed or sawed limestone, and if not satisfied with the surface being perfectly smooth, we specify that it shall be drove-tooled; when it is generally planed on a machine. Whenever they get the chance to put the machine on and make groves, they do it; and all the texture and sense of stone is got out of it. For house-building, the rough stone, the common flat stone that we use down there, makes, in my judgment, the finest wall surface in colour and texture, and interesting light and shade, that we can get. Next comes another material, and, in spite of what our friends who like dark exteriors say, I am extremely fond of it, and that is rough plaster, the roughest sort of dashed work or pebble dash. I think that when we are considering the colour of the exterior, we must remember, as your President said, shadow, the shadow of the eave—make it big if you want to; the shadow of the trees that overhang it; the shadows of the vines that grow on it. What is there more charming, more beautiful, than the white cottages and thatched or tiled roofs of England, with their beautiful vegetation around them? We may, perhaps, consign white to a greyer climate than ours, but much of the time we could stand white, or nearly white, here. And this material, it seems to me, is a very valuable one that is much neglected. It gives us mass, it does not chop the surface up, and it gives us a fine contrast with either stone or brick, whether it be white or coloured. Of course we use a great deal of timber work down with us, and I am sorry to say we very seldom use it honestly, most of our timber work being stuck on the outside of the house and not part of the structure. That, of course, is excusable, there is no possible excuse for it, as far as I can see—I do it myself, but I am ashamed of it and I am trying to stop. It is almost impossible in this country to use it honestly; I doubt if the timbers will stand in our climate long enough when really built in the wall to make it a practical mode of building.

These are, to my mind, the kinds of material that it is worth while to deal with in house-building. . . .

Perhaps the most serious problem we are up against is, how to get this material put together so that it may properly be called architecture after it is done. How much of the building that we are doing in this country would we walk out of our way to see in the old country; or would we collect pieces of as we do pieces of the old buildings? That comes back to the proposition of my friend that the architect is not a designer of buildings, but a designer of opportunities, and, if we cannot find the people about us who will seize these opportunities and together with us make architecture, the net result will not be architecture; we will have design, but not architecture. Here is where I am going to get 'reactionary' in trying to go on straight. People say that we are in a condition, and always have been, of evolution, and that we cannot fight against tendencies. But we know how mankind has evoluted in the past, it has been in spirals. When they were rebuilding a brick Rome in marble, they little thought that Rome was in its decline. Their literature, they thought better than the more rugged and tough literature of former days; their architecture they thought better, more refined, and elegant; but just the same, Rome was in a decline and not on an ascent. It seems to me that it is worth while for architects especially to see what can be done in stemming the tide, or at least in diverting the tide, from methods that are suicidal as far as art goes. You must remember that though the body of architects is a very small one compared with the community, it has been a very efficient mover of the community. The differ-

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ence between the Philadelphia—I speak of Philadelphia because it is my own place—of thirty years ago and of to-day, is almost entirely due to the few architects who have worked for better things there. They insisted, and insisted again and again, in spite of the conservatism of client and builder, that material and design should be better, and they have bettered them. Now it is in our hands very largely to influence the men who do our work, by continually insisting on honest work. The men who erect our buildings are divided into two classes—the contractors, with whom we come in touch, and the men who actually do the work. The contractor has, in a large measure, ceased to be a builder; he is simply a contractor; he gets a number of sub-bids, adds them together, and puts on his commission for profit and superintendence, and finances the job, and, to a certain extent, sees that it is carried out—that the people working under him to carry it out. But he has comparatively little touch and little sympathy with the actual workmen who carry out the work, and they are the men that we must go after. It is not the contractors who have much to do with the actual building, it is the craftsmen, if you can call them that, who do the work.

Now, it seems a reactionary proposition, and possibly a hopeless one, to fight against the machine. Here we are at the end of the nineteenth century, the century that brags more of its methods of production than any other one thing; and I say that those methods of production are themselves absolutely immoral and reactionary. And I mean it. I mean that the method of production that considers only the amount of the product and the profit that can be made upon it, is absolutely immoral, and that the products of these methods are essentially inartistic, especially in our decorative friends' materials. I know, for instance, what it is to try to select papers for other people; I know that always, or nearly always, when the people get the paper on the wall they will come into the room and say: 'That is not the paper I selected, it was not that colour, it was not that design.' There is a difference between the design, which may be very beautiful, and the thing you get upon your walls, wherever it is mechanically made. And that is an essential difference. It is a difference that is bound to exist. I do not care how far you may perfect your methods of production, if they are mechanical the result cannot be artistic, because art is, after all, as far as I can see it, only the expression of one's own individuality. Hubbard has said that art is the visible evidence of man's joy in his work. And that is almost a definition, but it is not the real definition, because the art is in the doing of the thing, and not in the product of the doing. You cannot, if that be true, get art material or art results without artists. The proof that it is true is that the artist never hoards the things that he makes; his real joy is in the making. The rich people do not possess the art of the country, they have the crumbs that fall from the artist's table, and that is all that they can get of it. The artists are the fellows that get the fun out of it. Art truly is to the artist. Now we architects are only half artists, because while we guide the hand we are not the hand. It is a pity, but it is true. And yet we have the biggest opportunity in the world, and that is the making of ourselves and the crowd better men at the same time, and it is in our hands to do it. We may be really leaders, but the evidence of leadership is a following. If we have not a following among the people that create the things that we are supposed to create, then we are in nowise leaders; but we have the privilege of being leaders and educators of the people, and especially educators of our co-workers in making architecture. And how shall we go about it?

This machinery question is a vital one, and one we cannot ignore—as to where we can draw the line on the machine. I was trying to make a distinction, and I think I can make one. I think you will agree that the place where we can draw the line is this—just so long as a machine is a tool with which a man works, it is a benefit, no matter how highly it may be developed; but the moment it ceases to be a tool, and becomes a mere automatic machine into which material is fed, and out of which the product comes without any volition of the man who is working it, then that machine becomes an immoral affair, and the product of it becomes absolutely worthless as far as the art world is concerned. That seems to me to be the place to draw the line. That does not cut out band-saws or turning lathes, or other power tools, but it does cut out much of the work we have to put up with; for instance, it cuts out machine carving in all its forms. It is an easy way to make a yard, or a yard and a half, or a whole piece, of so-called ornament, but of what value is such ornament? Now can we get the people we build for, and the people we build with, to go with us, and return—if it be a return—towards a more simple method of construction? I think we can. I think that there is one way we can do it if no other, but it would be a drastic method. That would be to cut off all the ornaments, make the thing absolutely simple and plain, with only the essential features in it. Then, at least, there would be no bad ornaments in it. I think we can go a step further, and instead of cluttering up the inside or the outside of our houses with numberless mouldings and brackets, and 'the Lord knows what, of round and square, stuck here, there, and everywhere,' without any special meaning except that our ancestors or forefathers did it in marble or some other material, for I am afraid that is the reason we put most of those things in, we can eliminate most of these things, and substitute for them extreme honest simplicity in construction, and a little bit of good carving, for we still have the carvers left to us, and some of the carvers and decorators are really artists and artisans. I would rather have on my wall a patch a foot square of real decoration, interesting enough to go and look at twice, than to have the room covered with decoration that has no interest except as to design. That seems to me a most practical line of elimination. Cut the quantity of it down to the quick, if need be, to get the quality a little where we want it. We can do that, and the people will go with us, for they are just as sick of the uninteresting wall papers and truck that their houses are cluttered up with, as we are. I have had no difficulty in getting people to allow me to simplify their houses for them. The tendency to ornament comes from the architect rather than from the client, almost every time. Of course, there are exceptions, and people want a lot of gaudy ornamentation and display; and I think in these cases we had better give in to them. I think that is possibly the best way to cure them. It is a little rough on us, but I think we had better suffer if we can make architecture possible in the doing of it."

A Bit of Mediæval Oxford. From a Sketch by Mr. C. Maresco Pearce.

A BIT OF MEDIÆVAL OXFORD.

THIS sketch, made by Mr. C. Maresco Pearce, shows a bit of mediæval work which was recently brought to light in pulling down the old houses that surrounded it to make room for the new buildings of Hertford College. It stands on the line of the old city wall which still exists round New College, 100 yds. or so away. It is believed to have been a chapel in connexion with the gate at the end of Catstreet, which runs from the High past the east end of St. Mary's to the Broad, which was outside the line of the walls. There is a small, but very good, Perpendicular doorway on the street side.

Mr. Pearce adds, "I understand that Mr. Jackson is going to incorporate the building in his new building for Hertford, but I am afraid that this will necessitate its being practically rebuilt, as it is in a very ruinous state."

COTTAGE HOSPITAL, TREDEGAR.—The laying of the foundation-stones of the cottage hospital which is being erected in Bedwellty Park, Tredegar, took place recently. On the ground floor will be a ward for nine patients, two private wards, an anæsthetic ward, nurses' and doctors' apartments, dispensary, and all the usual offices. The upper floor will comprise accommodation for the staff. The contractor is Mr. D. John Vaughan, Tredegar, the architect Mr. E. A. Johnson, Abergavenny, and the contract price is 2,784*l*.

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THE NEW ATOCHA CHURCH AT MADRID.

No one can visit Madrid without hearing of the Atocha Church. According to a well-established precedent, more difficult to disregard than most of the laws of the country, the ruling Sovereign of Spain is bound, when residing in Madrid, to attend the Salve service held in the Atocha Church every Saturday afternoon at 4 p.m. On this spot Christians worshipped even when the land was under the sway of the Mahomedan Moor; so to-day the most Catholic king must also, and regularly, worship here.

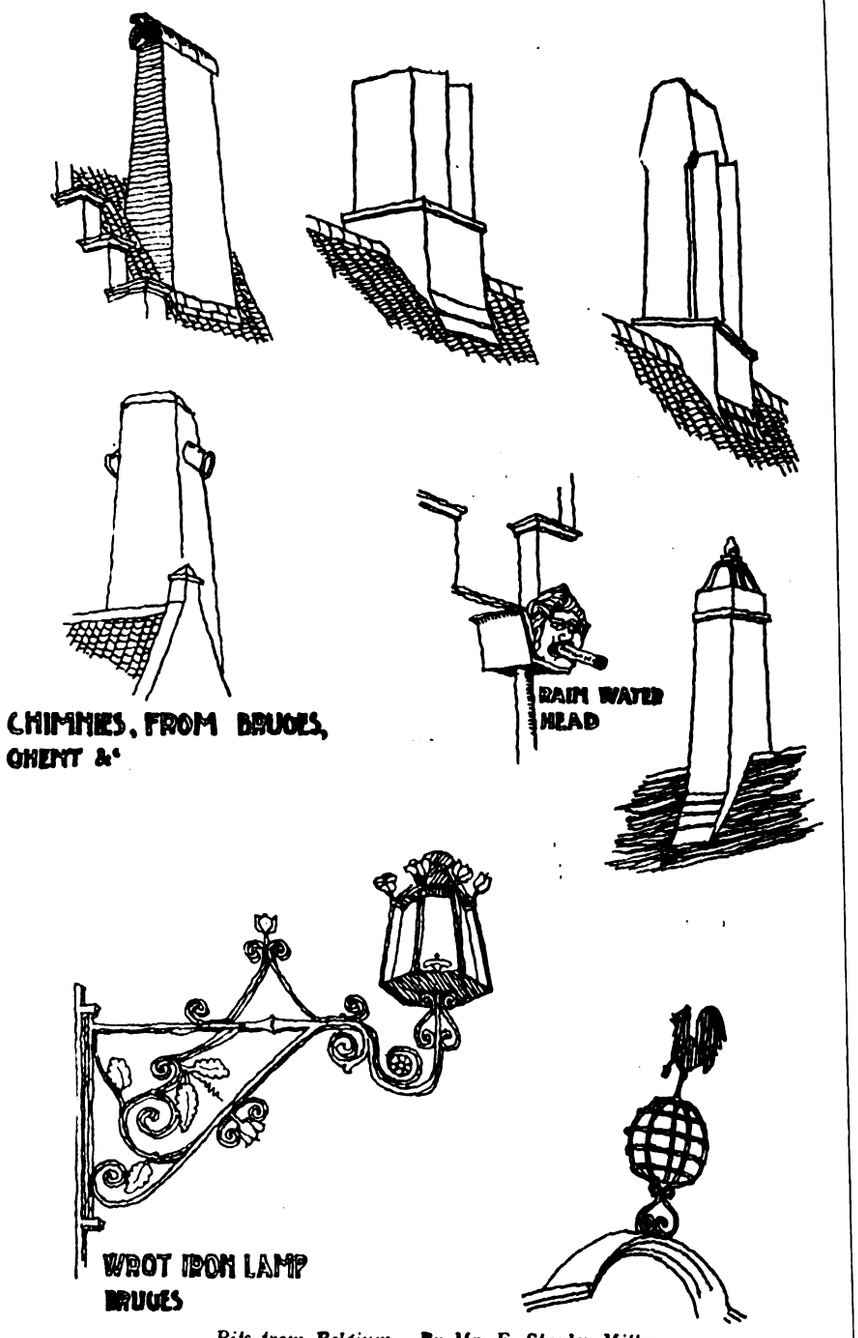
The church, however, came of late years to such a condition that it had to be pulled down, consequently there has been no Salve service for some years, and it is the reconstruction of this edifice which is a matter of some special interest to architects, particularly as Spain is better known for its old than for its new buildings.

The old church did not possess any architectural merit. It was connected with the Dominican convent founded in 1523 by Hurtado de Mendoza, confessor of Charles V. The various princes who had contributed to enrich this church were more distinguished for their piety than for their good taste. If to this is added the fact that the church was pillaged on several occasions, it will be seen that while its destruction has been no great loss it should not be difficult to replace it worthily. Indeed, no great importance was ever attached to the church itself. What is of importance, and what all pious Spaniards deeply revere and value is the image it contains. It represents the Virgin patroness of Madrid. It is black with age, for it has played an important part in Spanish history for some 800 years. Volumes have been written about the miracles it is supposed to have accomplished; and it is round this image that most of the flags won in battle have been hung up, and at its feet lay entombed some of the greatest men of Spain. This fact has given rise to the idea that in rebuilding the Atocha it should be planned in a manner that would render the new structure worthy to become the great Walhalla or Pantheon of Spain.

For this purpose a public competition was organised, and architects invited to submit designs. Señor Ferdinand Arbos is the author of the scheme which was finally adopted. Señor Arbos is of Italian descent, he is a member of the Royal Academy, and is well-known among the successful architects south of the Pyrenees. He has already built many churches and mansions in Spain. The style of the new building is not so much Spanish as a kind of bastard Lombardic Gothic, showing externally alternate courses of white and grey stone. A cresting of the favourite Venetian form crowns the walls, while the cloister arches are filled with some very badly designed quasi-geometric tracery, which has a gimcrack effect much at variance with the general solidity of the building.

The plan comprises a basilica church, and a monumental tower, besides the above-named cloisters. The tower was built first, and already constitutes a landmark in Madrid, where it can be seen rising above and beyond the Southern railway station. But the building progresses slowly. The fact is that the cost is not defrayed by the State, but out of State property, which, though it does not actually belong to the Royal Family, is nevertheless used or administered by them, and it would appear that the amount given out at a time is not large.

However, the tower is built, and some of the cloisters, and sufficient progress has, therefore, been made to begin the use of the site as a mausoleum of eminent men. The first person to receive this honour was a great Spanish statesman, Señor Segasta. He is buried in the new cloister, and a public subscription is now being made to raise a suitable monument to him. In the meanwhile, the wall near the spot where his remains rest is covered from floor to ceiling with crowns, some of them being very large and beautifully made. Here also the bodies removed from the old Atocha church are being reburied. Thus, to the other end of the cloister containing Segasta's newly made grave the body of General Prim has been brought. This lies inside a beautiful tomb, made of metal and richly inlaid. It was the work of the celebrated artist Zuloaga. The cloisters form a quadrangle, and in the centre there is a small ornamental column. The Marques del Duera, better known as General Concha, has a monumental grave in another part of the cloister, and these are the only three remarkable men as yet buried or transferred to this new building, which will eventually be the Westminster Abbey of Spain. At present, however, it looks very dull and deserted. The church is not yet built, the gates to the cloister are locked, and nobody thinks of visiting the place. Thus, while the glory of the old Atocha Church has departed, that of the new one has not yet come into existence.



Bits from Belgium. By Mr. E. Stanley Mitton.

BITS FROM BELGIUM.

THESE small sketches or notes of bits of detail were taken in Ghent and Bruges by Mr. E. Stanley Mitton, some of whose sketches in Belgium we have previously published.

They illustrate characteristic treatment of iron-work and of chimney terminations.

ALTERATIONS AT BALMORAL.—Sir Rowand Anderson has been carrying out some alterations and improvements, chiefly internal, at Balmoral Castle. The servants' wing has been enlarged and storerooms and bathrooms added. The new work externally is in grey granite, with symbolical decorative features in the pediments of the dormers. The Royal entrance-hall has been panelled in Scottish pine of the district, and a decorative over-mantel of the same material has been erected, with a square panel bearing a carved representation of the Royal Arms, copied from the Great Seal of Scotland.

ENGINEERING SOCIETIES.

THE INSTITUTE OF SANITARY ENGINEERS, LTD.—(Visit to the Northern Outfall Works, Barking.)—By permission of the Chief Engineer of the London County Council the members visited these works on Saturday, the 12th inst., about forty being present. The Northern Outfall is composed of three 9-ft. brick barrels, and is known as the high-level, middle-level, and low-level. The whole of the drainage of the north side of the Thames, nearly two-thirds of the total, finds its way into these three main sewers. The high-level starts at Highgate, taking the whole of the North and North-East districts, running through Hampstead Heath, Holloway, Stoke Newington, Hornsey, Highbury, Hackney, and Kingsland, etc., to Old Ford. The middle-level starts at Paddington, and runs through Hammersmith, Oxford-street, Holborn, Clerkenwell, Old-street, Bethnal Green-road, and joins the high-level at Old Ford. The low-level starts just outside Chiswick, runing through Fulham, Chelsea, along the Embankment, follows the river to Shadwell, then branches off towards Bow Common, through Bromley to Abbey Mills, taking all the low-lying districts and the East End. The high and middle levels come direct to Barking by gravitation, but the low-level is pumped twice; at Pimlico, which is known as the Western Pumping Station, and again at Abbey Mills, where it is raised 40 ft. From Abbey Mills it comes in an unbroken line direct to Barking. The sewage is then treated with lime

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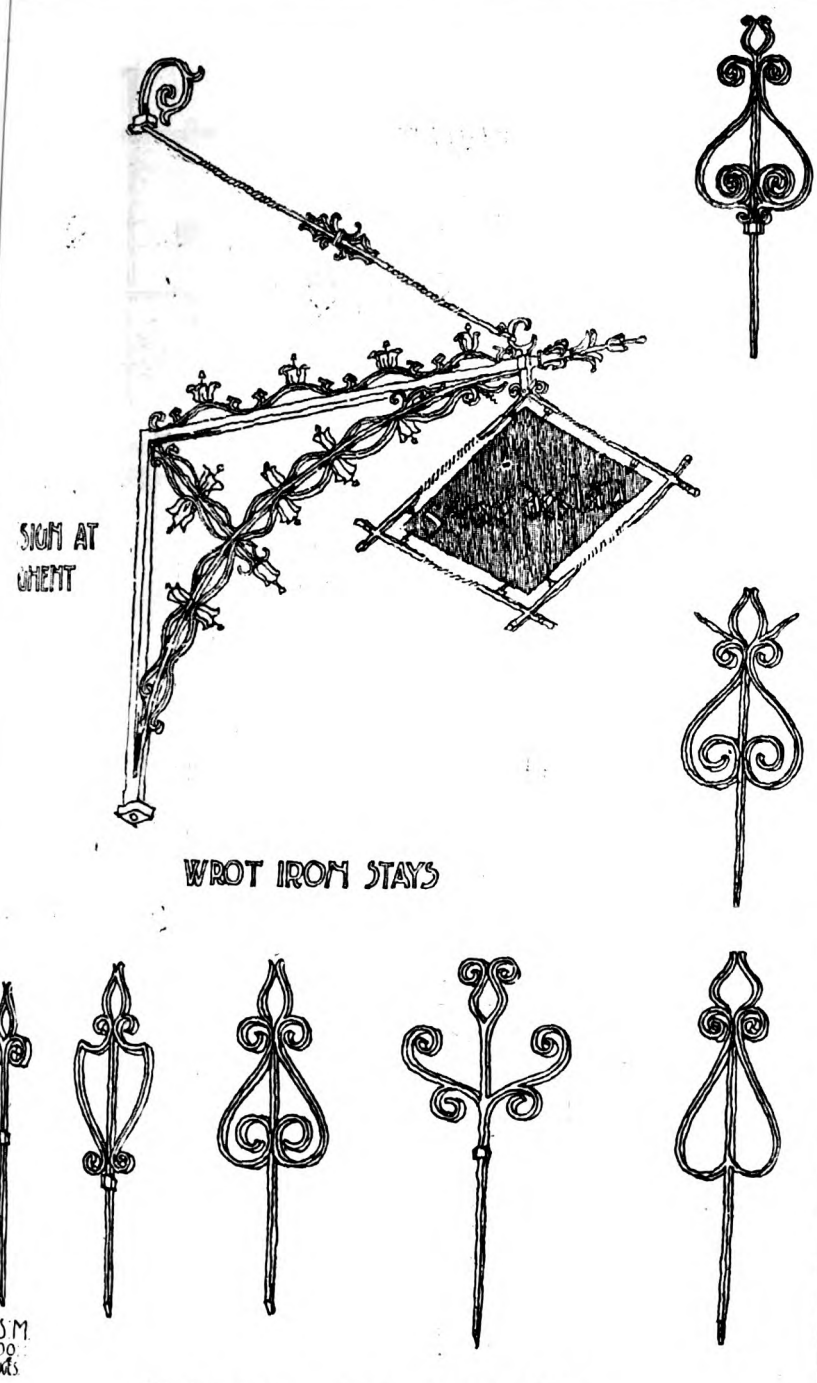

Bils from Belgium. By Mr. E. Stanley Mitton.

and proto-sulphate of iron, 5 grains of lime and 1½ grains of proto-sulphate of iron to one gallon of crude sewage. It then flows along and passes into precipitation channels (of which there are thirteen, each 40 ft. wide and averaging 1,000 ft. long), over a weir wall 8 ft. 6 in. high, during which time the sludge settles at the bottom. After running for a number of hours, say between 90 and 200, according to weather conditions, the penstocks or valves are closed, and the sewage is allowed to find its level with the weir wall, and the water that is left is drawn off by telescopic weirs, which are really open cylinders, worked by hydraulic power (these weirs being lowered very slowly to avoid stirring up the sludge). The water or effluent runs away through these, and meets the water that has already passed over the weir walls, and runs into the river Thames at any state of the tide. The average daily flow is 130,000,000 gallons. The sludge that remains is passed through screens to separate anything contained in it that would be likely to choke the pumps, among the articles found being:—Brushes, tops, balls, sticks, rags, clothes pegs, etc. The amount of screenings is about 90 tons per week. It is then pumped into settling beds, where it is allowed to stand for 24 hours for the purpose of taking off more water (called liquor), which is too black to run into the river and too thin to send to sea; the reason for this is to lessen the percentage of moisture contained in the sludge sent to sea, generally about 9 per cent. The water that is drawn off in this way is pumped back into the sewers, and is treated with an additional quantity of lime and iron—lime, 10 grains, proto-sulphate of iron, 3 grains. The sludge that remains is sent to sea in ships (there are six steamers, each carrying 1,000 tons, and they make eleven trips a week each; this is for the two outfalls (Northern and Southern), which go to the "Barrow Deeps," where they discharge while turning round, usually over a distance of about ten miles. The amount of sludge sent to sea last year from the Northern Outfall Works averaged 31,000 tons per week.

SOCIETY OF ENGINEERS.—A very interesting visit was made by the President (Mr. J. Patten Barber) and members of the Society of Engineers, on Wednesday, the 23rd inst., to the electricity generating station and one of the baths and washhouses at Islington, by permission of the Islington Borough Council.

The electricity works are situate in Edengrove, Holloway, at the side of the Great Northern Railway, and in a position that is practically the electrical centre of gravity of the Borough. The system adopted for supply is high-tension alternating, with street tank transformers as sub-stations. The works consist of a range of buildings comprising offices, new boiler-house, double-bayed engine-room, old boiler house, stores, workshops, and auxiliary plant-room, yard and mains, workshops, and cooling tower. The offices have been arranged to come between the works and the Catholic church of the Sacred Heart, which lies south-east of the works and adjacent to it. Coal is rail-borne, and delivered on a private siding from the Great Northern main line. The siding is continued through the works, and, by means of permanent ways over the coal bunkers in both boiler houses, railway waggons can be lifted and tipped directly into the bunkers, a special tipping-gear being provided for the purpose.

The boiler-houses are excavated so that the firing floor is about 13 ft. below ground level. They contain (old boiler-house) four Babcock and eight Lancashire, and (new boiler-house) six Babcock boilers. The steam pipes are arranged so that the boilers are coupled direct to the engines, and by means of an equalising range any boiler can be connected to any engine, or the whole system run together. By this means the large steam rings formerly favoured in electricity works have been avoided, and the condensation losses reduced.

The engines consist of Wheellock cross-coupled compound, run at 95 revolutions, with a steam-chest pressure of 125 lb. to 150 lb. per square inch. There is also a combined engine-driven motor generator, consisting of Reavell high-speed 80 h.-p. engine, Crompton 40 k.-w. high-pressure alternator, and Crompton 20 k.-w. dynamo used for charging cells, and day plant.

The switchboard is situated on a gallery which is extended across a portion of the width of the engine-rooms at one end, and along the engine-room down the centre so as to command a view of every part. The high-tension machine board is a fourteen-panel Ferranti 500 ampere board, split in halves, with the usual regulating gear instruments, fuses, and synchronisers. On either side are the circuit boards of the Fowler plug pattern, and on the extension gallery is the arc circuit switchboard by Cowan's, Limited. The alternators are run in parallel upon bus bars, and the rule adopted is that speed is adjusted for frequency, steam is adjusted for load, and excitation is adjusted for volts. For street arc lighting there are five thirty-light and three fifty-light rectifiers, with two boards, one of the 1895, and one of the 1902, pattern by Ferranti, and five alternating series, constant current transformers.

The street lighting now consists of 473 lamps made up as follows:—Four circuits with a maximum of thirty lamps each, 12 amperes rectified; two circuits with a maximum of fifty lamps each, 10 amperes rectified; six circuits with a maximum of thirty lamps each, high-tension constant pressure alternating with transformers in base of each lamp post for the individual lamp; four circuits with a maximum of thirty lamps, constant current series alternating with compensators in the series circuit, and across which the lamps are connected. For side-street lighting experiments have been made with the Reason Company's, the Improved Electric Glow Lamp Company's, and Nernst fittings.

The distributing system in the past has consisted of cast-iron pipes containing double concentric rubber insulated steel-armoured cables as high-pressure feeders and distributors, also vulcanised india-rubber double concentric steel-armoured cables drawn into 3-in. earthenware pipes. Extensions are now being laid with paper insulated twin arc cables, double concentric paper insulated high-tension feeders, and triple concentric paper insulated low-tension distributors, all laid on the solid system.

The meters in use are:—Chamberlain and Hookham, Hummell, Guttmann, Westinghouse, British Thomson Houston, Aron, Stanley; and Reason demand indicators are fitted where the sliding scale method of charging is adopted.

METHODIST NEW CONNEXION CHURCH, WALLSEND.—The foundation-stone of the Methodist New Connexion (Allan Memorial) Church, Park-road, Wallsend, was laid recently. The new building will be in the Gothic style, and will accommodate 500 persons. It will be of red brick, with stone dressings, and will have a red-tiled roof. There will be a transept and organ chamber, and on the north-west corner a tower and spire. There is to be a commodious gallery, and the total cost is estimated at about 6,600*l*. The contractor is Mr. W. T. Weir, of Howdon, and the architect is Mr. B. F. Simpson, of Newcastle.

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Illustrations.

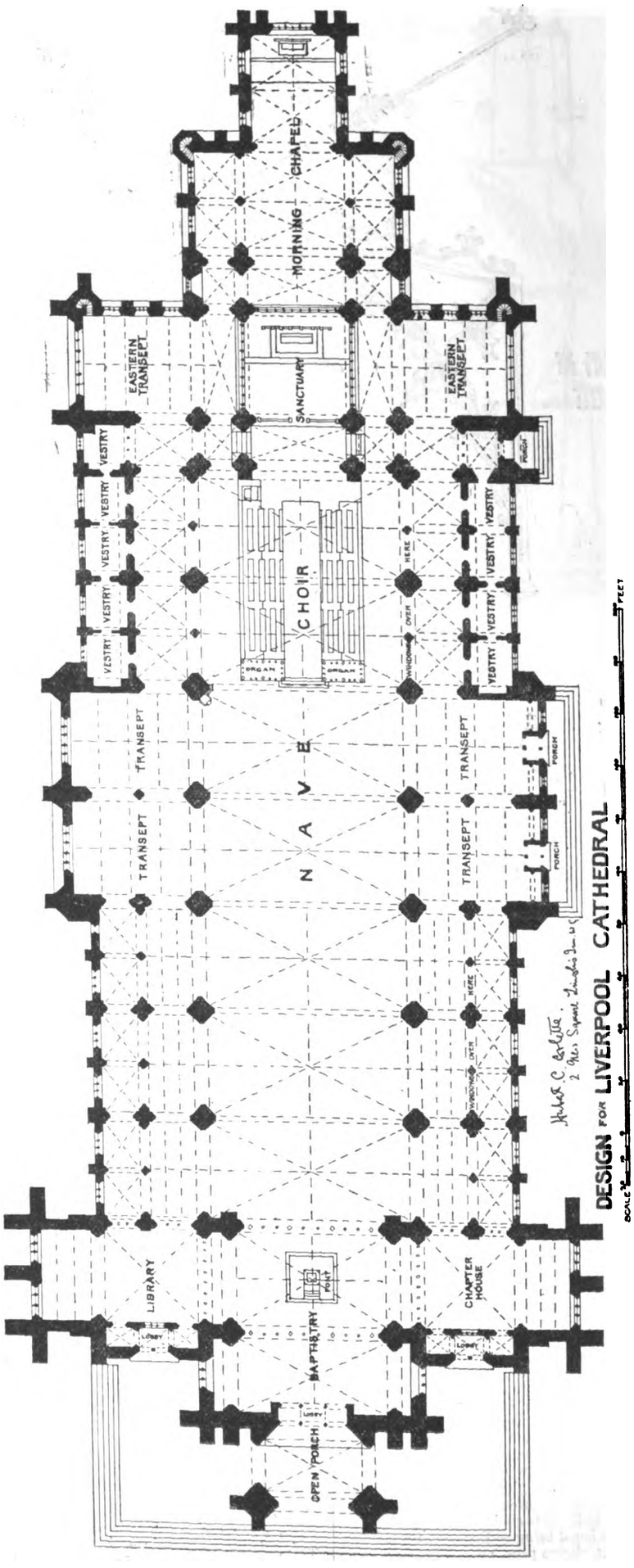
COMPETITION DESIGN FOR LIVERPOOL CATHEDRAL.

IT was intended in contriving this plan of a cathedral that by its internal arrangement and external composition it should express the facts of which it should be a visible symbol. It was to show the relative importance of the several parts of the building.

In planning a church it is manifest there are some fixed ideas to be embodied in the structure. These are:—The altar must be protected with reverence, guarded by dignity, and respected as the central object in the building. This being so, the architectural scheme should depend upon it, lead up to it, and emphasise its chief importance. Next:—The building is a place set apart for worship, for praise, for teaching, and the font must be provided for. This clearly means, (1) that the importance of baptism must be shown by the position given to the baptistry in the arrangement of the plan; (2) provision should be made for housing a congregation, and a place is to be set apart for (3) those whose duty it is to lead the praises and (4) offer the worship of the church.

The plan attempts to work out these ideas in one of many ways which might have been used. The dominant feature of the whole building rises above the sanctuary, which is thus separated, as something which stands alone among the elements of the group. The choir is in the nave, but connected with the sanctuary; and in order to break the vista, though not obstruct the view, the organ is put at the west end of the choir, and helps to give to it some architectural importance. Its size, and the small details of the woodwork and metal in its design, were intended to give scale to the great nave. The latter is 72 ft. wide between the piers of the nave arcades, and 120 ft. between those of the aisle arcades. It is 350 ft. long from the west wall to the sanctuary arch, and 130 ft. high. The piers of the nave arcade are 40 ft. from centre to centre, and 30 ft. clear span. These piers are carried high up, so that the apex of each arch is only a few feet lower than the central vault over the nave; and each arch of the great arcades, in three of the bays, is carried out as a pointed barrel vault till it stops against the outer wall of the building carried over the aisle arcades. In the case of the west transept, the central double transeptal bays, and the east transept, the barrel vaults run out to the outer walls. But in the two bays above the choir no barrel vaults occur; the large arcade is sub-divided at a low level, and the windows giving light to the choir are brought in close to the choir stalls, and placed in the wall under the great arches of the main arcade. The windows of the three barrel-vaulted bays of the nave are in the wall above the aisle arcade. The outer walls of the western and eastern parts of the nave are thus in different vertical planes, so that the lighting would be varied throughout its length. The transverse and diagonal ribs of the nave vault were to be stone, with a light concrete domed filling between them; and the decoration suggested was to be done in tempera directly on the filling, without any plaster surface decoration, except where a slight emphasis was introduced by modelling the decorative lines of colour upon the vault.

H. C. CORLETTE.



WOOD GREEN, ST. PAUL'S CHURCH.

THIS church is to be built of stock brick externally, with stone dressings. The interior is to be finished with plaster as a basis for decoration, and stone as shown.

The dome and apse vault are to be of concrete, and these it is intended to finish with glass mosaic. All the other roofs are intended to be painted.

The woodwork, except for the roofs, is of oak. The floors in the nave are of wood-blocks, and the passages of tiles, and the sanctuary of marble.

Mr. E. Goldie is the architect. The drawing was exhibited at this year's Royal Academy.

ST. MARY'S CHURCH, YATE.

THE tower of this interesting church was erected late in the fifteenth century, and was

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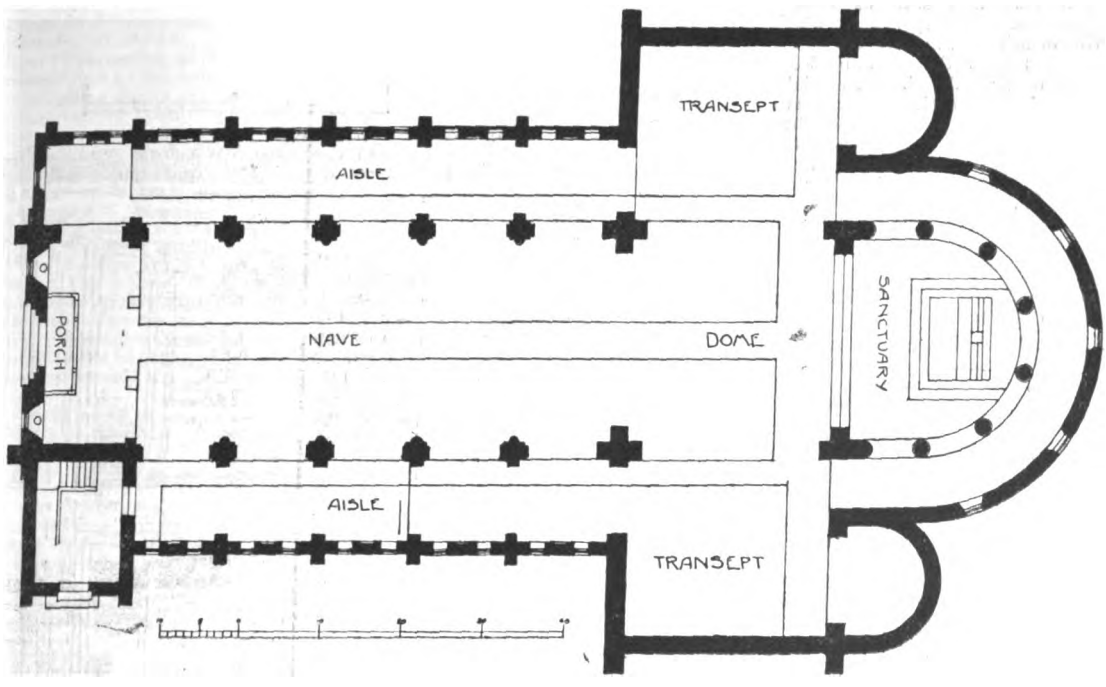

Church of St. Paul, Wood Green. Plan. [*See preceding page.*

probably left incomplete at the Reformation. The existing stones were, however, so completely finished that no doubt was left as to the detail of the upper part, the only matter for fresh decision being the height of the parapet and pinnacles.

The porch had suffered from a churchwarden restoration, the gable being filled with a large window of the period. This filling in of the gable has been replaced by a new design shown upon the drawing.

An Early English timber roof to the porch was discovered under the plaster, and is now repaired and exposed.

The work was carried out by Messrs. Cornish and Gaymer, of North Walsham. The work undertaken comprised the recovery of the roofs of nave, choir aisles, and transepts, all of considerable interest. The church includes work from the Norman period downwards.

Mr. W. D. Caröe was the architect.

CASKET AND GOLD CHAIN FOR THE CORPORATION OF PRESTON.

WE give illustrations of two examples of gold and silver smiths' work, designed by Miss Florence H. Steele.

The first is a casket to contain the Charter of the Honorary Freedom of the Borough of Preston, presented to the Earl of Derby on August 6 last, and the second, a gold Mayoress's chain, commemorative of the courtesy and hospitality of the Earl and Countess of Derby during his tenure of the office of Guild Mayor in 1902.

The casket is in silver, and the arms of the house of Stanley, those of the Borough of Preston, and the Derby monogram and coronet are enamelled on it, giving a balance of colour to the scheme. The inscription plate in the central panel is in champlevé enamel, and behind it is the space provided for the signed and sealed Charter of the Freedom of the Borough. The two figures cast in silver, standing to the left and right of the body of the triptych, represent respectively Justice and Mercy. The illustration shows the casket with the doors closed; when opened, they show the illuminated-lettered Charter, displayed so as to fill up the framing formed by the casket.

The chain is of solid gold, enriched with pendants, pearls, and opals. The seated figure in front, bearing in her right hand a ship, and in her left a distaff, is allegorical of the commerce and industry of the town. From this ornament depends a medallion portrait in relief of the Countess.

The coats of arms which adorn the chain are those of Great Britain, the County of Lancaster, the house of Stanley, and the Borough of Preston. They are executed in enamels, and give much charm of colour to the design without destroying the simplicity which distinguishes it.

The carrying out of these works from the designs executed in relief by Miss Steele was entrusted to Messrs. Barkentin and Krall, of London.

A SMALL COUNTRY HOUSE.

THIS is a small country house designed by Mr. J. H. Sellar, one or two of whose designs for the same class of building we have before published.

In the plan he has obtained a dignified *suite* of sitting-rooms well shut off, but perhaps with a too great prevalence of south light for all three rooms, which is inconvenient in summer, however agreeable in winter.

The servants' w.c. would have been better at the outside angle, in the position occupied by the coalshed, so as not to have its door so nearly opposite that of the scullery.

GATE-HOUSE AND MASTERS' LODGING, ABINGDON SCHOOL.

THIS is a small house designed to afford under one roof a residence for the porter and a lodging for apparently two of the masters, in connexion with Abingdon School. Mr. Harry Redfern was the architect.

Books.

The Cathedral Church of St. Albans. By REV. THOMAS PERKINS. London: George Bell and Sons. 1903. 1s. 6d.

THIS, the most recent of Messrs. Bell's series of books on the English cathedrals, resembles others already noticed in these columns in general arrangement, the five chapters into which it is divided giving an account of the history of the building, the exterior, interior, the See, and the churches and other objects of interest in the city. The excellent illustrations, chiefly from photographs taken by the author, are an attractive feature, not the least being the few that show the cathedral and some of its detail before the work of rebuilding and so-called repair was begun. Into the merits of this work it is not necessary here to enter, but the author appears to be fully sensible of the destruction of much of its beauty and architectural interest that has taken place. None the less is it necessary to raise a protest against the inclusion of such statements as we find on pages 25 and 72. In the former the author says that the work of the west front "is as good as is most nineteenth-century work," and a similar expression is used on page 72 with reference to the work in the Lady Chapel. We do not for one moment suppose that anyone with a knowledge of the subject will be misled by this statement—it does not even appear as merely the author's opinion; but in a book of this kind, excellent in almost every other respect, such a statement is to be regretted, and its omission in future editions is to be desired.

The recently added panel in the Wallingford or altar screen of Mr. Alfred Gilbert, R.A., is noted in the text, but does not appear in the photographic illustration on page 58. It undoubtedly is very beautiful in itself, but the placing of a representation of the Ascension below that of the Crucifixion has a somewhat incongruous appearance. A scene which which would have led up to the Crucifixion above would surely have been more appropriate.

The great gate is illustrated by a good photograph at the beginning of the chapter on buildings in the city, accounts of Sopwell Nunnery and the three churches also being included. The towers of St. Peter's and St. Michael's have been rebuilt, together with portions of the churches, by Lord Grimthorpe, and a smaller edition of the terrible circular window that is perhaps the greatest eyesore in the Abbey Church has been inserted in the west end of the former church.

The ground plan—unfortunately, like others in this series, a poor one—has a short reference to the shrines and monuments. The reference to the "Wallingford screen," however, has been placed behind the nave pulpitum, and not at the east end of the presbytery, as it should have been.

With the exceptions we have named, the book is well done, and forms an excellent and concise account of a building that is still, in spite of many vicissitudes, one of the most interesting ecclesiastical monuments in the kingdom.

The Candidate's Guide to Examinations and Appointments in the Building Trades. By GEORGE ELLIS. Published by the author at Ilford, Essex. 6d.

THIS is a very useful little book, giving information as to what qualities and acquirements are necessary for adequately filling the positions of clerk of works, building inspector, general foreman, etc.

The first part deals with examinations which can be passed in order to obtain various certificates; the places where such examinations are held, who to apply to about them, and fees required. The second part, under the head "Appointments," shows how to qualify for the class of appointments under consideration, and the best steps to take towards obtaining them.

Such a book should be very useful for those who look to the class of appointments referred

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to. If read, it may also save us some occasional trouble from correspondents who frequently write to ask us what are the conditions of passing this or that examination held by a known public body with an official address. Mr. Ellis's little book may suggest to them, what common-sense by itself ought to have shown them, that the proper person to write to for information about the rules and regulations of any public institution is the Secretary of the said institution—an idea which seems to be beyond the grasp of a good many people.

WALL-PANELLING, BRAMHAM CHURCH.

THIS is a reduction from a drawing exhibited at the Royal Academy, showing wall-panelling designed by Messrs. Bromet and Thorman, for the chancel of Bramham Church, Yorkshire.

The architects have contrived to produce a bit of work which is mediæval in spirit without being merely imitative.

COURT OF COMMON COUNCIL.

AT the meeting of the Court of Common Council on Thursday, last week, the Lord Mayor presiding, the Streets Committee submitted an adjourned report on the proposed regulations in regard to the demolition of buildings in the City. The report stated that they had further considered the regulations, together with the suggestions of the Royal Institute of British Architects, the Surveyors' Institution, and the Institute of Builders. The proposed by-laws read as follows:—

1. That proper hoards should be erected and fans fixed at the level of the first floor, and such other portions as may be directed. That before any pulling down is commenced, all windows and other openings in the external walls shall be close boarded in unless a gantry be constructed, and the upper portion boarded in to the full height of the building to be taken down.

2. The roof of any building shall be removed and the internal partitions and cross walls shall be pulled down floor by floor, before commencing to take down any of the main walls of such floors.

3. Canvas or boarded screens, mats, or other suitable appliances shall be used wherever required, and so placed as to reduce the nuisance arising from the escaped dust.

4. Water shall be laid on and constantly used on each floor by means of jet and hose during the demolition of any building, and all materials shall be freely sprinkled with water to reduce the nuisance arising from dust.

5. The ceilings and lath and plaster partitions shall not be broken down, or any rubbish, lime, or mortar shot or allowed to fall from floor to floor, or into any basement, within 20 ft. of a public way, between the hours of 10 a.m. and 6 p.m., except on Saturdays, when it shall be permitted after 3 p.m.

6. No materials arising from the demolition of buildings shall be basketed, wheeled, or loaded into carts, or carted away, between the hours of 10 a.m. and 6 p.m., except on Saturdays, when it shall be permitted after 3 p.m., unless a temporary carriage-way entrance, or draw-in across the footway, has been provided in such a manner as shall prevent any nuisance arising from the escape of dust.

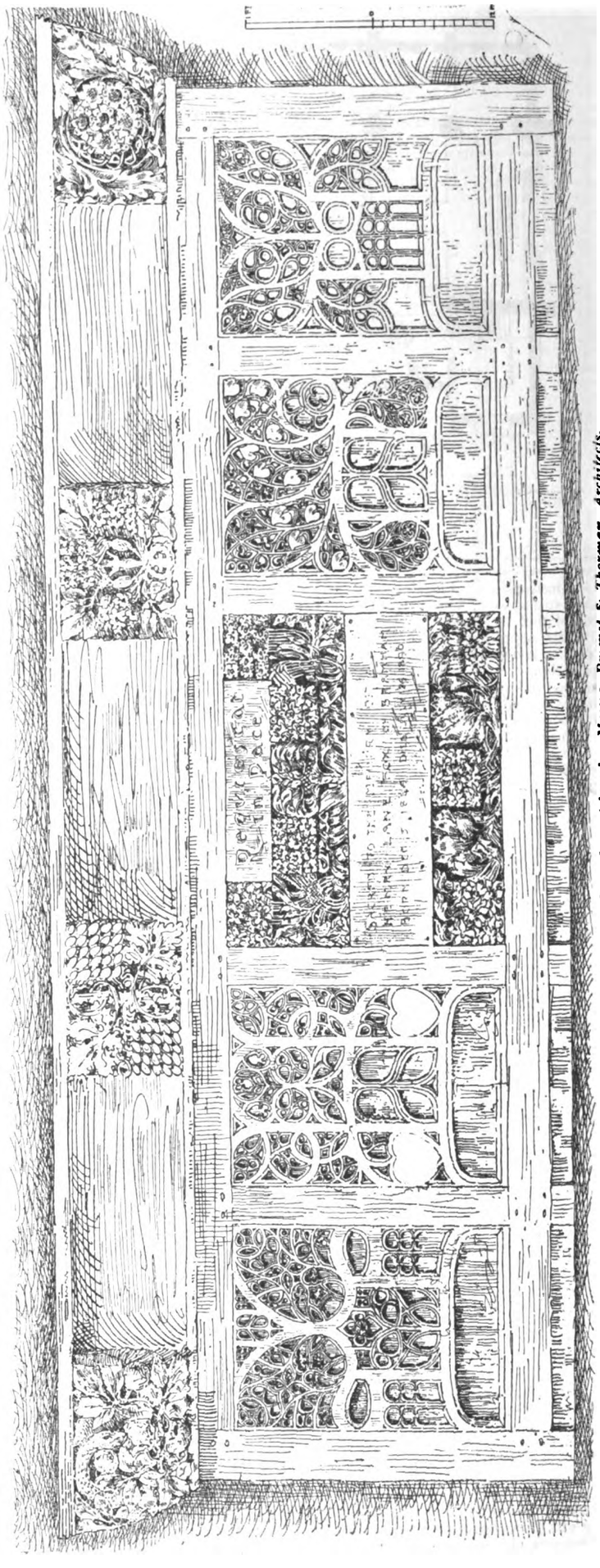
7. All directions of the engineer shall be strictly complied with.

8. Every person who offends against any of the foregoing by-laws shall be liable for every such offence to a penalty of 5*l.* for each breach thereof: Provided nevertheless that the Justices or Court before whom any complaint shall be made, or any proceedings may be taken in respect of any such offence may, if they think fit, adjudge the payment as a penalty of any sum less than the full amount of the penalty imposed by this by-law.

Mr. Deputy Mathews moved as an amendment, "That in clause 2 the words 'and cross walls' be eliminated; that the following be substituted for clause 5:—'That care be exercised in taking down to prevent unnecessary accumulation of dust and débris, and throwing from floor to floor, between 10 a.m. and 6 p.m., except on Saturdays, when it shall be permitted after 2 p.m.'; and '2 p.m.' be substituted for 3 p.m. in clause 6, and that the word 'any' in line 00 be omitted; and that the following be substituted for clause 7:—'That these by-laws shall be carried out under the directions of the engineer.'"

Some discussion followed, which ended in Mr. Deputy Mathews withdrawing his amendment and the whole matter being referred back to the Committee for further consideration.

The Bridge-House Estates Committee presented a report on the proposed re-construction



Wall-Panelling in Chancel, Bramham Church. Messrs. Bromet & Thorman, Architects.

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of Southwark Bridge, recommending the adoption of a design for reconstructing and lowering the bridge between 7 ft. and 8 ft., and raising the level of Upper Thames-street, at the intersection with Queen-street, to a height not exceeding 3 ft. (and the neighbouring streets and lanes proportionately), at an estimated cost of 350,000*l.*

In moving the adoption of the report, the Chairman of the Committee said that they had considered a scheme for the improvement of Southwark Bridge by the construction of a viaduct over Thames-street, the cost of which would be about 630,000*l.*; having regard, however, to the opinions of the police on the subject of traffic, and also the expense, that scheme had been rejected. The scheme which they had adopted would cost 250,000*l.* for the lowering of the bridge and the gradients, and 100,000*l.* would be for compensation to owners of property. The cost would be paid by the Corporation out of its own money, and would not come on the rates.

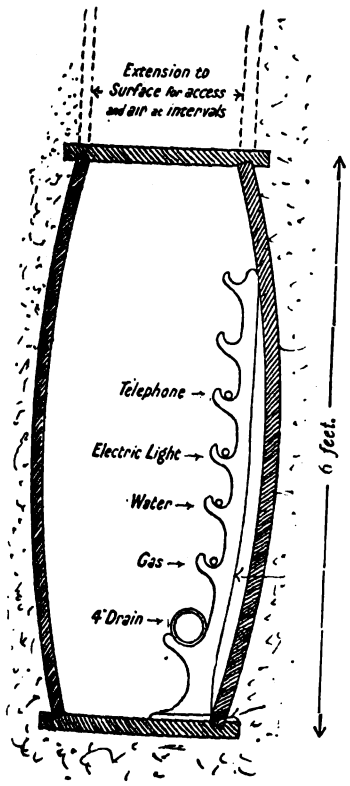
Mr. G. Edwards moved as an amendment:—"That the report be referred back to the Committee to submit an estimate for making the northern approach to the new bridge level, by constructing a viaduct over Upper Thames-street and raising the surface of Queen-street from Cannon-street, omitting the two proposed inclined planes in Upper Thames-street and constructing a new spur street from Upper Thames-street to the new approach." After some discussion the amendment was lost, and the report was then adopted.

Correspondence.

"INEFFICIENCY OF MODERN HOUSE DRAINAGE."

SIR,—In reference to Mr. W. R. Purchase's article on the inefficiency of house drainage, I should like to add my testimony to the great waste of time and money that eventually occurs by filling in the trenches and covering up out of sight and ready access of underground pipes of all kinds, as well as of drains. It has frequently occurred to me that a trench once opened should never be filled up to a greater extent than would allow of a tunnel for access being still left.

I have thought that if some economical and



effective method of forming such tunnels could be devised, perhaps by lining the excavation with slabs of vitrified stoneware, or artificial stone, or possibly cast-iron, somewhat in the form indicated in the annexed sketch, it would soon be very generally adopted. These tunnels might be too expensive to cause them to be adopted in the case of shallow drains just 2 ft. to 3 ft. below the surface in country places, but there is no doubt that they would pay for themselves over and over again in the case of deeply-laid drains in heavy clay soils, where drains are always being torn asunder by the movement of the clay, and are consequently frequently in need of being taken up for repairs. The tunnels should be at least 3 ft. by 2 ft., and perhaps they would be far more useful if 6 ft. by 2 ft. or 2 ft. 6 in.

I suggest slabs as being labour saving in fixing and more likely to be water tight against soil moisture, owing to fewness of joints, than laboriously constructed brick culverts. The latter, too, would need an excavation at least 12 in. wider than slabs would require. An extension upwards at the necessary points, with a cover on the top, would form the necessary manholes for access, which would not need to be so numerous as at present.

W. B. HOPKINS.

SIR,—I have read the article by Mr. R. Purchase in *The Builder* of 19th inst. on the subject of the inefficiency of modern house drainage, and I should like to say that I entirely disagree with his statement that "the stoneware pipe as a material for house drains has proved a failure."

In my opinion, the stoneware pipe drain, when properly constructed, is a great success. I fully admit that an improperly-laid stoneware pipe drain is a distinct failure.

My experience has shown me that there are very few people who know how to construct a stoneware pipe drain.

The slovenly specifications one sees are productive of much bad drainage.

If architects and others would write a full and detailed specification for the sanitary work, as they do for the other parts of their buildings, and would rigidly enforce such specification, we should hear less of leaky drains.

ROBERT WOOD, Mem.San.Inst.

SIZES OF GLAZED BRICKS.

SIR,—Among the many hints and suggestions which appear from time to time in your own and other journals devoted to the trade, I do not remember to have seen one to the effect, that glazed bricks, now so extensively used in London and the district, should be reduced from 2¼ in. thick to 2¼ in. thick. All interested know the difficulty there is in "keeping down," so as to work with stocks. I suppose it is a question of machinery having to be altered, but this would soon recoup itself as far as the manufacturer is concerned, and the little "extra mortar" would be more than equalled by the time saved in laying. I have just taken four glazed bricks from stack; these measure dry 11¾ in.; four stocks taken from stack measure just 10½ in. There is thus 1¼ in. for four joints in the stocks, and ¼ in. in the glazed bricks. Add to this that even the glazed bricks are somewhat irregular, and it follows that to work "four courses to the foot" becomes difficult; in fact, frequently it is brick and brick, with mortar in the frog only.

SUGGESTION.

SWANSEA COMPETITION FOR HOUSING THE WORKING CLASSES.

SIR,—In June last designs for this competition were sent in. Have you or any of your readers heard anything of a result or decision? Is this "affair" to add another story to the mighty monument of bogus competitions?

AD. REM.

BOOKS RECEIVED.

ABYDOS. Part II. By W. M. Flinders Petrie. Twenty-fourth memoir of the Egypt Exploration Fund. (Kegan Paul, Trench, Trübner, and Co.)

NOTES ON STEEL-CONCRETE CONSTRUCTION. By Major J. Winn, R.E. (Chatham: W. and J. Mackay and Co.)

THE CANDIDATE'S GUIDE TO EXAMINATIONS AND APPOINTMENTS IN THE BUILDING TRADES. By George Ellis. (By the Author, at Ilford, Essex. 6d.)

GUIDE TO THE SEARCH DEPARTMENT OF THE PATENT OFFICE LIBRARY. Second Edition. (Patent Office. 6d.)

APPOINTMENT OF DIOCESAN SURVEYORS.—It is announced that at a meeting held last week of the archdeacons and rural deans of the diocese of Bath and Wells for the appointment of diocesan surveyors in pursuance of the terms of the Ecclesiastical Dilapidations Act of 1871, for the five years next ensuing, the following gentlemen were duly elected:—Mr. C. R. Wainwright, of Shepton Mallet; Mr. E. M. Hippisley, of Wells; and Mr. A. B. Cottam, of Bridgewater. Mr. Cottam succeeds Mr. Samson, who has resigned the office after a tenure extending over twenty years. Messrs. Hippisley and Wainwright have held the office during many years past.

The Student's Column.

CONCRETE-STEEL.—XIII.

SHEARING STRESSES IN BEAMS.

ALL the formulæ hitherto discussed are based on the assumption, that if sufficient steel be employed for resisting bending moments, shearing stresses may safely be left to the concrete. No doubt the concrete is perfectly capable of taking shearing stresses up to a certain limit, within which the safety of the beam may be fully assured, but greater strength is attainable by more complete conformity with theoretical requirements, and, generally, greater economy may be secured thereby.

Shearing force in a beam is developed by the downward action of the load, and the upward reaction of the supports. In the case of a beam with a uniformly distributed load, and supported at the ends, the maximum shearing force has the value, $-wL \div 2$ at the left hand end, decreasing uniformly to zero at the middle of the span, thence increasing uniformly to $wL \div 2$ at the right-hand end. If the load be concentrated at the centre of the beam, the shearing force will be constant throughout, and equal to $W \div 2$, but the force will be positive along one half of the beam, and negative along the other half.

It is known that when a test specimen is pulled asunder or crushed, failure is due wholly or in part to shearing action on surfaces inclined to the direction of the force exerted. Further, it is known that beams frequently fail in consequence of tensile stresses resulting from shear. These facts show that it is very necessary for the designer of concrete-steel beams to consider the nature and influence of shearing stresses, and to make due provision for them in all works to be executed.

A state of simple shearing stress, or, as it is alternatively called, a state of simple shear, occurs when two simple stresses of equal intensity act in opposition. Under such a condition there is no normal stress on a plane inclined at 45 deg. to the two directions, because the normal component of one force is equal and opposite to that of the other, and nothing remains but shearing, or tangential, stress.

Hence the state of simple shear is one in which there are two principal stresses only, giving rise to a stress that is wholly tangential on the two planes inclined at 45 deg. to the axes of principal stress, and that is equal in intensity to the intensity of either of the principal stresses.

The same conclusion may be reached by a different line of reasoning. Thus, if to a cube of unit dimensions, represented by the rectangle in Fig. 21, tangential stresses QQ, be applied to the pair of opposite faces A and B, and equal tangential stresses QQ, to the pair of opposite faces C and D, the effect will be to create a state of simple shear. There will then be only tangential stress on all planes parallel to A and B, and to C and D, the intensity of the stress on each system of planes being equal throughout to the intensity applied to the face of the cube.

In order to show the relation between these two modes of defining a state of simple shear, we will consider the equilibrium of two triangular prisms, Figs. 22 and 23, into which the cube is now assumed to be divided by diagonal planes of section. To balance the stresses QQ, Fig. 22, we must have normal tension P, on the diagonal plane. As the diagonal is at 45 deg. to the horizontal, its length compared with the length l, of any side of the cube is $l \sec. \theta$, or $l\sqrt{2}$, and the amount of the tension is $P = Q\sqrt{2}$. As the area acted over by P is $\sqrt{2}$ times the area over which Q acts, it follows that the intensity of P is equal to the intensity of Q.

Taking the opposite prism, Fig. 23, similar conditions prevail, but normal compression P, is here evidenced, the value of which is $P = Q\sqrt{2}$ and for the reason already given the intensity of P is equal to the intensity of Q. Therefore the state of simple shear admits of analysis into two equal and opposite principal stresses, one tensile and the other compressive, acting in directions at right angles to one another, and inclined at 45 deg. to the directions of the shearing stress.

It is important to remember that tangential stress cannot exist in one direction unless accompanied by an equal intensity of tangential stress in a direction at right angles to the first

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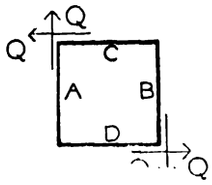

Fig. 21.

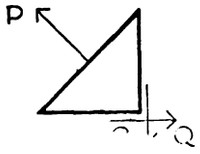

Fig. 22.

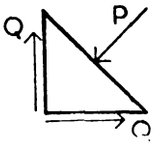

Fig. 23.

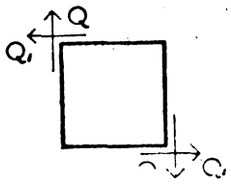

Fig. 24.

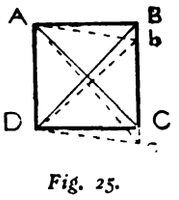

Fig. 25.

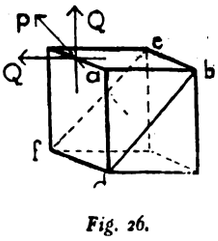

Fig. 26.

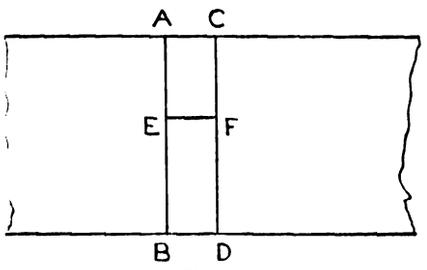

Fig. 27.

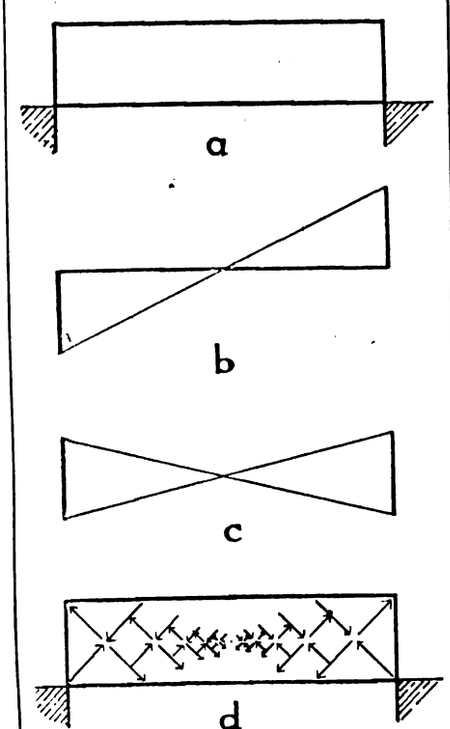

Fig. 28.

direction. The proof of this principle may be found by considering the equilibrium of a small cube of unit dimensions, represented by the rectangle in Fig. 24, and having one pair of sides parallel to the direction of the shearing stress Q. This stress, acting on opposite sides, produces a couple tending to rotate the cube. The couple cannot be balanced by any arrangement of normal stresses on any of the sides of the cube, and the only way in which the couple can be balanced is by an equal and opposite shearing stress Q_1, acting at right angles to the first direction, thus producing a couple that resists the tendency of the cube to rotate under the action of the first couple. In this case it will be seen that the cube is subjected to equal shearing stresses on two pairs of opposite faces, and the resultant stresses form a system of forces in equilibrium. The cube will be distorted into the form of an oblique prism, without perceptible change of volume. Hence, as in Fig. 25 it will assume a form such as Ab Dc. The material must be lengthened in the direction AC, and shortened in the direction DB, so that the diagonals become Ac and Db respectively, causing tension in one case and compression in the other. And it can be shown that the extension and compression along the diagonals of the face of a cube are each equal to half the sliding that takes place.

Let us next consider the diagonal plane, *b c f d*, Fig. 26, in a cube of any given dimensions, and forming part of a beam. Representing the area of one face of the cube by *a*, we have for the area of the diagonal plane $a\sqrt{2}$. As previously demonstrated, the forces QQ, to the left of this plane have a resultant $P = Q\sqrt{2}$, normal to *b e f d*. Hence, there is on the plane a tensile stress of intensity

$$P_t = (Q\sqrt{2}) + (a\sqrt{2}) = Q \div a.$$

If Q represents the whole shearing force, the intensity of shearing stress $q = Q \div a$.

Hence—$p_t = q = Q \div a$

Similarly, on a diagonal plane at right angles to *b e f d*, there is a compressive stress of intensity—

$$P_c = (Q\sqrt{2}) \div (a\sqrt{2}) = Q \div a.$$

Whence—$p_c = q = Q \div a$

It is now clear that tensile stress f_t, of intensity equal to the intensity of vertical or horizontal shearing stress *q*, acts over the whole of the diagonal plane *b c f d*, and that compressive stress f_c, of intensity equal to the intensity of vertical or horizontal shearing stress *q*, acts over the whole of a diagonal plane at right angles to the plane *b e f d*.

There are other aspects of shearing stress that deserve attention. We have shown that the shearing stress at any point in the vertical cross-section of a beam is accompanied by a shearing stress of equal intensity in a horizontal plane through the same point. Therefore, if AB and CD, Fig. 27, represent two vertical sections separated by the distance δx, the intensity of shearing stress in the plane of EF is equal to the intensity of the shearing stress at the point E in the section AB.

If *q* equals the intensity of vertical shearing stress at E, or at any other point in AB, and *b* the width of the beam at the same point, the intensity of horizontal shearing stress equals *q*, and the total horizontal shearing stress Q, in the plane EF, or in any plane corresponding to the point selected in the section AB, is $Q = q\,b\,\delta x$.

Again, considering an infinitesimal area in the section AB at the distance *y*, from the neutral axis, the intensity of shearing stress *q*, on the area may be expressed—

$$q = \frac{Q}{2I}(h^2 - y^2)$$

where Q equals the total shear on the section; I equals the moment of inertia of the section about the neutral axis; and *h* equals the distance of the extreme fibre from the neutral axis. Hence, it is seen that for any vertical section *q* is at a maximum when *y* equals 0, or, in other words, that for any given vertical cross-section the intensity of the shearing stress is greatest for points on the neutral axis, diminishing to zero at the top and bottom of the section. The further inference is to be drawn, that for any point at a given distance *y* from the neutral axis, *q* is greatest where Q is greatest.

From the foregoing consideration it is evident that the intensity of the tensile and compressive stress on planes inclined at 45 deg. to the horizontal, is greatest for points on the neutral axis in the plane of maximum shear, and that at any such point it is equal to the vertical or the horizontal shear at the same point.

In Fig. 28 let (*a*) represent a uniformly loaded beam supported at each end, and (*b*) the diagram of shearing force. Then the diagonal stresses of tension and compression will vary in intensity from point to point along the length of the beam as suggested in (*c*), which represents the diagram of shearing force in an altered form.

The final result is indicated in (*d*), where the uniformly varying intensity of tensile and compressive stress is represented on the vertical longitudinal section of the beam, it being understood, of course, that the greatest intensity in every plane occurs at the neutral axis.

In the case of a steel beam of I-section with wide flanges and a thin web, the intensity of shearing stress is nearly uniform over the whole of the web, although varying from point to point along the length with a uniform load, and it is much greater in the web than in the flanges, owing to the comparative thinness of the web. Again, for rectangular beams of steel, wrought iron, and wood, it is the fact that safety against shear will be assured if the design be such as to afford safety against the results of bending moment.

When beams of concrete steel are in question, however, the conditions are by no means similar. In the first place, we have two different materials which must adhere so firmly together as to behave similarly to one homogeneous material, and unless this condition be secured, the object of the designer will be frustrated. In the second place, the concrete in the tension area is not capable of resisting the tensile stress caused within the area in question, and as a general rule is not relied upon for the resistance of any part of the tension. Consequently, it is desirable to ascertain whether or not the shear in the horizontal plane of junction between the concrete and the steel reinforcement is sufficient to overcome the adhesion between the concrete and the steel; and whether the intensity of the tensile and compressive stress on planes inclined at 45 deg. to the horizontal is within the safe, or permissible, limits of tensile stress for the concrete employed.

GENERAL BUILDING NEWS.

PARISH HALL, TYNEMOUTH.—A new parish hall which has been erected at Tynemouth was recently opened. The building is of red brick, with stone dressings, the doors and windows on the principal front having moulded architraves, pediments, etc. The accommodation consists of a parish-room, a gymnasium, with lavatory, a reading-room, in which provision is made for a billiard table, with caretaker's apartments at back, all on the ground floor. On the first floor is a large hall, with seating accommodation for about 500, including the gallery. There are also ladies' and gentlemen's cloak-rooms, separated by a sliding partition, so that when required the rooms can be thrown into one. Tea boilers and a sink for use at entertainments are provided here. Two staircases lead from the main entrance and a relief staircase from the platform end, leading down into the reading-room. The platform is constructed on trestles, so that it can be moved and sections of it readily converted into tea tables when required. The main hall has a coved plaster ceiling, with moulded ribs. The rooms on the first floor are lighted by electricity; those on the ground floor by incandescent gas. The builder is Mr. Gilbert Park, of North Shields, and Messrs. Hicks and Charlewood are the architects.

CHILDREN'S HOME, FILEY.—On the 14th inst., the foundation-stone of a new children's home to be erected at Filey was laid. The new building is to provide accommodation for the invalid children of the poor of Rotherham. The main rooms face south. The ground floor will comprise the following:—A large dining-room and playroom (36 ft. by 20 ft. 6 in.), heated by two open fire places, and having windows facing south and east, and a verandah running the full length on the south side, a pantry next the dining-room with sink and cupboards, a kitchen with communication direct into the dining-room, a scullery, stores and larder, hall and staircase, separate entrances and lavatories, etc., for boys and girls, a separate entrance for visitors, a matron's sitting-room, matron's stores, and sick-room. The first floor will be divided into two halves, one side for boys and one side for girls. Each half will contain a dormitory (for 12 beds), a matron's bedroom, bathroom, linen stores and lavatories. The second floor will contains two large bedrooms, a boxroom, and a lumber-room. The building will be of pressed bricks, with brick sills, and the upper half of the external walls on the principal elevations will be finished with cement stucco tinted cream white. The roof will be of red tiles. The ventilation will be principally by "ventilating sashes," having broad bottom rails, admitting air half way up the window. The building will be plain inside and out, no unnecessary ornament or mouldings to create expense or to collect dust will be found. Accommodation will be provided for 24 children. Water is already

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laid on in the roadway. A fire hydrant will be provided on the site. The drainage will empty in a septic tank, and it is proposed to pass the effluent over a filter bed before discharging into the dyke. The contractors are Messrs. John Jaram and Sons, of Scarborough, the architect being Mr. J. E. Knight, of Rotherham. The cost of the buildings (exclusive of stoves, lavatories, fittings, and laying out of grounds) will be about 1,650*l.*

NEW BAPTIST CHURCH, BRIGHTON.—The foundation-stones of a Baptist Church, to be erected in Gloucester-place, Brighton, were recently laid. The building will be Gothic in style, with white flint walls, and terra-cotta dressings and tracery. A broad gable in the centre, having a prominent portico leading to the church, and above this a traceried window; flanked on the one side by a staircase wing and turret, and on the other by a tower, rising to a height of 58 ft. above the pavement, terminated by a spire 98 ft. to the top from the road. The accommodation will be for 450 adults on the ground floor and 300 in the galleries, allowing for a congregation of 750 persons. The gallery is, however, for the present to be omitted from the scheme. The seating on the ground floor is arranged on a semi-circular plan, so that each hearer will be able directly to face the preacher. The ceiling is domed. The church will be lighted by traceried windows, the interior being heated by hot-water pipes and radiators. The electric light fittings are to be in wrought iron and copper. The baptistry will be lined with white marble, candidates passing direct under the pulpit into the vestries, of which there are three. The basement will comprise a large hall and three classrooms for the Sunday school, a church parlour, and kitchen. The architects are Messrs. George Baines and R. Palmer Baines, of St. Clement's Inn, the builders are Messrs Battley, Sons, and Holness, Old Kent-road.

COTTAGE HOMES, PONTELAND, NEWCASTLE.—The cottage homes which are being erected at Ponteland, Newcastle, for the Newcastle Board of Guardians, are now nearing completion. The estate on which the homes are situated covers seventy acres. The buildings are erected in blocks of a semi-detached villa character. There are six designed for the residences of the children, five of which are now completed, whilst the sixth is in course of erection. At the entrance to the grounds is a porter's lodge, which will be the residence of the gardener. In close proximity there is a recreation hall, which will also serve as a schoolroom for the infant children. The recreation hall buildings have a 73 ft. frontage with a depth of 56 ft. The hall itself is 50 ft. long by 30 ft. broad, and has a large stage at one end. On each side are large classrooms 20 ft. by 16 ft. The building will be heated with hot water on the low pressure system. The residential blocks are erected in crescent shape with flower gardens in front and yards and large kitchen gardens behind. The first will be the administrative block, and is the residence of the superintendent. The committee having charge of the homes will hold their meetings in a room in this building, which contains also the superintendent's office and the necessary store accommodation. The administrative block is next to the children's residences, in the first of which there will be accommodation for forty, in addition to their attendants. The remaining blocks are each arranged to hold thirty children. They are subdivided, and in each half there are a kitchen, a room, scullery, lavatory, bathroom, and three larders on the ground floor; whilst on the first floor there are two large dormitories, foster-parents' room, and small bedroom. The kitchen in the first block is 22 ft. 6 in. by 16 ft., and the dayroom is 16 ft. by 20 ft. The larger dormitory is 22 ft. by 15 ft. 6 in., and the smaller one 20 ft. by 16 ft. The size of the rooms in the other blocks is somewhat smaller, the kitchens being 16 ft. by 16 ft., the dayrooms 18 ft. by 15 ft., the dormitories being 18 ft. by 15 ft. and 15 ft. by 13 ft. respectively. Concrete flats run the length of each building to minimise the danger to human life in case of fire. The drainage is on the septic principle. The blocks are made of brick and rough cast or stucco. They are connected with each other by neat trellis work; and altogether, they have a charming appearance. In addition to the residential portion, there is a water tower 50 ft. high, containing a tank capable of holding 12,000 gallons of water. It is pumped up by a mill from a boring. There is a stable behind the tower, in which there are three stalls and loose box; a coach-house and out-offices. In the grounds a workshop has been erected. The work has been carried out by Messrs. Edward Henderson and Son, contractors, of Ponteland, from the plans of Messrs. Oliver Leeson and Wood, architects, of Newcastle.

THE CITY TEMPLE, HOLBORN VIADUCT.—After having been closed during two months, the City Temple was re-opened last week. During that interval the interior and the lecture-hall and assembly rooms have been extensively decorated and improved, at a cost of nearly 7,000*l.*, by Messrs. Campbell, Smith, and Co. The improvements comprise new lighting (by electricity), heating, and ventilation, the strengthening with iron girders of the stone staircases in the vestibules leading up to the galleries, and the removal of the platform away from the pulpit, which was a gift made by the Corporation of the City. A stained glass window has been set up to commemorate the thirty-three years' ministry of the late Dr. Joseph Parker. One unusual feature calls for a passing notice, as it might with advantage be repeated in respect of similar public or quasi-public buildings. Upon a board outside the fabric is painted an inscription which embodies a useful, albeit brief, statement of the history of the City Temple, of its predecessors, and of the earlier congregations, represented by those who now attend the services. The memorial window depicts St. Paul's farewell to the brethren at Ephesus, and in the base is a medallion portrait of Dr. Parker, with two angels as supporters, designed and executed in white marble with a background of polished red granite by Mr. E. J. Physick.

INDIA OFFICE.—The present putty glazing has been removed from the large iron roof over the inner courtyard of the India Office, and the roof is being re-glazed with Helliwell's system of glazing without putty.

NEW VOLUNTEER HEADQUARTERS, LANCASTER.—New headquarters for the 5th Royal Garrison Artillery Volunteers, Lancaster, are about to be erected. The site comprises 1¼ acres, and is situated in Dallas-road and Carr House-lane. The plans provide on the ground floor on the left of the site a gun and drill shed, 150 ft. by 75 ft. The roof will be of single span, and there will be no pillars. The floor will be of rolled Carnford gravel. The building will be lighted by four windows on each side. To the north of the drill shed on the ground floor will be the orderly room, to which there will be access direct from the drillshed The "O.C.'s" room adjoins, and on the same level are men's clubroom, reading-room, and canteen. The men's clubroom, it is stated, will be nearly as large as the Council Chamber in the Town Hall. The main entrance is from Dallas-road. There will be an entrance hall 24 ft. by 26 ft., on the right of which are officers' room, sergeants' room, and corporals and bombardiers' room. From the entrance hall a staircase leads to the instructor's quarters, the other arrangements on this floor comprising an ambulance and lecture-hall, 40 ft. by 24 ft., signallers' room, two storerooms, armoury, a kitchen and serving-room, which will be of advantage when festivities are taking place. The entrance to the yard will be through large gates at the Carr House-lane corner. The work will be proceeded with immediately the plans have been sanctioned. The building will cost 6,000*l.*, and is being erected from the plans of Messrs. Harrison, Hall, and Moore, architects.

CONGREGATIONAL CHURCH, LITTLE ILFORD.—The church and schools occupy a prominent corner site. They are designed in a late period of Gothic freely treated, and are faced externally with red brick, the dressings and tracery, etc., being of white Costessey work. There is a tower and spirelet at the angle. A fireproof staircase runs up inside the tower, leading to the gallery. Ministers' and deacons' vestry are provided in connection with church, with other conveniences. The seating is circular on plan, radiating from the pulpit as a centre. The total accommodation of the church is for 724 persons. The school has a main hall on the first floor, with retiring-rooms, kitchen, cloakroom, etc. On the ground floor is the minor hall, together with three classrooms, and a portion of the minor hall is arranged so as to be divided off into classrooms by means of swivel partitions. The whole of the buildings are heated by hot-water pipes and radiators on the low pressure system. Electric light is to be adopted throughout. The contract for the two buildings complete is 4,435*l.* Messrs. George Baines and R. Palmer Baines, of London, are the architects, and Messrs. F. Gough and Co., of Hendon, the builders.

NEW WESLEYAN CHURCH, POLPERRO.—Memorial stones of a new Wesleyan church, Polperro, were laid recently. The new building will be in the Late Gothic style, and built of stone. The front will have a four-light traceried window of terra-cotta, flanked with buttresses, and two single-light windows and corner buttresses. The other windows throughout will have segment heads, except one in the rear gable, which will be circular, with Late Gothic tracery. The interior roof is to be partially open and ceiled with pitchpine, the timbers having arched work underneath. A light gallery will be placed at one end and two sides, with a raised choir and organ chamber behind the rostrum, which, like the pews and gallery front and other internal joinery, will be of pitch-pine. The cost of the work, including a vestry and necessary fencing, will be 1,700*l.*, in addition to which the cost of land and transfer, the architect's fees, etc., will amount to 300*l.* Towards this total of 2,000*l.*, only 300*l.* is in hand, but the subscriptions yesterday would, it was anticipated, bring the amount up to 600*l.* When 1,300*l.* has been raised, 200*l.* has been promised from the Twentieth Century Fund. The new church is to be completed by August 15, 1904. Mr. J. Wills is the architect.

COUNTY ASYLUM, BROMSGROVE, WORCESTERSHIRE.—The foundation-stone of a new County Asylum, to be erected at Bromsgrove, Worcestershire, was recently laid. The new building will consist of a main asylum capable of accommodating 570 patients (254 males and 316 females), with administrative offices sufficient for an extended asylum for 1,000 to 1,200 patients. In addition to the patients' wards, the institution will contain a large recreation hall, kitchens, and offices, quarters for nurses and attendants, workshops, laundry buildings, and also offices for the Visiting Committee and staff, together with accommodation for assistant medical officers. The detached buildings comprise a chapel, with sitting accommodation for 420 persons, a residence for the medical superintendent, an isolation hospital for the treatment of infectious disease, eight cottages for married attendants, and an entrance lodge. Attention has been given to the question of the provision of fire appliances, and to the means of escape from the building in case of fire. The asylum will be two stories high, and fire hydrants will be installed. The windows are of special design to allow of easy exit, and, in addition, there are stone fire-proof escape staircases, and sliding iron doors for the purpose of preventing the spread of any outbreak. The buildings will be lighted by electricity, generated in the engine-house. Water is procured on the estate from two bore holes already sunk to a depth of 350 feet and 341 feet respectively. The water, which is reputed to be of excellent quality, has risen to within 26 ft. below the ground surface, and it will be pumped into large tanks in a tower and conveyed by gravitation in pipes to the various buildings. The available supply from each bore hole is 7,000 gallons per hour. Rain water for use in the laundry and boiler-house will be collected in a large underground tank capable of holding 150,000 gallons. The estimated total cost of the erection, furnishing, and equipment of the buildings, irrespective of the site, is 215,887*l.* The contract for the buildings (Messrs. B. Whitehouse and Son) amounts to 151,475*l.*; the cost of the boilers and heating is 10,412*l.*; 950*l.* to be paid for work at the wells; the electric light installation will cost 8,000*l.*, while 2,500*l.* is involved in the construction of roads. The cost of furnishing and equipment of the asylum, with 570 beds at an estimated outlay of 25*l.* each, is 14,250*l.*, and 3,000*l.* is to be expended in the laying-out of the grounds, gardens, airing courts, etc., and planting. The amount of the estimates for building works (185,637*l.*) shows an average cost of 325*l.* per bed for 570 beds. Mr. G. T. Hine, of Westminster, is the architect.

SANITARY AND ENGINEERING NEWS.

SEWAGE WORKS, GLASGOW.—The annual inspection of the Western District Sewage Works, Glasgow, by the members of the Glasgow Corporation, took place on the 15th inst. The drainage scheme for the city embraces three sections, each distinct from the others and with separate works for the disposal of the sewage. The first of these, authorised in 1891, and doubled in extent in 1901, comprises about 11 square miles, one-half being within the city and the remainder in the landward district of the county of Lanark. The works for the treatment and disposal of the sewage of this area are situated at Dalmarnock, and the drainage is collected and conveyed there by a main sewer constructed at the cost of the Caledonian Railway Company. The second section was authorised in 1896, and includes the municipal area on the north side of the river not provided for in 1891, the burghs of Partick and Clydebank, and intervening parts of the counties of Renfrew and Dumbarton, the whole extent being 14 square miles. The works for the disposal of the sewage derived from this area are situated on the river bank at Dalmuir, about seven miles below Glasgow. The third section, authorised in 1898, comprises the whole of the municipal area on the south bank of the river, the burghs of Rutherglen, Pollokshaws, Kinning Park, and Govan, as well as various residential and rural districts in the counties of Lanark and Renfrew. The extent of this section is 14 square miles, and it may be enlarged by the inclusion of the burghs of Paisley and Renfrew. The works for the disposal of the sewage of this area will be situated on the river bank at Braeshead, about one mile eastward from Renfrew. The principal

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features of the western scheme are the construction of an outfall sewer to convey the drainage of the higher levels of Glasgow and Partick to the works at Dalmuir; the construction of an intercepting sewer to collect the drainage of the lower levels of the city; the construction of an intercepting sewer to collect the drainage of the lower levels of the burgh of Partick; and a third intercepting sewer to convey to the Dalmuir Works the drainage of the burgh of Clydebank. The levels of the Partick and Clydebank intercepting sewers are sufficiently depressed to admit the drainage of the Upper district of Renfrewshire, situated to the west of Glasgow and Partick and to the east of Clydebank, and negotiations are in progress for adjusting the terms for the inclusion, in accordance with the provisions of the Sewage Acts, of that territory, within the main drainage scheme. The Glasgow and Partick intercepting sewers will be pumped into the outfall sewer at Partick Bridge, the lift being 37 ft. The pumping engines, three in number, are of the triple-expansion inverted marine type, with plunger pumps, each capable of raising 11,250 gallons per minute, or 16 million gallons per day. Steam is supplied to these engines by four boilers, working at a pressure of 160 lbs. per square inch The Clydebank intercepting sewer will be pumped at Dalmuir, the lift being 21 ft. The smaller engines at Dalmuir will be of the centrifugal type, and power for the sewage treatment plant will be transmitted by electricity. Rather more than one-half of the total sewage of the western scheme will be carried without pumping to the Dalmuir Works, where the whole contents of the outfall sewer will be delivered into the precipitation tanks above tidal level. The purified effluent from the tanks will pass by gravitation over a discharge weir into the river, and the sludge will be pumped into specially-constructed barges and conveyed to sea. After careful deliberation and much patient investigation, it was resolved to adopt at Dalmuir the same method of sewage treatment as that which has for the last seven years been in successful use at Dalmarnock, with this exception, that the sludge presses, which by the compulsion of the situation of Dalmarnock Works, have been employed there, are to be dispensed with, and the liquid sludge carried out to sea. The precipitation tanks at Dalmuir, which are to be worked on the system of under-surface continuous flow, are more favourably situated than those at Dalmarnock, each being about 750 ft. in length, thus allowing opportunity for more complete precipitation than is afforded in the shorter tanks at the Dalmarnock Works, and effecting a saving in the reduced proportion of chemical agents required for the process. The work that has been completed up to the present time represents a large proportion of the whole undertaking. The western outfall sewer is constructed; the Partick and Clydebank intercepting sewers are virtually finished; the Glasgow intercepting sewer is being vigorously advanced; the Partick pumping station is nearing completion; the precipitation tanks, dock, wharf, and outfall works at Dalmuir are constructed; and the sludge tanks, pump-house, machinery, and other works are in active progress, and sufficiently advanced to warrant the hope that the greater part of the sewage derived from the western area will be undergoing purification during the course of next year.—*Glasgow Herald.*

FOREIGN.

FRANCE.—M. Jean Boucher, the eminent sculptor, has been created Chevalier of the Legion of Honour, on the occasion of the inauguration of the monument to Renan erected at Tréguier, and designed by him.——M. Albert Besnard has been commissioned to paint the ceiling of the new Salle of the Théâtre Français, in place of the temporary decoration by M. Jambon.——The French Government has offered to the King of Italy a gold medal in commemoration of his visit to Paris. It is modelled by M. Chaplain, and has on the obverse the profile heads of the King and Queen, and on the reverse an inscription surrounded by a garland.——M. Roty has executed a medallion portrait of Coquart, which is to be placed in the Ecole des Beaux-Arts, in the entrance, facing the monument to Ingres.——The Department of Public Instruction has been authorised to accept the gift to the State, by M. Osiris, of the château and estate of Malmaison, once the home of Napoléon.——A monument to Colonel Gillon, who fell in the Madagascar campaign, was inaugurated, on Sunday last, in the principal street of Chaville. The sculptor is M. Boverie, and the architect M. Sandier, the Director at Sévres, who has had the pedestal executed in polychromatic stoneware.——A new Hôtel de Ville has been inaugurated at St. Emilion (Gironde).——It is stated that the Municipality of Arles intend to demolish the ancient ramparts of the town, including the "Porte de la Cavalerie" and two towers dating from the sixteenth century.——The Municipality of Valenciennes intend to construct a new museum on a site once occupied by part of the ancient fortifications of the town.——The death is announced, at the age of 74, of M. Jules Pellechet, member of the Société Centrale des Architectes, and Chevalier of the Legion of Honour.——The death is also announced, at Nice, of a young architect of great promise, M. Marcel Moisand, a former pupil of M. Moyeux, and who obtained, in 1901, the Chaudesaignes prize. He was only 29 years of age.

NEW THEATRE, SYDNEY.—Her Majesty's Theatre, Sydney, which was burnt down in March, 1902, has been rebuilt on a new and improved plan. In the new building there are only two tiers. The total seating capacity of the theatre is 2,000. There are 236 seats in the dress circle, 670 in the stalls, and 1,000 in the amphitheatre, which will, however, hold more when crowded, thus making the capacity as stated. The abolition of the second tier has lowered the level of the theatre considerably. The dress circle is reached by a grand staircase, opening into a promenade 50 ft. long, leading at either end to richly-furnished foyers, with cloakrooms adjoining. From the foyers, swing doors give admission to the dress circle. This arrangement excludes all noise. The upholstering of the circle is in sapphire velvet and plush, with paler tinted carpets, while in the stalls it is royal blue. There are two boxes on either side. The general colour tone of the theatre is cream and gold. A new entrance has been provided in Market-street. The Hon. William Pitt, of Victoria, is the architect.

UNITED STATES.—The Boston Museum of Fine Arts has erected on the site of its new building on the Fens an experimental structure consisting mainly of a large movable skylight, some 50 ft. above the ground, which is to be used for determining the best position, and the best lighting, for the skylight of the future picture-gallery. This proceeding is very similar to that carried out some years ago by the German Government, which, before constructing the new Parliament House in Berlin, had a full-size model made, in wood and plaster, of the assembly hall of the Parliament, as shown in the architect's designs, in order to study its acoustic qualities before carrying it into execution.——There are indications in certain parts of the United States that wages in the trades concerned in building have reached their highest point, and that the tendency is now downward.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—The firms of Messrs. J. and H. Gwynne, Ltd., and Messrs. Gwynne and Co., both makers of centrifugal pumping machinery, have been amalgamated, and will now work under one management under the style of "Gwynnes, Ltd."

SCHOOL OF ART WOOD-CARVING.—The School of Art Wood-carving, South Kensington, which now occupies rooms on the top floor of the new building of the Royal School of Art Needlework in Exhibition-road, has been re-opened after the usual summer vacation, and we are requested to state that some of the free studentships maintained by means of funds granted to the school by the Technical Education Board of the London County Council are vacant. The day classes of the school are held from 10 to 1 and 2 to 5 on five days of the week, and from 10 to 1 on Saturdays. The evening class meets on three evenings a week and on Saturday afternoons. Forms of application for the free studentships and any further particulars relating to the school may be obtained from the manager.

DIARRHŒA AND POLLUTED WATER.—At a recent meeting of the Chelmsford Rural District Council Dr. J. C. Thresh, the County Medical Officer of Health, presented a report on an extensive outbreak of diarrhœa which had recently prevailed in the Borough of Chelmsford and a portion of the rural district. The epidemic commenced suddenly on July 25 and terminated as suddenly about August 25. The epidemic was limited in the rural district to a village deriving water from the Chelmsford mains, while in the borough it was limited to that portion deriving water from the same mains. One part of the borough supplied with water from a different source did not suffer from any excessive prevalence of diarrhœal disease, nor was there any excessive prevalence in any of the suburbs of Chelmsford deriving water from other than the implicated source. An inspection of the waterworks showed that water was pumped from a deep well into a large uncovered tank which permitted of road washings and garden soil being carried into it during heavy rains, and Dr. Thresh attributes the outbreak to the washing of such filth into the tank on July 23, when over two inches of rain fell in the 24 hours. An examination of the tank showed a deposit on the bottom consisting of soil, worms, etc. The water came early under suspicion, but analyses of samples taken from the various sources gave no indication of pollution. Water taken from the mains, however, showed undoubted signs of serious bacterial pollution. The water committee on August 23 had the implicated reservoir cut off and the epidemic at once ceased.—*Lancet.*

SOCIETY OF ARTS.—The Council of the Society of Arts holds a sum of 400*l.*, the balance of the subscriptions to the Owen Jones Memorial Fund, presented to them by the Memorial Committee, on condition of their spending the interest thereof in prizes to "students of the Schools of Art who, in annual competition, produce the best designs for household furniture, carpets, wall-papers, and hangings, damasks, chintzes, etc., regulated by the principles laid down by Owen Jones." The prizes will be awarded on the results of the annual competition of the Board of Education, South Kensington. Competing designs must be marked "In competition for the Owen Jones prizes." No candidate who has gained one of the above prizes can again take part in the competition. The next award will be made in 1904, when six prizes are offered for competition, each prize to consist of a bound copy of Owen Jones's "Principles of Design," and the Society's bronze medal.

GROOVED WALL-PAPERS.—The Grooved Wall-paper Co., which has purchased the sole rights of the patent for grooving wall-papers, sends us specimens of wall-papers prepared with a fine machine-made groove near the edge of each piece, which forms the permanent butt-joint of the piece when hung, the edge trimming being easily detached along this groove after the piece is pasted on, thus saving time and ensuring an accurate joining up of the pattern.

IMPROVEMENTS AT WINDSOR CASTLE.—Under the superintendence of Mr. A. Y. Nutt, surveyor of the works at the Castle, some extensive improvements are being made of the drainage arrangements and of the approaches by road from the town, and a reparation is to be undertaken of some of the external stone-work of St. George's Chapel. At the same time, their proper names are being cut in bold letters above the various entrances into the palace; that which has been commonly known as the Equerries' entrance, in the yard facing the Round Tower, is now named after King Charles, whilst that by the State apartments is named after King John's Tower. King John's Tower, which gives access to the State apartments, stands in the Upper Ward, of which the east and south sides were built in 1356-73 for Edward III. by William of Wykeham. King John proceeded from the Castle to affix his seal to the Magna Charta at Runnymede.

THE IMPERIAL INSTITUTE.—The annual Report of the Imperial Institute, just issued by the Board of Trade, states that Professor Wyndham Dunstan, who has hitherto been Director of the Scientific and Technical Department, is nominated Director of the Imperial Institute, with general charge of the various branches there. For the future the Commercial Intelligence Branch of the Board of Trade will absorb the Commercial Intelligence Office, which hitherto has been maintained at South Kensington and in the City for the collection and supply of intelligence upon matters of commerce, tariff, and statistics, and the scope and usefulness of the work of that department will be extended by its migration from Parliament-street to new quarters within the limits of the City and in a situation easily accessible to business men.

PORTLAND CEMENT AND SAWDUST.—Excellent tiles can, according to Messrs. Seger and Cramer, be made with a mixture of Portland cement and sawdust. Nails can be driven through these tiles without causing the tiles to crack. In a recent issue of the *Thonindustrie Zeitung* the following proportions are mentioned as suitable for the manufacture of the tiles:—Damp sawdust 100 parts by weight, Portland cement 240 parts, water 48 parts. The sifted sawdust is well moistened and allowed to stand for twenty-four hours before being employed for mixing with the proportions of cement and water mentioned. The sawdust is used in a damp condition to prevent it from absorbing from the mixture the water required for the proper setting of the cement; and during the process of drying, after moulding, the tiles are repeatedly sprinkled with water with the same object in view. Previous attempts to make durable tiles with a mixture of sawdust and cement are said to have failed owing to the absorbent action of the sawdust.

OPPORTUNITY FOR BRICKMAKERS.—According to the *South African Export Gazette*, there is a great want of bricks for building operations in Maritzberg, though it is stated that there is abundance of good brick clay in the neighbourhood. This, says the *Export Gazette*, can only be attributed to one of two causes: "either local firms are unable or unwilling to increase their plants to cope with the demand, or they are

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indifferent to the additional business which would follow by taking this judicious step, and are content with the trade they are doing. This being so, there is a splendid opening for Englishmen of enterprise with capital to go out to Natal, or to other parts of South Africa, and establish brick and tileworks on as large a scale as possible. There is scarcely a town in all South Africa where it would not pay, even if the situation were chosen haphazard, and it is a little surprising that brickmaking engineers in England, who are naturally interested in supplying the machinery, do not take steps to give prominence to the demand which exists, and thereby encourage expert brickmakers to emigrate."

THE "OTIS" ELEVATOR.—In consequence of a recent Report of the Committee on Science and the Arts of the Franklin Institute, an award of the John Scott medal and premium has been made to the Otis Elevator Company (U.S.A.). The lift examined was one of a type designed for private residences, and the following are the main features of the apparatus:—The lift hatchway is provided with a door on each floor, and the car also has a door. On each floor there is a push button on the landing, and in the car a row of buttons is provided, one for each floor, and a stop or safety button. Unless every door is shut and locked the car cannot be started, and unless the car is opposite to one of the landing doors, none of the doors can be opened. A single push on one of the car buttons brings the car opposite to the corresponding floor, where it is automatically stopped, and the lock on the landing door is similarly released. In opening the car door the controlling circuit is automatically cut off, and the elevator cannot be started by pressure upon the buttons at any other floor. If a passenger should then enter the car, he can close the landing door, but is unable to move the car until the inner door has been closed. During the trip none of the buttons on any of the floors have the least influence upon the motion of the lift. In case the inner door should be opened with the car in motion, the lift would instantly stop, and could not be started again until the door had again been closed. Many variations in the method of working are provided for by the makers, but in every case there appears to be ample security so far as this feature can be ensured by mechanical means.

SICILIAN ASPHALT.—It appears from the official statistics that in the year 1902, 5,262 tons of rock asphalt, valued at 1*l.* per ton, were shipped from Syracuse to London, and 5,486 tons from Mazzarelli to London.

PORTLAND CEMENT IN GERMANY.—According to Mr. Consul-General Schwabach, the condition of the German Portland cement industry has for years been most unsatisfactory, owing to the prevailing disproportion between supply and demand. The inland consumption is estimated at 14,500,000 casks per annum, whereas the works can produce close on 29,000,000 casks. This enormous disproportion is due to the numerous extensions and new works erected in 1895 and the following years, partly on account of the activity in the building trade, but chiefly in the expectation that the Great Midland Canal would be built. Repeated attempts to form a German cement syndicate, and to regulate the prices and the production, have proved unsuccessful. The numerous local organisations compete severely against one another. Under these circumstances, very few other than the old-established works, whose brands are well known, are remunerative. The South African war, and the influence it exercised on the Transvaal gold-mining industry has also severely affected the trade, as very large consignments of cement were formerly sent to that country. German cement is practically excluded from the principal European markets by reason of prohibitive duties, and, while it is exempt from duty in Germany, the import duties, including clearing expenses, per 10 tons amount to 8*l.* 10s. in Russia, 5*l.* 5s. in Austro-Hungary, 6*l.* 10s. in Roumania, 5*l.* in Italy, 3*l.* in Switzerland and Sweden, and 1*l.* 5s. in Norway. Thus only the transatlantic markets are available for the exportation of German cement. In 1902 Germany imported 51,047 tons and exported 641,520 tons. In the first six months of 1903 the imports were 25,950 tons, and the exports 374,381 tons.

TIMBER TRADE IN FINLAND.—Reporting on the commerce, etc., of the Grand Duchy of Finland for the year 1902, Mr. C. J. Cooke, British Consul at Helsingfors, observes that the timber trade was good, thanks to the measures taken both in Sweden and in Finland. The general result was favourable, though no great rise in prices actually took place, nor did the termination of hostilities in South Africa have so great an effect as was expected. During the South African war timber prices were very low and the market much depressed, but since peace has been established prices have gone up, and it is to be hoped that they may remain steady, as almost every one of the saw-mill proprietors have agreed to reduce their production, which means a decrease of about 200,000 standards. Even if this figure be exaggerated, it is certain that a considerable decrease has in fact taken place, which has tended to keep prices up. The great export of round timber, which for many years has taken place from Finnish forests to Sweden, is certainly, from a national point of view, a disadvantage. Ever since the year 1897 a great number of logs, of large dimensions, have been exported from Northern Finland to Sweden and there sawn into deals, and consequently the price for such timber has gone up considerably and labourers' wages have been improved; but still it is considered a loss to Finland in more ways than one that the timber should be exported in a raw state instead of being sawn up before exportation. The timber market is at present in a firm but somewhat uncertain position, as the British buyers have not yet decided to pay the price demanded by the exporters. Their reserved bearing has also influenced the French and other Continental markets, except the German, which has bought up large amounts of timber of late. The Utra Wood Company have sold their sawmills and extensive forests in the north of Finland to Messrs. Gutzeit and Co., of Kotka. The export of this firm has amounted to about 14,000 standards a year, and promises to far exceed that amount in the future. At a meeting of Finnish saw-mill owners in 1902 the president gave accounts for 95 saw-mills, and said that the production for 1902 amounted to about 337,972 standards, against 328,066 standards in 1901. The sawn goods remaining, deducting those sold, at the close of navigation in 1902, were 103,159 standards, against 139,422 standards in 1901. The total shipment was, therefore, in 1902, 373,181 standards, as against 318,193 standards in 1901. During the winter the number of logs sawn was 8,543,996, as against 15,419,075 in 1901. It was agreed that about 14 per cent. less timber should be brought out of the forests next winter. The decrease of timber exported in 1902 from Helsingfors is (remarks Mr. Cooke in conclusion) very serious. In 1900 the value exported was 212,000*l.*, in 1901 124,000*l.*, and in 1902 only 112,000*l.*, and yet the value of this, the most important article for the whole country, rose from 4,060,000*l.* in 1901 to 4,640,000*l.* in 1902.

THE WORKING POPULATION OF LONDON.—The London statistics referred to in a "Note" on another page, and just issued by the London County Council, include a census of the occupations in the various metropolitan boroughs. Dealing with the building trades the volume states that, taking the trade as a whole, the west and south-west of the county include all the boroughs where the largest proportion is found. The numbers engaged in the trade per 1,000 of the population are as follows:—Fulham, 54.98; Hammersmith, 53.33; Battersea, 49.95; Wandsworth, 42.92; Chelsea, 43.72; and Lewisham, 39.08. The smallest proportions are in the City of London, with 9.76; Stepney, with 17.94; and Bethnal Green, with 19.25. In Greater London very large proportions are found, Walthamstow having 57.1; Edmonton, 55.23; Croydon, 54.7; Tottenham, 52.8; Willesden, 52.6; East Ham, 46.0; Enfield, 46.0; and Wood Green, 45.5. Taking the various trades separately, the largest proportion of bricklayers and bricklayers' labourers are in Hammersmith, Fulham, Wandsworth, Lewisham, and Battersea; carpenters and joiners in Fulham, Battersea, Hammersmith, and to a less extent over the whole of South London, except Southwark, Bermondsey, and Greenwich; painters and decorators in Chelsea, Hammersmith, Fulham, St. Marylebone, and Paddington; and plumbers generally over the county with a larger proportion in the west, and a smaller proportion in the central and eastern boroughs. In the engineering trades the largest proportions are in Woolwich, Greenwich, Deptford, and Poplar, and to a less extent in all the other boroughs along the south side of the Thames. In Greater London there are a great number engaged in these trades in West Ham and Erith.

PROPOSED NEW BUILDINGS, NEWPORT, I.W.—At a meeting of the Isle of Wight Town Council, the Mayor moved the adoption of the recommendation that the plans deposited by Mr. Denham for four houses at Hunnyhill be disapproved, as not being in accordance with the by-laws.—The Mayor said the plans did not comply with the by-laws in several important respects. One was that the road on the east side was shown to be only 19 ft. wide, whereas it should be 24 ft. In front Mr. Denham did not show the width of the road at all nor the level and gradient of the road. It was very important that the by-laws should be strictly adhered to so long as it was not an undue hindrance to the building trade.—Ald. Cheverton seconded.—Mr. Purkis moved an amendment that the plans be approved subject to the width of the roadway being marked on the plans. A month ago the plans were sent back for alteration, and he now had a note from the surveyor to the effect that the re-deposited plans appeared to be in compliance with the by-laws. They should pay some regard to what their surveyor said, and not put any undue obstacle in the way of the erection of new buildings. The omission to state the width of the roadway on the plan was a small matter which they could easily get Mr. Denham to remedy. The rough plan since submitted showed that the houses were to face a new road, which was to be 33 ft. wide one end and 36 ft. at the other, and as to the other road, Mr. Denham was giving up 7 ft. in order to make it 19 ft. wide; and if, when building commenced the other side, the owner there also gave up 7 ft., the road would be 26 ft. wide.—Mr. Morgan seconded the amendment, saying they should encourage building as much as possible, and that the objection appeared trifling.—Mr. Purkis said the plans were in accordance with the by-laws, excepting that the width of the roadway was not shown.—Mr. Buckler said the plans went back, and were not amended in accordance with the by-laws.—The Mayor said the object of the committee was to show exactly the circumstances surrounding the proposed new building. The proposed cottages were very small and the rooms low, and it was very important that they should not allow modern slums to be created on their boundaries by the cramming in of small cottages without ensuring a proper width of road, etc.—The amendment was negatived, and the proposition was then carried, Mr. Purkis voting against.—*Isle of Wight County Press.*

SUBSIDENCE OF BLACKWALL PIER.—At the fortnightly meeting of the Managers of the Poplar and Stepney Sick Asylum District, held on the 15th inst., the Blackwall Visiting Committee brought up an important Report dealing with the alleged falling away of Blackwall Pier. It appeared that the Clerk reported to the Committee that he was informed that a portion of the pier adjoining the Branch Asylum had subsided, and that in connexion therewith he had immediately communicated with the Board's architects, asking them to report as to the safety or otherwise of the foundations of the institution. The architects—Messrs. Clarkson—wrote to the effect that they had made several examinations of the river wall in front of the building, and had been in communication with the Engineer to the Dock Companies with the view of ascertaining to what depth the foundations were carried. The records, however, appeared to have been mislaid. It had been found that certain buildings which existed near the Brunswick Hotel about the same time had their foundations carried to a depth of 10 ft. 6 in. below the quay level. It was, of course, impossible to say without examination whether the front wall of the building in question was carried down to a sufficient depth to make it quite secure in the event of the river wall giving way. The Engineer to the Dock Companies stated that a thorough examination of the whole length of the river wall would be made without loss of time. The architects added that, having made a careful inspection of the buildings, they did not find any cause for immediate anxiety, but suggested that they should be instructed to watch the operations of the Dock Companies in the neighbourhood with a view to reporting to the Managers in the event of an adverse development. The Committee recommended that the Clerk's action be approved, and that Messrs. Clarkson be asked to watch the operations of the Dock Companies as suggested. The report was adopted.—*Eastern Post.*

GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.—The opening lecture of the senior architecture class in this college was delivered on Monday last by Professor Gourlay, the subject being, "The Christian Churches of Athens." The lecturer began by referring to the way in which the Parthenon and other temples were altered to serve as Christian churches. He divided the churches erected by the Christians in the Byzantine style into three distinct types—(1) those possessing a large central dome, as may be seen in the Church of St. Nicodemus; (2) those having a small dome at the "crossing" of the four arms of the Greek cross, as in the Old Cathedral or Metropolis; and (3) those with the basilican or western type of plan, as in St. Mary's of the Great Monastery. The names of the various parts of a Greek church, with the uses to which they were put, were explained. Finally the methods of building used in the churches of Athens, with the architectural results obtained, were studied. The lecture was illustrated by means of photos collected and by sketches drawn by the lecturer while on a recent visit to Athens.—*Glasgow Herald.*

CAPITAL AND LABOUR.

SUNDERLAND JOINERS' DISPUTE.—Mr. A. A. Hudson, a Board of Trade nominee, has been appointed arbitrator to settle the house joiners' strike at Sunderland. No date has yet been fixed upon for the arbitration proceedings.

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LEGAL.

WORKMEN'S COMPENSATION ACT.

WHAT IS "PARTIAL CONSTRUCTION"?

AT the Brompton County Court (London) last Friday, before Judge Stonor, William Porter, a builder's labourer, 70, Royal-terrace, Kennington Park, S.E., applied—under the Workmen's Compensation Act—for compensation from Messrs. Aiton and Co., builders, etc., Western Works, Willesden Junction, N.W., in respect of personal injuries, sustained whilst in the respondents' employ.

Mr. McCurdy, counsel, appeared for the applicant, and Mr. Chester Jones, counsel, for the respondents.

Applicant's counsel stated that on May 8 last his client was in the employ of the respondents, assisting in fitting and fixing pipes—mainly water pipes—at the electrical station of the Fulham Borough Council. Some planks had been laid across a hole in an upper floor, and one of these planks slipping as the applicant caught hold of it for the purpose of lowering himself on to a girder, he fell a distance of about 20ft. One of his legs and one of his wrists were badly injured, and he had been unable up to the present time to do any work. The respondents contended that the man's employment was not employment to which the Act applied, and so it was necessary to go somewhat into details. It appeared that in 1898 the Fulham Borough Council erected a portion of the building in question, the height of which was about 50ft., leaving room for later extension. In 1902 the Borough Council wished to complete the construction of the building, and accepted three tenders, each for a portion of the work. A tender sent in by the present respondents was one of the tenders accepted, and it was upon work in connexion with this that the applicant was engaged at the time of the accident. He (counsel) would submit that each of these three firms of contractors were "undertakers" within the meaning of the Act.

Evidence was given by officials of the Borough Council, bearing out counsel's statements regarding the description of the building and the nature of the applicant's work. Emphasis was laid upon the statement that in the original design of the building in 1898 room was left for the "extension scheme," upon which the applicant was engaged at the time of the accident.

The applicant spoke as to the accident.

In cross-examination, he said that his work consisted in helping to fix the pipes, some of which were passed through and cemented to brick walls. He did not think that his people used any scaffolding for the work. The plank which slipped was placed in its position by men working for one of the other contractors.

Counsel for the applicant referred to the well-known case of Hoddinott *v.* Newton, Chambers and Co., Ltd., in connexion with which Lord Macnaghten had pointed out that the Workmen's Compensation Act spoke of a building being "constructed," not "erected;" adding that the "construction" might be "partial," *i.e.*, not concerning the erection of the whole building. In accordance with the case referred to, counsel submitted that whenever new material—as in the present case before the Court—was put into a building, there was in such work something of the nature of "construction." It did not matter whether such work were done immediately after the main portion of the building had been completed, or years afterwards. Counsel went on to quote from the cases Mason *v.* Dean—the ruling in which was endorsed in the House of Lords—and Cooper and Keen *v.* Wright, in support of his submission that a person who contracted for and carried out, a portion only of such work as that in question was an "undertaker" within the meaning of the Workmen's Compensation Act.

Counsel for the respondents submitted that the evidence failed to show that his clients were "constructing" the building at the time of the accident; and, secondly, it failed to show that there was "scaffolding" being used. The putting of "chattels" into a building was not part of the work of "building."

The Judge: It would be an addition to the freehold.

Counsel for the respondents: But because it is an addition to the freehold it is not necessarily a part of the building. Would your Honour say that an ordinary looking-glass, when fixed on a wall, becomes part of the building?

The Judge: Yes, when fixed to the wall firmly.

Counsel for the respondents: But in order for my friend to succeed he must prove that the respondents, on May 8, were constructing the building.

The Judge: It was "additional construction."

Counsel for the respondents: Then, I submit that it cannot be said that, on May 8, the building was being constructed by means of "scaffolding," simply because these few boards were left for the men to walk over.

The Judge: I certainly think it was scaffolding; the boards were for men to work upon.

Counsel for the respondents: There was no work being done just there.

His Honour: Or for the workmen to walk upon.

James W. Aplin, the respondents' foreman on the job, gave evidence regarding the precise nature of the work, stating that his people did none of the cementing of the pipes into the walls; they simply fixed them in proper position.

The Judge: I think this work was part of the construction, and had to do with the purpose for which the building was put up; and I think that the applicant is entitled to his compensation.

It was explained that the man's wages had been 30s. a week, and the award was accordingly fixed at 15s. a week. Costs were allowed on the "B" scale.

Counsel for the respondents asked for a stay of execution for three weeks, in case his clients might wish to appeal.

His Honour consented.

RICHMOND ANCIENT LIGHT DISPUTE.

THE case of the London Property Investment Trust, Ltd., *v.* the Corporation of Richmond and Gosling and Son was in the list for hearing before Mr. Justice Bucknill in the Vacation Court on Wednesday.

Mr. Mulligan, K.C., when the case was called on, said that his lordship might remember that this was a motion for an interim injunction to restrain the defendants building so as to infringe the plaintiffs' ancient lights. When it came before Mr. Justice Walton on September 9, the defendants gave undertakings not to build higher until the 16th inst. The case had on the 16th inst. stood over on those undertakings until that day, and it had now been arranged that the undertakings should be continued up to the trial of the action. It was arranged to take an order that the statement of claim should be delivered on or before October 1 next, the statement of defence on or before October 8, reply (if necessary) to be delivered within four days. A cross-order for discovery of documents, that the action should be set down at once, liberty to apply to advance the trial, and that the costs of the present application should be costs in the action.

Mr. Bramwell Davis, K.C., on behalf of the defendants, said he agreed to the order being taken as stated by his learned friend, the plaintiffs giving the usual undertaking in damages.

His lordship assented to the application.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

23,172 of 1902.—L. SCHLENTHEIM AND DIESEKER, LTD.: *Domestic Baths, Handbasins, Scullery Sinks, or the like.*

An ornamented bath, handbasin, scullery sink, or the like, formed of a concrete base and having a granito-mastic coating and ornamentation.

25,703 of 1902.—J. D. PRIOR: *A Hot-water Circulating Boiler suitable for Open Firegrates.*

A hot-water circulating boiler suitable for open firegrates, consisting of a tube with hollow or waterway sides and having a front open flue at bottom, and its top closed by a combined flap and damper, said boiler being fitted to a grate. The invention also consists in hinging the canopies or smoke-preventing hoods of the grates to one side of the same, so as to permit of better access to the upper part of the grate and chimney. It further consists in hinging the front bars to one side of the grate and providing a retaining catch at the other side.

14,556 of 1903.—J. S. BELL: *Tubular Mortise Locks and Latches, and Escutcheons to be Used with such Locks.*

In a tubular mortise latch, the combination of a follower operated by a spindle, a slide the rear end of which is acted upon by said follower, whilst the front end operates a follower acting to retract a latch bolt which is pressed forward by a spring.

15,930 of 1903.—R. ILES: *Ventilating Greenhouses, Botanical Structures, and Buildings Generally.*

In a building, the provision of an upper longitudinal chamber or lantern, the sides of which are perforated, in combination with valves or glazed panels suitably pivoted and provided with seats; and the construction of the chamber with ridging and perforated sides opening into one or more partitions of the lower part of the building, in combination with valves or glazed panels and seatings having a cord, cords, or like means for adjustment.

16,120 of 1903.—E. J. GLACKIN: *Ventilators for Windows and the like.*

This consists in the combination with a window casing, having the sashes therein, of a ventilator pivotally mounted to the casing on the inside of the window at one end thereof and normally hanging parallel thereto when the window is closed in position, so that it can be swung from the vertical position it normally occupies to any desired inclination to bring its lower edge against the displaced sash to co-operate therewith, and means for swinging said ventilator and for securing it in the position to which it may be moved.

16,429 of 1903.—H. A. PRICE and F. W. TURNER: *Gas Cooking Stoves.*

This invention relates to the construction of a gas cooking stove, with an automatic catch for opening the oven door. An automatic catch is fixed to the outside of the oven and is operated upon by the handle of the cock fixed in the gas supply pipe to the oven, in such a manner that should the cock be turned on at any time either by accident or otherwise, the latch is raised and the oven door opened, and when shut again the catch goes back to its original position, being hung on a centre. By using this catch it is thus impossible for an explosion to take place, as is sometimes the case at present when the gas cock is turned on by accident and the oven fills with gas.

16,327 of 1903.—H. W. D. FIELDING: *Ball-taps for Cisterns.*

This invention has for its object to cause the ball or float-tap to open fully when the flow of water commences and to close quickly when the cistern is sufficiently full. The arrangement consists of a tubular float lever through which the water flows into a small tank provided at the extremity thereof, said tank having a siphon by which the water passing into the tank can flow out into the cistern on its being filled. The tubular float lever is pivoted to the tap casing, and has an arm by means of which the tap is operated to open or close. On the float reaching its lowest position it will be understood that the tank is quickly filled, whereby the tap is immediately opened to its maximum extent.

23,135 of 1902.—W. KOHLMETZ: *Fireproof Ceilings or Roofs.*

In a fireproof flooring, construction, or ceiling, the combination of iron beams, each consisting of parallel upper and lower flanges and a network web rigidly connecting the said flanges, said beams connecting carrying walls and rigidly secured therein, and a layer of stony material supported by and filling the spaces intermediate the iron beams and entirely embedding the same, and the stony material on one side of a beam being connected to that on the other side thereof through the openings in the network web.

23,314 of 1902.—W. QUINE, Jun.: *Dressing, Grading, and Sizing Machines.*

This consists essentially of one or more cylinders or drums of any convenient size or shape, covered with silk wire or perforated or other suitable material, and so placed as to be capable of being violently shaken up and down or to and fro by means of a shaft crank or other suitable device, and of receiving, if desirable, other rotary or oscillating motion.

5,240 of 1903.—R. H. W. KNIGHT: *Conduits or Casings for Electric Conductors.*

A system of sectional circular lap spring-closed jointed tube conduit for protecting insulated electric conductors and wires, with branching-off pieces, angle pieces, diminishing sockets, and fuse boxes, constructed upon the same principle of a sectional circular lap spring-closed joint.

6,848 of 1903.—H. J. HADDAN (A. O. Crozier): *Glazed Bricks.*

The art of making a glazed cement or cementitious brick, consisting in forming the body portion of the brick of cement or cementitious material, and providing such body portion externally with a layer of a mixture or compound comprising a silica or silicate cement, a flux and water or moisture as ingredients, then permitting the said layer to set, and then burning or firing the same in a kiln.

12,853 of 1903.—P. B. GUILHAM: *Floors, Beams, and Methods of Fastening the same for Promoting the Sanitation of Private Dwelling Houses, Barracks, Hospitals, Schools, Public Buildings, and the like.*

The combination of a hooked cramp, consisting of a bolt passing through the lower flange of a bent fastening plate having two opposite flanges, of which the upper one is let into and fixed to the joist, whilst the bolt passes through the lower opposite one which is screwed down by a nut on the bolt, the lower end of the

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

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bolt being formed either into a hook fitting under the top flange of an iron girder, or into a forked end by which it is fixed into a cement, concrete, or other support, or the lower end of the bolt itself is screwed into a socket permanently fixed in a paved, cemented, or concreted floor in order to allow the laying down and fixing of a temporary boarded floor.

MEETINGS.

SATURDAY, SEPTEMBER 26.

Devon and Exeter Architectural Society.—Excursion to Dartmouth and Naval College Buildings. Leave Exeter at 8.40 or 10.50 a.m.

THURSDAY, OCTOBER 1.

Builders' Benevolent Institution.—Half-yearly general meeting, Crown and Anchor Hotel, Ipswich. 3 p.m.

FRIDAY, OCTOBER 2.

Architectural Association.—Annual general meeting President's address, 9, Conduit-street. 7.30 p.m.

TUESDAY, OCTOBER 6.

Institute of Heating and Ventilating Engineers.—Meeting at Holborn Restaurant. 2.30 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

September 10.—By LANGRIDGE AND FREEMAN, (at Maidstone).

Mereworth, Kent.—Swayhorne Farm, 11a. 1r. 22p., f.	£2,100
Upper Platt, Kent.—Three freehold cottages with farm buildings, area 5a. 3r. 22p.	700
Piece of freehold building land, 1a. 3r. 11p.	100

By WORSFOLD AND HAYWARD (at Dover).

Dover, Kent.—17, Caroline-pl., f., w.r. 15*l.* 12s.	225
22, Cherry Tree-av., f., q.r. 25*l.*	420
39, Albany-pl., u.t. 76½ yrs., g.r. 1*l.*, w.r. 12*l.* 2s. 8d.	155
1 and 2, Shooters-hill, f., w.r. 20*l.* 7s. 4d.	158

By WALTER BRIERLEY (at Leek).

Leek, Staffs.—Onecote, etc., five freehold farms, also lower and back commons, 409a. 0r. 1p., y.r. 208*l.* 10s.	7,075
Bradnop, Holly Bush Farm, 98a. 1r. 18p., f., y.r. 100*l.*	2,360

By WILLSON AND PHILLIPS (at Rochford).

Paglesham, Essex.—The Plough and Sail Inn, f., y.r. 50*l.*	2,100
"Milton Villa," f.g.r. 5*l.*, reversion in 94 yrs.	141

By W. MARTIN & Co.

Dulwich.—19, Elsie-rd., u.t. 68½ yrs., g.r. 8*l.* 10s., e.r. 45*l.*	480

By KING & CHASEMORE.

Billingshurst, Sussex.—Duncan's Estate, 117 a. 2 r. 16 p., f.	2,400
Valeland Farm, 115 a. 3 r. 35 p., f.	1,425
Enclosures of land, 17 a. 3 r. 5 p., f.	400
Pear Tree Field, 9 a. 0 r. 24 p., f.	200
North Field, 7 a. 2 r. 11 p., f.	150
Washington, Sussex.—Bostal Meadow, 2 a. 3 r. 22 p. f.	250
White Acres enclosures, 3 a. 3 r. 38 p. f.	300

September 11.—By G. LOVEITT AND SONS (at Coventry).

Fillongley, Warwick.—Four freehold fields, 12a. 2r. 25p., y.r. 15*l.*	1,020
The Manor House, f. and c., y.r. 17*l.*	550
Ryton-on-Dunsmore, Warwick.—Freehold cottage with farm buildings, area 15a. 2r. 19p., y.r. 35*l.*	940

By HANFORD AND SON (at Exeter).

Chumleigh, Devon.—The Colleton Estate, 552a., f.	13,400
Hart's Ground and Clapham Moor, 30a., f.	700

September 12.—By SPELMANS' (at Norwich).

Hethersett, Norfolk.—The Old Hall Estate, 49a. 0r. 27p., f.	4,000
The Dealer's Occupation, 8a. 3r. 0p., f.	450
Two freehold enclosures, 2a. 3r. 18p.	65

September 14.—A. SAVILL AND SONS.

Doddinghurst, Essex.—Wishfields Farm, 96a. 0r. 10p., f. and c., y.r. 95*l.*	2,000
Collier Row, Essex.—A freehold cottage and enclosure of land, 25a. 1r. 8p., y.r. 50*l.*	1,010

By PERKINS AND SONS (at Southampton).

St. Deny's, Hants.—7 to 21 (odd), Kent-rd., part freehold and part u.t. 95 yrs., g.r. 7*l.* 16s., w.r. 126*l.* 2s.	1,315

By PROTHEROE AND MORRIS (on the Estate).

Newhaven, Sussex.—Station-rd., etc., 58 plots of freehold building land (in lots)	768
Main rd., a freehold meadow, 2a. 0r. 10p.	180

September 15.—By FRED VARLEY AND SON.

Chiswick.—66 and 68, Burnaby-gdns., u.t. 97 yrs., g.r. 17*l.*, e.r. 84*l.*	815
Stoke Newington.—53, Lordship-rd., u.t. 58 yrs., g.r. 4*l.* e.r. 70*l.*	575

By WYATT AND SON (at Havant).

Bedhampton, Sussex.—Freehold house and shop, y.r. 20*l.*	470
Six freehold cottages, w.r. 48*l.* 2s.	700

September 16.—By C. H. BROWN.

Fulham.—69, Fulham Park-gdns., u.t. 74½ yrs., g.r. 6*l.*, y.r. 36*l.*	£400

By MIDDLETON AND CRACKMELL.

Shepherd's Bush.—24, Melrose-gdns., u.t. 73 yrs., g.r. 6*l.*, p.	500

By DOUGLAS YOUNG AND Co.

Brixton.—38, Acre-ln., u.t. 24½ yrs., g.r. 1*l.* 2s., e.r. 45*l.*	395

By W. GRAHAM, HITCHCOCKS AND Co., with STEPHENSON AND ALEXANDER (at Newport).

Llangattock-Juxta-Caerlon, etc., Monmouth.—Portions of the Glen Usk Estate, comprising farms, lands, etc., about 1,270 a., f. (in numerous lots)	40,608

September 17.—By H. E. TRAFFORD AND CARTER.

Tottenham.—40 and 42, Chesnut-rd., f., w.r. 55*l.* 18s.	605

September 18.—By BARR AND GREEN.

Willesden.—15, 23, and 27, Leopold-rd., u.t. 85 yrs., g.r. 15*l.*, w.r. 106*l.* 12s.	552
8 to 12, Evelyn-villas, u.t. 92 yrs., g.r. 25*l.*, w.r. 171*l.* 12s.	550
Shepherd's Bush.—14 and 16, Abdale-rd., f., w.r. 85*l.* 16s.	875
Croydon.—24, 25, and 27, Clyde-rd., u.t. 62 yrs., g.r. 25*l.* 10s., y.r. 90*l.*	630

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 0	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 10 0	" at railway depôt
Red Wire Cuts	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime	20 6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12s. 0d. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 2½	" "

PRICES CURRENT (*Continued*).

STONE.

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt.
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 or 1200 at ry. dep.
20×12 " " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green	15 2 6	" "
20×12 best Eureka unfading green	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000, at rly. depôt.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0

[*See also page 327.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITION.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*Reconstruction of Cattle Market	Governors Wakefield Charities	50 guineas and 25 guineas	Dec. 1

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Road Works, Rosebery-terrace, Plasmarl	Swansea Corporation	G. Bell, Borough Surveyor, 13, Somerset-place, Swansea	Sep. 29
Road Works, Shipley-road	Tynemouth Corporation	J. F. Smillie, Borough Surveyor, Town Hall, Tynemouth	do.
Shops and Offices, Saville-street, North Shields	do.	do.	do.
Flints, Granite, &c.	Bromley (Kent) R.D.C.	E. Haslehurst, Union Offices, Bromley	do.
Surveyor's Materials	do.	do.	do.
Gravel and Road Metal	Bishop Stortford U.D.C.	T. Swatteridge, North-street, Bishop Stortford	do.
Broken Granite, &c. (1,400 tons)	do.	do.	do.
Sewers, &c., at Lunatic Asylum, Clifton, Yorks	The Visiting Committee	Fairbank & Son, Civil Engineers, Lendal, York	do.
Corrugated Iron Sheds	Walthamstow U.D.C.	G. H. Holmes, Civil Engineer, Town Hall, Walthamstow	do.
Rebuilding Chapel, Landore, Swansea	The Trustees	W. B. Rees, Architect, 37, St. Mary-street, Cardiff	do.
Business Premises, Mile Cross, Halifax	Mr. C. Horner	J. F. Walsh & Nicholas, Architects, Halifax	do.
Plumbing, &c. Work at 6 Houses, Wellington-row	.....	J. S. Moffat, Architect, Whitehaven	do.
Improvement to 16, South Mall, Cork	.....	E. Walker & Sons, Civil Engineers, 17, South Mall, Cork	do.
Alterations to Cottages, Winterhill, Linthwaite	.....	J. E. Lunn, Architect, Milnsbridge, Huddersfield	do.
Chapel and School, Senghenydd, Wales	.....	T. Nicholas, Station House, Senghenydd	Sep. 30
Rebuilding the White Hart Hotel, George-st., Pontypool	.....	Fisher & Sons, Architects, Pontypool	do.
Sanitary Works at Workhouse & Hospital, Dorchester	The Committee	W. J. Fletcher, Civil Engineer, County Hospital, Dorchester	do.
Road Works, &c., Kentisbury	Ilfracombe U.D.C.	The Engineer, Town Hall, Ilfracombe	do.
Road Works, Challacombe	do.	do.	do.
Street Works, New-street	Macclesfield Corporation	Borough Engineer, Town Hall, Macclesfield	do.
Twelve Houses, Scriven, Knaresborough	Messrs. Jas. Grafton & Co.	W. R. Minns, Architect, 13, Market-street, Bingley	do.
Sewers, &c.	Llandaff R.D.C.	J. Holden, Civil Engineer, 35, St. Mary-street, Cardiff	do.
Church, Grange-road, West Hartlepool	Primitive Methodist Trustees	H. Barnes, Architect, Scarborough-street, West Hartlepool	do.
Main Laying	Dundee Town Council	H. Richardson, Civil Engineer, Dunhope Crescent-road, Dundee	do.
Road Works, &c., Park-road and other streets	Exmouth U.D.C.	S. Hulton, Surveyor, Council Offices, Exmouth	do.
Thirty-five Houses, Cefn Bach Estate	Derl (via Cardiff) Building Club	Jas. Ward, Cascade House, Derl	do.
Sewers, &c., Eastbrook	Llandaff & Dinas Powis R.D.C.	Baldwin Latham, Civil Engineer, 35, St. Mary-street, Cardiff	do.
Drainage Works, Brixton, Devon	Plympton St. Mary R.D.C.	W. E. Horton, Surveyor, Ridgeway, Plympton	do.
House, Longacre-road, Carmarthen	.....	G. Morgan & Son, Architects, King-street, Carmarthen	Oct. 1
Stabling, &c., St. John's, Withycombe, Raleigh	.....	E. H. Harbottle & Son, Architects, County Chambers, Exeter	do.
Kerb, Channel Stones, &c.	Glasgow Corporation	J. Lindsay, City Chambers, Glasgow	do.
Flagging Works, &c., Forge-street	Normanton U.D.C.	C. B. L. Fernandes, Council Offices, Normanton	do.
Sea Wall, &c.	Felixstowe U.D.C.	J. Russell, Civil Engineer, 15, Victoria-street, S.W.	do.
Road Works, Brookside-road	Uttoxeter Town Council	R. W. Marshall, Surveyor, Town Hall, Uttoxeter	do.
Sewerage Works, Wakefield-road	Featherstone (Yorks) U.D.C.	F. R. Rothera, Civil Engineer, Council Offices, Featherstone	do.
Riding School, Hull	Lt.-Col. Lord Wenlock	A. E. Thompson, Architect, Manor-street, Hull	do.
Free Library, Great Crosby	Great Crosby U.D.C.	Andersson & Crawford, 36, Dale-street, Liverpool	Oct. 2
Two Cottages, East Woodley Farm, Newton St. Cyres	Trustees of the Quick Estate	Ellis, Son, & Bowden, Surveyors, Bedford Chambers, Exeter	do.
Road Works, Jameson-road	Hull Corporation	A. E. White, Civil Engineer, Town Hall, Hull	do.
Free Library, College-road	Great Crosby (Lancs.) U.D.C.	Andersson & Crawford, Architects, 36, Dale-street, Liverpool	do.
Additions to Schools	Ballingry (N.B.) School Board	Wm. Birrell, Architect, 200, High-street, Kirkcaldy	do.
New Coast Guard Buildings, Isles of Scilly	Admiralty	Superintending Civil Engineer, R.M. Dockyard, Devonport	do.
*Granite Road Metal	Southowram (Yorks) U.D.C.	R. W. Evans, Commercial Bank Chambers, Halifax	Oct. 3
Shelter	Bridlington Corporation	E. R. Matthews, Civil Engineer, Town Hall, Bridlington	do.
Ironwork, Princes' Parade	do.	Mangnall & Littlewoods, Architects, 42, Spring-gardens, Manchester	do.
Water Supply Works, Rathmullan	Milford (Ireland) R.D.C.	J. M. Robinson, Engineer, 7, East Wall, Londonderry	do.
Kerbing, &c.	Berwick Corporation	Borough Surveyor, Wallace Green, Berwick	do.
Public Library, Carlise-street	Goole U.D.C.	H. B. Thorpe, Architect, Aire-street, Goole	do.
Public Hall, Cross Hands, Llanelly	.....	D. Jenkins, Architect, Llandilo	do.
Three Houses, Risca, Mon	.....	E. N. Johnson, Architect, Risca, Mon	do.
Works at Mortuary Chapels	Crewe Town Council	G. Eaton-Shore, Borough Surveyor, Town Hall, Crewe	do.
Fire Station, &c., Darklands-road	Swandlincote U.D.C.	T. Kidd, Town Surveyor, Swadlincote	do.
Water Works, Crake Scar	Bishop Auckland R.D.C.	C. Johnston, Surveyor, Cradock-street, Bishop Auckland	Oct. 5
Road Works, &c., Upper Park-road, Camberley	Frinley U.D.C.	F. C. Wren, Surveyor, High-street, Camberley	do.
Sewerage Works	Leeds Town Council	Spinks & Pilling, Engineers, 20, Park-row, Leeds	do.
Schools, Pickering, Yorks	Grammar School Governors	John Bilson, Architect, 23, Parliament-street, Hull	do.
Police Station, Bloomsbury-street	Birmingham Corporation	J. Price, City Engineer, Council House, Birmingham	do.
Additions to Hospital, Townsend-street, Belfast	.....	W. J. Fennell, Architect, 2, Wellington-place, Belfast	do.
Shops and Houses, Portsoy, N.B.	.....	R. B. Pratt, Architect, Elgin	do.
Vicarage, Harrington, Cumberland	.....	J. P. Curwen, Architect, 26, Highgate, Kendal	Oct. 6
*New Roads and Sewers, Acton Green	.....	Monson & Sons, Architects, Grosvenor House, Acton Vale, W.	Oct. 7
Sixteen Cottages	Naas (Ireland) R.D.C.	D. J. Purcell, Council Offices, Naas	do.
Additions to Works, Halifax	Campbell Gas Engine Co., Ltd.	Jackson & Fox, Engineers, 7, Rawson-street, Halifax	Oct. 8
*New Coast Guard Station, Walton Creek	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	Oct. 9
*Roadmaking, Lighting, &c., Works	Hanwell U.D.C.	Council's Surveyor, Church-road West, Hanwell, W.	Oct. 12
Sewage Works Extension	Ilford U.D.C.	H. Shaw, Civil Engineer, Town Hall, Ilford	Oct. 13
*Clearing Site	Bethnal Green Borough Council	Borough Surveyor, Town Hall, Bethnal Green	do.
*Depot Buildings, Blackheath	Greenwich Borough Council	Council's Surveyor, Town Hall, Greenwich-road, S.E.	Oct. 15
*Underground Convenience, Blackwall-lane	do.	do.	do.
*Wrot-Iron Unclimbable Fence	Colchester Guardians	Clerk's Office, 57, North-hill, Colchester	Oct. 19
Reservoir, Peuceru, Wales	Tregaron District Council	J. Davies & Son, Civil Engineers, Llanelly	Oct. 31
Stabling, &c., Netherwood, Utley, Yorks	.....	Moore & Crabtree, Architects, York Chambers, Keighley	No date.
Two Semi-detached Villas, Skircoat, near Halifax	.....	Horsfall & Son, Architects, 22A, Commercial-street, Halifax	do.
Chapel and Schools, Senghenydd	.....	T. Nicholas, Station House, Senghenydd	do.
Ten Houses, Fochriw (Wales)	.....	W. Walters, 5, Dynevor-street, Fochriw	do.
Mission Church, Pwll (Llanelly)	.....	C. A. Jones, Clymaenlly, Llanelly	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Clerk of Works	Pontypridd U.D.C.	3l. 3s. per week	Sep. 30
*Architectural Assistant	Fulham Borough Council	2l. 2s. per week	Oct. 3
*Clerk of Works	Devizes Joint Hospital Committee	Not stated	Oct. 10

* *Those marked with an asterisk (*) are advertised in this Number.* — *Competition*, iv. *Contracts*, iv., vi. viii. & x. *Public Appointments*, xvii.

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PRICES CURRENT (*Continued*).

WOOD.

	£ s. d.	£ s. d.
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10 0
" " " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 3 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Dantzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
½ in. do. do.	0 0 6½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	22 0 0
American Whitewood Planks— Per ft. cube	0 4 0	- -

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered.	Railway Vans, per ton.
	£ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Fitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
Iron—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
" " galvanised	10 0 0	- - -
(* Add upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	- - -
" " to 24 g.	10 15 0	- - -
" " to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
" " 22 g. and 24 g.	16 10 0	- - -
" " 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	- - -
" " 22 g. and 24 g.	12 15 0	- - -
" " 26 g.	14 0 0	- - -
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
Lead—Sheet, English, 3 lbs. & up.	14 0 0	- - -
Pipe in coils	14 10 0	- - -
Soil pipe	17 0 0	- - -
Compo Pipe	17 0 0	- - -
Zinc—Sheet—		
Vieille Montagne ton	26 0 0	- - -
Silesian	25 15 0	- - -

PRICES CURRENT (*Continued*).

LEAD, &c.

	Per ton. in London. £ s. d.	£ s. d.
Copper—		
Strong Sheet per lb.	0 0 10½	- - -
Thin "	0 0 11½	- - -
Copper nails "	0 0 11	- - -
Brass—		
Strong Sheet per lb.	0 0 10	- - -
Thin "	0 0 11	- - -
Tin—English Ingots "	0 1 4	- - -
Solder—Plumbers' "	0 0 6	- - -
Tinmen's "	0 0 8	- - -
Blowpipe "	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1½d. " "
21 oz. thirds	3½d. " "
" fourths	2½d. " "
26 oz. thirds	3½d. " "
" fourths	3½d. " "
32 oz. thirds	4½d. " "
" fourths	4½d. " "
Fluted sheet, 15 oz.	2½d. " "
" 21 oz.	3½d. " "
½ Harley's Rolled Plate	1½d. " "
¾ " " "	2d. " "
1 " " "	2½d. " "

OILS, &c.

		£ s. d
Raw Linseed Oil in pipes or barrels	per gallon	0 1 10
" " in drums	"	0 2 2
Boiled " in pipes or barrels	"	0 2 1
" " in drums	"	0 2 5
Turpentine, in barrels	"	0 3 8
" in drums	"	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	"	19 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 6
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence.

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*** Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

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"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BACUP.—For the erection of School buildings, Lanehead-lane, for the Corporation. Messrs. Smith & Cross, architects, Town Hall Chambers, Rochdale. Quantities by the architects:—

Masonry.—Wm. Coupe, Waterfoot.*
Carpentry and Joinery.—J. W. Sutcliffe, Bacup.*
Iron and Steel Work.—J. J. Smithies, Rochdale.*
Slating.—Rushton & Sons, Bacup.*
Plastering.—Fielding Bros., Bacup.*
Painting and Varnishing.—W. J. Jackson, Bacup.*
Plumbing and Glazing.—Robert Clegg, Bacup.*
Dado Tiling.—F. S. Ross, Rochdale.*
Wood-block Flooring.—Roger & Lowe, Ltd., Farnworth.*
Asphalting.—W. Shepherd, Rochdale.*
Ventilating.—Bedford & Co., Halifax.*
Heating.—J. Butterworth, Rochdale.*
Cloakroom Fittings.—Brooks & Co., Ltd., Manchester.*
Movable Partition.—Hy. Whiteley, Rishworth.*
Total £4,515 16 7

CROYDON.—For the erection of a Board School, Ingram-road, Thornton Heath, for 1,166 children. Mr. H. Carter Pegg, F.R.I.B.A., Thornton Heath, architect:—

Roberts & Co.	£20 948	J. & C. Bowyer	£18,300
C. Ansell	19.500	Smith & Sons, Ltd.	18.186
Leslie & Co., Ltd.	19 495	Akers & Co.	18,128
Cook & Sons	19.150	J. & M. Patrick	17,900
Smith & Sons	18 945	Bulled & Co.	17.153
Rowland Bros.	18 598	Knight & Son	16,987
Martin Wells & Co.	18.596	Kebridge & Shaw, Cambridge‡	16,629
Wilcock & Co.	18.500		

‡ Recommended for acceptance.

DOVER.—For the erection of a Congregational Church, High-street, Dover. Messrs. Cresswell & Newman, and Mr. W. Beeston, joint architects, 54, Castle-street, Dover. Quantities by the architects:—

Tuff & Miskin	£7,309 9	W. J Adcock	£6.850 0
E. Stokes	7.306 0	Game	6.774 0
Lewis & Son	7,250 0	Paramor	6.589 0
Warren & Son	7.142 0	Austin & Simms	6,421 0
J. J. Beaufoy	7,116 8	R. Brisley, Dover*	6,382 10
Denne	6.941 0	G. Munro	5 927 0
J. Wise	6,900 0		

DUNSTABLE.—For the supply of granite road-metal for the Town Council. Mr. George Simcox, Borough Surveyor, Town Hall, Dunstable:—

	Per ton. s. d.
Chas. Abell, Hartshill, near Atherstone*	9 9
Whitwick Granite Co., Whitwick*	9 2
Steam Rolling.	
G. E. Gould, Hornsey*:—	
Rolling £1 5 0 per day.	
Scarifying 0 0 0½ per yard super.	

HERNE BAY.—House, Hill Top-road, for Mr. J. Parker Ayers. Mr. C. E. Hutchinson, 11, John-street, Bedford-row, architect:—

F. W. Baverstock	£536
A. W. Woolf, Herne Bay*	478

[*See also next page.*

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LEATHERHEAD.—For the construction of sewers, &c., for the Urban District Council. Mr. T. Salkield, surveyor, Council Offices, Leatherhead :—

Soan	£1,147	17	6	Catley	£885 0 0
Wimpey & Co.	1,075	0	0	Streeter & Todhunter	845 0 0
Meston	983	12	5	Osenton	826 0 0
Kavanagh & Co.	953	14	4	May*	774 8 8
Iles	926	0	0	Davies, Ball, & Co.	750 0 0
Jackson	903	3	0	Swaker	741 0 0
Kettingham	892	0	0		
Free & Sons	886	19	6		

[Surveyor's estimate, £938.]

MACCLESFIELD.—For the erection of three shops, Bollington, for the Equitable Provident Society, Ltd. Messrs. Whittaker & Bradburne, architects, 19, King Edward-street, Macclesfield. Quantities by Mr. F. Hewitt, Manchester :—

Roylance & Co., Ltd.	£1,820	0	0	Gorton & Wilson	£1,580 0 0
J. Clayton	1,635	0	0	Berry & Sons, Macclesfield*	1,578 17 7
W. T. Beard	1,600	0	0	J. Dakin	1,566 0 0
				Clayton Bros.	1,450 0 0

MORTON (Notts.).—For erection of house at Morton, near Newark. A. R. Calvert and William R. Gleave, architects, 18, Low Pavement, Nottingham :—

W. Smith, Newark* £875

[Lowest of ten tenders.]

NEWARK.—For the erection of infirmary buildings, Bowbridge-road, for the Guardians. Mr. A. Marshall, architect, King-street, Nottingham. Quantities by Mr. C. Pearson Shaw, Angel-row, Nottingham :—

Eastwood & Co.	£11,928	8	0	Williamson & Co.	£10,847 18 11
Moss & Sons	11,150	0	0	J. Wright	10,408 0 0
Crane & Co.	11,100	0	0	F. Evans	10,307 0 0
Vickers & Co.	10,940	0	0	T. Barlow	10,294 0 0
Fish & Sons	10,823	0	0	W. Smith, Newark*	10,200 0 0
Brown & Son	10,588	0	0	T. H. Harper	9,830 0 0

NOTTINGHAM.—For erection of house, Sherwood-rise, Nottingham. A. R. Calvert and William R. Gleave, architects, 18, Low Pavement, Nottingham :—

Crane, Ltd.* £1,185

[Lowest of nine tenders.]

OAKENGATES.—For the construction of sewers and sewage disposal works for the Urban District Council. Mr. R. E. W. Berrington, M.InstC.E., Bank Buildings, Wolverhampton :—

E. H. Page	£11,992	J. Owen	£8,599
Braithwaite & Co.	9,802	H. Holloway, Wolverhampton*	7,897
W. H. Reading	8,800		

PADIHAM (Lancs).—For the erection of St. Leonard's National Schools. Mr. Thos. Bell, architect, 14, Grimshaw-street, Burnley :—

Excavating and Masonry.—Smith & Sons, Burnley.*
Carpentry and Joinery.—J. Bertwistle, Padiham.*
Plastering and Concreting.—Rawlinson & Sons, Burnley.*
Slating.—Foster & Sons, Padiham.*
Plumbing.—Pollard, Padiham.*
Painting.—Smith & Son, Padiham.*
Gates and Railing.—T. Ashworth, Burnley.*
Ironfoundery.—W. Walton, Burnley.*

STAMFORD.—For making-up, &c., private streets, Northfields Estate, for the Corporation of Stamford. Mr. T. W. Hayward, A.M.Inst.C.E., engineer, 6, St. Mary's-street, Stamford :—

A. Jewell	£1,565	0	0	J. C. Trueman	£1,239 0 0
Bentley & Loch	1,504	15	10	Borough Surveyor	1,200 0 0
J. Woolston	1,397	0	0		

WEM (Salop).—For the erection of a market house, assembly hall, &c., for the Urban District Council. Mr. James Brown, architect, 12, Castle-street, Shrewsbury :—

G. Edge	£4,670	T. Pace	£3,667
E. Whittingham	4,450	Gettins & Co.	3,647
G. Dodd	3,902	G. H. Nicholas	3,632
T. Jervis	3,875	Treasure & Son	3,619
Tommy & Co.	3,862	G. Bullock	3,470
J. Hayes	3,800	T. Huxley	3,400
G. H. Bickerton	3,775	Morris & Sons	3,343
H. Price	3,765	G. Phillips, Wem*	3,330
Price & Sons	3,700		

WREXHAM.—For works at the fever hospital, for the Rural District Council. Mr. G. Morison, architect, King-street, Wrexham. Quantities by the architect :—

W. H. Wycherley	£550	0	0
H. A. Jones	491	7	9
Lewis Bros.	£450	4	0
Davies Bros., Hill-st., Wrexham*	445	0	0

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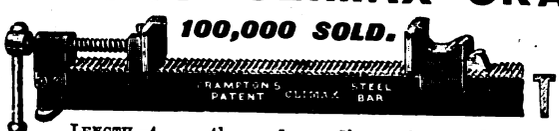

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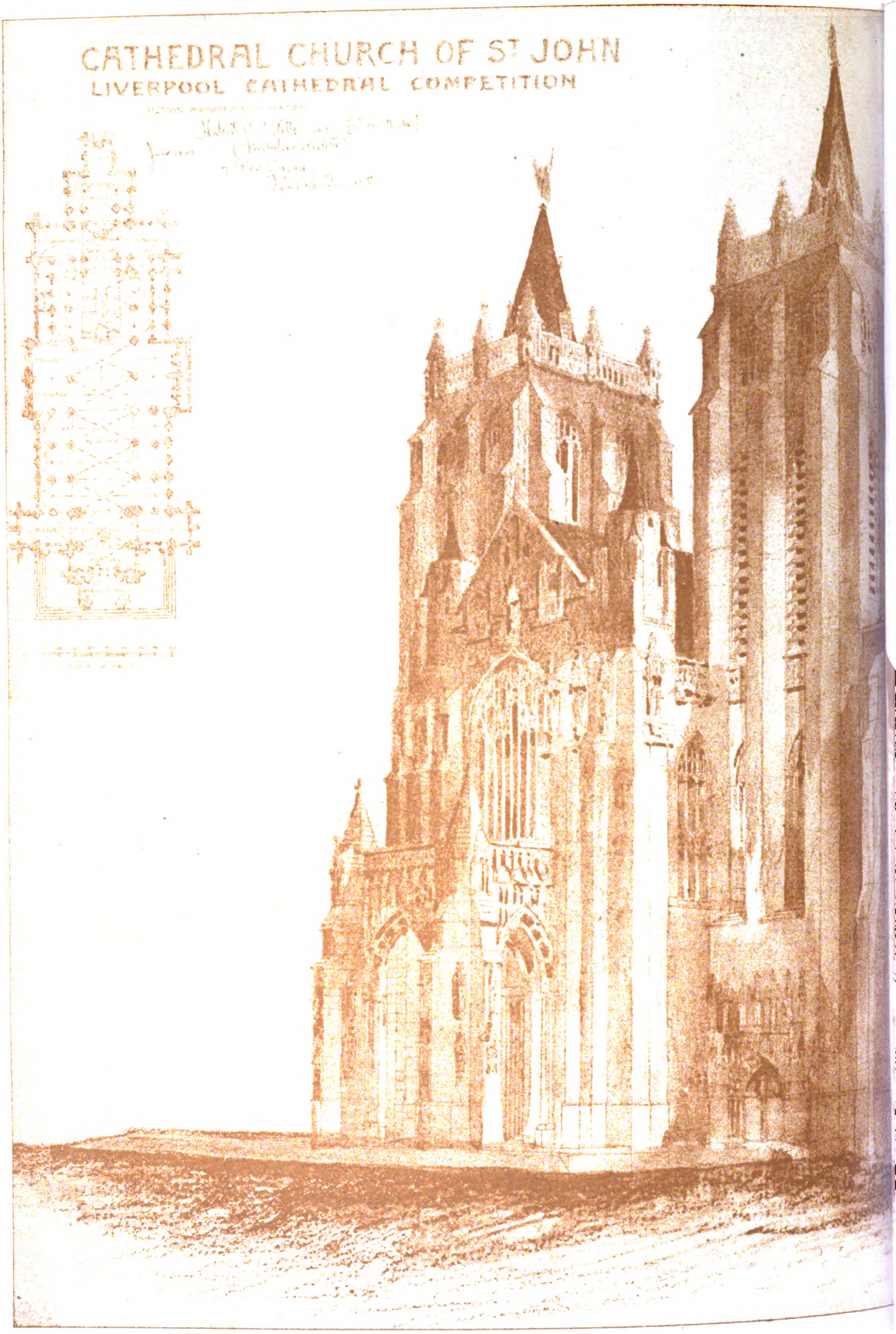

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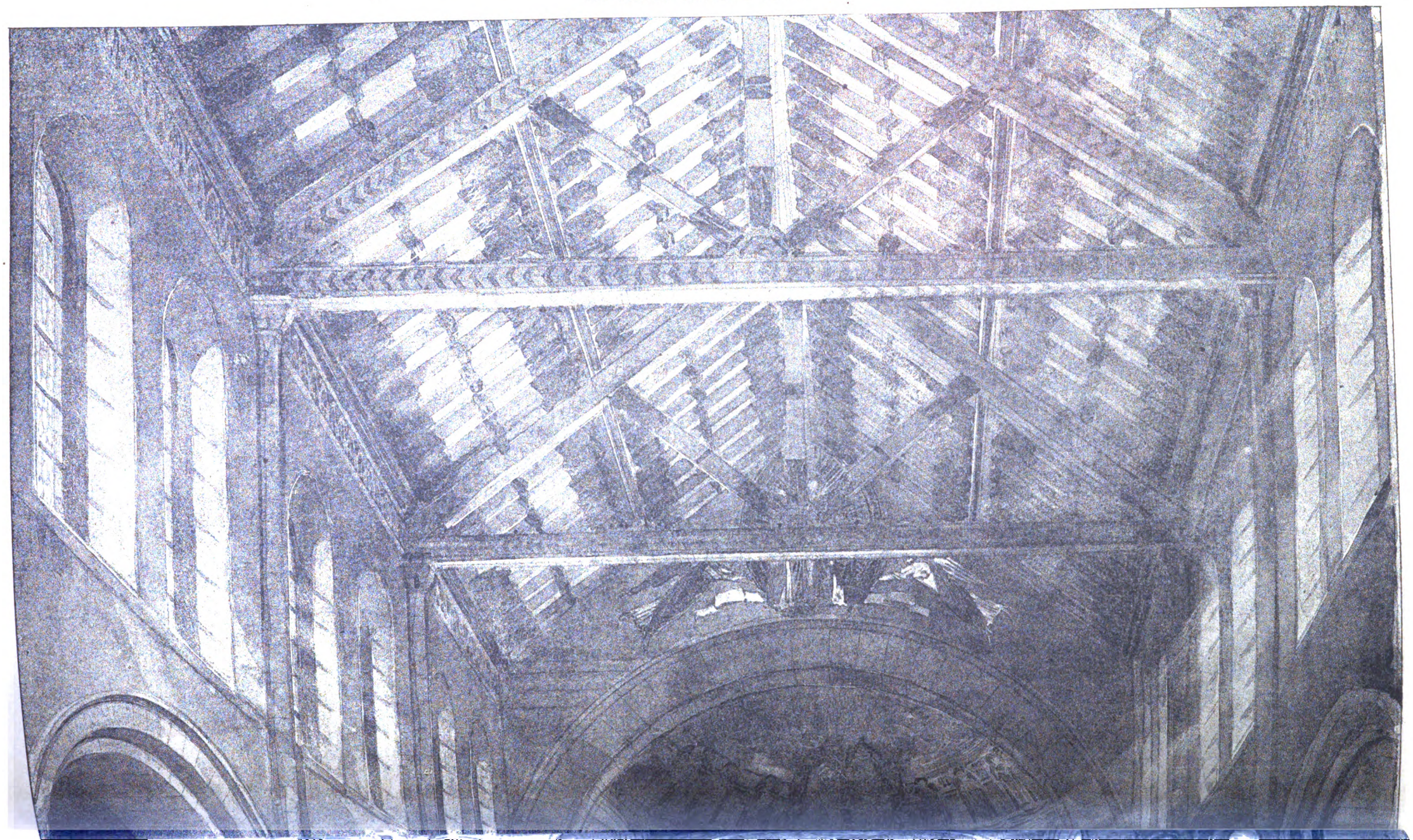

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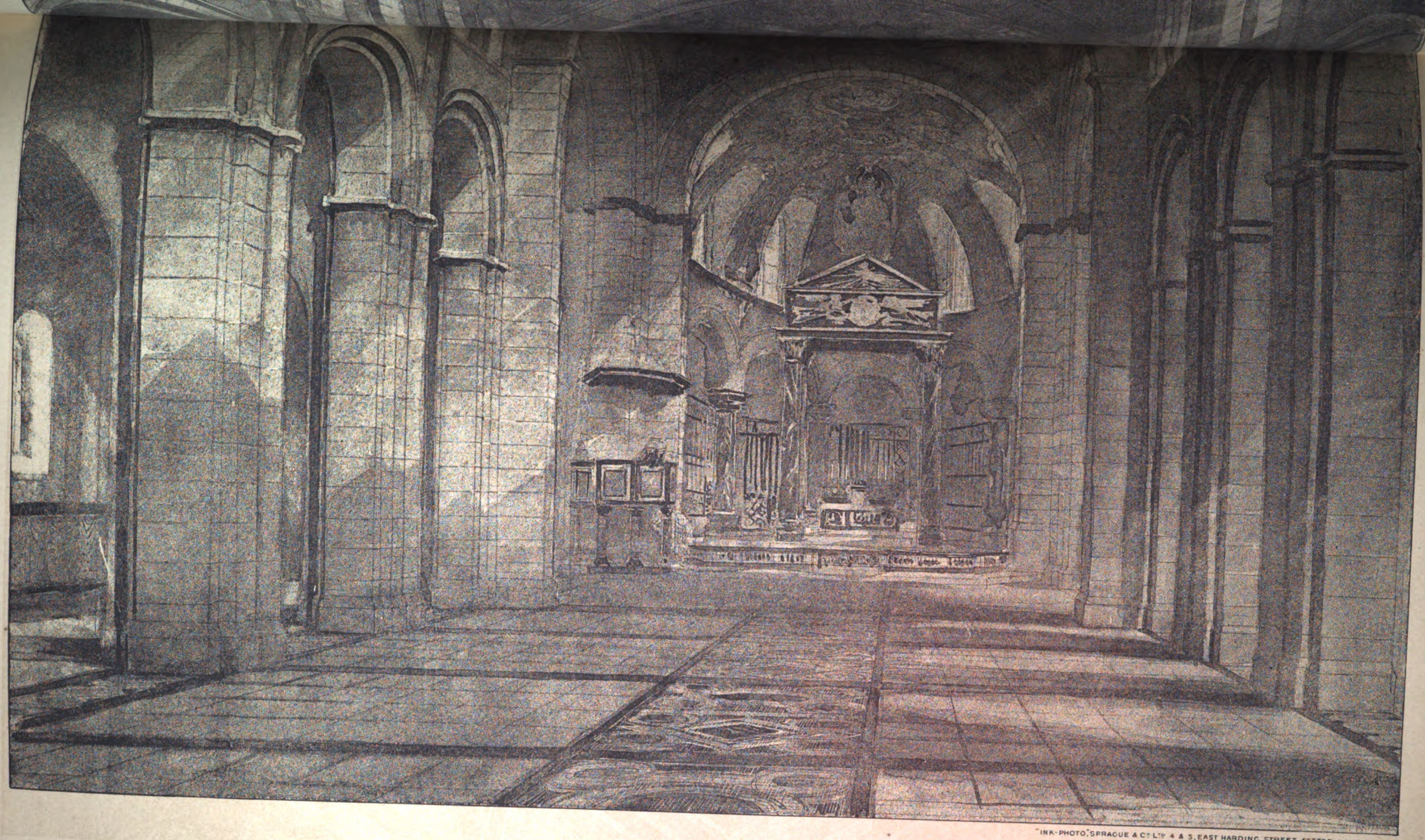

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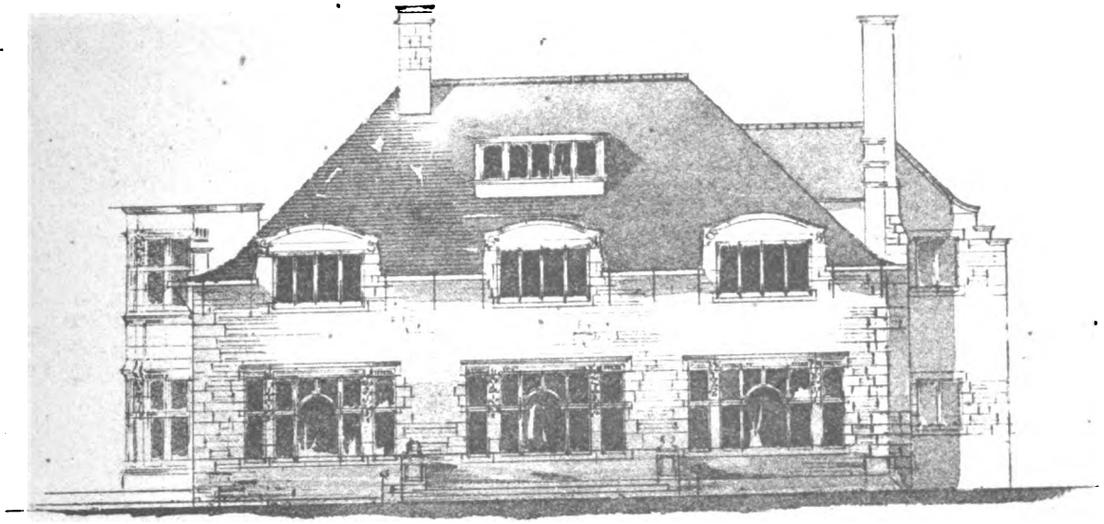

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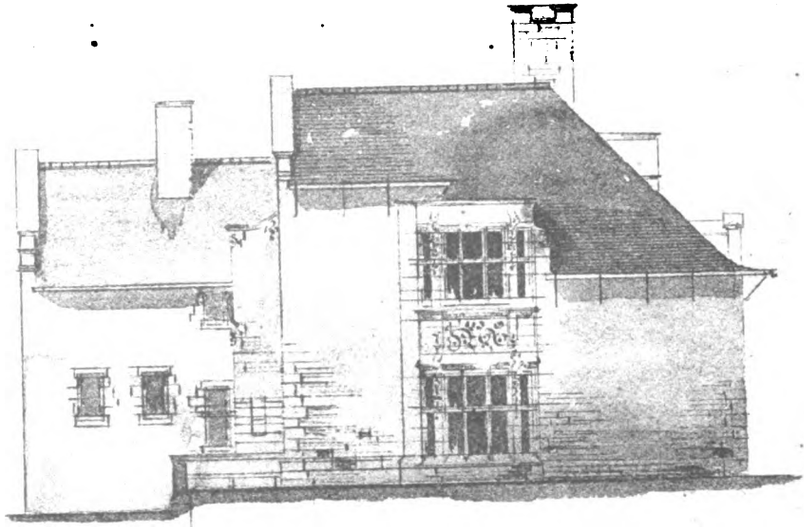

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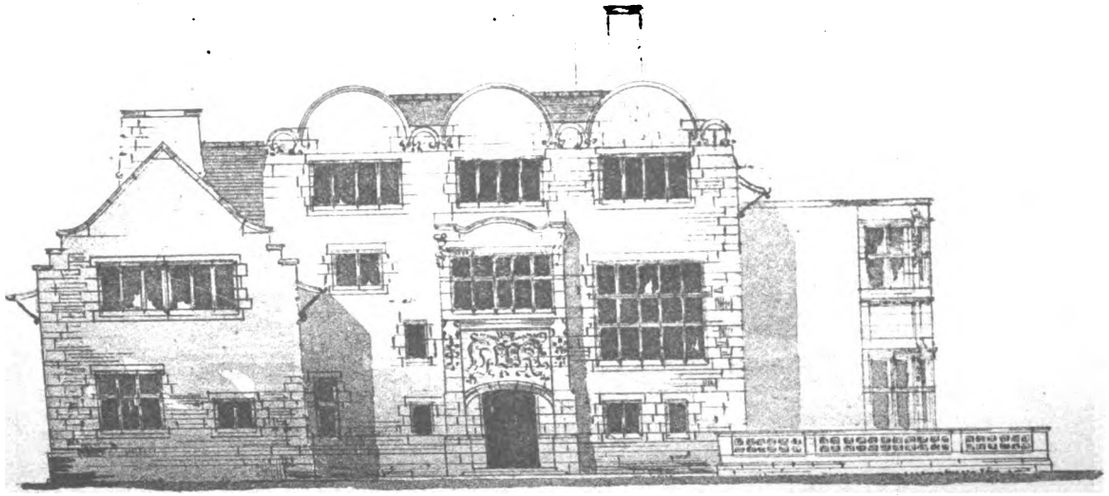

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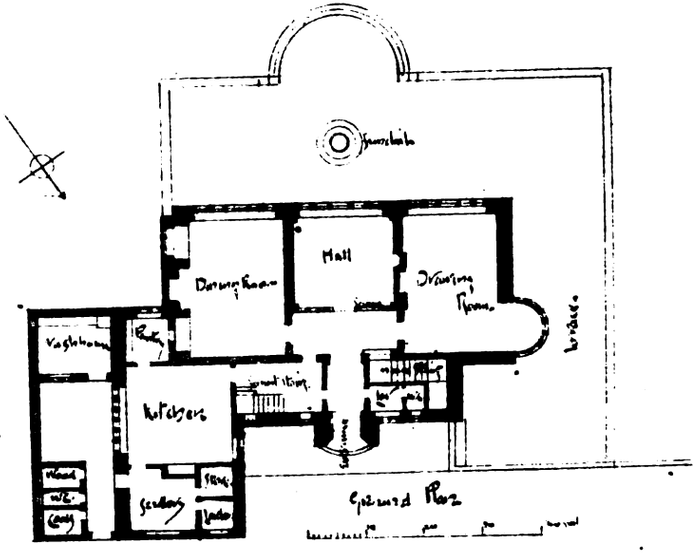

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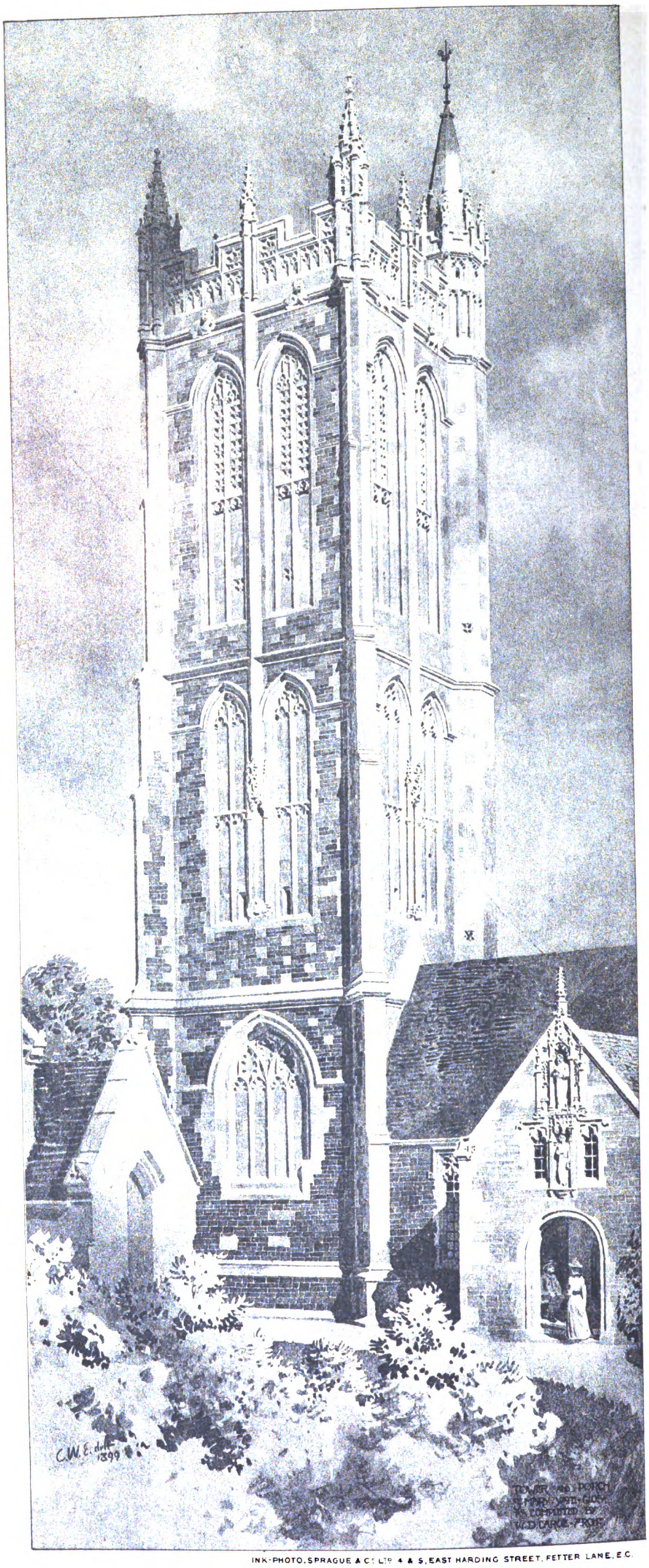

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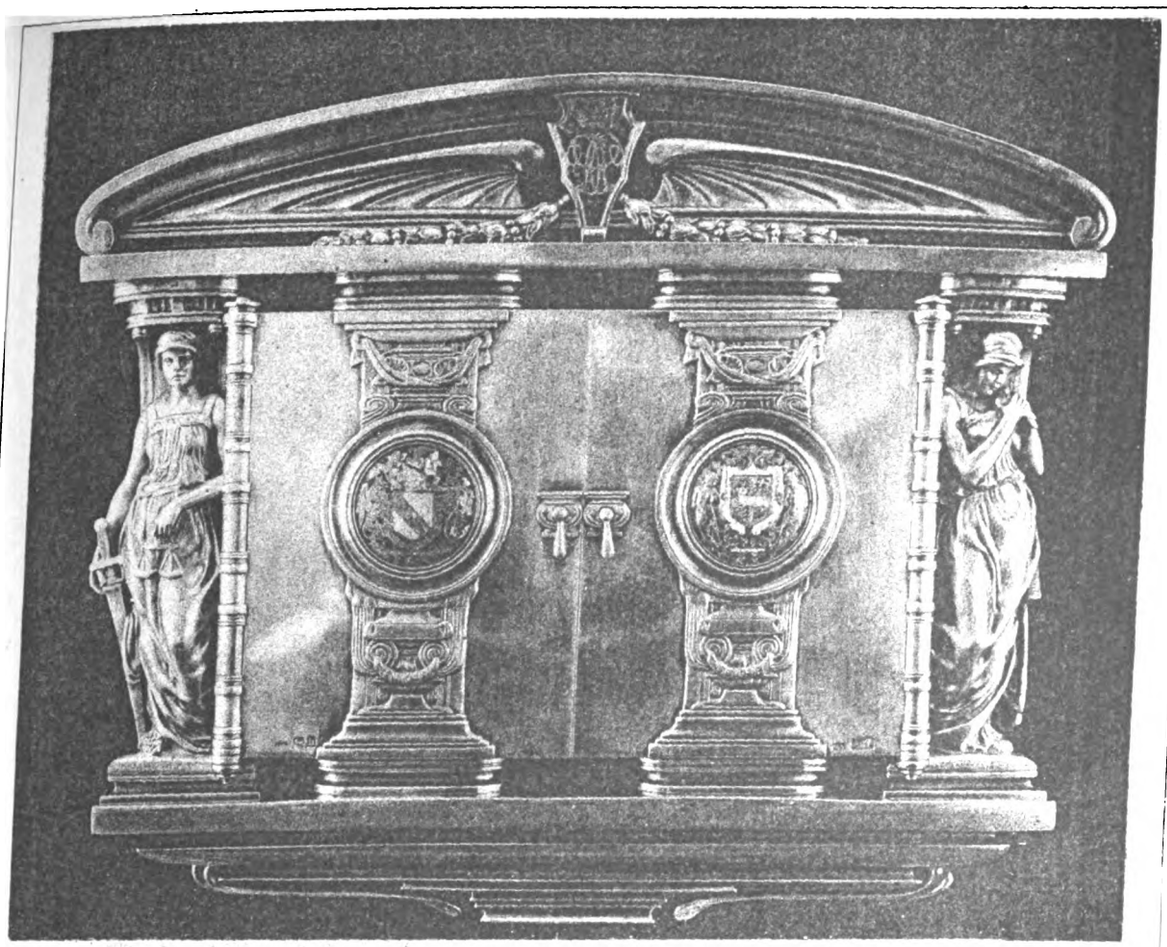

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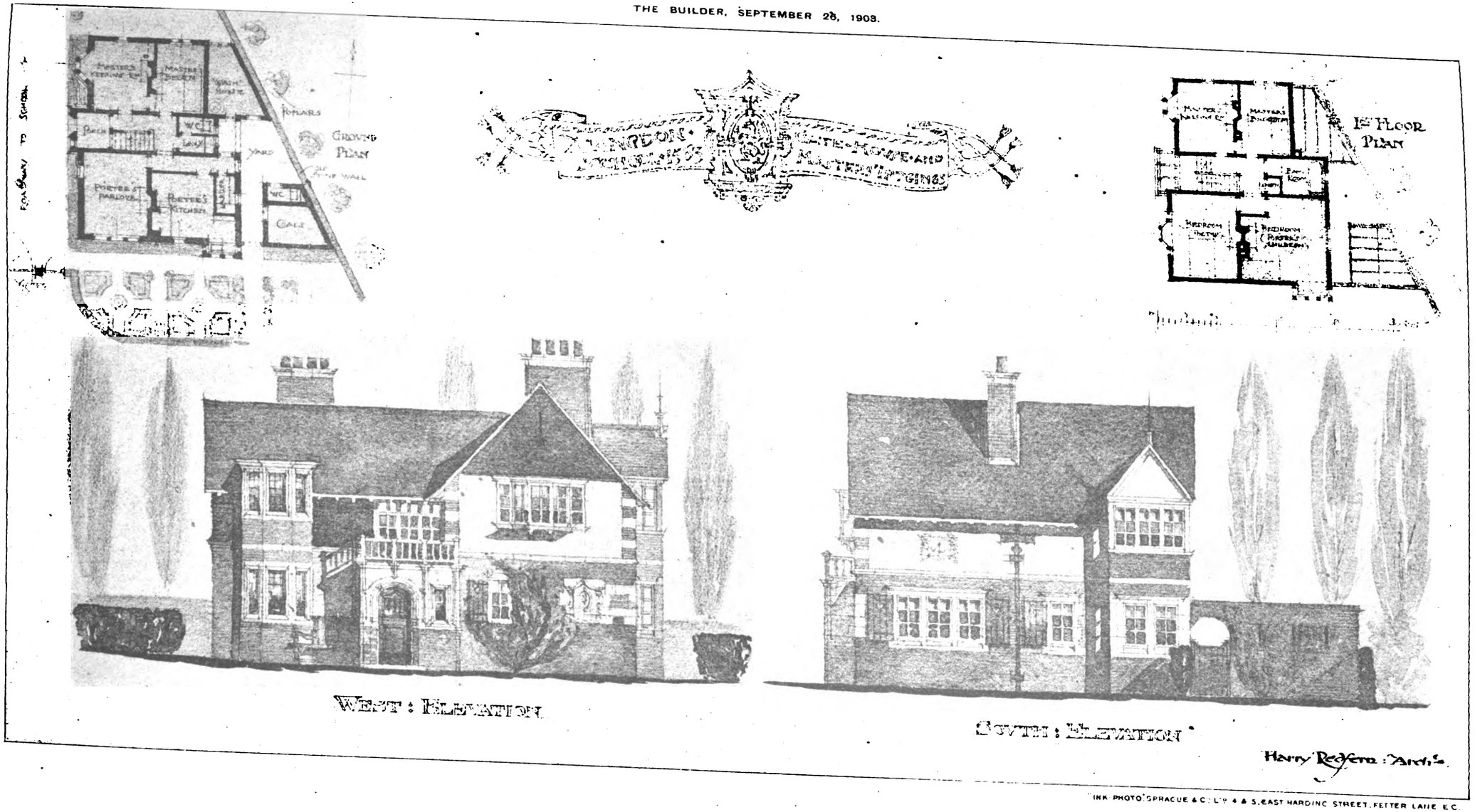

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The Parish Church and Abbey of Titchfield.

IN the beautiful Hampshire valley of the Meon, nine miles south-east of Southampton, and two miles west from Fareham, is the small ancient market town of Titchfield. In the centre of the town stands the parish church of St. Peter, of fair size and of much interest. It consists of a chancel of three bays, with south chapel, a wide nave of four bays, with north and south aisles and south porch, and western tower and spire.

Recent attention given to this church has resulted in the lower part of the small, unbuttressed western tower being pronounced to be of fairly early Saxon work. This was first noted by Rev. Dr. Cox, in the spring of 1901, and his surmise was confirmed by Mr. Peers when the church was visited by the Royal Archæological Institute, in July, 1902. The position of a blocked-up round window in the west wall of the nave shows that the tower was originally much lower than at present, and more of the nature of a porch, with probable side openings, like those of several early Saxon churches, such as Brixworth at its first building. Mr. Peers considers that the western arch of the tower is original, though tampered with at later dates, and that the south-west angle of the original nave remains, "with a triple lacing course of Roman brick, about 12 ft. from the ground, which also ran round the three exposed sides of the tower."

In the first half of the twelfth century the Saxon church was considerably enlarged, a south aisle being built, and a very good doorway, of three orders of zigzag mouldings, inserted as an improved entrance in the eastern archway of the tower. A new chancel must have been built at the same date. The chancel arch is pointed, but springs from semi-circular, substantial responds of undoubted Norman date. A variety of moulded stones, including portions of several Norman capitals and arch voussoirs, were found in the fabric during alterations and rebuilding of 1867. Some of these may now be seen in a curious position within the church, namely, heaped up in front of the low chancel screen on the south side of the nave.

In the year 1222, when this Norman church was standing, Titchfield began to grow in importance, for an abbey of Premonstratensian Canons was then founded about half a mile to the north of the town. Bishop Peter des Roches invited a colony of these White Canons to settle here from the Shropshire abbey of Halesowen. First among the foundation endowments of the abbey was the manor and advowson of Titchfield, and thenceforth, for more than three centuries, the fortunes of the church and town were fostered by the overshadowing adjacent monastery of the like name.

Ere long the rectory of the church became appropriated to the abbey, and formed the more substantial of its spiritualities; it was valued at the high annual rate of 58*l.* 6s. 8d. by Pope Nicholas's taxation of 1291. The church was also peculiarly under the care of the abbey, not only on account of its nearness to that religious foundation, but because the long series of vicars up to the time of the dissolution of the monasteries were chosen from among the canons of the convent. The canons of Prémontré alone among religious orders possessed the special privilege of appointing (if they desired it) their own members to act as vicars of churches in their gift, without any papal or episcopal dispensation. Such vicars had to be presented to the bishop for institution, and were "perpetual," but they continued to wear the white habit of their order, and to observe their rule in various particulars. They also remained members of the chapter of their own convent, and had to present themselves for visitation when the superiors of their order made their circuit. In the record of visitations of Titchfield Abbey in 1420, and again in 1478, the presence of the canon who was vicar, or perpetual curate, of the parish church of Titchfield is mentioned on each occasion.

It took the White Canons some time to erect their own conventual church and buildings, and it would appear that they soon afterwards took in hand or directed the extension and repairs of the parish church. The old west tower in front of the Norman work (which had been probably crowned with a belfry stage) was further heightened in the first half of the thirteenth century, though altered several times at subsequent dates. Later in the same century a south chancel chapel was built, and the Norman chancel removed to make way for a larger fabric in the English style. On the south side of the chancel are three pointed arched sedilia of that date, the one nearest to the east being on a higher level; beyond them is a trefoil headed piscina niche, with projecting drain. The arcade of two arches into the south chapel has enriched capitals to the pier and responds. This rebuilding of the chancel and erection of a south chapel would undoubtedly be the work of the abbot and canons, as they were the rectors. The monastery was dedicated to the Assumption of Our Lady, and this new chapel became the Lady Chapel of the parish church. It was always, however, specially identified with the abbey, and before this altar there was probably a special seat or throne for the abbot; in several pre-Reformation wills of different dates it is named as the "Abbot's Chapel." The founder of this chapel was probably William de Byketon, the fourth abbot, according to the old chartulary, but in reality the seventh, who is described as "ruling venerably the Church."

The monastery suffered with almost exceptional severity from the awful visitation of the Black Death in 1349. There are complete inventories extant of the corn and stock of the monastery and its manors or granges in 1348, and again in 1370. Although the interval of twenty-two years gave some time to recuperate, the contrast between the comparative affluence of the one date and the poverty of the other is most remarkable. For instance, in 1348

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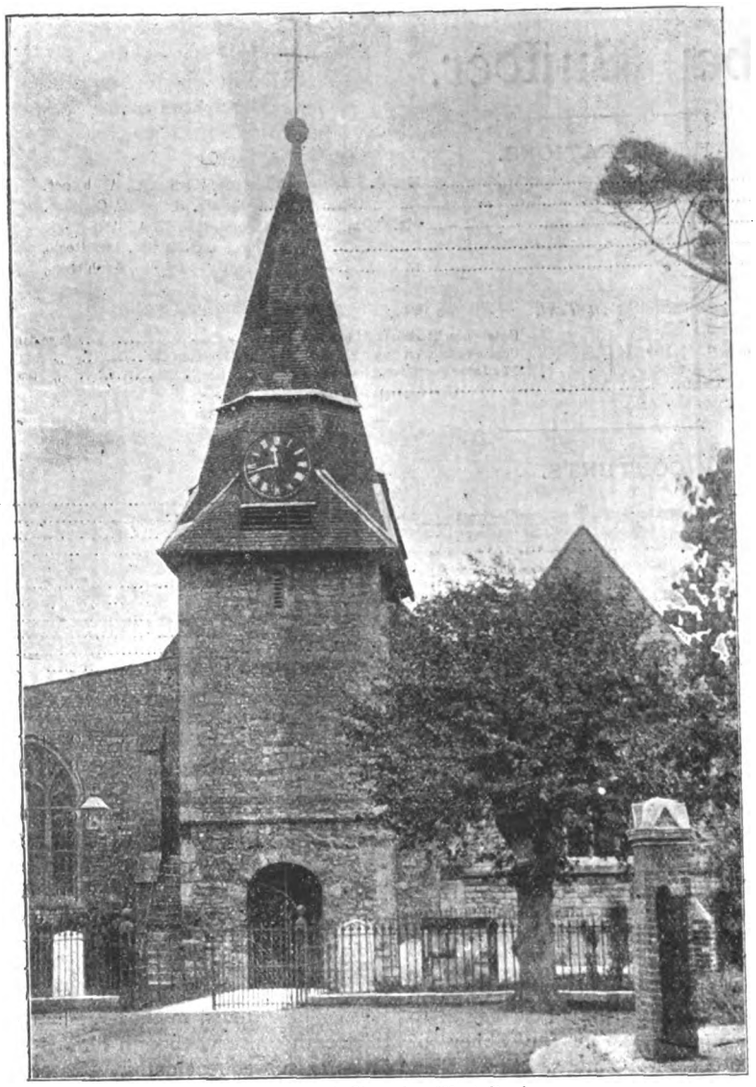

Titchfield Church: West End.

Titchfield Church: Interior.

the abbot and canons had 170 quarters of wheat, 175 of barley, and 198 of oats, and 28 of winter wheat; whereas in 1370 they had no wheat, and merely 5 quarters of barley and 16 of oats.

All this had probably its effect on the architecture and development of the parish church, but some time in the rule of John de Thomy, who was abbot from 1360 to 1379, the south chapel was enlarged, and the outer walls were rebuilt. The three somewhat quaint two-light windows, with ogee heads in the south wall, belong to this period, with a doorway beneath the centre one; these windows, as well as the three-light one at the east end, look singularly bare on the exterior, owing to the entire absence of hood moulds. There are three sedilia in this chapel of equal level, with ogee trefoiled heads, and a piscina niche of like style beyond them. The arch into the south aisle is of a plain character, and lacks capitals. In fact, all the work about this chapel, save the thirteenth century arcade on the chancel side, is of an impoverished character for the time of its execution, and doubtless reflects the embarrassed condition of the abbey's finances.

The south aisle is separated from the nave by an arcade of four arches, supported by octagon piers and responds of late fourteenth century style, but the outer wall of this aisle and other parts were generally reconstructed in 1867. The inner circle of the south wall is disfigured by some lines of various coloured bricks; there is, however, some justification in their presence, as they emphatically stamp the work as of the Victorian era.

The north aisle is separated from the nave by an arcade of four lofty arches, the spring of which is considerably higher than that of the opposite arcade. The piers and responds are slender, and formed of a group of four shafts round a centre. Their style, together with the bases and capitals, show unmistakably that they are of advanced fifteenth century work. The work of this aisle is usually assigned locally to Bishop Wickham; but this is an impossibility, as an arcade of this character can scarcely be eariler than 1450. The five-light east window, the four three-light windows on the north side, and the west window are of similar style, and good examples of the date. On each side of the east window is the handsome crocketed canopy of a large image niche, whilst the smaller one of the same kind is placed against the aisle side of the eastern respond. The roof of this aisle is a lead-covered lean-to of slight elevation; it has the original main timbers, and the supporting spandrels are plainly pierced. The roof of the nave is now high pitched and lead-covered.

The chancel, save on the south side, was rebuilt later in the perpendicular style, probably at the beginning of the reign of Henry VII. There is a fine five-light east window, and three three-light windows on the south side.

The tower at the west end, of Saxon origin, has been altered at various dates, and it is difficult to say whether the octagon-broached spire, covered with wooden shingles, was placed on it in the fourteenth or fifteenth century. It is crowned with a vane supported by well-wrought, elegant ironwork, giving the compass points, of eighteenth century date. The lowest stage of the tower still serves as a west porch, and the bellringers' chamber above is gained by an outer flight of stone steps against the north wall.

The south porch is modern, and of the same date as the aisle. On each side of the large east window of the chancel are two good canopied niches, one above the other. Part of the lower one on the north side is interrupted by a mural monument to Edward Ives, formerly surgeon of the *Kent*, commanded by Vice-Admiral Watson; he died in 1786. Against the south wall, close to the east end, is the mural monument of William Chamberlaine, 1608, and his wife, with their two sons and two daughters, their respective effigies are all represented in kneeling attitudes. His epitaph somewhat singularly ends with the old Catholic conclusion, "Upon whos soule our Lorde have mercie."

When the Hampshire abbeys were being forcibly "surrendered" to Henry VIII., the formal surrender of Titchfield was signed on December 28, 1537, by John

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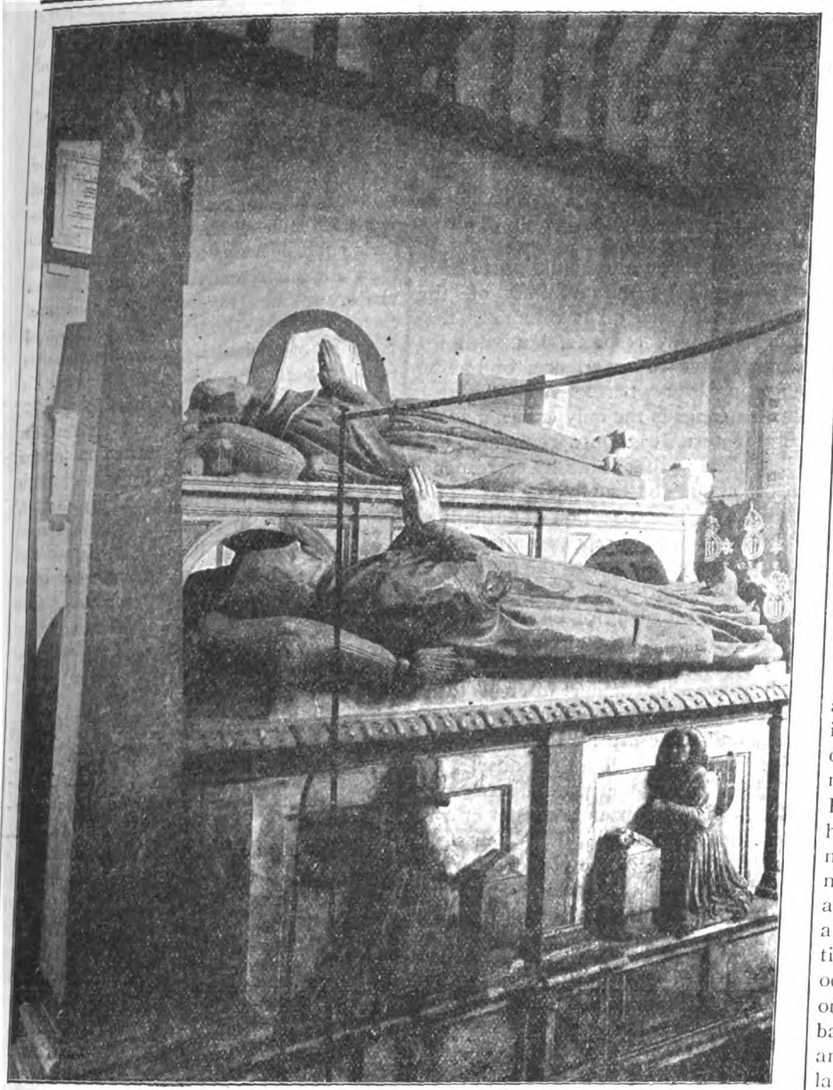
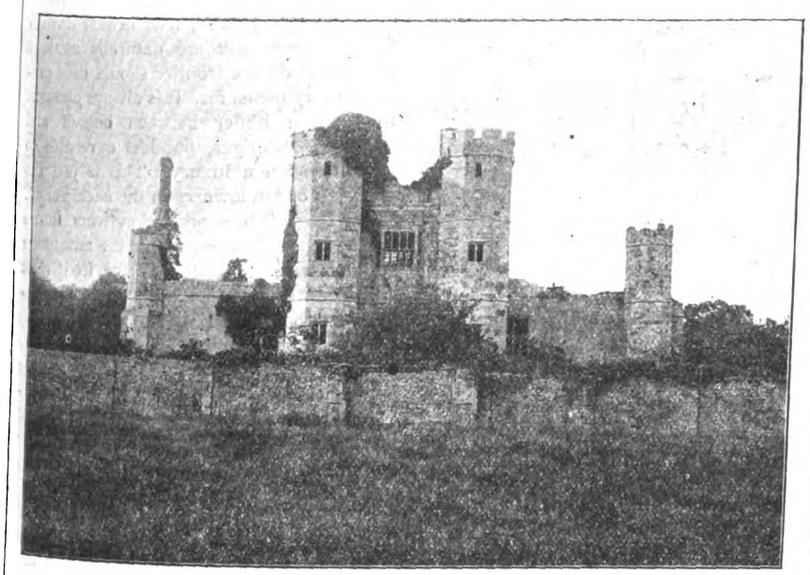


The Wriothesley Monument, Titchfield Church.



Gate-House, Titchfield Abbey.

Salisbury, the last abbot. He had been consecrated Suffragan Bishop of Thetford in the previous year, and held the abbey "in commendam." There were few people in England who took a more active part in the destruction of the monasteries or profited more by their destruction than Sir Thomas Wriothesley, the controller of the royal household. He obtained the houses and most of the possession of the Hampshire abbeys of Titchfield, Beaulieu, and Hyde, and for a time the friary of Southwick. By favour of the King, the whole of the possessions of Titchfield monastery, including the rectory and advowson of the vicarage of Titchfield Parish Church passed to Wriothesley, the very moment that the "surrender" was accomplished. The altar stones and monumental pavers and tombs of the conventual church were in progress on January 20, 1538, and the work of turning the abbey into a grand residence of Wriothesley begun. In this "right stately house embattled," as Leland termed it, Sir Thomas at once took up his residence. He was created Earl of Southampton by Edward VI., and naturally became the chief man of Titchfield and the district. The bad fortune that afterwards befel him and his son forms a striking feature in Spelman's "History of Sacrilege," and there has for many a long year been but little left of his great stately house, save the deserted entrance tower.

The Wriothesleys, as holders of the great tithe and of the vicarage advowson, and general successors to the manorial and other rights of the old abbots, not unnaturally treated the abbot's chapel of the parish church as their special property and burial place. Sir Thomas Wriothesley, K.G., Chancellor, Baron Wriothesley of Titchfield, and first Earl of Southampton, died at Titchfield in 1550, but was buried in the church of St. Andrew, Holborn. But in accordance with the will of his son Henry, the second Earl, who died in 1581, a most sumptuous monument was erected in the centre of the abbot's chapel in this church to the memory of his father and mother and himself. The body of the first Earl was removed here by the direction of his son, from the place of its first interment. The whole composition of this monument is a remarkably fine example of a late Elizabethan non-mural memorial, and is, on the whole, in very good preservation. The life-size effigy of the Countess occupies the highest, or centre, position; on her right hand is the effigy of her husband, the first Earl, in Chancellor's gown, and on her left her son, the second Earl, in late plate-armour. All three effigies retain much of the original painting. On the north side of the great monument are a son and daughter kneeling at a desk, and on the south side two daughters; the ends bear elaborate heraldic shields. At each of the four angles of the monument are tall obelisks of red-veined marble.

Against the south wall of this chapel is the mural monument, with small recumbent effigy of "Ye Ldie Marye Wryotheslye, fourth daughter of Henry, Earl of Southampton, who died in 1615, aged four years and four months." The Henry of this inscription was the third Earl, the friend and patron of Shakespeare; he was buried at Titchfield in 1624.

There is a singular lack of old fittings in this church. Almost the only bit of woodwork of any age is a single Jacobean coffin stool or support, now used as a seat to a prayer desk at the east end of the south aisle. The octagon font at the west end of the nave is modern.

Over the chancel arch at the west end of the nave is a painted embattled roodbeam. On the wall above is a well-executed painted rood of the Crucifixion, with St. Mary and St. John, with the words beneath, "So God loved the world." The painting was executed by Mr. C. E. Kempe, in memory of the Honourable Misses Baring, of West Hill, in this parish. Over the west doorway of the nave is a large wall painting of our Lord and the miraculous draught of fishes; it was executed in 1852, as a memorial to Rev. W. M. Cosser, vicar of the parish, and is

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already suffering not a little from the passage of time.

It only remains to be added that the greater part of the good grey stone of this church obviously came from the long ago exhausted excellent limestone quarry of Binstead, in the Isle of Wight.

The Abbey of Titchfield, to the north of the town, was a building of considerable magnitude, largely rebuilt in the fifteenth century by Abbot William Autyn, and standing in the midst of a fine estate. It was renowned for its great fish ponds, four of which were a mile in length. When Richard II. and his queen paid a surprise visit to the abbot in 1393 they were nearly washed away by the bursting of one of the fish ponds a little distance from the abbey, but were to some extent appeased by the appearance of twelve great pike at the dinner table. A good deal as yet unprinted concerning the rule and condition of their house and estates can be gleaned from the three old registers or chartularies, in the possession of the Duke of Portland. The most interesting entry gives a full catalogue of the abbey's very large library, drawn up in the year 1400.

The fate of the abbey in the hands of Sir Thomas Wriothesley has already been mentioned. The new abbot's lodgings or house built by Abbot Autyn went by the name of "The Grete Place" (or palace), and Wriothesley gave the name of Place House to his reconstructed residence, which it still bears. This once fine mansion, which has so often changed hands, was successively a residence of the Earls of Southampton, the Earls of Gainsborough, the Dukes of Portland and Beaufort, and the Delmé family. The Delmés dismantled the buildings between 1780 and 1790, since which time they have been left a prey to the weather and the ivy. The ruins, however, still present a stately appearance, and sufficient remains to be able to trace the general plan of the old thirteenth century abbey. The cruciform church was aisleless, with a vaulted roof, and had a tower in the centre. The cloisters were on the north side of the church, having the chapter house with dormitory over it on the east, the refectory on the north, and the cellarer's range on the west, according to the usual plan. Wriothesley's chief alteration was to build up a great square gatehouse, with embattled corner turrets, which forms the chief feature of the present ruins, right in the centre of the nave of the church, pulling down the tower; he turned the refectory into his hall, and adapted the other buildings to domestic purposes.

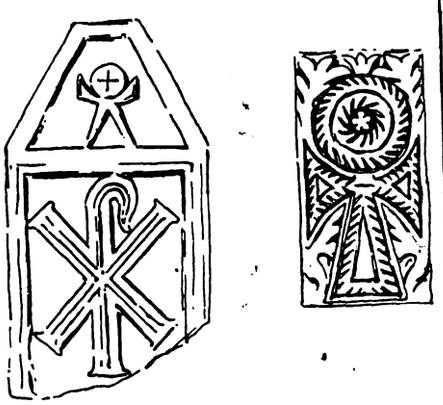
THE ALEXANDRIA MUSEUM.

THE new Museum at Alexandria in Egypt has been formed during the past ten years, under an enthusiastic Committee of European residents, assisted by the patronage of the Anglo-Egyptian Government. The Government has been constituted owner of the antiquities within its walls, but the exceedingly well-designed building is the property of the Municipality, in the rear of whose offices on the high road between Alexandria and Ramleh it is built.

The Museum is now in course of enlargement to its full extent. It consists of six galleries crossing each other in such a way as to enclose four courtyards. At the intersections of these galleries are chambers in the form of Greek crosses, separated from the main corridors. Each gallery is about seven mètres wide* and thirty long; the only apertures for light are four openings in the ceiling of each gallery, each about three mètres square, which can be closed with blinds to exclude the glare of an Egyptian sun.

One might suppose the building to have been designed by the architect of the Museum at Athens. It resembles that building in many respects, but with the advantage, due to experience, of having top lighting everywhere. A large Greek portico entrance is the only external architectural feature. It is appropriate, although the line of its pediment hardly corresponds with the actual construction of the roof to the building. The collection of antiquities, which is remarkably representative of the Delta province, comprises the usual items of an Egyptian collection; "Disjecta membra" from rifled tombs, mummies in greater or less perfect state of decay, fragments of temples, &c. But the objects which give a particular interest to the collection are the Roman and Christian remains, and these are also remarkable for their quality as well as quantity. They are given a suitable prominence in the galleries of the Museum, so that at a first glance the characteristic Egyptian style is hardly noticeable in the collection.

The collection of Coptic monuments is very interesting, and includes stone tablets, carvings in various materials, and textiles. Some curious Christian emblems are noticeable amongst these fragments of detail. In one case the common Egyptian



Coptic Crosses on Stone Slabs: Alexandria Museum.

Tau cross (see sketch) has been fancifully treated in the style of a Byzantine throne, supporting what is evidently the sacramental loaf of bread. This idea is possibly almost unique.

Innumerable terra-cotta lamps of the usual forms, Græco-Roman figurines (some with well-preserved colours), and the inevitable pottery of all periods fill up most interesting show-cases along the walls, whilst many fine statues and architectural details are disposed in the galleries and the inclosed courtyards.

The once famous city of Alexandria has hitherto possessed but few attractions to the traveller of modern days, its ancient monuments seem so utterly lost to view beneath the repulsive squalor of an Arab town of the very worst description—even such of them as are still known to exist. "Pompey's Pillar," covered with the traces of past generations of philistine tourists, stands a melancholy monument of the greatest of ancient peoples in the midst of a filthy plague-stricken suburb. "Cleopatra's Needles" have been removed from their rubbish heaps to adorn cities greater than Alexandria. And so the European visitor anxious to see the splendours of Saracenic art in the true East, or the grand remains of ancient Egypt on the Nile, has always been only too glad to curtail his stay in Alexandria as much as possible.

Alexandria, however, now possesses in its new Museum an attraction for the educated tourist, the chief merits of which lies in its being decidedly local in character, and therefore unique. It is also of special interest, in that it exhibits Greek and Roman art under the influences of other races and other physical conditions than those of the two peninsulas.

* Seven mètres (23 ft.) seems a very convenient width for museum galleries. It allows of two deep showcases, one on either wall, and plenty of space for large architectural objects and monuments in the centre.

NOTES.

Coast Protection. THE recent report of the British Association Committee on changes in the sea-coast of the United Kingdom has contributed useful information upon this subject, but it does not bring us much nearer to a solution of the difficult problem involved in the provision of funds for inauguration of the necessary protective works. In some places where towns are threatened by the sea, there is no difficulty, as the cost of sea-walls, groynes, and other works is defrayed out of the rates. But there are long stretches of coast, where land is of so little value that its owners would rather lose a yard or two in width every year than pay anything for protection. People owning land behind owners in the front rank are naturally anxious that those on the frontier should take precautionary measures. It is always pleasant to keep a buffer between oneself and threatened danger, but less agreeable to pay for such a luxury. This is just the position of landowners in the background. They would like protection from future peril, but object to pay for the advantage of posterity. Owners in the front rank also want protection, and think Government should afford it free of cost. The whole situation bristles with difficulties. In the present day land is worth very little except for building purposes. The suggestion has been made that Government loans should be granted on the prospective value of land, so as to encourage owners to undertake coast protection works. This idea might be feasible in some parts, but, as we cannot expect the whole of our threatened coast-line to be converted into a continuous seaside resort, the suggestion is not likely to be of very material assistance.

South African Irrigation. THE latest contribution on this subject is to be found in a paper presented to the American Society of Civil Engineers by Mr. F. R. Johnson, who has had practical experience of irrigation, both as an engineer and as a farmer in Natal. This communication confirms the opinions expressed by more than one engineer, that hydraulic engineer-

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ing is very inadequately performed by South African agriculturists. Ditches or "furrows" are made without levels, the procedure being to test the furrow as construction proceeds, by letting the water follow up the work. Consequently the fall is generally inadequate, and much silt is deposited at flood time. Many farms have small reservoirs for surface water, but successful storage works for irrigation are very scarce. Occasionally dams have been thrown across streams, but owing to deficient design and construction many of these have burst. Speaking generally, irrigation works on any considerable scale are practically unknown. In dealing with the future possibilities of irrigation, the author thinks that until the law is amended irrigation works on a large scale cannot be undertaken by private enterprise. This conclusion is the same as that previously formed by Sir William Willcocks, who recommended that all public streams should be proclaimed as State property, a course that would result in all irrigation works being carried out by the Government. In the opinion of Mr. Johnson, if irrigation be left wholly to private enterprise, the Government will eventually have to deal with the storage problem, as happened in the United States. It is much to be desired that prompt action should be taken upon the question of irrigation as a policy of drift will do much to delay the agricultural development of South Africa, and in addition will tend to create difficulties to be dealt with in the future.

Sunderland Harbour. SATISFACTORY progress is being made with the harbour of refuge now in course of construction by the River Wear Commissioners. As Sunderland is one of the chief seats of the shipbuilding industry, and comes next to Southampton among the principal seaports of the United Kingdom, the new harbour is a work of considerable importance. The scheme, of which the estimated cost is more than half a million sterling, comprises the construction of two massive piers of granite and concrete, one on each side of the river. One of these piers, that on the Northern side, has recently been completed, the length being 2,800 ft., and the width 35 ft. for a distance of 2,000 ft., while for the last 800 ft. the width is 41 ft. The height of the pier above high-water level is 10 ft., and at the extreme end a circular head, built on a foundation 40 ft. below low water level, rises to a height of 18 ft. above high water level, making a total height of 72 ft. 6 in. Upon this structure a lighthouse of red and white granite has been erected, rising to a height of 54 ft. 6 in. from the pier head. The lighthouse is 31 ft. in diameter at the base, gradually reduced to 16 ft. at the summit; the lantern has a diameter of 10 ft., and the focal plane of the light is 83 ft. 6 in. above high water level. All the granite and concrete blocks used in the construction of the piers are made at works established by the Commissioners, where they are loaded upon waggons, and afterwards lifted into position on the site by 60-ton radial hydraulic cranes. Some idea of the character of the work may be gathered from the statement that the largest blocks used weigh 56 tons each. Operations are now being concentrated upon the southern pier. The final completion of the work will certainly be to improve the river, and to promote the prosperity of the town and port of Sunderland.

The Permeability of Concrete. ALTHOUGH a great difference exists between the permeability and porosity of concrete, some people are apt to consider these qualities as being identical. One of the most complete series of investigations with regard to the permeability of concrete was that undertaken by M. Feret, at the Boulogne Laboratory of the Ponts et Chaussées. The experiments to which we refer occupied a period of about five years, and from them it appears that the porosity of cement mortar varies considerably, diminishing as the proportion of cement increases, and increasing as the size of the sand grains diminishes. Again, the permeability of mortar diminishes as the proportion of cement increases, but increases with the size of the sand grains. Here it will be seen that the conditions of permeability and porosity are by no means alike. The further difference is apparent that, while all mortars immersed in water will absorb liquid of volume practically equal to that of the calculated voids, there is a very great difference as regards permeability, and in general it seems that the most porous mortar is the least permeable, and vice versâ. According to M. Feret, the effect of the passage of water is to set free small particles of cement, bringing them to the surface, where they produce fine stalactites tending to solidify the mortar, and to form an exterior coating. A practical confirmation of M. Feret's experiments was shown some time ago in connexion with a concrete tunnel at Hartford, U.S.A., where a large quantity of stalactites and stalagmites formed on the surface. This growth was first regarded as a defect, but was allowed to remain by the engineer, and the tunnel proved to be absolutely impermeable, although built in a particularly damp situation. Other instances could be given confirming the results obtained by M. Feret, and it seems to be quite clearly proved that the permeability of cement mortar is not a consequence of porosity, and that it is, in fact, inversely proportional to porosity.

The Savoy Hotel Accident. AT the inquest into the death of the workman who was killed on Friday last by the failure of a crane, it was ascertained that the mishap was primarily due to the shifting of the shoe carrying the mast. The shoe was not directly secured to the platform, but was supposed to be held in position by two guys. Consequently it is not altogether surprising that the mast should have broken away under the strain of work. Although the contractor's foreman considered the crane to be properly erected, he was of opinion that the accident was caused by the slipping of the shoe owing to the wetting of the platform by rain. This is a very natural conclusion, and no one will be likely to disagree with the view of the jury that the erection of the crane was improperly supervised. Those who have studied the characteristics of water know that under favourable conditions it is one of the most efficient lubricants at the disposal of the engineer.

Alterations at Blenheim. CONSIDERABLE alterations are now being made to the grounds which lie before the main front of Blenheim Palace, with a view to a larger expanse of short turf and wider sweeps of drive. The well-known bridge by Sir William Chambers will presently lead to a larger and more dignified space, more in keeping with the bridge itself. But Blenheim Palace must be always an unsatisfactory building, for the good reason that Sir John Vanbrugh designed a palace instead of a house. No one can notice the so-called triumphal arch which the Duchess placed at the entrance by the little town of Woodstock as a memorial of the Duke without a smile. Both in character and situation it is a failure. The misfortune of erecting such palaces as Blenheim is that the expense of keeping them up is enormous, and they must often either be allowed to go to rack and ruin or be a heavy burden on a landed estate to the detriment of the dwellers in it. Fortunately, so far as Blenheim is concerned, this is not at present the case. But when we look at Blenheim or at Stowe as primarily English country mansions, we must feel that the architects of the eighteenth century were foiled when they came to the designing of these buildings. They were wanting in an appreciation of the needs of the future. But then again there was, as regards Blenheim, the "troublesome chiel" in the shape of the Duchess Sarah.

Kew Bridge. ONE of the few recent fine days tempted us to an excursion to Kew, partly with the object of seeing the completed effect of the new bridge at Kew. No architect, we believe, has been employed on it, and the details are rather commonplace; but the simple and massive treatment of the work renders it much more agreeable to the eye than many more pretentious engineering works in which what is supposed to be "architectural effect" has been attempted. The iron lamp-standards are clumsy in design, but the massive granite arches, with no ornament except a low-relief panel at the centre of the bridge with a coat of arms, have a fine effect, and illustrate how difficult it is to spoil a stone arched bridge if you will only let its lines speak for themselves. It cannot, of course, be pretended that the new bridge has anything like the picturesque and graceful effect of the old one, but that effect arose partly from its practical defects; for a bridge with numerous narrow arches and a considerable gradient is much more dear to the eye of the artist than one with a few wide arches and a flatter gradient. That cannot be helped; but we certainly miss the graceful effect of the old open balustrade—a particularly well-designed one. We do not see why this effect at least might not have been preserved, instead of adopting the solid balustrade, which is so blank and heavy in effect by comparison.

Birkbeck School Art Exhibition. THE Birkbeck School of Art has on exhibition the students' work for session 1902-3. The exhibits include a set of drawings in architectural design which in 1902 gained a

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National silver medal, and other works awarded book prizes in the same year. The Annie Taverner Prize for painting a head from life has produced perhaps the most striking work of the Exhibition; the winning head, by Miss Lydia Bainbridge, being a piece of creditable water-colour in good tone, and painted with considerable power. The Garrould Prize—modelling a head from life—is won by Miss Maud Steggall with a well-modelled head in low-relief. Miss Elsie Neweh wins the Godwin Prize for a study of drapery on an antique figure, with a delightfully-drawn study. The Mason prize—a design for an entrance hall—has produced a rather indifferent set. The design by the winner—Mr. Jos. Ginsburgh—is the only one with any pretensions to serious architecture, and is designed with true architectural feeling, but is spoiled by a rather unhappy ceiling with a pediment decoration of landscape and peacocks, which seems rather out of scale. In the figure composition time sketches some decorative talent is evident. The Sketch Club landscape class is disappointing. In pen-and-ink work, some of the work shows merit—notably "The Wrestle in the Way-side Inn," by Mr. Monck. The painting on wood class only shows one piece of consequence, a head by Miss Beclenberg, which might have been successful but for the fact that it is an almost perfect imitation of wood inlay. The possibilities of water-colour on wood are considerable, and as a medium of expression ought to be rightly used, instead of relegating it to the position of imitating an entirely different art. In the decorative classes for wall papers and textiles some of the work is promising. The County Council Scholarship (40*l.*) is won by Mr. A. G. Richardson with a set of architectural designs and sketches fairly well drawn, but, in the case of the Clock Tower, decidedly weak in design. His Market Hall, however, is a creditable effort. Altogether, the Exhibition is somewhat disappointing.

The Parthenon Model, British Museum.

All who are familiar with the Elgin marble room at the British Museum will remember the large model of the Parthenon placed there, which is so useful in enabling the less instructed visitor to realise what was the general position and the architectural function of the separate fragments of sculpture which he sees around. It was only a few days ago, however, while accompanying some strangers through the collection, that we noticed that the frieze, perhaps the most remarkable portion of the Parthenon sculpture, is not indicated on the model, though all the other sculpture is sketched out in a recognisable manner. This is surely a serious defect in the model, especially in an educational point of view; the more so as the position of the frieze has a great effect on the architectural design, and it occurs in a position where the spectator ignorant of the subject would not expect to find it. In fact, the knowledge of the position of the frieze on the building is very important towards forming a right estimate of the intention and spirit of the sculpture itself. Cannot the representation of the frieze be now added to the model, and an important deficiency be thus repaired?

LETTER FROM PARIS.

The Academie des Beaux-Arts has awarded to M. Lefort, pupil of M. Paulin, the Chaudesaigues prize of 2,000 fr., with the object of enabling the holder of it to pursue his architectural studies for two years in Italy. The subject given to the competitors was Un Pavillon des Bains et d'Eaux Minérales.

Since the terrible catastrophe of the Couronnes Station, the Paris population has no longer the same enthusiasm as before for the Metropolitan Railway; a result mainly owing to the obvious carelessness of the Company which works the existing lines. A Committee has been appointed to draw up a whole programme of reforms, which, however, are very long in being carried out, if indeed they are ever really intended to be carried out at all. Demands have been made for a system of ventilating shafts, for additional exits, for an alteration in the present combustible material of the carriages, etc., but the public can see for itself that nothing is altered. There seems to be a force of inertia, both in the construction and the administration of the lines, which gives rise to much apprehension, and will be likely to injure the prospects of the additional lines, which nevertheless are being pushed on with activity, to the great impeding, for the present, of the ordinary street traffic. A new set of lines is actually in contemplation, and is undergoing the formalities of official inquiry. One, from the "Circulaire," No. 2, by the Trocadéro to the Porte St. Cloud; a second parting from line No. 8, to run from the Invalides to the Porte de Châtillon; the third, a prolongation of line No. 3 to either the Porte de Champerret, or the Porte d'Asnières; the fourth, from the Place Gambetta to the Place du Danube, connecting lines 3 and 7. It is to be hoped they will be laid out and worked so as to preclude further accidents.

As the Longchamps Races will soon finish, M. Girault will be able to push on with the completion of the new tribunes which he is carrying out on a plan which has the full approval both of the Municipal Council and of the Jockey Club. They consist of two pavilions, one for the State authorities and one for the members of the Jockey Club. The first will be twenty-five mètres long in the front elevation, with a large salon, forming a rotonda, and a monumental flight of steps in front which will give access at once to the vestibule and to two terraces and an open loggia towards the racecourse; the whole surmounted by a terrace and a belvedere. The Jockey Club Pavilion will be forty-eight mètres long, with an open arcade of nine bays, flanked to right and left by square towers surmounted by light balustrades. As soon as the autumn season is closed, M. Girault will also proceed with new public tribunes; and the whole of these graceful structures will be opened together next spring. M. Girault is also to commence shortly the architectural portion of the monument to Pasteur to be erected on the site of the artesian well at Breteuil, which in two months will cease to exist. M. Girault's design comprises a turfed bank, on which will be the surbase of the monument, of Carrara marble, supporting a sculptured group by Falguière. The monument will be inaugurated early in 1904. Early next year also will be inaugurated the monument to Alfred de Vigny, which is to be placed in the Luxembourg Garden, opposite to that of Leconte de Lisle. The sculptor, M. José de Charmoy, has represented the poet on a high square pedestal surrounded by figures recalling his principal works. The monument to Dumas fils, to be erected in the Place Malesherbes, opposite the Doré monument, is another memorial erection intended to be finished in the near future. M. St. Marceau is the sculptor, and the idea of the treatment is much the same as in the de Vigny monument—the figure of the poet on a pedestal which is surrounded by figures symbolical of his works; only in this case the pedestal will be cylindrical instead of square. Lastly, to finish with this list of monuments, the equestrian statue of Lafayette is eventually to be erected on the Cour du Carrousel, but so far it only exists in a model, which the sculptor, M. Bartlett, will be required to modify considerably before its final execution.

M. Pascal is actively engaged on the enlargement of the Bibliothèque Nationale, the shell of which is nearly completed on the side towards the Rue Colbert. M. Pascal proposes to restore various historic localities, notably the Cabinet du Roi and the Chambre de Richelieu, in this portion of the building, which will also be decorated with a series of busts of celebrated librarians and of the administrators and architects of the Bibliothèque Nationale.

The work is soon to be begun for the enlargement of the Pont de Bercy, rendered necessary by the passage of a branch of the Metropolitan Railway. The work will consist in the establishment of a steel viaduct by the side of the old bridge. The two roads will be separated by a high partition fence of steel framing.

At the Luxembourg M. Scellier de Gisors has been at work for some years over the restoration of different portions of the building. At present he is engaged on the repair of the façade to the Rue Vaugirard, especially at the principal entrance facing the Rue de Tournon. In the garden, at the Place du Bassin, there is to be erected a work by M. Pierre Roche, entitled "L'Effort," which was exhibited in the Salon of 1900. It represents Hercules removing the rocks and thus opening the source of the Alpheus. The principal figure is in lead; the rocks are to be constructed in brick covered with cement.

There is another old garden in Paris the existence of which appears to be threatened—that of the Hospice de la Salpêtrière, which it is proposed to destroy in order to erect on the site a hospital which will replace at once the old Hotel Dieu and the Hçpital de la Pitié. The department of L'Assistance Publique has taken up this unfortunate proposal, which will not only be an act of vandalism but will hardly be beneficial to public health, in closing up such an open space with buildings, in what is already one of the least healthy quarters of Paris. The Vieux Paris Committee has accordingly put in a protest to the effect that, in any re-arrangement of the Paris hospitals, the gardens of the Salpêtrière should be left untouched.

The new architect to the domain of St. Cloud, who is also architect to the Château de Rambouillet, is taking up in earnest the restoration and embellishment of the park of St. Cloud, which, since the war of 1870, has been in a lamentable state. The fine terrace of the Trocadéro, as it is called, has already been completely restored, as well as the old terrace of the palace, and basins of the fountains. Work of the same kind is now being carried out in the Jardin du Prince Impérial, and the restoration has been undertaken of the basins and canals, which form an uninterrupted perspective of *jets d'eau* beneath a complete tunnel of foliage. If we cannot again have the old palace, which was the finest work of Mansart, we can at least have the gardens as they existed before the *année terrible*.

At the Société Centrale des Architectes Français Mr. Aston Webb, R.A., the present President of the Institute of British Architects, has been elected a "Membre Correspondant."

We regret to have to record the death, at the age of seventy-one, of M. Eugene Train, Honorary Architect to the City of Paris. M. Train was a pupil of Jay and of Questel. He received medals in th Exhibitions of 1878 and 1889, and the Cross of the Legion of Honour in 1880. He had been a member of the Société Centrale since 1864, and had carried out numerous buildings, among which may be mentioned the Collège Chaptal and the Lycée Voltaire. He also designed the high altar of the Church of St. Augustin. Attached during half a century to the service of the Paris Municipality, he rose step by step by his own merits, without having ever demanded anything by favour. He was the first French architect who successfully employed ceramic and metal in the decorative treatment of an important building. The Collège Chaptal is a good example of this.

Methodist Church, Netherfield.—The new Wesleyan Methodist Church, which has been erected at Netherfield, was recently opened. The edifice is built of brick with stone dressings, and a large carved stone pediment surmounts the front gable. The accommodation is for 609 worshippers, 311 on the ground floor and 270 in the gallery, which occupies three sides of the building. The choir and organ are placed in a recess, having pilasters with capitals and enriched arch. The ceiling is panelled and covered in plaster, with enriched ornamental work. In addition to the church proper there are vestries for the choir and minister, and there is a large band-room under the organ recess. The estimated cost of the church, inclusive of the site, will be about 3,600*l.* The architects of the work were Messrs. W. J. Morley and Son, of Bradford.

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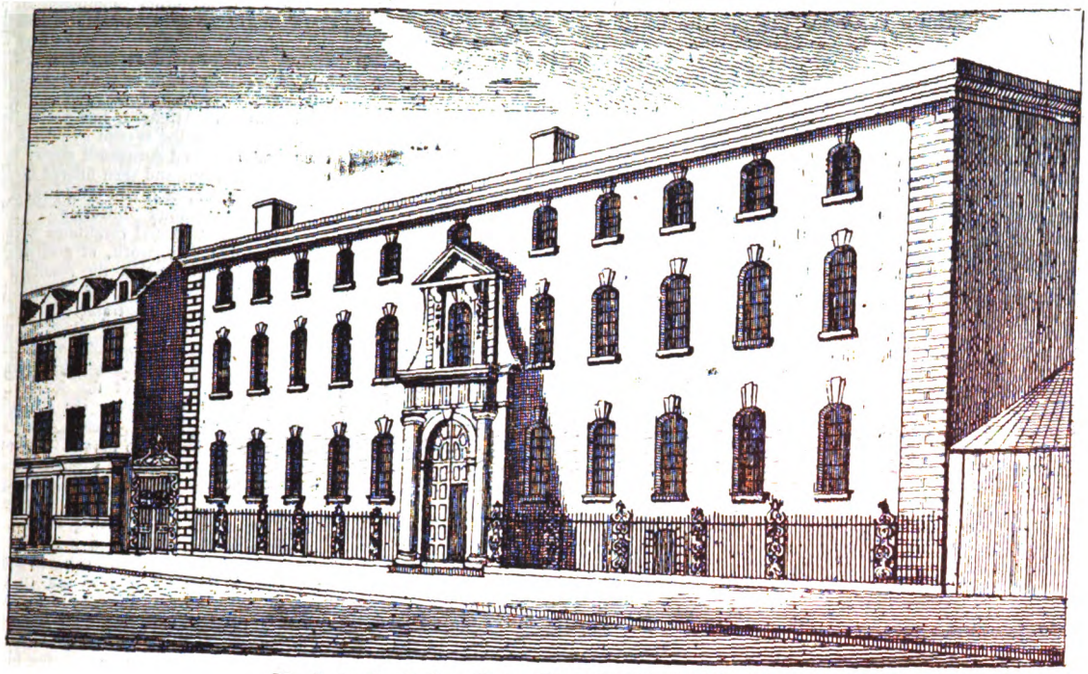

The Later South Sea House, Threadneedle-street (1773).

THE LATER SOUTH SEA HOUSE.

We publish this week an interior of the new British Linen Company's Bank, and in our issue of August 22 we gave an illustration of the exterior front to Threadneedle-street.

It may be of interest, as an example of the changes in City architecture, to give a representation of the old building, the later South Sea House, which was built at the latter end of the eighteenth century on the site where the new Linen Company's Bank now stands. The view is taken from an old engraving lent to us by Mr. Anderson, but which is not as old as the date of the building. It appears to be a fairly accurate copy of the engraving by Fougeron, from a drawing by S. Wale; the only difference in the representation being that in place of the hoarding on the right the older engraving shows a low building with a door, projecting somewhat beyond the frontage line of the South Sea House, and a row of curb-posts instead of the raised footwalk. Fougeron's is a better executed engraving than the one from which this illustration is taken, but we did not know of its existence until we looked into the history of the site.

The later South Sea House, afterwards occupied as the Baltic Exchange, was built, of red brick with stone dressings, on the north side of Threadneedle-street in 1772-3 (see Noorthouck's "History of London," 1773). The freehold was purchased for 55,700*l.* in 1856 by the members of the Baltic Exchange, and in 1900 was bought for 350,000*l.*, equivalent to 451. 10s. 2d. per square foot, by the British Linen Company Bank of Edinburgh as the site of their new premises.

The South Sea House in Threadneedle-street is that which is familiar, by name at least, to readers of the first of the "Essays of Elia," for it was there that Charles Lamb, who likens it to Ossian's desolate Balclutha, had his first employment under his brother John, who was a clerk in the house.* The Baltic Society, a private association, formed by Baron Schröder, of merchants and brokers engaged mostly in the Russian grain, tallow, and other shipping trades, migrated thither after the pulling down of the "Baltic" coffee-house in Sweeting's-rents for the building of Tite's Royal Exchange, and subsequently acquired the freehold of the property. On May 22, 1894, were sold at auction, after their removal from the South Sea House, a set of portraits, life-size, of Kings George I-IV, and William IV, by Kneller and Allan Ramsay, and after Sir Thomas Lawrence, Sir Martin A. Shee, P.R.A., and Kneller. The pictures represented past Governors of the Bubble Company, founded in 1710 by Harley, Earl of Oxford, and Sir John Blunt. We should remind our readers, however, that the scene of that disastrous speculation of 1710-20 was not the building here illustrated, but the Old South Sea House at the rear, which fronted Old Broad-street, and had previously been used for the Excise. That house in Old Broad-street was built for himself by Sir William Cockaine, elected Lord Mayor in 1619. In his "Handbook of London" Cunningham says its site is unknown; but that is not so, for in the Parish Clerks' "New Remarks," 1732, will be found mention, under St. Peter-le-Poor (Old Broad-street) parish, of "a large house built by Alderman Cockaine, formerly the Excise Office and the South Sea Company's House." Moreover, Aubrey in his "Lives" says that Eliab, brother of Dr. William Harvey, the great physician, "bought about 1654 Cockaine House, now the Excise Office." The *earlier* South Sea House, and at one time the *old* Excise Office, was consumed by fire in 1826; most of its site was taken for the buildings of the City of London Club, 1833-4, designed by Philip Hardwick, R.A. The Baltic Exchange in Threadneedle-street was closed on Saturday, September 29, 1900, and the City Corporation effected a widening of the street by setting back the frontage at a cost of 14,400*l.*

* In a parcel of documents relating to the Bubble which are preserved in the Albert Museum, Exeter, is one bearing his signature—"Recd. 8th February, 1792, of the Ffrobble. South Sea Company by the hands of their Secretary, Twelve pounds 1s. 6d. for 23 weeks attendance in the Examiner's Office. £12 1s. 6d. Charles Lamb."

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS.

BATH CITY AND QUARRIES.

The concluding summer visit of a successful series was made on Saturday, the 26th ult., to the city of Bath and neighbourhood. The good results of the excursion to the Portland quarries last year suggested the present outing, which was divided between an examination of the Bath Stone Firms' quarries and an inspection of the principal buildings of this ancient town.

In fine weather an early start was made by a party of thirty members, including the President, Mr. H. T. Hare, in brakes kindly provided by the Bath Stone Firms. Mr. W. David, the general manager, together with other officials, accompanied the party, pointed out the various quarries, and gave much general information which added greatly to the interest of what was seen. In our issues of April 13 and 20, 1895, we gave an exhaustive account, with plans, diagrams, etc., showing the stone-producing areas of Bath stone, and full detailed information concerning the many kinds of rock produced. Practically the whole of this *great oolite* formation is quarried by a process of "mining." Sloping shafts or tunnels are bored until the fine beds are reached some 70 ft. to 100 ft. below the surface. These beds vary in thickness from 20 ft. to 30 ft., and lie between two strata of coarse shelly stone, unfit for building use, here termed the upper and lower rag beds. The top of the fine beds is first removed, and an examination made of the underside of the upper rag bed, which is to form the ceiling of the working. These workings or headings vary in width from 15 ft. to 35 ft., and any risk of the ceiling falling is met by means of timber strutting and wedging. The blocks are roughly squared as soon as quarried, and are swung on to trolleys or moved about by strong hand-power cranes. A large quantity of loose waste material thus accumulates, and is returned to the excavation, filling in about half of the depth of the freestone beds, and upon this made bottom are laid the tram lines. Trial holes are frequently sunk from the surface, and if the material be found satisfactory, headings are pushed out towards them. Lateral workings are also made, but in all cases piers are left to the extent of at least one third of excavated rock to carry the weight of the superincumbent mass. Air shafts, in addition to the sloping shafts or tunnels, provide ventilation, and all working operations are carried out with naked benzoline lamps.

At Box Station, the first halt, some large masons' shops and stacks of rough and dressed stones ready for dispatch were inspected; here, also, the quarry-man's markings and natural peculiarities by which the bed is identified, were fully described by the manager, who also gave information upon the packing and transit of worked stone. It was instructive to note that the whole of the material is sawn and dressed by hand, and that no machinery is employed for any purpose other than hoisting blocks from the mines.

At Corsham, two enormous stacks of stone in process of drying, and a sloping shaft with steam hauling gear, claimed much attention. Lunch was kindly provided here by the Bath Stone Firms, to whom a cordial vote of thanks, proposed briefly by the President, was accorded for their courtesy and hospitality. This concluded the first half of the day's proceedings.

Under the guidance of Mr. W. Mowbray Green, a tour was then made of the more important houses and public buildings in Bath, commencing with Prior Park. Situated high up on Coombe Down, the site of this house, now a Roman Catholic College, is remarkable for the extent and beauty of its view. By courtesy of the principal, access was obtained to the various rooms and to the old and new chapels in the college. Not the least interesting was the basement story, the whole of which is vaulted in stone. We illustrated and described these buildings, and many others in the city, on April 27, 1901. As the name suggests, a priory formerly existed upon the site, but the greater part of the Classic house now seen was built by the celebrated Ralph Allen in 1735-1743, who also erected the Palladian

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Bridge upon the lines of that at Wilton. The purpose of this feature is difficult to determine, beyond being an ornament in the park, for it is placed in no relation to the surroundings, and spans but a small piece of water almost stagnant. Widcombe House and gardens were next seen, and proved thoroughly interesting. Entering the city, a good piece of modern work was passed in Fortt's factory, designed by Messrs. Silcock and Reay. The Roman Bath* naturally drew keen attention, and in due course Mr. Green conducted the party to the Pump Room and to the Guildhall (built by Baldwin, 1774-1777), and at all three places the additions and other works by the late J. M. Brydon were much admired. The Mineral Water Hospital and Beau Nash's house † were also visited.

From this point Mr. Green led the members to Queen-square, where the four elevations have a Classic treatment slightly varied. This forms part of a very extensive scheme carried out by the brothers Wood, embracing many streets, the Crescents, and the Circus. The houses have excellent plans, and good detail in staircases, ceilings, and other parts, but the whole was a kind of speculative undertaking, wherein the architects had an opportunity of producing a treatment of a uniform character throughout, and have succeeded. A noticeable point in the numerous effects is the small scale of the various features, together with the maintenance of a pleasing consistency throughout. Modern speculators appear to be blind to the lessons of Bath, Edinburgh, and eighteenth century work of other cities, and, moreover, it is also apparent in Bath that the Georgian tradition has very little, if any, influence on the modern work of the town.

After accepting Mr. Green's welcome hospitality, a hearty vote of thanks was given him for his valuable assistance and leadership. Thus ended a profitable, although a lengthy, day's sightseeing.

DUSTLESS ROADS.

At the present time, when we are promised a further investigation into the great dust question, it may be useful to revert to the subject of oiled roads. Although the experiments made last year in this country were not followed by permanently successful results, we believe it probable that this is due to inexperience, and that the failure recorded should not be put down to the fault of the system. In California, where the practice of treating roads with oil was first applied, various precautions are taken with the view of insuring success. When a road is to be oiled it is carefully prepared, particular attention being devoted to drainage; and although the covering when finally made is impervious to water, it will lose firmness and break up if the foundation is water soaked. Again, after the road surface has been shaped, it should be well-sprinkled and rolled to insure uniform consistency and a firm foundation. The next step is to run a sharp-toothed harrow over the road so as to loosen the surface to a depth of 3 in., the aim being to form an oil-crust of that thickness. If the surface be too hard for the use of a harrow, the practice is to build it up by adding material after the oil has been applied. A very important point is to keep traffic off the new surface until it has hardened, and if it is not possible to close the road entirely, one half should be treated at a time. The oil is preferably applied hot, by the aid of a suitable plant, and a thin coating of sand should be spread over the road to absorb oil that does not sink into the surface. Two, and sometimes three, coatings are necessary during a season to obtain the required oil crust, and repairs must not be neglected.

The experiments made at Farnborough were evidently not carried out with sufficient thoroughness. A thin crust was formed that lasted during dry weather, but was not adequate to resist the conditions prevailing during the winter season.

If proper precautions had been taken, and all essentials had been duly complied with, it is highly probable that very different results would have been attained. As things stand, people seem to think that the oiled road is impracticable in Great Britain, simply because a half-hearted and incomplete attempt resulted in failure. That is the natural and fitting end of all bad work, and we now want further tests upon a road that has been prepared with suitable oil and in a thoroughly workmanlike manner, by people who understand the proper way of setting about and completing their work.

* See the *Builder*, October 23, 1897, and May 25, 1895
† Ibid., October 31, 1896.

THE SANITARY INSTITUTE.

MODERN METHODS OF TREATING SEWAGE.

A Provincial Session of the Sanitary Institute was held in the Lecture Theatre of Birmingham University on Saturday, September 26, for the discussion of some practical considerations in connexion with modern methods of treating sewage. Dr. Alfred Hill, ex-Medical Officer of Health for Birmingham, presided, and there were present Professor Bostock Hill, Dr. Reid, Stafford, Dr. Fosbrooke, Worcester, Dr. Rideal, London, Colonel Jones, Aldershot, Messrs. White Wallis, London, Secretary of the Institute, J. T. Eayrs, Birmingham, local Honorary Secretary, Scott Moncrieff, London, A. Creer, York, S. R. Lowcock, London, J. E. Willcox, Birmingham, and others.

The Chairman said the subject of sewage treatment was important to their health, to their pockets, and as regarded the command of land. He remembered that the conditions in Birmingham thirty years ago in regard to sewage treatment were horrible, but he thought when they visited the works at Tyburn they would see much to admire in the present system. What struck most people in the bacterial system was that they could by such simple means eat up a great part of the sludge in the sewage. But there was nothing new under the sun. Nature had been carrying this out under their noses for all time, but they had not been observant enough to see it. They were now trying to imitate Nature's own processes by scientific means.

Professor Bostock Hill, M.Sc., M.D., then opened a discussion on some practical considerations in connexion with modern methods of treating sewage. He said that although they now knew so much of the scientific principles underlying the purification of sewage, when they considered the condition of many of the rivers it was not surprising the subject should still retain a peculiar interest. Although it was little more than ten years since the science of bacteriology became paramount among those concerned in the treatment of sewage, practically it might be said that the modern methods had eliminated all the older ones, such as precipitation, with the countless number of precipitants urged as desirable at one time or another, and practically by modern methods they meant either treatment on land or by bacterial means. Dealing first of all with the treatment of sewage on land, few new points had arisen of late, but in the last few years they had gained certain fresh experience. For instance, they knew that land treatment was absolutely useless unless the proper sort of land could be obtained, and in sufficient quantity. In many land treatment systems the sludge was treated on the land. This was a mistake, for as it contained little manurial matter, and in the case of large towns, a good deal of chemical matter, it was far better to get it taken away as far as possible, and distributed on other lands. There was no doubt that land, if it could be obtained of proper quality and in sufficient quantity, was a perfectly valid method of dealing with sewage, and excellent results were obtained; but, on the other hand, bad results were often obtained, as the various actions in the courts of law had shown. One great trouble was storm water, and personally he was of opinion that in many cases economy would result from treating the dry weather flow by bacterial methods, and utilising the land for storm water. The great advantage of this was that the land could be practically returned to agricultural uses. Coming to a consideration of bacterial methods, it was no exaggeration to say that one thing was now definitely proved, viz., that properly carried out, and with a due regard to scientific knowledge, this was a perfectly valid method of dealing with sewage in large or small quantities. There were several plans of treating sewage bacterially, and unhappily each was apt to think that the one they had experience of was the best under all circumstances. This was not so, and the experiences of the last few years had conclusively shown that the systems which would satisfactorily treat the sewage of one district were quite unfitted for the treatment of another class of sewage under other conditions. At present there might be said to be three methods of working bacterial systems. The first was the septic tank, followed by filtration through contact beds. The second, the use of coarse and fine, or so-called anærobic and ærobic filters, both contact. Attention had particularly been given of late to the system by means of which they first removed suspended matter by chemical precipitation, and then filtered through fine ærobic beds, or, as it had been termed, "intermittent continuous filtration." All these systems under special conditions were capable of doing excellent work, of purifying sewage to such an extent that the resultant effluents might be discharged as practically non-polluting and non-putrefactive into ordinary streams. In considering which of them was best adapted for any set of circumstances, they had to bear in mind many important points, notably the quality of the sewage, the surroundings of the works, the available fall in the land, and the stream into which the effluent was finally to pass. In many respects the septic tank was the simplest to work. As regarded coarse and fine filters, the main points experience had brought to light were the absolute importance of putting the sewage on to coarse beds as free from inorganic suspended matter as possible. As regards the material, it should be hard and as smooth as possible. Any material which broke down was unsuitable. As regarded the final anærobic or oxidising filter, there was no doubt that the intermittent continuous, or streaming filter, was the best. This was the type of filter which had come to stay. It was only fair to say that it required more care and observation than the contact bed, and it required to be deeper, but he had not the least doubt that both from a theoretical consideration and practical results, it was undoubtedly the best. As regarded the filtering material, though good results could be obtained with almost any hard material, he believed that coal was still the best, as it produced an effluent of high-class quality. Granite chippings were also excellent. As regarded the size of the particles, he believed ½ in., with a few inches of fine material on the top of the filter, gave the most satisfactory results.

Mr. J. E. Willcox, A.M.I.C.E., of Birmingham, in a paper on the subject of the modern treatment of sewage, dealt first with the general principles underlying modern methods of sewage disposal. General principles being established and understood, it would be conceded that good results must largely depend on overcoming the practical difficulties which arise in connexion with the design and construction of works. It was impossible to deal successfully and economically with all classes of sewage by similar methods, regardless of conditions obtaining in each case. The first consideration was the volume and character of the sewage to be treated, and the standard of purity required. Though a standard of purity was very desirable from an engineering point of view, the difficulty of fixing one was very great owing to the different conditions of the sewage of various towns. The requirements of the Local Government Board with respect to provision for dealing with six times the dry weather flow were excessive, and was proved by the results of various gaugings extending over long periods of time. He next dealt with the reason for the divergence of volume, and also rates of flow, and the effect that area and configuration of districts sewered had on this point and on pollution of streams by storm overflows; also as to how the volume and character of sewage was affected by combined or separate systems, and trade wastes and the rates of flow, for which provision must be made both for gravitation schemes and pumping schemes, and the effect of varying rates of flow on the design of the tank and filters. Treatment in tanks he regarded as a necessary preliminary to all methods of treatment. He then proceeded to the consideration of the construction of detritus tanks and screening chambers. He regarded the over screening of domestic sewage as undesirable, and referred to the removal of silt from chambers. The design of settling tanks and septic tanks, methods for preserving scum if required, and the drawing off of sludge from septic tanks, over-septicised sewage, and excessive accumulations of scum were then dealt with. He dealt with the difficulty met with by reason of excessive scum in the septic tank, and the offensive nature of the septic tank effluent, and the effect upon such effluents when flowing in closed pipes, with the arrangements for draw-

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ing off sludge from septic tanks. He then proceeded to refer to land treatment, and dwelt upon the impracticability of taking a basis of so many persons per acre in considering land schemes. The basis of acreage should be the number of gallons per acre, depending on the character of the land and the nature of the sewage. He then dealt with the bacteria system, and pointed out that as the final treatment consisted, as was admitted, in aeration and nitrification, this must depend largely upon the intimacy of contact between the sewage and the air. In his opinion, percolating filters were to be preferred in many cases to contact beds, and where the latter were used the effect of size of particles on the contact bed effluents, and the means of distribution over the beds, should be carefully considered. The question of the sludging up of contact beds was a matter of much importance, and there should be care taken in avoiding the use of materials which were likely to disintegrate and choke up the beds. The question of distribution on streaming filters was next dealt with, together with the difficulties which occur in connexion with obtaining an even distribution of the sewage over the filters. Natural means by which contact or filter beds are aerated, and remarks as to the varying factors of discharge. In conclusion, Mr. Willcox referred to the large experiments with power-driven distributors on half-acre filters, with varying size particles, now being carried out by himself at Hanley in conjunction with Dr. Reid, the Medical Officer for Staffordshire.

Dr. Rideal, London, thought they had a very good object lesson from the Birmingham experiments of what should be the size of septic tanks. The total volume of the Birmingham sewage was 25,000,000 gallons, and the capacity for intercepting the solids was only about half the dry-weather flow. The effect of that was that in the last two years there were about 24 grains of suspended matter in the liquid which came out of the tanks. That quantity was very high indeed. In Birmingham when there was chemical precipitation there were only about 4 or 5 grains of suspended matter. A good septic tank working should not give more than about 10 grains. Another point was as to the distribution of the sewage on the filters. If they could increase the flow of the filters by 10 per cent. by the use of an efficient distributor, it would pay for any additional outlay on distribution.

Dr. Reid, Medical Officer for Staffordshire, was glad to find that both Dr. Hill and Mr. Willcox agreed that filtration was better than contact. He thought it was a great mistake they had ever heard of contact; if they had not they would have heard more of efficient distribution and efficient filters. They must blame the engineering world for accepting Mr. Dibdin's suggestions, and recommending authorities all over the country to lay down contact beds, a policy which he thought they would regret. The experiments with filtration at Hanley proved that they could obtain good results without going down to the very smallest sizes of material. The best size was ¼ in., rejected by ⅛ in.

Dr. Fosbrooke, Medical Officer for Worcestershire, said the Worcestershire County Council had laid down at Malvern a series of tanks, septic tanks with continuous filtration, with contact beds, and with streaming or intermittent filters. Four different kinds of material had been used—coal, coke, bricks, and local stone. Shortly, the results of the experiments had been that the septic tank with continuous filtration had given the best effluent, and the contact beds had not reached the high standard of purification once expected. Personally, he shared the opinion that the contact bed was dead, or, if not dead, dying. He thought coke was the best material for the filters.

Mr. Sidney R. Lowcock, Birmingham, said there was one point in connexion with the Malvern experiments—that was that the sewage was taken from the main sewer as it came down to the works. Therefore, they got it at the different rates of flow, as was the case with an ordinary sewage works. His name had been associated with filters, and he was very glad they were all coming round to his way of thinking that the filter bed was a great deal better than the contact bed. He came to that conclusion as long ago as 1890, and expressed it in a paper read to the Institution of Civil Engineers. At that time he had an idea that it would be possible to work the filters continuously. He had since come to the conclusion that he was wrong, and that they must work them intermittently. With reference to the use of automatic machinery, he did not believe it possible to have automatic machinery that would work satisfactorily under all the varying conditions of sewage disposal works. The quality and the quantity of the sewage continually varied, and the whole secret of success or failure depended upon intelligent scientific supervision.

Mr. J. S. Pickering, Cheltenham, said that having had a fair experience of material for bacteria beds, he had come to the conclusion that it was a mistake to employ coke or any material which was likely to disintegrate. He was quite sure where coke was adopted there would be a difficulty in the silting up of the beds. He thought it would be necessary to convey all septic tank effluents by closed channels to the contact beds or filters, owing to the nuisance of smell. He would like to bear out what Mr. Lowcock had said as to how unnecessary it was to have automatic gear to save the wages of two or three labourers.

Colonel Jones, Engineer of the War Office Sewage Farm at Aldershot, said the whole success or failure of contact beds and streaming filters depended upon the character of the liquid sent forward from the septic tank. If the liquid contained much suspended matter, it would choke up the contact bed or filter. Suspended matter might be of two kinds, organic and inorganic. In his opinion it was not right to retain anything but inorganic matter, because no microbes had a taste for anything of the kind. In many cases it was usual to keep out everything, whether mineral or organic matter. He had been at the subject for the last thirty or thirty-five years, and he congratulated them on coming round to his idea of land treatment.

Mr. A. J. Martin, London, said, with reference to the so-called offensive character of the liquid and sludge from the septic tank, he would remind them that Mr. Watson had said in a recent article that this was largely a matter of the way in which they conducted the liquid from the tank. One reason why septic tanks had been found so offensive was owing to the practice of having small tanks, and removing from them large quantities of material only partially digested and in an active state of putrescence. If they had the tanks large enough to bring about full putrescence, they would get a residuum less in volume, which could be dealt with without any nuisance. He was saddened to hear Dr. Fosbrooke say the contact bed was dead or dying. Four or five years ago it was said the septic tank was dying, but it was to-day in a healthy state of convalescence, and he predicted that four or five years hence the contact bed would be in an equally healthy state of convalescence. He dissented from Mr. Pickering's remark that the use of automatic apparatus was to save two or three labourers' wages. The reason was because the reliability and efficiency of automatic gear such as they had at Leeds or Exeter gave results such as could not be obtained by any manual labour that would be available this side of the millennium.

Mr. Scott Moncrieff, London, thought a meeting such as that ought to be utilised for taking the public into their confidence, and letting them know how they stood in reference to these expensive matters of sewage purification. There was a general opinion abroad that land was the proper method of treatment. All he had to say upon that was that theoretically that might be perfectly true, but practically all of them were agreed that nine-tenths of the land in England was unsuitable for carrying it out. The next thing was that land not being available, could they so concentrate the methods of nature that the solution of the problem could be carried out completely?

Mr. O'Shaughnessy, Birmingham, supported the opinion of Dr. Bostock Hill that coal was the best filtering media. He had tested it alongside other materials, and the difference in favour of coal was simply enormous.

Dr. Barwise, Birmingham, thought a vigorous protest ought to be made against any proposal that sewage effluent should be bacteriologically treated, because there was an idea that the Royal Commission intended to set up a bacterial standard of purification. It was not the duty of a Sanitary Authority to turn its sewage into a drinking water, but the duty of water authorities to take their supplies from unimpeachable sources.

The afternoon was devoted to a visit to the Birmingham Sewage Disposal Works, over which the visitors were conducted by Mr. Watson, the Chief Engineer.

ARCHITECTURAL SOCIETIES.

Manchester Society of Architects.—On September 19 the members of this Society visited some recent buildings at Alderley. Mr. McConnel's house (Messrs. Thomas Worthington and Son, architects) was the principal building visited, with its picturesque white-washed and stone-slated exterior, and very charming interior. A fireplace, with green tiles, beaten brass work, and bosses of green enamel, attracted much attention. The same architect's house for Mr. Agnew, a brick and stone building, contained much of interest. Mr. Alex. Graham's Epileptic Homes at Sandlebridge, now approaching completion, were an interesting study of a novel type of building, in which the planning and all practical details have evidently been worked out with the greatest care and skill. The growing darkness prevented more than a hasty glance at Messrs. Worthington and Sons' Convalescent Home, but this showed that when completed it will make a very good group of simple character.

Devon and Exeter Architectural Society.—On Saturday, the 26th ult., the members of the Devon and Exeter Architectural Society made an excursion to Dartmouth to visit the new Naval College buildings now in course of erection. The President (Mr. A. S. Parker, A.R.I.B.A., of Plymouth) entertained the party to luncheon, among those present being Mr. Aston Webb, R.A., President of the Institute of Architects, and also the contractor for the new college, Mr. Hill, of the firm of Higgs and Hill, London, Mr. Wallis, clerk of the works, and Mr. Hill, Admiralty clerk of the works. The President (Mr. Parker) proposed "The Royal Institute of British Architects," coupling with it the name of its president, Mr. Aston Webb, R.A. From the time of its foundation in the reign of William IV., and for the greater half of the reign of Queen Victoria (who graciously granted it two charters), the Institute, he said, notwithstanding the prefix of the word British, remained largely as a Metropolitan society, in which provincial architects had but little share; but during the latter end of the century the policy of the Institute expanded on something like the Imperial lines of the nation, so that to-day the Institute had seventeen allied societies in Great Britain and the colonies, of which the Devon and Exeter Society has the honour of being one. He would not attempt on such an occasion as that any enlargement of the subject of the Parliamentary registration of architects, but he believed that a large section of provincial architects held that even an imperfect Bill would be better than no Bill at all, inasmuch as a compulsory examination and registration would promote improved education amongst those entering the profession in a manner in which no other method could produce. They welcomed Mr. Aston Webb's presence, not only because he was the President of the R.I.B.A., and not only because he was the architect for the Royal Naval College, but because he was an architect whose abilities they had long recognised as placing him amongst the very foremost of modern artists. His star had continued to ascend for very many years, and one might be pardoned for prophesying that it had not yet reached its zenith. They had had the advantage of seeing the actual work or the drawings of a long list of public and national buildings, not the least of which was the great architectural scheme of the national and Imperial memorial to Queen Victoria. But a wonderful evidence of Mr. Aston Webb's reputation occurred by its even penetrating the Government official mind. He believed it took an extraordinary reputation to convince a Government official that there was better ability outside than in. Hence the fortunate selection of Mr. Aston Webb as the architect for the Dartmouth Naval College. Mr. Aston Webb, responding, expressed his pleasure at being honoured by that Society of visiting one of his buildings. In about a month it would be his duty to deliver the annual address to the Institute, and as he had been devoting serious thought to several matters, among them being education and registration, he would not enter into them to-day, but would ask the members to be so kind as to read the report, and give their careful consideration to these important questions. The Institute was not merely a London society, but intended equally for the advantage of the provinces as for London. Under the guidance of Mr. Aston Webb, the new Naval College was then inspected. From a large plan Mr. Webb described the general scheme and the purposes to which the various

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sections were appropriated. The main buildings, to cost upwards of 400,000*l.*, were generally at the roof level, and one of the wing towers is erected, but the central portion, which includes a dominating tower, is not up to its height. Wide-jointed red bricks, with Portland stone dressings, give a warmth to the composition, the main façade being about 700 ft. long. The accommodation is for about 300 cadets, with quarters for officers and staff, and a residence for the captain. The power station for generating steam and electricity, also pumping purposes, is at the river level, so that the 150-ft. chimney is not an eyesore to the college. On the higher ground to the west, and near the extensive playing fields, is the hospital, this being the only portion at present occupied, and over this the visitors were conducted by the Captain of the *Britannia*.

Illustrations.

THE BRITISH LINEN COMPANY BANK, THREADNEEDLE-STREET.

We give a view of the interior of this bank, of which we published a plan and view of the exterior on August 22.

The walls of the banking chamber are lined throughout with pavonazzo marble between the dado and the entablature. The die of the dado is in verde-antique, the base and surbase being in grand antique marble. The columns and pilasters are in St. Ambrozia Verona marble, with white alabaster caps and bases. The entablature is in coloured alabaster. The walls of the managers' and directors' rooms are lined with white alabaster, all done by Messrs. Farmer and Brindley. The floor of the banking chamber is in marble mosaic by Messrs. Burke and Co. The ceilings throughout are in faience by the Burmantofts Works. The screens and fittings throughout are in mahogany. The whole interior is therefore finished in polished materials, dispensing with the necessity for periodical painting.

As before stated, Mr. J. Macvicar Anderson is the architect.

COMPETITION DESIGN FOR LIVERPOOL CATHEDRAL: INTERIOR.

We gave last week the exterior view and plan of Mr. Corlette's design for Liverpool Cathedral. We give this week a view of the interior as proposed.

The author's intention in the design was described in our last issue.

VILLAGE CROSS, WEST MEON.

We publish this week an illustration (the original of which was in this year's Royal Academy) of a village cross which has been presented to the inhabitants of West Meon, in Hampshire, by the Rev. R. N. Gandy. An ancient wooden cross formerly stood on a triangular piece of ground (known as the Cross) in the centre of the village, and portions of it were in existence till 1644, but in that year the troops of General Walker totally destroyed it. A new cross of Portland stone has now been erected on the same site by Mr. Gandy in memory of the late Dr. and Mrs. Rogers. Its height is 18 ft. The work was executed by Messrs. Farmer and Brindley, the local builder being Mr. Walter Read, of West Meon.

The architect is Mr. C. Harrison Townsend.

PROPOSED SEASIDE CONVALESCENT HOME.

This drawing shows the original design for the building; in execution it was considerably modified both in plan and elevation.

The materials proposed to be used in its erection were red-brick facings for the ground floor story, with tinted cement rough-cast above, Broseley tiles being used for the roofs and vertical tiling bay.

The principal rooms and dormitories for the patients were to have coloured glazed-brick high dados, with distempered plastering above, the angles with ceiling being coved, and all angles rounded, the floors of rooms throughout paved with pitch-pine block flooring, and the corridors and sanitary blocks with Venetian mosaic paving, the walls of latter being faced throughout with glazed bricks.

Messrs. Cheston and Perkin are the architects.

BILLIARD-ROOM, CLEWER PARK.

This room was erected for the late Sir Henry Gooch, Bart., some years ago. The whole of the joinery is executed in oak, wax-polished, the ceiling being formed with moulded oak beams with plaster panels between.

The fireplace recess was ceiled elliptically with decorated plaster work in low relief. The floor was laid with solid oak blocks to design on concrete, and wax-polished.

The cost of the room was about 2,000*l.*

Messrs. Cheston and Perkin are the architects.

COMPETITIONS.

Stonehaven: Additions to Town Hall.—The design of Messrs. D. and J. R. Macmillan, Union-street, Aberdeen, has been accepted.

ENGINEERING SOCIETIES.

The Junior Institution of Engineers.—Mr. J. Fletcher Moulton, K.C., M.P., F.R.S., has been elected President of this Institution in succession to Colonel Edward Raban.

LONDON BUILDING ACT, 1894.

QUESTION OF FIRE-RESISTING ROOFS.

The Tribunal of Appeal under the London Building Act, 1894, sat at the Surveyors' Institution on Friday last, 25th ult., to hear an appeal by Messrs. Whittington, Son, and Barham, on behalf of the City of London College, under Sect. 78 and 79 of the Act, against the determination and requirements of Mr. Edmund Woodthorpe, district surveyor, by his letter to Mr. Edward Street, the appellants' architect, refusing to sanction the alteration and adaptation of 9, Ropemaker-street, to the purposes of the City of London College, and alterations in the premises situate at 7, White-street, as not complying with the provisions of Sect. 68, 77, Sub-sect. 2, 79 and 80, Sub-sects. (*a*), (*b*), (*c*), (*d*), and (*e*) of the Act; and with certain further requirements, viz.: that the roof of 9, Ropemaker-street should be made fire-resisting throughout.

The members of the Tribunal sitting were Messrs. J. W. Penfold (chairman), A. A. Hudson, and E. A. Gruning.

The appellants were represented by Mr. Sidney Humphreys, barrister, and Principal of the College, and the London County Council by Mr. Andrews, of the Solicitor's Department.

Mr. Humphreys explained that the City of London College, 7, White-street, was erected in 1883 for the purpose of teaching, mainly by means of classes and lectures, for commercial subjects and science and art. In 1894 the accommodation was found to be insufficient, and No. 8, White-street was taken over and connected with a bridge across White's-court, which intervened. Both buildings satisfied the requirements of the Acts then in force. Now it was found necessary to still further extend the College, having in view work of a higher character in commercial work and developments in the present work. It was therefore proposed to convert No. 9, Ropemaker-street, from a vacant warehouse into an addition to the College, the sum to be expended being 18,000*l.* The District Surveyor objected to the construction of the roof of the building proposed to be converted, holding that the roof should be made fire-resisting throughout. He also objected because the staircases were not shown in the building proposed to be converted, in accordance with Section 80, especially Sub-sections (*d*) and (*e*). He objected, too, to the uniting of the present City of London College to the building proposed to be converted, because the buildings, when united and considered as one building only would not be in conformity with Sections 68, 79, and 80. The District Surveyor argued that there might be danger to the lives of the students from a sudden fire occurring in the College building or in that adjoining. In recent years, he declared, there had been many large fires in the immediate neighbourhood. The danger in the upper part of No. 8, White-street, and in the upper part of the building at the corner of White-street and Finsbury-street from a sudden fire might, so the District Surveyor pointed out, be very considerable, and these floors were nearly all constructed of wood, with wooden partitions and match-lining even in the roofs, and the one and only staircase in No. 8, White-street, was of wood, and enclosed with wooden partition only, and separated in no way from the warehouse below except by a wood floor and partition.

Commenting on these objections, Mr. Humphreys said the plans showed that the roof would retain the old principals, and there was no objection to doing what the Tribunal might ask regarding it, but it was quite unnecessary to substitute fire-resisting materials. The grounds upon which the appellants appealed therefore were: (1) That the proposed construction and arrangement of the building are such as to render a fire-resisting roof throughout unnecessary; (2) that the buildings 7, White-street, and 9, Ropemaker-street are not and will not be buildings within Sect. 80 of the London Building Act, 1894; (3) that the staircases shown in the building proposed to be converted are in accordance with Sect. 80, Rule (*a*); (4) that the total numbers of students to be accommodated are such as do not bring the building within Sect. 80, Rule (*c*); (5) that no part of the existing or extended building is used or intended or adapted to be used for the public; (6) that the premises of the College situate in White-street were erected before the passing of the London Building Act, 1894, and are erected or constructed in compliance with the provisions of that Act; (7) that the present College and the building proposed to be converted, if altered and converted according to the plans deposited, and united and considered as one building only, will be in conformity with the London Building Act, 1894; (8) that the uses to which the buildings will be put and the work proposed to be carried on within them are such as to render the risk of fire infinitely small, that the buildings are separated from buildings in the immediate neighbourhood so as to preclude any fire risk from them, that the persons using the buildings will be adults, not more than 20 per cent. of whom will be women, and there will be no congested assembly of persons within the building, and that generally there is no danger to those using the premises in case of sudden fire; (9) that the part of the building referred to as No. 8, White-street, was adapted to be used by the appellants in 1894, and the construction approved by the authorities having authority to approve the same, and it is in conformity with the London Building Act, 1894; (10) that the premises known as No. 8, White-street, do not form part of the building which it is proposed to unite with No. 9, Ropemaker-street.

The Tribunal heard the evidence of Mr. Street, and then advised the parties to confer on the points in dispute, and suggested that the claim for a corridor should be dropped.

After an interval, it was intimated by Mr. Humphreys that the appellants withdrew their appeal so far as the corridor was concerned, and consented to an adjournment on other points.

The precise terms of the agreement arrived at were these:—"The appellants withdraw their appeal in so far as it applies to the corridor communication between No. 7, White-street, and the building No. 9, Ropemaker-street. The hearing is adjourned to enabled the parties to agree upon a second means of escape from No. 9, Ropemaker-street, and to agree upon the requirements necessary to make the building fire-resisting, with liberty to apply."

Further, it was agreed between the parties that the floors, between the existing joists, are to be filled with coke breeze concrete 5 in. thick, supported by angle iron fillets secured to the sides of the joists, with plastered ceilings. Roof: The interstices between the rafters to be filled with coke-breeze concrete 5 in. thick, and the under side of the rafters to be plastered on expanded metal lathing. Staircase to be constructed as shown on the plans. Escape: That an opening be cut in the south external wall of No. 9, Ropemaker-street. A teak door to be hung in the opening to open outwards, as described for doors under the Factory Act. That a metal bridge be constructed from this opening across the roof of No. 7, White-street, to the south-west corner thereof. At the corner the staircase of No. 7, White-street is to be continued up to the roof—a detail of these stairs and the opening therefrom to the roof be prepared and agreed upon, and to form part of the Order of the Tribunal. The doors at the foot of these stairs next the street to comply, as before, with the Factory Act.

Correspondence.

SIZES OF GLAZED BRICKS.

Sir,—I was indeed pleased to read the remarks in last week's issue on glazed bricks and their sizes. It has always been beyond my comprehension why they have been tolerated by the scientific world so long. We read in most of our technical books the necessity of joints in brickwork being a uniform thickness to prevent unequal settlement. Mr. Mitchell writes in his book on building construction the following paragraph:—"Bedding of Bricks": "Bricks are bedded in mortar; first, to distribute the pressure more evenly over the bricks; secondly, to obtain adhesion, and thus give homogeneity to the mass; thirdly, by filling up the interstices, to make the walls weather-proof." If anyone has watched the bricklayer in his task of laying these bricks, he will observe how futile are his efforts to carry these remarks into

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practice. The stability and solidity of the wall, in my opinion, is greatly decreased. Pointing of the joints in cement or parian is a mere sham, which is proved by the number of open joints that can be seen in most glazed walls a short time after construction. Are we to continue with the sacrifice of strength, homogeneity, equal settlement and good pointing to the large brick?

I am confident that most bricklayers would welcome the larger joint. The greater ease with which the brick could be laid would compensate for any extra material; and finally the pointing could be executed in a workmanlike manner with the trowel instead of scamping it over, which is forced on the operator by the fad of appearance.

C. OAKLEY.

Bromley.

SIR,—The suggestion made in a letter in your issue of last week, that the thickness of glazed bricks for London should be reduced from 2⅝ in. to 2¼ in., is one that is easily met by manufacturers. All glazed bricks of the best makers are made by hand, each brick is weighed separately to secure uniformity of thickness, and is then pressed by a hard screw press. It is thus a matter of little importance to the manufacturer, and no additional expense, whether the brick asked for is 2¼ in. or 2⅜ in. No machinery requires alteration, as the thickness of the brick depends on the quantity of clay put into the press.

H. R. ALLEN.

Halifax.

INQUIRY FOR A MODEL FARM.

SIR,—Can you or any of your readers inform me, through the medium of your paper, of the whereabouts of a model farm homestead of about 200 acres, erected recently, within fifty miles of London.

LOUIS MOORE.

The Student's Column.

CONCRETE-STEEL.—XIV.

SHEARING STRESSES IN BEAMS

(continued).

WE will next consider a horizontal longitudinal section of a beam in connexion with the influence of horizontal shear in the plane of junction between the concrete and the steel reinforcement, with the view of throwing light upon the adequacy of adhesion between concrete and steel for the resistance of horizontal shear.

Let the symbols E'_c and E'_s represent the coefficients of shearing elasticity of concrete and steel respectively, and let q_{ct} and q_{st} represent the intensities of shearing stress at any point on the concrete and the steel reinforcement in a beam.

Then, assuming that the concrete and steel act together as if they were one homogeneous substance, and that plane sections remain plane after flexure, it follows that

$$\frac{q_{ct}}{q_{st}} = \frac{E'_c}{E'_s}.$$

Similarly, if f_{ct} and f_{st} represent the intensities of normal stress on concrete and steel respectively, at any point in a plane section inclined at 45 deg. to the horizontal, we have

$$\frac{f_{ct}}{f_{st}} = \frac{E_c}{E_s}.$$

We have already shown that the intensity of normal stress on diagonal planes is equal to the vertical or horizontal shearing stress acting at the same point. Consequently

$$\frac{E'_c}{E'_s} = \frac{E_c}{E_s}.$$

Let us now take a horizontal longitudinal section of a beam through the centre of the reinforcement, and assume the reinforcement to consist of horizontal bars. Let b represent the width of the beam, and t the collective width of the reinforcement, each measurement being taken in the plane of the section.

Then in a portion of the length δx in the horizontal plane, the area of concrete is $(b-t)\,\delta x$, and the area of steel is $t\,\delta x$.

Hence, if q represents the intensity of horizontal shearing stress on the portion $b\,\delta x$ of the longitudinal section, we get

$$q\,b\,\delta x = q_{ct}\,(b-t)\,\delta x + q_{st}\,t\,\delta x$$

and the intensity of horizontal shear on the concrete is

$$q_{ct} = \frac{q\,b\,E_c}{E_c\,(b-t) + E_s\,t} \quad \ldots\ldots\ldots\ldots \text{(a)}$$

If the ratio expressing the relative values of the coefficients of elasticity for concrete and steel be determined for the materials employed in any given construction, this equation can be simplified. Thus, if the values of the coefficients be $E_c = 3\,000{,}000$ lbs., and $E_s = 30{,}000{,}000$ lbs., corresponding with the ratio 10, we have

$$q_{ct} = \frac{q\,b}{(b-t) + 10t} \quad \ldots\ldots\ldots\ldots \text{(b)}$$

The agreement of this rule with the previously stated principles governing the distribution of shearing stress may be seen by taking a horizontal longitudinal section through the concrete just above the reinforcement. Then $t = 0$, and $E_s = 0$, and the result is

$$q_{ct} = \frac{q\,b}{b} = q \quad \ldots\ldots\ldots\ldots \text{(c)}$$

In this case the concrete takes the whole of the horizontal shear, but when steel reinforcement is present, most of the shear comes upon that material, and, as shown by the equation in the forms (a) and (b) the value q_{ct} is proportionately reduced.

Moreover, as already shown, the intensity of vertical and consequently of horizontal shearing stress diminishes with its distance with the neutral axis. Consequently, in concrete-steel beams of ordinary design there is very little probability that the shear in the horizontal plane of junction between the concrete and the steel will be sufficient to overcome the adhesion between the two materials.

On reference to Table XX. it will be found that the average adhesion may be taken at about 350 lbs. per square inch, and unless the greatest value of q_{ct} obtained by the foregoing equation exceeds the safe adhesive strength of the combined material, the beam will be perfectly safe so far as the effect of horizontal shear is concerned.

In this connexion it may be mentioned that, in various experiments made upon concrete-steel beams, fracture has resulted without any evidence being given of slipping of the concrete on the steel. Still, in short and heavily-loaded beams, and in long beams where a high percentage of reinforcement permits heavy loading with a relatively small sectional area of concrete, the shear may become excessive, and in such cases it is important to ascertain whether the intensity of horizontal shear is likely to overcome the adhesion of the materials.

The next question is suggested by the resolution of shearing force, first, into four equal tangential forces, as in Fig. 24, and, second, into two equal forces acting normally to diagonal planes at right angles to each other, as in Fig. 25.

Taking any diagonal cross section of a beam inclined at 45 deg. to the horizontal, and subject to normal tensile stress, we have to ascertain whether or not the intensity of such tensile stress, normal to the diagonal plane, is within the permissible limit for concrete. It will, of course, be understood that the diagonal lines in Fig. 28 representing tension and compression, merely illustrate the relative intensities of stress at particular points in the length of the beam, and that there is no arithmetical or other limit to the number of similar hypothetical planes.

Nevertheless, as tension and compression exist in opposite diagonal directions, it is necessary to base calculations upon the intensity of stress existing at assumed positions in the length of a beam.

Leaving the resistance of normal compressive stress to the concrete alone, we will devote attention to normal tensile stress.

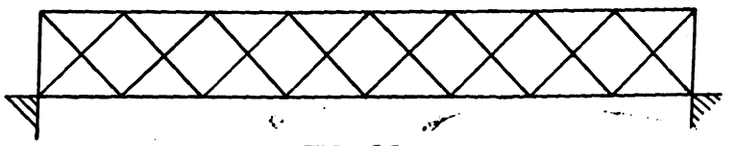

FIG. 29

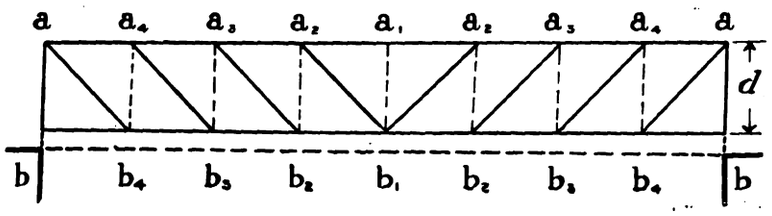

FIG. 30

Illustrations to Student's Column.

For the purpose of illustrating the calculation of "diagonal" tension, we might regard a concrete-steel beam as approximately resembling a lattice-girder, Fig. 29, which includes two systems of the Warren type, and is subject to tensile and compressive stress in the diagonals of the web, somewhat as we have found such stresses to exist in the part of a concrete-steel beam that acts as the web. As the stresses in the intersecting diagonals of a lattice girder of this type are unequal unless verticals be introduced between the apices of the two systems, our object will be better served by considering tensile stress resulting from shear to be concentrated along the lines occupied by the ties in a Linville or "N" girder.

As an example we will take the case of a concrete-steel beam, Fig. 30, under a uniformly distributed load, and having horizontal reinforcement sufficient to ensure safety against the effects of bending moment. As we shall disregard concrete below the axis of the reinforcement, the lower part of the beam is drawn in broken lines in the figure. Let

b = breadth of the beam ..... = 5 in.
d = depth from top of beam to axis of reinforcement ..... = 10 in.
l = clear span between supports ... = 80 in.
δx = distance between assumed diagonals ..... = 10 in.
w = load per in. run..... = 100 lbs.

The load applied upon the top of the beam is practically equivalent, so far as concerns stress on the assumed diagonals, to downward vertical forces equal to $w\,x$, acting at each of the points, a_1, a_2 a_3, a_4, and downward forces equal to $\frac{1}{2}w\delta x$, acting at the points a, a. The total tensile stresses along the diagonals may be ascertained by adding together the stresses due to the different weights, or by the simple rule,

$$P_t = \frac{(n-2y)+1}{2} w\delta x \sec\theta.$$

Where

P_t = total tensile stress on any diagonal plane,
n = number of bays formed by assumed diagonals,
y = numerical order of any bay from the abutment,
θ = inclination of assumed diagonals.

In this case the inclination of the diagonals to the horizontal is 45 deg., and the value of $\sec\theta = 1.41421$, say 1.414.

Calculating the tensile stresses on the diagonals for one half of the beam, we have

on a b_4 $\quad P_t = \frac{(8-2\times1)+1}{2} \times (1{,}000 \times 1{\cdot}414) = 4{,}949$ lbs.

on a_4 b_3 $\quad P_t = \frac{(8-2\times2)+1}{2} \times (1{,}000 \times 1{\cdot}414) = 3{,}535$ lbs.

on a_3 b_2 $\quad P_t = \frac{(8-2\times3)+1}{2} \times (1{,}000 \times 1{\cdot}414) = 2{,}121$ lbs.

on a_2 b_1 $\quad P_t = \frac{(8-2\times4)+1}{2} \times (1{,}000 \times 1{\cdot}414) = 707$ lbs.

Dividing each of these results by the area of the diagonal plane = $(10 \times 5 \times \sec.\,0) = 70{\cdot}7$ square in., we have the intensity of tensile stress per square in., f_t for each diagonal plane.

Thus

on a b_4 $\quad f_t = 70$ lbs. per square in.
on a_4 b_3 $\quad f_t = 50$ lbs. " "
on a_3 b_2 $\quad f_t = 20$ lbs. " "
on a_2 b_1 $\quad f_t = 10$ lbs. " "

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These figures show that in the case of a b_4, the stress is beyond the limit of 50 lbs. per square inch, generally taken as the allowable unit stress for concrete. Still, as the ultimate resistance of the concrete would probably be between 250 lbs. and 300 lbs., it is clear that the beam might be safe without diagonal reinforcement, although one or two ties would be desirable.

Under more severe conditions of loading than those assumed, and ranging up to the ultimate resistance of the beam, we should have proportionately greater intensity of tensile stress on diagonal planes, and, unless suitable reinforcement were added, the beam might fail in consequence of tensile stress arising out of shear.

Reverting to the conditions now under discussion, we may point out that as some designers leave the effects of shear to be resisted by the concrete alone, it would be perfectly reasonable to take into account the resistance of the concrete when settling the sectional area of the reinforcement. The other alternative is to disregard altogether the strength contributed by the concrete, and to provide sufficient steel to resist the whole of the tension due to shear.

In the first case, limiting tensile stress on the concrete to 50 lbs. per square inch, and taking the area of the diagonal planes at $(10 \times 5 \times sec.\ \theta) = 70{\cdot}70$ **square in., we have** for the resistance of the concrete

$$50 \times 70\,70 = 3.535 \text{ lbs.,}$$

leaving $(4\,949 - 3.535) = 1{,}414$ **lbs. to be met by** steel reinforcement in the first bay, while in the remaining portions of the beam, between the abutment and the centre, tension can be met by the concrete alone.

If the limit of tensile stress for the steel be fixed at 15,000 lbs. per square inch, the sectional area of the steel tie along the diagonal $a\,b_1$ **will be**

$$1{,}414 \div 15{,}000 = 0{\cdot}0942 \text{ square in.}$$

It would perhaps be more correct to calculate the area of the concrete by taking the effective depth between the axes of compression and tension. Assuming the position of the neutral axis to be 5 in. above the centre of the reinforcement, the effective depth would be $(5 + 3.3) = 8.3$ in., or, say, 8 in. Then, proceeding as before, the area would be $(8 \times 5 \times sec.\ \theta) = 56.56$ square inches, and the resistance of the concrete $(56\,56 \times 50) = 2{,}828$ lbs. This would leave $(4{,}949 - 2{,}828) = 2{,}121$ lbs. to be met by the first diagonal tie, $a\,b_4$. Thus it is clear that a very safe rule would be to regard the concrete as taking one half of the tension on any diagonal plane.

In the second place, disregarding the value of the concrete altogether, the areas of the diagonal ties should be as follows:—

$a\ b_4$ $4.949 \div 15\,000 = 0{\cdot}3290$ **square in.**
$a_1\ b_3$ $3.535 \div 15{,}000 = 0{\cdot}2356$ **square in.**
$a_2\ b_2$ $2{,}121 \div 15.000 = 0{\cdot}1414$ **square in.**
$a_3\ b_1$ $707 \div 15{,}000 = 0\,0471$ **square in.**

As it would be inconvenient in practice to use round rods of different diameters, or thin strips of different gauges, the average section of 0.1885 square inches might be adopted in conjunction with a suitable adjustment of the spacing, the ties being placed near together at the abutment, and the distance progressively increased towards the centre of the beam.

Another method of calculating the sectional area of reinforcement in the form of ties, or "stirrups," for resisting tension on planes inclined at 45 deg. to the horizontal, is given by Dr. Slocum, of Cincinnati University, in the following terms:—"The maximum intensity of tensile stress is first found for points midway between successive stirrups. The average of these two intensities is taken and multiplied by the width of the beam times the distance between two successive stirrups measured on a horizontal line, not greater than the depth of the beam. If this tension is divided by the safe unit stress for steel, it will give the area of the steel required in a cross section of the stirrups."

This method appears to be based upon the ordinary expression, $Q = q\,b\,\delta x$, for ascertaining the amount of shear on a horizontal plane. Stated algebraically, it gives the **equation** $P_t = max.\ p_t\,b\,\delta x$, **where** P_t **= total tension on any tie. Denoting the safe unit stress for steel by** f_t, **the area of steel is** $P_t \div f_t$.

The practice of some engineers is to place the reinforcement for resisting shear at right angles to the horizontal, but from the preceding discussion it is evident that the ties or stirrups should be perpendicular to the planes subject to normal tensile stress, and should be inclined at an angle of 45 deg. to the horizontal.

BOOKS RECEIVED.

A Digest on the Law of Easements. By L. C. Innes. Seventh edition. (Stevens and Sons. 7s. 6d.)

Gas Engines. By W. A. Tookey. (Merritt and Hatcher. 1s.)

Technical Plumbing. By S. Barlow Bennett, R.P.C. (J. Harrison, Stockton-on-Tees. 2s. 6d.)

Elementary Building Construction and Drawing for Scottish Students. By Charles Gourlay, B.Sc. (Blackie and Son. 6s.)

The Modern Carpenter and Joiner. Edited by G. Lister Sutcliffe. Divisional-Volume VI. (The Gresham Publishing Co.).

GENERAL BUILDING NEWS.

New School, Loughborough.—The new school in Rendell-street, Loughborough, will be opened shortly. Competitive designs for this school were invited by the late School Board about two years ago, and five designs were submitted by local architects, Messrs. Barrowcliffe and Allcock, with two designs, securing the first and second places. The new building is arranged upon the corridor system, and consists of a schoolroom 59 ft. by 23 ft., divided by a sliding partition for separate classes, and three classrooms about 25 ft. square. An 8 ft. corridor divides the schoolroom from the classrooms, and communicates with the entrance lobbies and cloakrooms. It is separated from the classrooms by large glazed screens. The girls' and boys' entrances are placed at the extreme ends of the building and have large cloakrooms. There are also storerooms for books, etc., and teachers' retiring-room, with lavatory adjoining. The whole of the internal walls, to a height of 4 ft., are lined with cream-glazed tiles, with stucco to walls above. The floors throughout are maple boards, laid on concrete, and all the internal joinery is of pitch pine. The heating is by Grundy's patent ventilating stoves. The corridor is covered by a flat roof, enabling school and classrooms to have windows on both sides to provide cross ventilation. The windows are carried up to ceiling levels, and have opening fanlights above transome, with steel hopper casements, for introduction of fresh air at sill level. The extract ventilation is by Boyle's ventilators, fixed in turrets upon roofs, and connected with grids in ceilings by separate metal ducts. Asphalted playgrounds and covered playshed are provided for each sex. Externally, a simple treatment of Renaissance character has been adopted. The building is faced with Gibbs' sandstock bricks, and has terra-cotta dressings, supplied by the Hathern Station Brick Company. The contractor is Mr. A. Faulks, and the architects Messrs. Barrowcliffe and Allcock.

Synagogue, Stoke Newington.—The new synagogue and classrooms situated in Shacklewell-lane, Stoke Newington, were recently opened. The synagogue gives seating accommodation for 450 men and 300 women, while the classrooms will hold 250 children. Mr. Lewis Solomon is the architect. The total cost, including the site, is about 12,000*l.*

Co-operative Society Branch, Deckham, Gateshead.—A new branch of the Gateshead Co-operative Society has been opened at Deckham, Gateshead. The building is of brick with stone facings. On the ground floor are the provision shops, and on the second floor drapery and hardware departments. At one end of the building is a self-contained house, and at the opposite end there is an upstairs and a downstairs flat. The cost of the building was 8,000*l.* It is fitted throughout with the electric light, and there is a lift from the ground floor to the floor above. The contractors were Messrs. Raven and Hitcham, Gateshead, for the brick and masonry work, and for the woodwork and fittings Messrs. Greason Bros., also of Gateshead. There is on the premises a 25 b.h.-p. engine for driving the dynamos and working the lift. The electric fittings were put in by Messrs. Mason and Co., Gateshead. Mr. Edwin Bowman, Newcastle, was the architect for the work.

Municipal Buildings, Crewe.—The foundation-stone of the new municipal offices, Crewe, has just been laid. The buildings are being erected by Messrs. Robert Neill and Sons, Manchester, from designs by Mr. H. T. Hare, London. The total cost, with furnishing, will be about 18,000*l.*

Council Offices, Prestatyn, Wales.—The opening of the new offices and fire-station for the Prestatyn Urban District Council took place on the 21st ult. The new building is three stories in height, and has an elevation of Ruabon pressed brick, with terra-cotta ornamentations and Gwesfyr stone dressings. The accommodation comprises a council chamber, and a suite of offices for the clerk and surveyor, and on the ground floor is the fire-station. The contractor is Mr. Joseph Williams, who carried out the work from plans made by Mr. Bell, a former surveyor, under the superintendence of Mr. Thomas, the present surveyor.

School, West Hartlepool.—On the 23rd ult., the new Jesmond-road school, West Hartlepool, was opened. The new building occupies a site of 6,000 superficial yards, and the type of plan adopted is that of a central hall, with classrooms arranged along both sides. There are 24 classrooms, each accommodating about 50 to 60 scholars, the infants and junior mixed department being on the ground floor, and the senior mixed occupying the whole of the first floor. The lighting is by electricity, and the ventilating apparatus is also driven by electric power. The exits are arranged so that the whole building can be cleared of its occupants in two minutes. The school provides accommodation for 1,448 children, and it has been built at a cost of 21,000*l.* The contractor was Mr. Thos. Beetham, of West Hartlepool, and the architect Mr. Percy Hinde.

Underground Conveniences.—The Lambeth Council have just completed two underground conveniences—one at Loughborough Junction, and the other opposite St. Thomas' Hospital, at the end of Westminster Bridge—designed by Mr. Edwards, Engineer to the Council. The ranges of urinals—which are different from those usually employed in the London public conveniences—have been specially manufactured by Messrs. Adams and Co., of Westminster. They have white circular fireclay backs with dark green mouldings, set against St. Anne's marble slabs, with St. Anne's marble flushing tanks. The contractor for the work was Mr. J. Parsons, of Waterloo-road.

New Buildings and Memorial Fountain, Guy's Hospital.—The new library for the use of the students and the medical school has been built by Messrs. Holloway Bros., after plans and designs by Mr. J. H. T. Wood, architect to the governing body. The library, a gift of Sir Frederick Wills, M.P., occupies the entire ground-floor of the building adjacent to the new physiological department, and the two blocks are portion of a scheme for the gradual remodelling of the medical school museums and allied departments. It will contain space for 10,000 volumes, the cases and panellings, of carved oak, are arranged so as to form separate bays for the students, each bay having its own window and being furnished with a large oaken reading-table. In the colonnade that stands next south to the entrance-door of the Astley Cooper Ward, has been erected a memorial in honour of Guy's men who fell in the course of the South African War, 1899-1902. It is in the shape of a drinking fountain, after a classic design, having a base 6 ft. 6 in. wide and 7 ft. 6 in. high, constructed of Siena marble, with columns of Verte-Antico at the sides, their Ionic capitals being of gun-metal, and the entablature of Pavanazza. The hospital coat of arms, executed in enamel and bronze, surmount of pediment, and cherubim support a canopy in which is the inscription in letters of gun-metal. The Coalbrookdale Company executed the memorial from the designs of Mr. Frederick Wheeler.

New Wesleyan Chapel, Corsham.—The memorial-stones of the Wesleyan Chapel, which is to be erected in Pickwick-road, Corsham, were laid recently. The new building, which is in the Gothic style, with open timber roof and traceried windows, will provide seating accommodation for three hundred persons, and it is estimated to cost 1,500*l.* Mr. Bromley is the architect, and the contractor Mr. Moore, of Trowbridge.

Extensions to Sunderland Asylum.—The new male patients' villa and the nurses' home at the Sunderland County Borough Asylum, at Ryhope, have now been completed. The male villa is entirely detached from the main building, the object being to avoid, as far as possible in further extension, the continuance of what might be termed the barack-room system. The new villa provides accommodation for forty patients, and contains in all twenty-one rooms, including dining-room, dayroom, three dormitories, five single bedrooms for private patients or attendants, and the usual kitchen, scullery, etc. The nurses' home will accommodate twenty-five nurses, and is handsomely furnished It is connected with the main building by a corridor. The contract for erecting the two buildings was let to Mr. Joseph *Elliot*, of North Shields, who has executed the work under the supervision of the Borough Engineer, Mr. J. W. Moncur, assisted by Mr. Thomas Axtell as clerk of works. The cost of the nurses' home is 3,882*l.*; the male extension, 5,434*l.*; draining and sanitary plumbing, 960*l.*; and furnishing, 1,085*l.*—total, 11,361*l.*

Central Hall, Birmingham.—The new Wesleyan Methodist Central Hall, which has been erected in Corporation-street, Birmingham, was opened on the 16th ult. The building is designed in the renaissance style. It covers an acre of land, and has a frontage of 224 ft. to Corporation-street, 113 ft. to Ryder-street, and 275 ft. to Dalton-street. The ventilating tower rises 180 ft high. There are five entrances to the building; two from Corporation-street, two from Dalton-street, and one from Ryder-street. It is intended to use the ground floor and basement as shops and for commercial purposes. The main entrance to the hall is in Corporation-

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street beneath the tower, and in the porch are terra-cotta panels in bas-relief depicting incidents in the life of John Wesley. From the hall rises a double staircase leading to a corridor, from which the synod hall and great hall are approached. The latter is the principal feature of the building. It is arranged in the form of an amphitheatre, and will accommodate 2,000 persons besides the orchestra. Ample provision has been made for quickly emptying the building, there being twenty-one exits. On the first and second floors are the synod hall, Sunday school, ladies' parlour, library, gymnasium, girls' club-room, and men's club-room, and a number of committee and class-rooms. The synod hall will accommodate about 450, the Sunday school 400, and committee rooms about 100 each. In the basement a room is set apart as a ragged school, and its close proximity to the kitchens makes it that it can be easily adapted in time of distress for feeding the poor. The heating arrangements are a combination of hot water and hot air systems, and have been carried out by Messrs. Haden and Co., of Trowbridge and Birmingham. There is also a twofold system of lighting—electricity and gas—but the gas installation is on a minor scale, and is only intended to be an alternative service in the event of the electric supply failing. The entrance-hall and main corridors are laid with mosaic, the staircases and landings being of granolithic cement. Mr. Ewen Harper, of Birmingham, is the architect, Messrs. John Bowen and Sons being the contractors. The cost of the building has been 65,000*l*.

Victoria Memorial, Crathie.—On the 20th ult., a bust of the late Queen was unveiled by the King in the Parish Church, Crathie. The monument consists of a portrait bust in white statuary marble, and is placed in a granite niche on the face of one of the granite pillars which support the arches of the chancel and the Royal transept. The bust is of the finest Carrara marble, and the Queen is represented as wearing the crown with a veil. She also wears State robes and the Order of the Thistle. In the design of the niche and canopy advantage is taken of the variety of colours in the granite of Aberdeenshire. The pillar itself is of Deeside light grey. The interior of the niche is of a darker shade of polished grey, and the canopy and sides are of coral-coloured granite from Donside, while the panel containing the inscription is of the same granite, but with a deeper shade. The inscription is incised and gilded. Like the rest of the church, the niche with bracket and canopy is designed in the Scottish phase of the decorative Gothic period. The bracket on which the bust stands is carved in granite, a winged angel's head supporting the panel which carries the inscription. The base of the niche is moulded and the sides enriched with pinnacled buttresses, moulded and carved; but the leading feature in the scheme is the richly carved canopy which enshrines the monument. The design was the joint work of Herr Emil Fuchs, and Mr. A. Marshall Mackenzie, of Aberdeen, the bust being the work of the former, and the niche, canopy, and bracket of the latter. Two mural tablets have also been erected, one at each side of the Royal pew. These are of dove-coloured marble with medallions of white Carrara marble and borders of Caen stone. The King has also had a canopy erected over the pulpit. The design is in light Gothic open work, which bears at intervals shields showing the arms and emblems of the writers of the New Testament. The canopy may be raised or lowered by a chain of wrought iron and brass.

Church, Beeston Hill, Leeds.—The foundation-stone of the church of the Holy Spirit, to be erected at Beeston Hill, Leeds, was laid on the 26th ult. The new edifice, which is to cost about 10,000*l*., and which is to provide seating accommodation for 800, has been designed by Messrs. Prothero and Phillott, architects, of Cheltenham. It is to be built of stone from Horsforth, with Ancaster stone dressings outside, and Bath stone dressings inside. The style of architecture is to be the Late Perpendicular. The plans provide for a tower, but it is proposed to erect only twenty feet of this in the meantime.

Gresham's School, Holt, Norfolk.—The new buildings, which were opened on the 30th ult., supersede the present school buildings in the Market Place of Holt, which were rebuilt about forty-five years ago on the site of the former and original buildings of the school, which was founded and endowed by Sir John Gresham in 1555-56. The new buildings are on the north side of the Cromer road, half a-mile from Holt. They are designed in two separate blocks, the one on the west containing the headmaster's house, dining-hall, boys' studies and dormitories, kitchens and offices, and that on the east containing the school buildings, assembly hall, laboratories and workshops. The buildings can be connected by a cloister later on, if required. In the centre of the master's house block is placed the boys' dining-hall, and on either side are placed the master's private apartments, and the boys' studies and dormitories. The breathing space in the dormitories for each boy is 800 cubic feet. Lavatories and bath-rooms are placed at the end of each dormitory. Over the dining-hall is an isolated sick room, with separate bath-room, and nurses' room adjoining. On the west side of the dining-hall, the remainder of the buildings, which are in three stories, comprise the master's house, communicating on the main stair landing with a corridor leading to the boys' dormitories by a pass door. In the rear of the ground-floor are the kitchen and offices, with servants' rooms over, approached by a separate staircase. To the east of these buildings, but in the same line of frontage, is the school building, in the form of a three-sided quadrangle; the west side containing the school assembly hall, 70 ft. by 32 ft., with tracery windows and open timber roof of a late Gothic type. From this hall a wide corridor runs eastwards, with class-rooms and cloak-room on the north side, ending in a return wing containing the laboratories, workshops, and lecture rooms. The class-rooms contain 483 ft. superficial each, for the accommodation of twenty-four boys each, allowing over 20 square feet for each boy, the lighting in all cases being left-handed, and all the rooms have additional lighting from the corridors, and also means of cross-ventilation. The rooms are all fitted with double-hung sashes with deep window boards, extract ventilation flues connected to a main exhaust, and are heated with hot-air stoves, with additional heating from low-pressure hot-water pipes. On the second floor a special drawing class-room has been provided. There are also chemical laboratory, physical laboratory, the metal workshop, and carpenters' shop. Electric light is used in the whole of the buildings, supplied from an installation specially erected in the school grounds. The buildings have been carried out in the domestic renaissance style of building, prevalent in the early seventeenth century (except the hall, which has been given a late Gothic character), and are all faced with red local bricks and Ancaster stone, the roofs being covered with Broseley tiles. The general contractor was Mr. George Riches, of Cromer, the sub-contractors being:—For the plumbing and drainage—Messrs. Matthew Hall and Co.; for the heating and cooking apparatus—Messrs. F. Edwards and Son; for the wrought-iron work—Messrs. Starkie, Gardner and Co. The electric light plant and installation was designed by Messrs. Massey and Alipress, and the work has been largely executed by Messrs. Wells and Co. The fittings for the laboratories have been carried out by Messrs. Baird and Tatlock, from the architect's design, and the school desks have been provided by Messrs. Hawes of Norwich, and the Bennett Furnishing Co. The buildings were designed and have been carried out under the personal supervision of Mr. H. Chatfeild Clarke, architect, of London.

MISCELLANEOUS.

Professional and Business Announcements.—In consequence of the death of Mr. Nightingale, builder, of Albert Embankment, the business will in future be carried on by his sons, who have entered into partnership under the name of "B. E. Nightingale."——Mr. Edwin J. Sadgrove, architect, has removed his offices from 22, Surrey-street, to 4, Southampton-row, W.C.——Messrs. Dent and Hellyer, sanitary engineers and plumbers, have removed from their old premises at 21, Newcastle-street, Strand (the site being required by the County Council for the Holborn-Strand improvements), to 35, Red Lion-square, and 75, Theobald's-road, W.C.—Mr. Francis W. Bedford, architect, has transferred his principal office from Greek-street Chambers, Leeds, to 22, Old Burlington-street, London, W., retaining the Leeds address as a branch office, where he can be seen by appointment.

Felt Linings.—Messrs. Engent and Rolfe, Poplar, send us a specimen of their "ƎX Hair Bitumen," a felt for underlining roof covering, and lining, walls, partitions, floors, etc. It seems to be a very good material in a constructive and sanitary sense, but has a strong bituminous smell, so that in residences, etc., it could only be used where it is entirely covered and shut in.

Royal Academy Lectures.—The card of lectures at the Royal Academy for the session 1903-1904 leaves the lectures on painting and sculpture a blank for the present. In architecture, Professor Aitchison is announced to give a course of four lectures on Vitruvius, a subject which he probably knows more about than any one else. These will be given on February 29, March 3, March 7, and March 10.

Leeds School of Art.—At the opening lecture in connexion with the class of architectural design, on the 24th ult., Mr. Butler Wilson, the President of the Leeds and Yorkshire Architectural Society, occupied the chair, and in a short address, after congratulating them on the occupation of their new buildings, he said he had long thought that pupilage should be preceded by some elementary training preparatory to an office career. Many architects who refused to receive pupils as beginners would probably take them if they were well grounded, and in such cases the period of pupilage would obviously be shortened. A year or two spent in a school of architecture should enable a student to acquire at moderate cost the rudiments of his work before learning in an architect's office the practical details of his profession, and the Committee of that Institute had equipped the several departments with facilities previously unknown in connexion with the drawing schools of Leeds. Mr. F. Musto, the architectural teacher in the new School of Art, then gave a lecture on "The Study of Architectural Design: Its Necessity and Its Recompense." He remarked that young men starting their profession found no difficulty in taking up constructional work, but somehow he usually found that beyond that they had not gone. As time went on he trusted they would find that they were increasingly looking at design and the artistic side of things. The subject of design did not appear in the intermediate programme at all. He had had to discourage young men from beginning the study of architectural design because they had not gone over the preliminary ground, but when once they had passed that preliminary ground the sooner they got to work on thinking out actual design work the better. He advised students to visit old and new buildings, and in addition to measuring and sketching and analysing, he suggested that they should criticise and sum them up, and consider whether it ought not to be possible to improve upon them. Alluding to a letter which appeared recently in the *Yorkshire Post* from a lady, he said she complained bitterly that architects were most horrible people, who would not provide cupboards and several other things. He thought that lady was perfectly justified in her complaints. An architect who designed a house that had not enough cupboards and proper bathroom and wash-house arrangements, and proper facilities for carrying on household work, ought to become something different from what he was. As to the rewards of architects, these were few and far between. The engineer and the contractor, and the secretary and anybody else, could get his name in the papers, and get presented to Royalty, and get honours and baronetcies, but an architect had to live on his own innate appreciation of his art. The prospects of a man who had not only studied construction but detail and design work were, however, greater than those of a man who had done nothing but constructional and strictly practical work.

A Questionable Improvement at Hampstead.—Some of our readers are doubtlessly familiar with the steep and narrow lane, blocked with a toll-gate, which, as it descends from the end of Church-row to Frognal and West End-lane, skirts the northern side of the parish churchyard. The Borough Council have just purchased the toll-bar and its quaint little toll-house, together with an adjoining strip of land, for the purpose of widening the lane and rendering it available for general traffic. The toll-gate at Hampstead is one of the last that have survived in the immediate neighbourhood of London. Why could they not have let it alone?

Recent Compensation Claims and Awards (London).—In the Westminster High Bailiff's Court the jury have made an award of 5,435*l*. in settlement of a claim for 9,604*l*. preferred by Messrs. Wyld and Robins, market-produce dealers, in respect of their premises at No. 19, James-street, Covent Garden. The house is acquired by the Great Northern, Piccadilly, and Brompton Railway Company, and it was stated in evidence that the value of the premises, which are held upon a lease, of which thirteen years are unexpired, at a rent of 150*l*. per annum, and are in close proximity to Covent Garden Market, was greatly enhanced by reason of their freedom from the Duke of Bedford's market-tolls, which vary from ½d. to 4d. for each package delivered into the shop. Mr. Douglas Young assessed the value at 2,300*l*. —At the Sheriff's Court, in Red Lion-square, has been concluded, after a four days' hearing, a case for a claim advanced by the London and India Docks Company against the North London Railway for a sum of 140,000*l*. The claim, made in that Court upon an order of the Court of Appeal, related to a small parcel of land having a quay frontage to Blackwall Basin, and formerly owned by the claimants, but now acquired by the Railway Company under statutory powers for widening and deepening the entrance from the basin into the Poplar Dock, which they have leased from the claimants for a term of 999 years. Sir Ralph Littler, K.C., Mr. Balfour Browne, K.C., Mr. Moon, K.C., and Mr. Joseph Shaw, were counsel for the Railway Company. The claimants were represented by Sir Edward Clarke, K.C., Mr. Edward Boyle, K.C., and Mr. Rowlatt. After a summing-up by Mr. Under-Sheriff Burchell, a special jury found for the Dock Company in the sum of 5,575*l*.

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Widening of Sloane-street, S.W.—A scheme is formulated for carrying out an improvement of the northern end of Sloane-street, where the thoroughfare will be widened to a minimum of 60 ft. between Brompton-road and Basil-street. The estimated cost of the works, at the expense of the London County Council, is 75,000*l.*, towards which 20,000*l.* will be contributed by the Borough Council.

Drawing Appliances.—We have received from Messrs. Longman and Co. a set of specimens of set-squares, scales, etc., designed by Professor D. A. Low, and in which this eminent publishing firm are apparently dealing. They are all made in London, with special tools and appliances designed for the purpose. The peculiarity about the make of the set-squares is that they have bodies of a strong and tough white wood edged with transparent celluloid in the case of Design A, and with hard ebonised wood in the case of Design B. They are framed and faced with thin white polished celluloid. It is claimed that the celluloid facings give great strength to the squares, enabling them to be made much thinner than the framed set-squares which have been in use hitherto. The specimens are certainly both light and stiff, and the faces which come in contact with the paper being smooth and white any speck of ink or dust is at once seen and can easily be wiped or washed off. But the most important peculiarity is that the thin celluloid facings leave off within about 1-10th of an inch of the drawing edges of the square, so that when a square is resting on the drawing paper, the drawing edges stand above the paper to the extent of 1-100th of an inch. "This slight elevation of the drawing edge above the paper does not interfere with accuracy in drawing, and it is found that in inking in it reduces very considerably the chances of blotting or smearing." This we have no doubt would be the case. Another novelty is an adjustable protractor set-square, made of white celluloid, in which a moveable portion slides round in a quadrant groove in the body of the set-square, the moving portion divided up to 90 degrees, so as to supply a straight-edge set at any angle that may be required. It is ingenious, but a little stiff in adjustment, and we rather doubt its coming much into practical use. But the set-squares can certainly be recommended. There are also some drawing-scales printed on slips of wood, covered with a very thin coating of celluloid for preservation. It is claimed that the wood, which is cut with the grain parallel with its length, will be sufficient to prevent the usual tendency of celluloid to expand or contract, and that the celluloid renders the scale practically indestructible. That will be a point for experience to show.

Breach of Building By-Laws.—At a recent meeting of the Woking County Bench, D. G. Bayliss was summoned by the Woking District Council for a breach of their building by-laws, and pleaded not guilty.—Mr. R. Mossop, clerk to the Council, explained that the offence committed was in respect of a shed erected by the defendant at St. John's, on a narrow piece of land abutting on the canal. It was 25 ft. by 20 ft., and 7 ft. high, and was built on wooden supports with an iron roof. It was within 2 ft. or 3 ft. of another wooden building, and within 12 ft. or 15 ft. of a stable. The sides of the shed were of wood and wire netting. The only cases where such sheds were exempt from the by-laws were when they were 30 ft. away from any other building, and the same distance from the boundary of adjoining premises, or when the walls were entirely enclosed by iron. The building was used for keeping a pony and cart in, also some chickens. The state of things described would be very dangerous in the event of fire.—Defendant: The insurance company accepted the risk.—Evidence having been given by Mr. G. J. Wooldridge, Surveyor to the Council, defendant said that the shed was a poultry-house in 1901, and had only been enlarged. There was no manger, and the cart referred to was used for chickens to roost on.—Mr. Mossop contended that even if what defendant said were true, there could be no doubt that the additions constituted a new building under the by-laws.—The Chairman said a fine of 20s. would be imposed, and reminded defendant that he was still liable if he allowed the shed to stand.—*Surrey Advertiser.*

The Manchester School of Architecture.—We learn from the *Manchester Guardian* that the syllabus has been issued of the new Manchester School of Architecture, which has been called into existence by the joint arrangements of Owens College, the Municipal School of Technology, the Municipal School of Art, and the Manchester Society of Architects. Professor S. H. Capper has been appointed director of the new school. His career began at Edinburgh University, where he took first-class honours in classics. Thence he went to Heidelberg, and afterwards he took a special course of architectural study at the Ecole des Beaux Arts, in Paris. Returning to Scotland, he practised for some years the profession of architecture in Edinburgh, and was in the course of time appointed lecturer at the University and examiner for the Master of Arts degree in art history and archæology. Seven years ago Mr. Capper went to Canada, where he held at the M'Gill University in Montreal a similar position to that which he has now taken up in Manchester. The work of students in the School of Architecture will be carried on partly at Owens College, partly at the Municipal School of Technology, and partly at the Municipal School of Art, and the syllabus has been arranged, in consultation with Professor Capper, by a committee upon which Mr. J. W. Beaumont and Mr. Paul Ogden represent the Manchester Society of Architects and, of course, the practical interests of their profession. This new School of Architecture will provide Manchester with educational opportunities which it has not hitherto possessed. There has been for some time a School of Architecture in Liverpool, under Professor Simpson, which has done good work, and the Victoria University had an honours school of architecture leading to the B.A. degree; but hitherto there has been no such school in Manchester. Professor Capper's students will have the opportunity of proceeding to the degree of the Victoria University and taking honours in architecture, just as those of Professor Simpson had before the partition of the colleges. A first-year course has been mapped out for students who intend to take the degree of the Victoria University in the Honours School of Architecture, and the inclusive fee for the full course has been fixed at eighteen guineas. There are, in addition, certain special courses at lower fees. For example, there will be a course on the history of architecture delivered at the Owens College on Tuesday and Thursday mornings. In this course Professor Capper will make a general survey of architectural history from ancient Egypt to modern times, with special reference to the evolution of styles and to constructional forms and methods. The course includes ancient Egypt and Assyria, Greece, Rome, Byzantine and early Christian architecture, Romanesque, Monastic, Gothic, Renaissance. The fee will be 2*l.* 12s. 6d. On Friday mornings he will give at the Municipal School of Technology a course on the elements of architecture; the classical orders, Greek and Roman, their mouldings and details; arcading, classical and Gothic; Gothic mouldings and details, their construction and design; elements of architectural effect; composition and style, and so on. The fee for this course will be 1*l.* 11s. 6d. Drawing classes will meet at the School of Technology for the study of programmes and exercises set in connexion with the lectures on the elements of architecture and in the class on architectural drawing and design, and Professor Capper will examine and criticise the work of the students. Classes for freehand drawing and modelling will meet at the Municipal School of Art. It will not be attempted in the University course to supersede that side of training for professional practice which is only fully gained by practical employment in offices and works. The University course is intended chiefly to provide for a thorough grounding in the principles upon which professional practice is ultimately based.

Buildings in Glasgow.—At a meeting of Glasgow Dean of Guild Court held recently, the Lord Dean of Guild—Lord Inverclyde—referred to the work passed by the Court during the past twelve months. The total valuation of the linings granted was 2,200,773*l.* as compared with 2,549,698*l.* during the previous year. The linings granted numbered 603, of which 170 were for dwelling-houses and shops, 12 for public buildings, 19 for churches, halls, and schools, 134 for warehouses and shops, 228 for alterations and additions, and 40 for new streets, extending to 11,683 yards, or about seven miles. Of linings for dwelling-houses granted, 765 were of one apartment, and 2,117 of two apartments. The single and double apartment houses were mostly in the Eastern, St. Rollox, and Maryhill districts, while of linings for three and more apartments by far the greater number were for Queen's Park district. The Lord Dean of Guild further remarked that in a general way the feeling of the Court was greatly against the granting of linings for the erection of buildings in hollow squares, except in exceptional cases. It seemed in every way desirable that, in the more thickly populated districts of the city in particular, there should be the greatest possible amount of open spaces within the bounds of hollow squares, not only for sanitary reasons, but for the general well-being of the large population, who were in many instances thronging the buildings on the four sides of the squares, and to whom light, and air space, was of the very greatest consideration.—*Scotsman.*

Manchester Water Supply.—At a meeting of the Waterworks Committee of the Manchester City Council, held recently, it was reported that there was at present a stock of water equal to 109 days' supply. The engineer stated that during the past fortnight 1¼ miles had been laid of the second pipe to Thirlmere. Up to the present 31 miles had been laid out of a total length of 45 miles. It is anticipated that the line will be completed in 12 months. The committee have under consideration the question of proceeding with a third pipe to Thirlmere as soon as the second pipe is completed.

CAPITAL AND LABOUR.

Plumbers' Strike, Stockton.—The strike of plumbers at Stockton is assuming more serious aspects. The whole of the men employed in the town are out, and the building trade is becoming affected. The employers are trying to fill strikers' places from outside. The men came out nearly three weeks ago as a protest against an alleged violation of the working rules by one of the firms employing non-unionists.—*Newcastle Leader.*

Sunderland Joiners' Dispute.—A mass meeting of the Sunderland joiners was held on the 25th ult., in connexion with the dispute which has existed between the house joiners and the master builders for fourteen weeks. The question, it will be remembered, was submitted to arbitration, and Mr. A. A. Hudson, the referee appointed by the Board of Trade, awarded that the advance asked for by the men, from 9½d. to 10d. per hour, should not be granted. At last night's meeting the text of the award was read over, and the men agreed to start work again on Monday, and the chargemen will resume their duties this morning.—*Newcastle Chronicle.*

LEGAL.

EMPLOYERS' LIABILITY ACT.

How should old concrete be taken up?

At the Brompton County Court (London), on Tuesday, before Judge Stonor and a jury, Frederick B. Giles, a builders' labourer, 39, Malva-road, Wandsworth, S.W., sought to recover damages under the Employers' Liability Act, against Messrs. Perry and Co., builders and contractors, Tredegar Works, Bow, E., the claim being in respect of personal injuries, said to have been sustained owing to negligence on the part of the defendants or their servants.

Mr. J. W. Moyses, counsel, appeared for the plaintiff, and Mr. W. Duckworth, counsel, for the defendants.

Plaintiff's counsel stated that on June 4 last his client was in the employ of the defendants, assisting in some building operations at the District Railway's new generating station at Lots-road, Chelsea, S.W. Some old concrete had to be taken up by means of large steel wedges or "pins" and heavy hammers. The plaintiff was told by the "ganger" on the job to hold one of these "pins" with his hand, while another workman, slinging the hammer over his head, struck the top of the "pin," and so broke up the concrete. The work went on well for a time, but missing his aim, the man with the hammer struck the plaintiff a terrible blow on the hand, crushing it against the concrete.

The plaintiff bore out counsel's statement, adding that he had several times asked the ganger for iron tongs with which to hold the pin, but was told that there were none, and that he must do the best he could. The top of the pin also was worn, and the face of the hammer might have been a little the worse for wear.

In cross-examination, the plaintiff denied that there was hoop iron, hazel wisps, or osier sticks with leathern thongs upon the job, to use in steadying the pins or wedges.

The Judge: The question seems to be one of *volenti non fit injuria*—whether this man voluntarily took the risk, or whether he used his hands only under fear of dismissal.

Counsel for the plaintiff referred to the well-known case of Smith *v.* Baker, which he said was practically "on all fours" with the present case, and in which Lord Halsbury held that there was no "*volenti*," adding that if "*volenti*" were to apply to such a case, it would apply to the case of every person who crossed the streets in London.

Samuel Hazledon, the labourer who swung the hammer causing the accident, stated that there were no tongs of any kind upon the job for holding the steel wedges.

Mr. C. R. Griffiths, architect and surveyor, stated that for such work as that in question iron tongs, hazel wisps, or sticks with leather thongs should be supplied, by which the men could steady the steel wedges.

Cross-examined, witness said that hoop iron was not the recognised means by which the wedges or pins should be held; hoop iron was occasionally used for the purpose, but it was not so good as proper tongs.

Richard McKay, a man working on the job, also said that he asked the ganger for tongs, and the reply was that he would have to get on with the work without them.

Cross-examined: Pieces of hoop iron were sometimes used for the work, but they were not much good. Hoop iron was used for holding the pins after the plaintiff's accident, but not before.

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Medical evidence having been given regarding the plaintiff's injuries,

Frederick Chas. Jordan, the general foreman on the job, was called for the defence. Witness stated that there was an ample supply of hazel wisps, osier sticks, and hoop iron upon the spot, and these were used by some of the men both before and after the accident.

In cross-examination, witness said that men frequently used only their hands to steady a steel wedge while another man struck it with a heavy hammer, and he considered that such a course was perfectly safe.

William Smith, the ganger on the job, stated that there was plenty of hoop iron for the men to use, although no tongs were supplied. He had often seen such wedges held simply by the hand. They had hazel wisps in the stores which the men could have had by asking for them. It was true that he had been asked for some wisps, but he did not get them at the time; he told the men to use hoop iron.

John Goodram, another ganger on the job, also stated that there was plenty of hoop iron lying about on the spot. Personally, he would rather hold one of the wedges with his hand alone, if he knew that the other man could strike properly.

The jury found: That the way in which the work in question was carried on was generally dangerous and improper; that the plaintiff did the work under fear of dismissal; and they assessed the damages in the plaintiff's favour at 200*l*.

His Honour gave judgment accordingly, and allowed costs.

ANCIENT LIGHT DISPUTE.

THE case of Godson *v.* Robinson and Fisher was mentioned to Mr. Justice Bucknill in the Vacation Court on Wednesday, on an application by the plaintiff for an interim injunction to restrain the defendants from interfering with his ancient lights until the trial or further order.

On the case being called on counsel in support of the application said that counsel appearing for Robinson and Fisher, but who was not instructed to appear for the builder, wished for time to answer affidavits, and subject to his lordship's consent it had been arranged that the present injunction, granted by his lordship, should be continued, viz., an injunction to restrain the building going on so as to darken the ancient lights of the plaintiffs. It was arranged that so far as these two defendants were concerned that injunction should be continued until next Wednesday, when the case would be heard. In the circumstances he (counsel) asked his lordship to continue the injunction he had granted ex parte against the builder until next Wednesday.

His Lordship: Yes; I know all the facts.

LITIGATION AS TO ANCIENT LIGHTS.

THE case of Foster *v.* Waring was mentioned to Mr. Justice Bucknill, sitting as Vacation Judge last Wednesday, on an application by the plaintiff for an interim injunction restrainng the defendant until the trial from building so as to obstruct the plaintiff's ancient lights.

Mr. Bramwell Davis, K.C., for the defendant, said that he had arranged with Mr. Edward Ford, counsel for the plaintiff, that the defendant should give an undertaking in the terms of the notice of motion, the plaintiff undertaking in damages, and on these conditions, that the motion should stand over until the second motion day next sittings.

His lordship assented to the application.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

19,471 of 1902.—A. G. BAYLES and J. UNTERMANN: *Radiators Heated by Gas or Oil Stoves.*

A radiator for burning gas or oil, having a plurality of heating tubes is provided with a plurality of baffle plates, mounted in the upper part of each tube. The edges of the plates are provided with teeth to insure the more rapid heating thereof. A single cross-bar is also provided for each parallel series of tubes, and the plates suspended in the different tubes of the series from this single cross-bar. The plates may be strung on a rod, and separated from each other by intervening sleeves.

20,399 of 1902.—W. KLEUSER: *Locks for Doors and Similar Objects.*

A safety lock having a key-hole allowing the introduction of a key bit in two different positions, and a safety bolt and tumbler adapted to secure the main bolt and the door latch in their locking positions.

23,341 of 1902.—P. R. J. WILLIS. (W. R. Mudd): *Fire-Resisting Windows, Ventilators, Doors, and the like.*

A window made of hollow metal, having sashes provided with flanges and a frame, provided with grooves in which said flanges fit, the sashes having offsets adapted to engage each other when closed, said grooves, flanges, and offsets being so arranged relatively to each other that when closed the window is impervious to dust, rain, and fire. The said frame is provided with sections having flanges, said sections adapted to be fitted removably in the frame and held or suspended therein by means of a hooked or turned over portion engaging a flanged portion of the lintel.

23,602 of 1902.—E. H. KLAWITTER: *Bolts Applicable to Doors and Gates.*

This relates to bolts and means for locking them in position, consisting essentially of a plate with (or without) a cover, having mounted thereon a projecting spindle, on which is fixed a disc (or lever) to which the inner ends of two or more slotted and recessed sliding bolts are attached, and means for guiding, intermittently operating, locking, releasing, and causing them to engage with or to be disengaged from the retaining loops or recesses fixed to the door jambs or floor.

25,850 of 1902.—J. O. KLIMSCH, A. BESCHORNER, C. A. WELS, and J. V. RUSTON: *Manufacture of Slabs, Tiles, Sheets, and Other Forms of Material Similar to Marble Ceramic Ware and the like.*

Manufacture of slabs, sheets, tiles, and the like with enamel-like surface, and similar in appearance to marble or ceramic ware, consisting in mixing a saturated magnesium chloride solution with waste products such as bone-meal, beet residues, leyes, bran, or with peat or cellulose, and, if necessary, with the addition of a binding material such as flour, or resin powder, the resulting compound being then mixed with burnt and pulverised magnesite, and if necessary with colouring pigment, after which the material is subjected to drying and solidifying upon or between smooth or patterned slabs or plates.

6,217 of 1903.—C. W. RAYMOND: *Brick Cutting Machines.*

In a brick-cutting machine, a feed table, and a cutting-reel having a continuous rotary motion, and adapted to cut a series of bricks at a time from a clay bar advanced thereto by said feed table.

16,079 of 1903.—W. K. L. DICKSON: *Window Catches and the like.*

An automatic locking device for window fasteners and the like, consisting of a spring adapted to be depressed by the latch in closing, and to rise and lock the latch when it is passed over the spring, which is provided with an arm or the like, whereby it may be depressed by hand from inside and the latch released; a shield being provided over the spring whereby depression of the spring and release of the catch from outside are prevented.

23,497 of 1902.—G. C. BROWN: *Hinged Sliding Window Sashes to Open Inwardly.*

This invention relates to hinged sliding window sashes, and has for its object the provision of means whereby both upper and lower sashes may be readily opened inwardly for cleaning. A pair of hinges is fixed to the batten rod for the lower sash, the fixed flap having a short ward at each end, and the other flap consists of a longer ward to fit between. This in each hinge is provided with a U-shaped slot which receives a round-headed stud to fasten the flap down to the sash which can thus be readily opened inwardly. The opposite batten rod is secured in a closed position by a special form of screw fastener. When two sash weights are used, means are provided for supporting the one on the side opposite to that on which the hinges are fixed.

23,773 of 1902.—C. SHOWELL: *Hinges.*

This relates to the construction of wrought metal hinges, in which the joint is formed by rolling or folding over the metal to form the eye for the joint pin. Blanks are cut out of sheet metal, leaving gapped projections, which are folded to form the eyes, and in addition smaller projections, or studs, are formed at the outer ends of the said projections, and in alignment therewith, and upon the body or plate portion holes are pierced so that when the projections are bent over to form the joint these studs shall pass through the fixed holes and then be rivetted on the other side.

16,359 of 1903.—F. C. ROBERTS: *Joints for Brickwork of Furnaces, Roasters, and the like.*

This relates to the construction of joints for brickwork for furnaces, flues, and chambers subjected to high temperatures, which will permit the expansion of the brickwork without cracking. During the building of the furnace perishable pillars of wood or other material are provided between the opposing faces of the bricks which form the joints. When the structure becomes heated the pillars char or burn out, so that expansion can take place without distortion or weakening of the brickwork.

19,385 of 1902.—W. L. MITCHELL and W. L. MITCHELL, Jun.: *Method of Constucting Hinges for Manhole-Doors or Lids and Frames for Sewers and Tunnels.*

A method of constructing hinges of doors for manholes, for sewers or tunnels, which consists of a recess fixed or cast in the sides of the frame and a corresponding projection on sides of the door, which projection fits into the recess and allows the door to be lifted out of the frame, or to swing open as by a hinge; a stop or projection being provided which fits into the recess and allows the door to be lifted out only in a certain position.

20,303 of 1902.—T. LEWICKI: *Process for the Revivification of Filtering Materials.*

A process for revivifying filtering material, consisting in supplying the matter remaining in the filter with artificially-bred organisms for the purpose of producing the required fermentation in a few hours.

20,388 of 1902.—H. G. BUTLER: *Dredging and Excavating Machines.*

In an excavating machine, consisting in the combination with a car body, of supporting axles towards the opposite sides of the car body and an intermediate car axle, wheels upon said axles, unyielding connexions between the intermediate axle and car body at the rear side of the car between the side axles and car body at the forward part of the car, yielding connexions between the intermediate axle and car body at the forward side of the car between the side axles and car body at the rear side of the car, car propelling gear connected with the intermediate axle, and connecting rods between the car wheels at opposite sides of the car.

20,878 of 1902.—J. C. QUINN: *Manufacture of Artificial Stone or Similar Substances.*

The manufacture of artificial stone or the like by the following process, viz.:—Making a creamy magma of hydrated lime; thoroughly mixing this first with slate dust and water, and thereafter adding meta-silicic acid, and subjecting the mixture to pressure in a mould.

22,840 of 1902.—C. DRESSLER: *Manufacture of Glazed Tiles, Bricks, and Other Articles of Earthenware.*

In the manufacture of glazed tiles, and other articles of earthenware, coating or gumming the surface of each tile or other article to be glazed whilst the same is in "biscuit" form, with a solution of soluble silicate or equivalent substance that will be absorbed by the tile or other article and will produce an even and non-porous surface thereon, and afterwards applying a layer of slip to the coated or gummed surface preparatory to the application thereto of glaze or enamel.

23,664 of 1902.—H. W. CHAPPELL: *Manufacture of Tiles, Slabs, and the like.*

A process for the manufacture of tiles, slabs, bricks, and similar articles, consisting in pressing to shape a mixture of sand and lime, indurating the articles by treating them with carbonic acid gas, and finally submitting them to a high temperature in a furnace.

23,680 of 1902.—J. S. RIGBY: *Manufacture of Concrete Flags, Blocks, or Other Articles.*

A process for the manufacture of cement concrete flags, blocks, or other articles, consisting in mixing Portland cement and aggregage, subjecting such concrete to a pressure in a mould, then removing said article from the mould and allowing same to set, and then subjecting said article to steam or hot water under a pressure above that of the atmosphere.

23,771 of 1902.—E. DEANE: *Stonebreakers.*

In a stonebreaker consisting in the combination with the frame and a member movably mounted thereon of a crank shaft, a connecting rod or pitman, comprising downwardly projecting side parts and a transversely extending connecting bar, at the end of the connecting rod or pitman, and a toggle bearing between the frame and the said movable member thereon, engaged by the transverse bar of the connecting rod or pitman, the inward ends of the toggle being inside the downwardly projecting side parts of the connecting rod or pitman.

23,815 of 1902.—J. A. KING: *Fireproof Floors and Ceilings.*

Fireproof ceilings, consisting in the combination of flanged girders or joists with arched lintels or bricks having downward extending flanges, adapted to form the two sides of an air chamber, the top of which is formed by the girder or joist and the bottom by ceiling laths.

24,038 of 1902.—L. WHITTAKER and C. WHITTAKER AND CO., LTD.: *Moulds of Brick Presses or the like.*

Moulds for brick or like presses having wedge-shaped recesses in the walls thereof and corresponding wedge-shaped lining pieces fitting into the said recesses.

24,445 of 1902.—G. L. BROWN: *Fireproof Roofs.*

A roof covering comprising a series of concrete slabs suitably supported, said slabs having projecting sides covered with a suitable capping, the lower end of one slab adapted to overlap the upper end of the adjoining slab.

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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25,429 of 1902.—J. E. Kirkpatrick: *Manufacture of Bricks and Compositions Capable of Withstanding Very High Temperatures and for Use in Steel and other Furnaces.*

The manufacture of bricks and compositions capable of withstanding very high temperatures from crude magnesite of a high degree of purity, such as that found in many parts of Southern India, by the following process, viz.:—(1) Dead burning the magnesite to free it from carbon dioxide and any other volatile or organic impurities it may contain. (2) Crushing the dead burnt magnesite to powder. (3) Exposing the crushed dead burnt magnesite to the atmosphere and frequently turning it over. (4) Mixing the crushed dead burnt magnesite after exposure to the air with a small proportion of its weight of borax. (5) Adding only sufficient water to the material to enable it to be conveniently handled in a mass. (6) Moulding the mass to the required shape. (7) Drying the moulded mass, and (8) Burning the dried moulded mass at a high temperature.

161 of 1903.—J. H. Knight: *Machines for Laying Bricks for Buildings.*

This relates to machines for laying bricks for buildings, and consists of a number of structural improvements in such machines. In order to make the girder stiff and to keep the machine near to the vertical posts, the depth of the girder is utilised for the machine to travel on, the machine either sliding on the girder or running on small wheels or rollers. In order to allow the machine to commence work at ground level, three or more holes or sockets are made in the frame of the machine in which the horizontal bars which carry the actual laying apparatus can be inserted, so that the position of the laying part of the machine can be altered relatively to the position of the girder. In order to keep the bond better than it can be done by hand, the lever which carries the feeding pawl or ratchet is coupled to a crank, arm, or eccentric on a shaft which revolves once in the length of half a brick, which shaft derives its motion from the forward movement of the machine. When a header or transverse brick is presented to the machine, the pawl at once catches it and drives it home; when stretchers or parallel bricks are fed, on the first revolution of the crank the pawl simply runs forward and backward over the surface of the bricks, and on second revolution it catches them, and then drives them home. A spring or safety appliance is inserted in the connecting rod. The angular position of the crank in reference to the position of the machine on the girder can be altered by stops on the shaft, or by altering the angles of the tooth-wheel and pinion which work the same. This is necessary, as in different courses the vertical joints are a quarter brick in advance or behind the previous ones. To lay the mortar, mortar is run out by hand from a box or hopper, and in order to smooth it down and ensure an equal quantity of mortar throughout the work, a striking board is arranged and fixed either in advance of the actual machine, or on a separate slide or carriage running on the girder.

12,095 of 1903.—M. Perkiewiez: *Manufacture of Bricks.*

A method of protecting bricks from deposits and the like during burning by coating them with a solution of gelatine to which flour is added.

14,448 of 1903.—M. J. Murphy: *Bricks.*

A brick comprising a facing carrying lugs on its rear side, said lugs having contracted portions, and a body portion of cement applied to said rear side of the facing while in a plastic state, whereby the cement may engage in said contracted portions of the lugs and form a locking engagement therewith when the cement is in a hardened state.

16,663 of 1903.—T. Beevers and The Safety Tread Syndicate, Ltd.: *Staircases.*

This invention relates more particularly to the construction of metal staircases, and the invention consists in the mode of building up the staircase, and also in a construction of tread. The invention is applicable to staircases built between walls and to what are known as spandril staircases, the treatment in the several cases being slightly different. In carrying out the invention a series of separate brackets are provided which are built directly into the walls or may be secured to metal stringers, the brackets being provided with dovetail dowels which are built into the walls in any convenient manner. The brackets carry the risers and treads, which may be bolted or otherwise secured thereto.

16,854 of 1903.—S. A. Eddy: *Brickmaking Machinery.*

A brickmaking machine consisting in the combination with a rotating table having a series of brick moulds formed in it, of a chamber mounted above the said table and having an inclined bottom in which is formed an aperture immediately above the path of the brick moulds, the said chamber containing a series of rotating knives or blades adapted to rotate in an opposite direction to the table.

MEETINGS.

Friday, October 2.

Architectural Association.—Annual general meeting—President's address, 9, Conduit-street. 7.30 p.m.

Saturday, October 3.

Northern Architectural Association.—Visit to St. Chad's Church, Bensham. 3.30 p.m.

Monday, October 5.

Liverpool Architectural Society.—Ordinary meeting 6 p.m. Opening address by the President.

Tuesday, October 6.

Institute of Heating and Ventilating Engineers.—Meeting at Holborn Restaurant. 2.30 p.m.

Institute of Builders.—Half-yearly general meeting, Anchor Hotel, Ipswich. 3 p.m. (Postponed from October 1.)

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

September 16.—By Bentley, Hobbs, & Mytton (at Worcester).

Claines, Worcester.—Tappenhall Estate, 96 a. 1 r. 25 p., f.	£4,000
Lower Town Farm, 82 a. 3 r. 20 p., f.	2,955
Porter's Hill Estate, 76 a. 1 r. 39 p., f.	2,750
Little Park Enclosures, 3 a. 0 r. 2 p. f.	245

September 18.—By W. Brown & Co. (at Great Missenden).

Great Missenden, Bucks.—Hyde Heath Cottage and 10 a. 1 r. 21 p., f. and c.	1,025
Farmhouse and 40 a. 1 r. 12 p., f. and c.	2,500

By G. B. Hilliard & Son (at Chelmsford).

Margaret Roothing, Essex.—Hunt's Farm, 14 a. 2 r. 6 p., f., y.r. 11*l.* 10s.	260
Freehold house and garden, y.r. 8*l.*	125
Three freehold cottages, w.r. 12*l.* 12s.	210
Roxwell, Essex.—House, malting, and 1 a. 2 r. 29 p., c.	230

September 19.—By C. M. Stanford (at Colchester).

Boxted, Essex.—Boxted Hall Estate, 506 a. 1 r. 30 p., f.	10,000
Enclosure of arable land, 4 a. 0 r. 28 p., f.	110
Long Fen, 4 a. 0 r. 6 p., f.	110
Great Horkesley, Essex.—Hope's Meadow, 10 a. 1 r. 22 p., f.	235

By Maddison, Miles, & Maddison (at Norwich).

Billockby, Norfolk.—Enclosures of land, 13 a. 0 r. 20 p., f.	405
Rollesby, Norfolk.—Enclosure of land, 3 a. 3 r. 8 p., f.	100

September 21.—By May & Philpot.

Brixton.—20, Overton-rd., ut. 58½ yrs., g.r. 4*l.* 10s., e.r. 45*l.*	450

By T. V. Price (at Builth).

Aberedw, Radnor.—Hendre Farm, 87 a., f.	1,670

September 22.—By David Burnett & Co.

Tooting.—14 to 20 (even), St. Cyprian's-st., u.t. 93 yrs., g.r. 24*l.*, w.r. 153*l.* 8s.	650

By Nott, Cartwright, & Etches.

Pimlico.—6, Moreton-ter. Mews, u.t. 30 yrs., g.r. 4*l.*, e.r. 28*l.*	195
51, Denbigh-st., u.t. 28 yrs., g.r. 9*l.*, y.r. 80*l.*	475

By Spelmans' (at Yarmouth).

Yarmouth, Norfolk.—9, Nelson-rd. South, u.t. 965 yrs., g.r. 2*l.* 2s., y.r. 34*l.*	690

September 23.—By Percival Hodson.

Finsbury Park.—52, Regina-rd., u.t. 55 yrs., g.r. 6*l.* 6s. e.r. 38*l.*	340

By Nicholas, Denyer, & Co.

Great Missenden, Bucks.—Prestwood Lodge Estate, 44 a. 2 r. 3 p., f.	5,950

By Spelmans' (at Yarmouth).

Burgh Castle, Norfolk.—Freehold occupation farm, 32 a. 0 r. 7 p.	830
Various enclosures of land, 31 a. 3 r. 37 p., f.	790
Grazing marshes, 81 a. 2 r. 28 p., f.	1,750
Cantley, Norfolk.—Freehold grazing marsh, 9 a. 0 r. 20 p.	240

By S. Chantry Adams (at Leytonstone).

Leyton.—93, Westdown-rd., u.t. 77½ yrs., g.r. 3*l.* 15s., y.r. 28*l.* 12s.	200

By Bridgman & Son (at Hoddesdon).

Nazing, Essex.—Tatesfields and 47 a., f., y.r. 100*l.*	2,500

September 24.—By G. F. Box & Co.

Clapton.—83, Cricketfield-rd., f., y.r. 38*l.*	600
Stoke Newington.—80, Rectory-rd., u.t. 69 yrs., g.r. 7*l.*, q.r. 42*l.*	480

By C. C. & T. Moore.

Spitalfields.—6 to 16 (even), Underwood-st., u.t. 44 yrs., g.r. 72*l.*, w.r. 312*l.*	1,200
St. George's East.—21, Princes-sq., f., y.r. 30*l.*...	580
172, St. George's-st. (S.), y.r. 45*l.*, and 11, Princes-st., w.r. 36*l.* 8s., f.	1,025
Limehouse.—11, 13, 15, and 17, Beccles-st., f., w.r. 78*l.*	505
Bow.—Bow-rd., The Old Police Station, u.t. 46 yrs., g.r. 28*l.*, p.	650
Forest Gate.—11 to 15, Worsley-rd., u.t. 82 yrs., g.r. 15*l.* 16s., w.r. 110*l.* 10s.	660

By Rutters'.

Purleigh, Essex.—Howe Green Farm, 102 a., c., p.	1,150

By Stimson and Sons.

Plumstead, Kent.—36, 36a, and 38, High-st. (houses, shops, and steam joinery and saw mills), y.r. 135*l.*, f.	1,485
Battersea.—38, Corunna-rd., u.t. 40¾ yrs., g.r. 6*l.*, w.r. 68*l.* 18s.	545
50, Sterndale-rd., u.t. 60½ yrs., g.r. 3*l.*, w.r. 33*l.* 16s.	220
Old Kent Road.—49, Trafalgar-rd., u.t. 13½ yrs., g.r. 7*l.*, y.r. 40*l.*	150
Clapton.—214, Evering-rd., u.t. 70½ yrs., g.r. 8*l.*, y.r. 60*l.*	630
64, Mount Pleasant-la., u.t. 79¼ yrs., g.r. 6*l.* 6s., y.r. 36*l.*	450
Tottenham.—56, St. Ann's-rd., u.t. 72 yrs., g.r. 7*l.*, y.r. 34*l.*	295
285, St. Ann's-rd., u.t. 73 yrs., g.r. 5*l.*, e.r. 45*l.*	415
Chiswick.—42 *to* 45, William-st., u.t. 34 yrs., g.r. 14*l.*, w.r. 62*l.* 8s.	£150

By H. F. Russell & Son (at Presteigne).

Presteigne, etc., Hereford.—Letchmoor Farm, 30 a. 2 r. 2 p., f.	4,800

By A. Spain & Son (at Gravesend).

Gravesend, Kent.—Stuart-rd., a block of freehold building land	700
Cliffe, Kent.—West-st. Farm, 54 a. 2 r. 18 p., f.	2,500
A block of marsh land, 175 a. 1 r. 32 p., f.	3,000

September 25.—By A. Rider & Son.

Notting Hill.—115, Latimer-rd., u.t. 37 yrs., g.r. 6*l.*, w.r. 39*l.*	240
42, Bevington-rd., u.t. 63 yrs., g.r. 7*l.*, w.r. 53*l.* 6s.	400

By A. J. Sheffield.

Vauxhall.—116, 118, and 120, Vauxhall-walk, c., w.r. 136*l.* 10s.	705
Stratford.—201, High-st. (S.), u.t. 50 yrs., g.r. 8*l.*, e.r. 45*l.*	350
Forest Gate.—64, South Esk-rd., f., e.r. 32*l.* 10s.	310
Ilford, Essex.—3, Wellesley-rd., f., e.r. 34*l.*	435
Cheshunt, Herts.—Goff's-la., Oak Cottages (two), f., w.r. 27*l.* 6d.	245
144, High-st., f., y.r. 25*l.*	305

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 16 0	per 1,000 alongside, in river.	
Rough Stocks and Grizzles	1 13 0	"	"
Facing Stocks	2 12 0	"	"
Shippers	2 5 0	"	"
Flettons	1 10 0	"	at railway depôt
Red Wire Cuts	1 13 0	"	"
Best Fareham Red	3 12 0	"	"
Best Red Pressed Ruabon Facing	5 0 0	"	"
Best Blue Pressed Staffordshire	4 5 0	"	"
Do. Bullnose	4 11 0	"	"
Best Stourbridge Fire Bricks	4 8 0	"	"
Glazed Bricks.			
Best White and Ivory Glazed Stretchers	13 0 0	"	"
Headers	12 0 0	"	"
Quoins, Bullnose, and Flats	17 0 0	"	"
Double Stretchers	19 0 0	"	"
Double Headers	16 0 0	"	"
One Side and two Ends	19 0 0	"	
Two Sides and one End	20 0 0	"	
Splays, Chamfered, Squints	20 0 0	"	
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	"	"
Quoins, Bullnose, and Flats	14 0 0	"	"
Double Stretchers	15 0 0	"	"
Double Headers	14 0 0	"	"
One Side and two Ends	15 0 0	"	"
Two Sides and one End	15 0 0	"	"
Splays Chamfered, Squints	14 0 0	"	"
Second Quality White and Dipped Salt Glazed	2 0 0	"	less than best.

	s. d.	
Thames and Pit Sand	6	per yard, delivered.
Thames Ballast	6	" "
Best Portland Cement	30	per ton, delivered.
Best Ground Blue Lias Lime	20 6	" "

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12s. 0d. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
Bath Stone—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "
Portland Stone (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

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PRICES CURRENT (*Continued*).

STONE.

YORK STONE—*Robin Hood Quality.*

	s.	d.	
Scappled random blocks 6 in. sawn two sides landings to sizes (under 40 ft. super.)	2	10	per ft. cube, deld. rly. depôt.
6 in. Rubbed two sides Ditto, Ditto	2	6	per foot super.
3 in. Sawn two sides slabs (random sizes)	0	11½	"
2 in. to 2½ in. Sawn one side slabs (random sizes)	0	7½	"
1¼ in. to 2 in. ditto, ditto	0	6	"
Scappled random blocks 6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	3	0	per ft. cube
6 in. Rubbed two sides Ditto	2	8	per ft. super.
3 in. sawn two sides slabs (random sizes)	—		"
2 in. self-faced random flags	1	2	"
Hopton Wood (Hard Bed) in blocks	0	5	"
" " " 6 in. sawn both sides landings	2	3	per ft. cube.
" " " 3 in. do.	2	7	per ft. super. deld. rly. depôt
	1	2½	"

SLATES.

in.	in.	£	s.	d.	
20	10 best blue Bangor	13	2	6	per 1000 or 1500 at ry. dep.
20	12 " " "	13	17	6	" "
20	10 best seconds "	12	15	0	" "
20	12 " " "	13	10	0	" "
16	8 best "	7	0	0	" "
20	10 best blue Portmadoc	12	12	6	" "
15	8 best blue Portmadoc	6	12	6	" "
20	10 best Eureka unfading green	25	2	6	" "
20	12 best Eureka unfading green	17	2	6	" "
18	10 " "	12	10	0	" "
16	8 " "	10	5	0	" "
20	10 permanent green	11	10	0	" "
18	10 " "	9	10	0	" "
16	8 " "	6	18	0	" "

TILES.

	s.	d.	
Best plain red roofing tiles	42	0	per 1,000, at rly. depôt.
Hip and valley tiles	3	7	per doz. " "
Best Broseley tiles	50	0	per 1,000 " "
Do. Ornamental Tiles	58	6	" " "
Hip and valley tiles	4	0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57	6	per 1,000 " "
Do. ornamental Do.	60	0	" " "
Hip tiles	4	0	per doz. " "
Valley tiles	3	0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51	9	per 1,000 " "
Do. Ornamental Do.	54	6	" " "
Hip tiles	4	1	per doz. " "
Valley tiles	3	8	" " "
Best "Rosemary" brand plain tiles	48	0	per 1,000 " "
Do. Ornamental Do.	50	0	" " "
Hip tiles	4	0	per doz. " "
Valley tiles	3	8	" " "

WOOD.

	At per standard. £	s.	d.	£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15	10	0	16	10	0
Deals: best 3 by 9	14	10	0	15	10	0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11	10	0	12	10	0
Battens: best 2½ by 6 and 3 by 6	0	10	0	less than 7 in. and 8 in.		
Deals: seconds	1	0	0	less than best		
Battens: seconds	0	10	0	" " "		
2 in. by 4 in. and 2 in. by 6 in.	9	0	0	9	10	
2 in. by 4½ in. and 2 in. by 5 in.	8	10	0	9	10	
Foreign Sawn Boards— 11 in. and 11½ in. by 7 in.	0	10	0	more than battens.		
¾ in.	1	0	0	"		
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4	10	0	5	0	0
Seconds	4	5	0	4	10	0
Small timber (8 in. to 10 in.)	3	18	6	3	15	0
Small timber (6 in. to 8 in.)	3	0	0	3	10	0
Swedish balks	2	15	0	3	0	0
Pitch-pine timber (30 ft. average)	3	5	0	3	15	0

JOINERS' WOOD.

	At per standard. £	s.	d.	£	s.	d.
White Sea: First yellow deals, 3 in. by 11 in.	23	0	0	24	0	0
3 in. by 9 in.	21	0	0	22	10	0
Battens, 2½ in. and 3 in. by 7 in.	17	0	0	18	10	0
Second yellow deals, 3 in. by 11 in.	18	10	0	20	0	0
" " 3 in. by 9 in.	17	10	0	19	0	0
battens, 2½ in. and 3 in. by 7 in.	13	10	0	14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	15	10	0	16	10	0
Battens, 2½ in. and 3 in. by 7 in.	11	10	0	12	10	0
Petersburg: first yellow deals, 3 in. by 11 in.	21	0	0	22	10	0
Do. 3 in. by 9 in.	18	0	0	19	10	0
Battens	13	10	0	15	0	0
Second yellow deals, 3 in. by 11 in.	16	0	0	17	0	0
Do. 3 in. by 9 in.	14	10	0	16	0	0
Battens	11	0	0	12	10	0
Third yellow deals, 3 in. by 11 in.	13	10	0	14	0	0
Do. 3 in. by 9 in.	13	0	0	14	0	0
Battens	10	0	0	11	0	0

PRICES CURRENT (*Continued*).

WOOD.

	£	s.	d.	£	s.	d.
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14	10	0	15	10	0
" " 3 in. by 9 in.	13	10	0	14	10	0
Battens	11	0	0	12	0	0
Second white deals 3 in. by 11 in.	13	10	0	14	10	0
" " " 3 in. by 9 in.	12	10	0	13	10	0
" " " battens	9	10	0	10	10	0
Pitch-pine: deals	16	0	0	18	0	0
Under 2 in. thick extra	0	10	0	1	0	0
Yellow Pine—First, regular sizes	33	0	0	upwards.		
Oddments	22	0	0	24	0	0
Seconds, regular sizes	24	10	0	26	10	0
Yellow Pine Oddments	20	0	0	22	0	0
Kauri Pine—Planks, per ft. cube	0	3	6	0	4	6
Danzig and Stettin Oak Logs— Large, per ft. cube	0	2	6	0	3	6
Small " "	0	2	3	0	2	6
Wainscot Oak Logs, per ft. cube	0	5	0	0	5	6
Dry Wainscot Oak, per ft. sup. as inch	0	0	7	0	0	8
¾ in. do. do.	0	0	6½	-	-	-
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0	0	9	0	0	11
Selected, Figury, per ft. sup. as inch	0	1	6	0	2	0
Dry Walnut, American, per ft. sup. as inch	0	0	10	0	1	0
Teak, per load	17	0	0	21	0	0
American Whitewood Planks— Per ft. cube	0	4	0	-	-	

Prepared Flooring—	Per square. £	s.	d.	£	s.	d.
1 in. by 7 in. yellow, planed and shot	0	13	6	0	17	6
1 in. by 7 in. yellow, planed and matched	0	14	0	0	18	0
1¼ in. by 7 in. yellow, planed and matched	0	16	0	1	1	6
1 in. by 7 in. white, planed and shot	0	11	6	0	13	6
1 in. by 7 in. white, planed and matched	0	12	0	0	14	0
1¼ in. by 7 in. white, planed and matched	0	14	6	0	16	6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0	11	0	0	13	6
1 in. by 7 in. do. do. do.	0	14	0	0	18	0
¾ in. by 7 in. white do. do.	0	10	0	0	11	6
1 in. by 7 in. do. do. do.	0	11	6	0	13	6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £	s.	d.	£	s.	d.
Rolled Steel Joists, ordinary sections	6	5	0	7	5	0
Compound Girders " "	8	2	6	9	5	0
Angles, Tees and Channels, ordinary sections	7	17	6	8	17	6
Flitch Plates	8	5	0	8	15	0
Cast Iron Columns and Stanchions, including ordinary patterns	7	2	6	8	5	6

METALS.

	Per ton, in London. £	s.	d.	£	s.	d.
IRON— Common Bars	7	10	0	8	0	0
Staffordshire Crown Bars, good merchant quality	8	0	0	8	10	0
Staffordshire "Marked Bars"	10	10	0	-	-	-
Mild Steel Bars	8	15	0	9	5	0
Hoop Iron, basis price	9	5	0	9	10	0
" " galvanised	17	0	0	-	-	-

(* And upwards, according to size and gauge.)

Sheet Iron, Black.— Ordinary sizes to 20 g.	9	15	0	-	-	-
" " to 24 g.	10	15	0	-	-	-
" " to 26 g.	12	5	0	-	-	-
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12	15	0	-	-	-
" " 22 g. and 24 g.	13	5	0	-	-	-
" " 26 g.	14	5	0	-	-	-
Sheet Iron, Galvanised, flat, best quality:— Ordinary sizes to 20 g.	16	0	0	-	-	-
" " 22 g. and 24 g.	16	10	0	-	-	-
" " 26 g.	18	0	0	-	-	-
Galvanised Corrugated Sheets:— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12	15	0	-	-	-
" " 22 g. and 24 g.	13	5	0	-	-	-
" " 26 g.	14	0	0	-	-	-
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11	15	0	-	-	-
" " 22 g. and 24 g.	12	15	0	-	-	-
" " 26 g.	14	0	0	-	-	-
Cut nails, 3 in. to 6 in. (Under 3 in. usual trade extras.)	9	5	0	9	15	0

LEAD, &c.

	Per ton, in London. £	s.	d.	£	s.	d.
LEAD—Sheet, English, 3 lbs. & up.	13	15	0	-	-	-
Pipe in coils	14	5	0	-	-	-
Soil pipe	16	15	0	-	-	-
Compo Pipe	16	15	0	-	-	-
ZINC—Sheet— Vieille Montagne ton	26	0	0	-	-	-
Silesian	25	15	0	-	-	-
COPPER— Strong Sheet per lb.	0	0	10½	-	-	-
Thin "	0	0	11½	-	-	-
Copper nails "	0	0	11	-	-	-
BRASS— Strong Sheet per lb.	0	0	10	-	-	-
Thin "	0	0	11	-	-	-
TIN—English Ingots "	0	1	4	-	-	-
SOLDER—Plumbers' "	0	0	6	-	-	-
Tinmen's "	0	0	8	-	-	-
Blowpipe "	0	0	9	-	-	-

PRICES CURRENT (*Continued*).

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1¾d. " "
21 oz. thirds	3¼d. " "
" fourths	2¾d. " "
26 oz. thirds	3½d. " "
" fourths	3¼d. " "
32 oz. thirds	4¼d. " "
" fourths	4d. " "
Fluted sheet, 15 oz.	2¾d. " "
" 21 oz.	3¼d. " "
¼ Hartley's Rolled Plate	1¾d. " "
⅜ " " "	2d. " "
½ " " "	2¼d. " "

OILS, &c.

		£	s.	d.
Raw Linseed Oil in pipes or barrels	per gallon	0	1	10
" " " in drums	"	0	2	2
Boiled " " in pipes or barrels	"	0	2	1
" " " in drums	"	0	2	5
Turpentine, in barrels	"	0	3	8
" in drums	"	0	3	10
Genuine Ground English White Lead	per ton	19	0	0
Red Lead, Dry	"	19	0	0
Best Linseed Oil Putty	per cwt.	0	8	0
Stockholm Tar	per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for Seats of Churches	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal	0	18	0
Extra Pale French Oil	1	1	0
Eggshell Flatting Varnish	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
French and Brush Polish	0	10	0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 1s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 2s. 6d. each.

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PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER, Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter, (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITION.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
*New Cotton Exchange	Liverpool Cotton Association, Ltd.	Not Stated	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
House, Longacre-road, Carmarthen	.....	G. Morgan & Son, Architects, King-street, Carmarthen	Oct. 1
Brick bound. wall, Wallness Elec. Stn., Frederick-rd.	Salford Corporation	Borough Engineer, Town Hall, Salford	Oct. 5
School, Pickering, Yorks	Lady Lumley's Grammar S. Govnrs.	J. Bilson, Architect, 23, Parliament-street, Hull	do.
Wharf, Royal Victoria Dock, London, E.	G. W. R. Co.	G. K. Mills, Paddington Station, London	Oct. 6
Bridge-works, Cricklade-road, Swindon	do.	do.	do.
Cottage, Legacy near Ruabon, N. Wales	do.	do.	do.
Cottage, Raglan-road, near Llandenny Station, Mon.	do.	do.	do.
Additions to Goods Shed, Maesteg Station, Glam.	do.	do.	do.
Road Works, Borneo-street	Walsall Corporation	Borough Surveyor, Bridge-street, Walsall	do.
Private Street Works, New Springs, near Wigan	Aspull D.C.	Heaton & Co., Surveyors, Wigan	do.
Slating Works at Gasworks	Hereford Corporation	W. Parlby, Gas Engineer, Gasworks, Hereford	do.
Kerbing Works, &c., Balfour-crescent	Wolverhampton Corporation	Borough Engineer, Town Hall, Wolverhampton	do.
Additions to Buildings, Union Mills, Pudsey, Yorks	.....	C. S. Nelson, Architect, 15, Park-row, Leeds	do.
Billiard-room, &c.	Alnwick Mechanics' Institute	Secretary, Mechanics' Institute, Alnwick	do.
Sewers, &c., Westfield-lane	Mansfield (Notts) Town Council	R. J. Vallance, Borough Surveyor, Mansfield	do.
Road Metal (1,900 tons)	Bedlingtonshire U.D.C.	— Brown, Surveyor, Bedlington	do.
Water Mains, &c., Beckenhall	Taunton R.D.C.	T. Goldsworthy-Crump, Surveyor, Taunton	do.
Portland Cement (1,000 tons)	Aberdeen Harbour Commissioners	R. G. Nicol, Engineer, Aberdeen	do.
Erection of the Royal Oak Inn, Dartmouth	Mr. H. Swayne	E. H. Back, Civil Engineer, Dartmouth	do.
Surface Water Drain and Manholes, Church-road	Cheriton (Kent) U.D.C.	Surveyor, Council's Offices, Cheriton	do.
Caretaker's Lodge at Hospital, Kirkby Quarry	Hemsworth (Yorks) R.D.C.	—. Richardson, Architect, Hemsworth	Oct. 7
Water Supply Works	do.	T. H. Richardson, Engineer, Hemsworth	do.
Road Works, Thoroughgood-road and other roads	Clacton U.D.C.	A. R. Robinson, Surveyor, Town Hall Buildings	do.
Generating Station and Shed	Kilmarnock Corporation	R. Blackwood, Borough Surveyor, Market Bridge, Kilmarnock	do.
Bridge Works, Wilts and Berks. Canal	Swindon Corporation	Lacey & Sillar, Engineers, 78, King-street, Manchester	do.
Sewers, &c., Caverswall-lane, Blythe Bridge	Cheadle R.D.C.	J. S. Cox, Council Offices, Cheadle	Oct. 8
Rebuilding a House, Bassenthwaite Halls, Keswick	Mr. Thos. Ewart	J. Watson, 1, Museum Square, Keswick	do.
Sewers &c.	Sunderland Corporation	Borough Surveyor, Town Hall, Sunderland	do.
Laying Underground Telephone Pipes (Contract No. 7)	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
Additions to House and Stabling, Bepton, Sussex	.....	W. Buck, Architect, Horsham	do.
Five Houses and Shops, Cwm, near Ebbw Vale, Mon.	.....	E. N. Johnson, Architect, Risca, Mon	Oct. 9
Sewers, &c., Meltham, near Huddersfield	.....	J. B. Abbey & Son, Civil Engineers, New-street, Huddersfield	do.
*New Coast Guard Station, Walton Creek	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	do.
Schools, Alfred-street, Harpurhey	Manchester Corporation	Borough Surveyor, Town Hall, Manchester	Oct. 10
Free Library, Salter-row, Pontefract	.....	Garside & Pennington, Architects, Pontefract	do.
Three Houses, Colwyn-road, West Hartlepool	.....	F. E. Boaz, York-road, West Hartlepool	do.
House, Shibden, Yorks	.....	Walsh & Nicholas, Architects, Harrogate	do.
Thirty Houses, Seven Sisters, near Neath	.....	J. Cook Rees, Architect, Neath	do.
Wood Annexe, &c., at Cattle Market, Geldern-road	Mr. E. E. Bevan	F. Mitchell, Architect, Albion-street, Leeds	do.
Business Premises, Ballinamallard, Ireland	Leeds Corporation	T. Elliott, Architect, 37, Darling-street, Enniskillen	do.
Seven Cottages, Ireland	Mr. H. A. Burke	E. Nolan, Engineer, Workhouse, Downpatrick	do.
Terra-cotta for Alfred-street Schools	Downpatrick R.D.C.	Borough Surveyor, Town Hall, Manchester	do.
Wall, Newgate Gapway	Manchester Education Committee	A. Borg, Borough Surveyor, Town Hall, Margate	Oct. 12
Water Supply Works, East Kent District (Contract 2	Margate Corporation	A. Latham, Civil Engineer, 15, Cecil-square, Margate	do.
Schools, &c., Nantyglo	do.	R. L. Roberts, Architect, Abercarn	do.
Water Supply Works	Aberystwith School Board	H. Tulloch, Engineer, 28, Victoria-street, S.W.	do.
Filter Beds, &c., Blackbog	Bedford Corporation	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	do.
Outfall Sewer, &c.	Hamilton (N.B.) Waterworks Coms.	W. A. Collins, Engineer, 120, West-street, Bridgwater	do.
Drainage Works, &c.	Bridgwater R.D.C.	do.	do.
Soldiers' Home, Fair Green, Mullingar, Co. Meath	do.	A. E. Joyce, Architect, Mullingar, Ireland	do.
Sewerage Work, 3¼ miles, Gedling, &c., nr. Nottin'h'm	The Committee	Elliott & Brown, Engineers, Nottingham	do.
Laying Sewers, London-road, St. Helens	Basford R.D.C.	P. H. Palmer, Civil Engineer, Town Hall, Hastings	do.
Bridge Works, Padiham	Hastings Corporation	County Bridgemaster, Council Offices, Preston	do.
*Making up Roads	Lancs County Council	Council's Surveyor, Beckenham	do.
*Roadmaking and Paving Works	Beckenham U.D.C.	Council's Engineer, Dyne-road, Kilburn, N.W.	Oct. 13
Fireproof Floors, &c., at Asylum, Donegal	Willesden District Council	J. P. M'Grath, Architect, Foyle-street, Londonderry	do.
Road Materials, &c.	The Committee	W. W. Gale, Civil Engineer, High-street, Carshalton	do.
Sewage Works Extension, &c.	Carshalton U.D.C.	H. Shaw, Civil Engineer, Town Hall, Ilford	do.
*Roadmaking and Sewer Works	Ilford U.D.C.	Council's Engineer, 99, Southwood-lane, Highgate, N.	do.
Clearing Site	Hornsey U.D.C.	Borough Surveyor, Town Hall, Bethnal Green	do.
*External Repairs at Relief Station, Stockwell-road	Bethnal Green Borough Council	Guardians' Offices, Brook-street, Kennington-road, S.E.	Oct. 14
*Supply of Horse Brooms and Slop Carts	Lambeth Guardians	Borough Engineer, Maxey-road, Plumstead, S.E.	Oct. 15
Pitework, West-road Quay Wall to the New Cut	Woolwich Borough Council	T. Miller, Civil Engineer, 9, Thoroughfare, Ipswich	do.
Earthenware Drain Pipes	Ipswich Dock Commissioners	F. C. Lloyd, Town Hall, Croydon	do.
*Extension of Post Office at Hereford	Croydon Town Council	H.M. Office of Works, Storey's Gate, S.W.	Oct. 16
*Supply of Articles for 12 months	Commissioners of H.M. Works, &c.	Company's Storekeeper, Neasden Station, N.W.	Oct. 19
*Erection of Repairing Shed and Shops, Neasden	Metropolitan Railway Company	Secretary's Office, 32, Westbourne-terrace, W.	do.
*Road, Sewer, and Tarpaving Works	do.	Council's Engineer, Council Offices, Hendon	do.
*Heating and Ventilating New Cuncl. Schls., Brislington	Hendon U.D.C.	Holbrow & Oaten, 9, Clare-street, Bristol	do.
*Extension of Boiler House, at Workhouse	Bristol Education Committee	F. J. Smith, Architect, Parliament Mansions, Victoria-street, S.W.	Oct. 20
*Engine Shed, &c., Acton	Paddington Guardians	Engineer, Paddington Station, W	do.
*Additions to Police Station, Portland	G.W.R. Co.	County Surveyor, Shire Hill, Dorchester	Oct. 27
Water Supply Works	Dorset Standing Joint Committee	T. W. Latham, Engineer, Kingsbridge	Nov. 2
*Shops and Sunday School Premises, Swindon	Kingsbridge (Devon) U.D.C.	W. F. Bird, Architect, Midsomer Norton, Somerset	No date.
Sunday School, &c., Cardigan-lane, Leeds	Wesleyan Methodist Trustees	Danby & Simpson, Architects, 10, Park-row, Leeds	do.
Shop and Residence, High-street, Southwold, Suffolk	.....	A. Pells, Architect, Beccles	do.
Sewers, &c., Blacker-road, Stalncross, Barnsley	Mr. F. Eastaugh	Crawshaw and Wilkinson, Surveyors, 13, Regent-street, Barnsley	do.
Hall, Pontypool	.....	Habershon, Fawckner, & Co., Architects, 41, High-st., Newport, Mon.	do.
Electric Lighting Works	Presbyterian Church of Wales	H. York, Surveyor, Station-road, New Barnet	do.
	East Barnet Valley U.D.C.		

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Clerk of Works	Heston and Isleworth U.D.C.	4*l.* 4*s.* per week	Oct. 8
*Draughtsman and Clerk	Cambridge Univ., &c. Waterwks. Co.	Not Stated	Oct. 13
*Assistant Clerk (Borough Engineer's Department)	Hackney Borough Council	104*l.*	Oct. 15
*Civil Engineering Draughtsman	Admiralty	Not Stated	No date.

Those marked with an asterisk (*) are advertised in this Number. Competition, iv. Contracts, iv. vi. viii. & x. Public Appointments, xviii. & xix.

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TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ALNWICK.—For the supply of road metal, for the Urban District Council. Mr. Geoffrey Wilson, Town Surveyor, Council Offices, Green Bat, Alnwick:—

	Per cubic yard at depots.
For Division No. 1 (Moor Roads).	s. d.
Wm. Appleby, Bank Top, Alnwick	7 0
For Division No. 2 (Town Streets).	
Wm. Appleby, Bank Top, Alnwick	6 0
For Division No. 3 (South and East Roads).	
Thomas Coxon, Denwick, Alnwick	6 0

AMMANFORD.—For building three houses and shops for Mr. Jonathan Jones, Llangadock. Mr. David Jenkins, F.R.I.B.A., architect, Llandilo:—
William Evans, Tirydail, Ammanford, £1,205.*

BRIDLINGNON.—For the lengthening of the Clough Bridge, for the Corporation. Mr. E. R. Matthews, C.E., Town Hall, Bridlington:—

Urinal, Crane Wharf.

J. H. Hudson	£241 15	J. Sawdon, Bridlington*	£185 0
W. Barnes	213 0		
C. Simon	212 10		

Retaining Wall, Clough Bridge.

J. H. Hudson	£408 19 6	J. Sawdon, Bridlington*	£249 0 0
G. Musk	387 0 0		
W. Barnes	318 16 0		

BRIDLINGTON.—For the erection of a greenhouse, Quay-road, for the Corporation. Mr. E. R. Matthews, C.E., Town Hall, Bridlington:—
W. Nettleship, Quay-road, Bridlington...£127 10*

BRISTOL.—For the erection of Hanham-road schools, Kingswood, for the Gloucestershire Education Committee. Mr. John Mackay, architect, Richmond-place, Kingswood, near Bristol. Quantities by Mr. Maynard Wood, Bristol:—

Foss & Low	£14,500 0 0	Cowlin & Son	£12,350 0 0
Watson & Son	13,570 0 0	Wilkins & Sons	11,874 0 0
Bennett Bros.	13,385 0 0	Adams & Jefferies, Oldland Common, Bristol*	11,396 0 0
Love Bros.	12,885 0 0	J. E. B. James	10,795 19 8
J. Brownjng	12,734 0 0		
G. Humphreys	12,680 0 0		
E. Clark	12,600 0 0		
Stevens & Bastow	12,418 0 0		
A. J. Beaven	12,300 0 0		

Plumbing and Gas Fitting.

Slade & Bridgman	£780	J. E. B. James	£660
A. & J. Tutcher	730	S. H. Povey	619
G. F. Tuckey	684	Wilkins & Son*	595
Arthur S. Scull	670	A. E. Wilkins	594

Heating by Low Pressure.

Dark Bros.	£748 14	Welch & Sons§	£405 0
Bradford	591 15	Williams & Son§	400 0
Skinner & Co.*	452 0		

§ Arrangements of scheme not fully estimated, extras required considerably amounted above the accepted tender.

CHEADLE (Cheshire).—For the erection of shops for Messrs. Burgous, Ltd. Mr. Edward Hewitt, F.R.I.B.A., architect, Temple Chambers, Brazennose-street, Manchester. Quantities by Mr. Frank Hewitt, 33, Brazennose-street, Manchester:—

John Hibbert	£3,325	Padmore & Sons	£3,080
Macfarlane & Son	3,295	Burgess & Galt*	3,033
W. L. Adkinson	3,156		

HIGH WYCOMBE.—Town Hall. Messrs. Batemans and A. Hale, architects, Birmingham:—

	Tender.	Deduction for Hollington Stone.	Deduction for Ketton Stone.	Deduction for Bath Stone.	Deduction if with Ordinary Plaster.
	£	£	£	£	£
Smith & Son	12,197	10	132	240	75
Barnsley & Sons	12,169	—	126	224	70
Sapcote & Sons	12,043	—	add 120	213	73
Thos. Rowbotham	12,000	226	352	498	150
Rudd & Son	11,843	add 45	add 180	360	142
Stephens, Bastow & Co., Ltd.	11,689	180	290	450	130
Collins & Godfrey	11,586	98	185	315	60
S. F. Halliday	11,545	108	198	248	68
Webster & Cannon	11,388	91	181	310—Guiting, 300	100
Groves & Sons	11,280	75	115	229	205
Lee & Son	11,273	158	60	339	86
Hy. Lovatt	11,190	95	2 0	345	140
Geo. Darlington	11,180	110	110	350	125
Jas. Lovell	11,127	56	209	331	98
Parnell & Son	11,077	130	60	380	30
Gaze & Sons	10,971	—	337	537	150
Hy. Flint	10,787	90	223	362	131
G. H. Gibson	10,738	—	100	230	80
C. H. Hunt & Son, High Wycombe*	10,373				

CROOKSTON (Renfrewshire).—For the erection of a Poor-House, for the Guardians. Messrs. MacWhannell & Rogerson, architects, 58, West Regent-street, Glasgow:—

Masonry. — George Henderson, 21, Oakshaw-street, Paisley	£18,430 12 9
Carpentry. — J. Baxter & Son, 20, Catherine-street, Glasgow	7,437 10 0
Slating.—A. Robertson, 31, Argyle-street, Glasgow	1,293 14 1
Plumbing. — Scott & Anderson, Barrhead	3,227 15 2
Plastering. — Joseph Graydon, 29, Craigneastock-street	2,729 12 10
Tilelaying.—Galbraith & Winton, 129, St. Vincent-street	2,364 11 4

[Accepted tenders only.]

DOVER.—For additions to small-pox hospital, Poulton, for the Town Council. Mr. H. E. Stillgoe, C.E., Town Hall, Dover:—

Lewis & Sons	£421 0	J. Morgan	£268 0
Gann & Co.	396 0	Geo. Munro, Dover*	265 10

EASTBOURNE.—For the erection of three football and cricket pavilions near Hampden Park, for the Corporation. Mr. D. J. Bowe, Borough Surveyor, Town Hall, Eastbourne:—
Llewellyn, Eastbourne £136

GRIMSBY.—For the erection of a house, Bargate. Mr. H. C. Scaping, architect, Court Chambers, Grimsby:—

Hewins & Goodland	£1,497 0 0	Gilbert & Kirton	£1,367 0 6
Waterman	1,485 10 0	Smith & Hodson, Grimsby,*	1,360 0 0

For the erection of a ladies' bijou residence on the Hadley Wood Estate. Mr. Albert Kingwell, Hadley Wood, architect:—

G. Johnson	£3,589	C. Wheeler	£2,972
A. Mitchell	3,510	F. Minter	2,884
Sprossam & Babb	3,438	Hunt & Co.	2,863
L. & H. Patman	3,100	S. Warboys	2,729
A. Fairhead	3,093	J. Barker	2,727

HAY RURAL DISTRICT COUNCIL.—For the construction of sewerage and sewage disposal works at Talgarth. Mr. R. E. W. Berrington, M.Inst.C.E., engineer:—

E. Powell	£6,852 0 0	Braithwaite & Co.	£5,271 11 0
E. H. Page	5,949 14 2	G. Holloway	5,147 0 0
J. E. Evans	5,898 3 5	J. H. Macdonald*	5,054 9 8
Johnson Bros.	5,710 0 0		
W. H. Reading	5,453 0 0		

Engineer's estimate, £5,397.

HAY RURAL DISTRICT COUNCIL.—For the construction of water-supply works at Talgarth. Mr. R. E. W. Berrington, M.Inst.C.E., engineer:—

J. E. Evans	£7,105 0 0	E. Powell	£4,695 2 8
John Laing	4,857 0 0	Peter Edwards	3,970 0 0
Johnson Bros.	4,400 0 0	G. Holloway	3,767 0 0
Braithwaite & Co.	4,100 0 0	W. H. Reading	3,600 0 0
		J. H. Macdonald*	3,430 0 0

Engineer's estimate, £4,170.

HIGH WYCOMBE.—For the erection of a lodge near Isolation hospital, Clay-lane, for the Rural District Council:—

W. H. Sairey	£354 0 0	Nash & Sons.*	
J. Hatherley	350 0 0	High Wycombe	£345 0 0
Senior & Clarke	318 16 6	J. Bond	328 0 0

LIMAVADY.—For the erection of cottages, for the Rural District Council. Mr. J. W. Wilson, Main-street, Limavady:—
McCunn & Gillespie, Limavady £529 1 10
(Accepted for four cottages.)
Richard Hall, Limavady 298 2 0
(Accepted for two cottages.)

LLANDEBIE.—For building new class-rooms and alterations to Penygroes School for the Llandebie U.D. School Board. Mr. David Jenkins, F.R.I.B.A., architect, Llandilo:—
Lewis Davies, Penygroes, Llandebie, R.S.O., £1,398.*

LLANDILO.—For alterations to hosiery premises, New-road, Llandilo, for Messrs. D. E. Williams & Co. Mr. David Jenkins, F.R.I.B.A., architect, Llandilo:—
Jones Bros., Tirydail, Ammanford, £330.*

LLANDOVERY.—For building a dwelling-house at the Old Chemical Works for Mr. Evan Pritchard, Verdre (brick and stone supplied). Mr. David Jenkins, F.R.I.B.A., architect, Llandilo:—
William Thomas, Trecastle, £379 15s.

LLANGATHEN.—For building a vestry to the Methodist Chapel, Cross Inn, for the Rev. B. B. Griffiths and the Building Committee. Mr. David Jenkins, F.R.I.B.A., architect, Llandilo:—
J. L. and J. Lewis, Dryslwyn, Golden-grove, R.S.O. £296 5s. 6d.*

LONDON.—For rebuilding No. 20, Newgate-street, and No. 7, Rose-street, City of London, for Mr. Wm. Straker. Mr. H. Gardiner Gribble, architect, Woking. Quantities by Messrs. J. Rider, Hunt, & Co., 181, Queen Victoria-street, E.C.:—

Spencer, Santo, & Co.	£5,000	Patman & Fotheringham	£4,923
Sims & Woods	5,000	Johnson & Son, Leicester‡	4,860
Holloway Bros.	4,977		

‡ Accepted subject to modification.

LOWER GORNAL (near Dudley).—For extensions to Robert-street Boys' School, Lower Gornal, for the Sedgley School Board. Mr. A. Ramsell, architect, Dudley:—

J. Herbert	£2,597 0	Cave & Son	£2,330 0
Hilton & Caswell	2,499 4	Oakley & Coulson	2,319 0
T. & S. Ham	2,445 0	J. Dallow	2,300 0
C. Griffiths	2,425 0	M. Round	2,275 0
H. Dorse	2,420 0	E. Seckerson	2,200 0
F. L. Jones	2,391 0	H. Gough, Wolverhampton*	2,190 0
Speke & Sons	2,339 0		

MARAZION (Cornwall).—For the erection of schools. Mr. F. St. Aubyn, architect, Lambe-buildings, Temple, E.C.:—

J. Miners, Marazion, Cornwall	£2,852 10
H. Nicholas, Penzance, Cornwall	2,435 8
G. Miners, Marazion, Cornwall†	£2,050 0
Masonry, Plumbing, and Smithing.	
H. Nicholas, Penzance, Cornwall	1,685 15
Carpentry.	
P. Walters, Penzance, Cornwall	749 0

PONTNEWYDD.—For additions to the Bridge End Inn, for Messrs. W. Hancock & Co., Ltd. Mr. Norman M. Brown, architect, Steam Packet Chambers, Dock-street, Newport, Mon.:—

Dean & Sons	£822	C. Lock	£629
J. Charles	675	R. H. Parkyn*	599
Gough Bros.	669		

PUMPSAINT.—For building sheds for shooting box near Pumpsaint, for Colonel Methuen, Avonwood, Clifton, Bristol. Mr. David Jenkins, F.R.I.B.A., architect, Llandilo:—
David Davies, Bryncrach, Llanwrda, Pumpsaint, R.S.O., £165 2s. 4d.*

REIGATE.—For the erection of a residence at Cronk's Hill, Reigate, for Mr. R. W. Neale. Mr. C. E. Salmon, architect, Bell-street, Reigate:—

J. Knight	£2,217	Elsey & Sons	£1,293
T. Nightingale	1,359	W. Wickman	1,290
Nightingale & Sons	1,350	J. Waycott*	1,150

RHONDDA.—For the execution of sewerage works, Trebanog, for the Rhondda Urban District Council. Mr. W. J. Jones, engineer, Council Offices, Pentre:—

Enoch Bros.	£338	Collins & Co., Barry*	£130
Barnes, Chaplin & Co.	140		

WALTHAMSTOW URBAN DISTRICT COUNCIL.—For providing a low-pressure heating apparatus in the Selwyn-avenue School, for the Education Committee. Mr. H. Prosser, Architect to the Committee:—

Wontner-Smith & Gray	£319 0	W. Cassidy	£295 0
Rosser & Russell	315 0	Russell & Co.	264 10
		Palowkar & Son*	231 0

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following list of tenders. Mr. T. J. Bailey is the Board's Architect:—

CALVERT-ROAD SCHOOL (Greenwich).—Improvements to Girls' School:—

E. B. Tucker	£2,365 0 0	Bulled & Co.	£1,889 0 0
Martin, Wells, & Co., Ltd.	2,188 0 0	Akers & Co.	1,865 0 0
Loney & Son	2,083 0 0	J. & C. Bowyer	1,869 0 0
Rice & Son	2,019 0 0	H. Groves	1,794 0 0
Holliday & Greenwood, Ltd.	1,943 0 0	Thomas & Edge	1,786 0 0
Mitchell & Son	1,897 0 0	Smith & Sons, Ltd.	1,756 0 0
		Garrett & Son	1,717 8 9
		T. D. Long*	1,649 0 0

[*See also next page.*

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CREEK-ROAD SCHOOL (Deptford).—Halls and other improvements:—

Staines & Son	£3,596	0	0	Thomas & Edge	£2,915	0	0
Martin, Wells, & Co., Ltd.	3,417	0	0	Johnson & Co.	2,906	0	0
Akers & Co.	3,252	0	0	J. Greenwood, Ltd.	2,895	0	0
Smith & Son, Ltd.	3,122	0	0	Garrett & Son.	2,884	3	7
Treasure & Sons	3,055	0	0	T. D. Leng	2,742	0	0
Bulled & Co.	2,972	0	0	General Builders, Ltd.*	2,617	0	0
Rice & Son	2,917	0	0				

DUNCOMBE-ROAD SCHOOL.—For senior mixed school:—

Williams & Son	£11,888	Perry & Co.	£10,967
Gregar & Son	11,572	Lawrance & Sons	10,899
Killby & Gayford	11,510	T. L. Green	10,776
Patman & Fotheringham, Ltd.	11,473	Gough & Co.	10,655
Allen & Sons, Ltd.	11,406	J. & M. Patrick	10,595
Miskin & Sons	11,375	Treasure & Son	10,571
Simpson & Son	11,341	L. H. & R. Roberts	10,427
Grover & Son	11,330	Chessum & Sons	10,354
A. Porter	11,055	Dearing & Son*	10,150

GILL-STREET SCHOOL (Limehouse).—Drainage and sanitary works:—

Ashby Bros.	£2,564	J. & C. Bowyer	£2,079
Johnson & Co.	2,530	J. Peattie	1,998
G. Parker	2,449	Williams & Son	1,947
Willmott & Sons	2,222	R. P. Beattie*	1,909
Rice & Son	2,130		

GOODRICH-ROAD SCHOOL (East Dulwich).—Special school for mentally defective children and a science room:—

Holliday & Greenwood, Ltd.	£4,603	Martin, Wells, & Co., Ltd.	£4,413
Smith & Sons, Ltd.	4,500	Rice & Son	4,366
W. Downs	4,499	Garrett & Son	4,342
E. Triggs	4,490	J. & C. Bowyer	4,335
Stimpson & Co.	4,459	Smith & Son	4,255
Bulled & Co.	4,449	Appleby & Sons	4,121
Mitchell & Son	4,433	T. D. Leng‡	4,087
		Akers & Co.‡	3,611

‡ Error in tender.

KENNINGTON-ROAD SITE.—Special school for mentally defective children:—

Martin, Wells, & Co., Ltd.	£3,550	Smith & Son	£3,261
Spencer, Santo, & Co., Ltd.	3,529	Akers & Co.	3,238
Marsland & Sons	3,421	E. Triggs	3,210
Rice & Son	3,367	General Builders, Ltd.	3,181
Bulled & Co.	3,336	Appleby & Sons	3,138
Mitchell & Son	3,307	J. & M. Patrick	3,124
Garrett & Son	3,288	T. D. Leng*	3,098
Johnson & Co.	3,261		

LAVENDER-HILL SCHOOL.—Adapting room for experimental science teaching:

H. Bouneau	£95	General Builders, Ltd.*	£72
Spencer & Co.	89		
London School Furniture Co.	86		

PLUM-LANE SCHOOL (Plumstead).—Heating apparatus:—

Stevens & Sons	£745
W. G. Cannon	739
J. Grundy	620
J. & F. May	608
The Brightside Foundry and Engineering Co., Ltd.	558
Clark, Bunnett, & Co., Ltd.	538
Wontner, Smith, Gray, & Co.	535
The Paragon Heating Co.	492
Defries & Sons, Ltd.*	481

SALTER'S SCHOOL (West Norwood).—Enlargement:—

Smith & Sons, Ltd.	£14,450	Treasure & Son	£13,370
Lawrance & Sons	13,813	J. & M. Patrick	13,328
Holliday & Greenwood Ltd.	13,615	Garrett & Son	13,326
Appleby & Sons	13,500	Martin, Wells & Co., Ltd.	13,294
F. & H. F. Higgs	13,462	Mitchell & Son	13,286
Stimpson & Co.	13,460	W. Downs	13,186
		J. & C. Bowyer	12,993
		Wallis & Sons*	12,988

SWAFFIELD-ROAD SCHOOL (Wandsworth).—Heating apparatus for enlargement:—

Sloper & Co.	£448	J. & F. May	£362
Esson & Son	390	Brightside Foundry and Engineering Co., Ltd.	327
Clark, Bunnett & Co., Ltd.	386	Eates & Sons*	297
W. G. Cannon	365		

UPTON HOUSE TRUANT SCHOOL.—Fire-escape staircase:—

Ashton & Green Iron Co.	£116	R. H. & J. Pearson, Ltd.	£92
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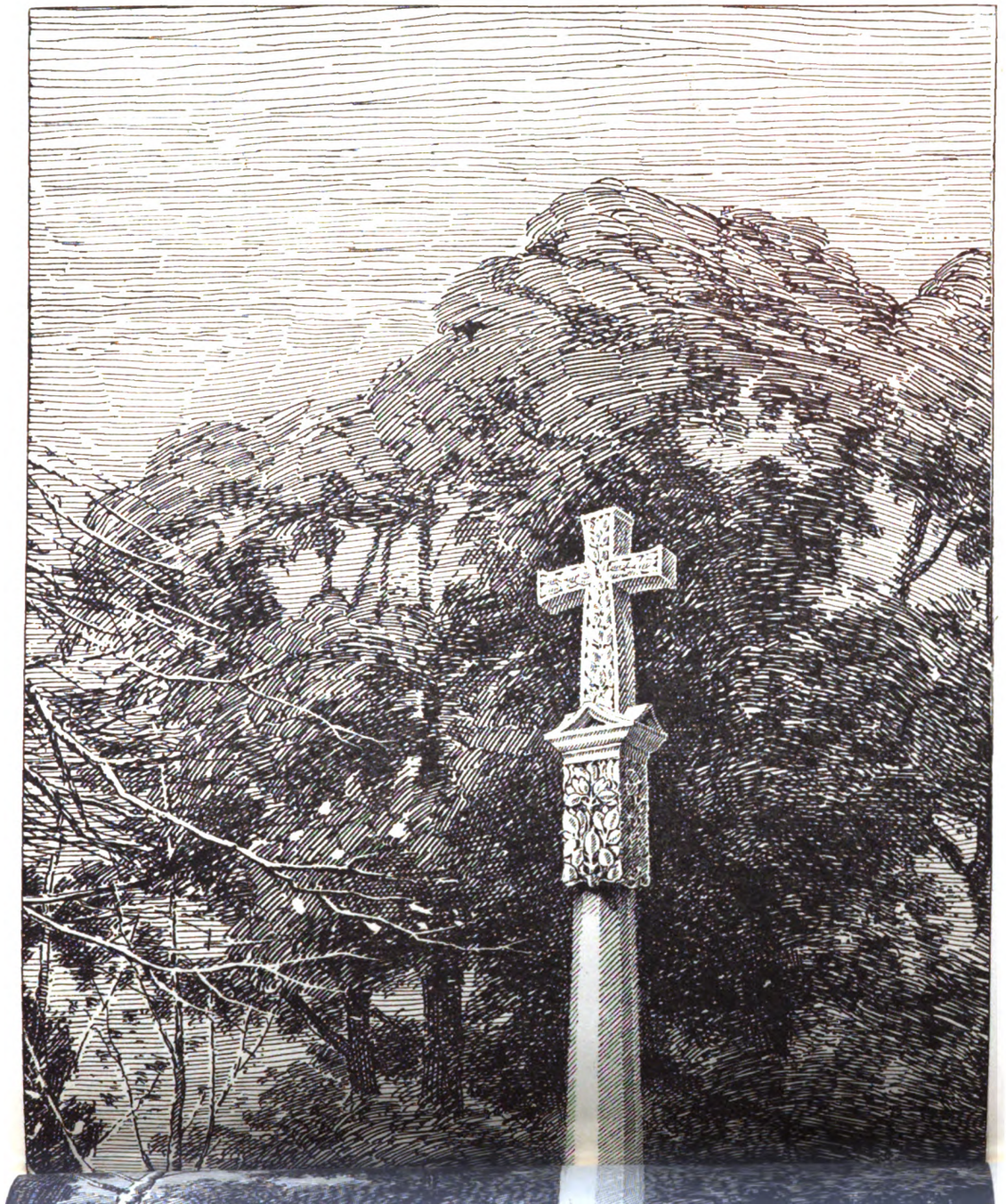

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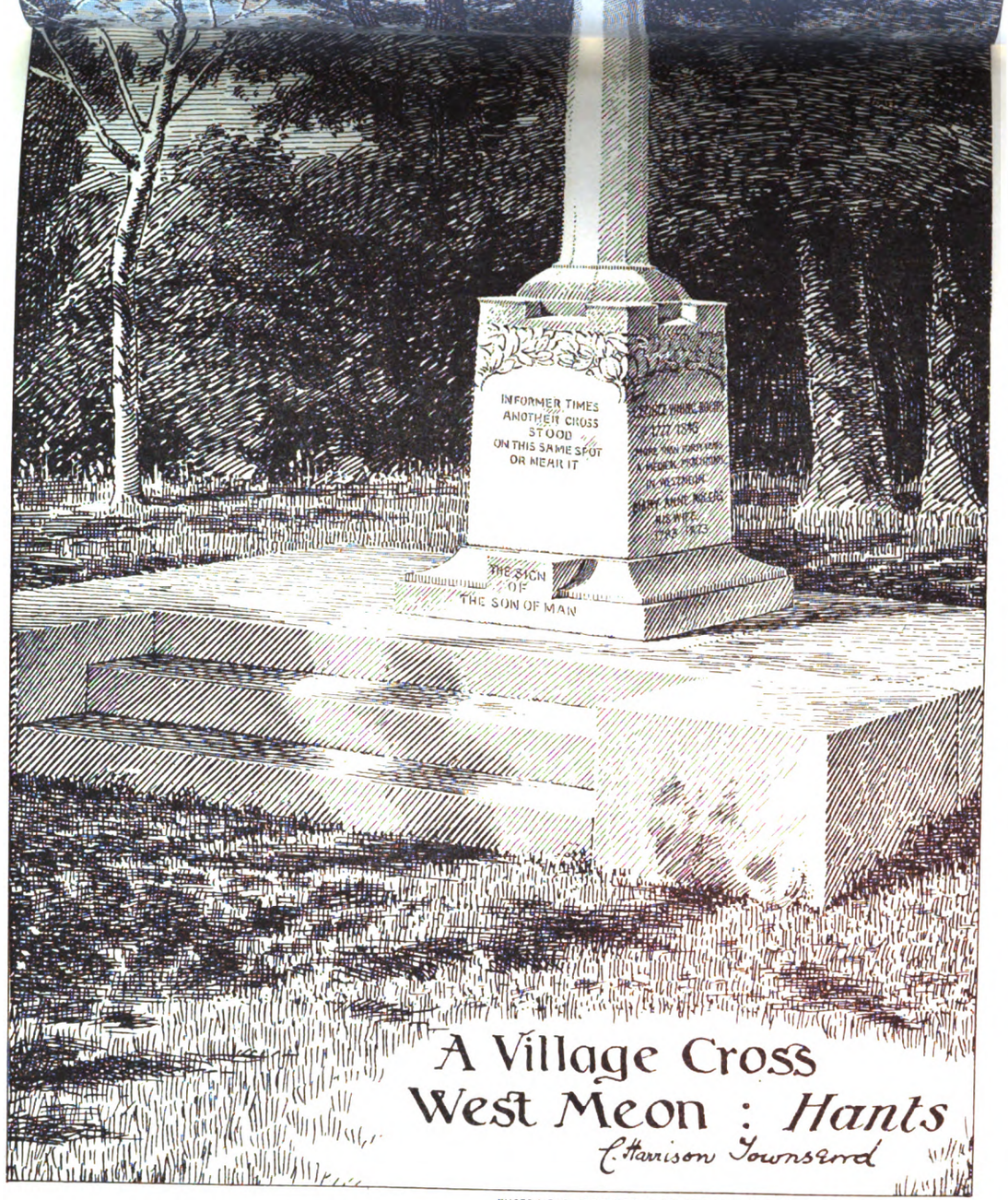

A Village Cross
West Meon : *Hants*

C. Harrison Townsend

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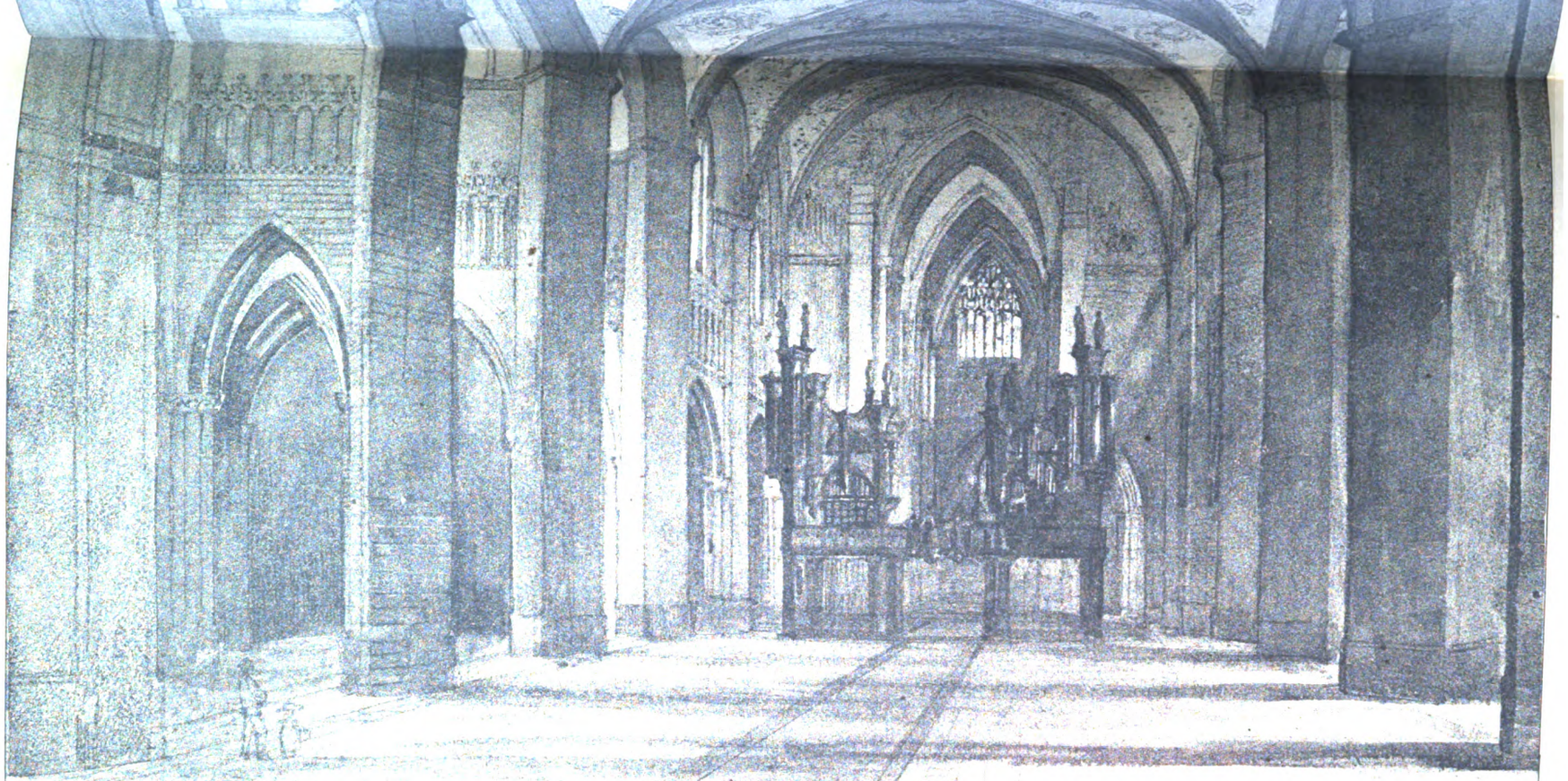
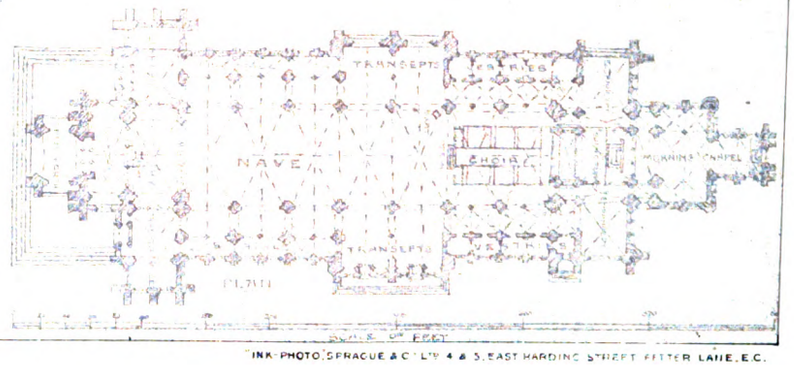


CATHEDRAL CHURCH OF ST JOHN

LIVERPOOL CATHEDRAL COMPETITION

DESIGN AWARDED HONOURABLE MENTION



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INTERIOR, BRITISH LINEN COMPANY'S BANK, THREADNEEDLE STREET.—Mr. J. Macvicar Anderson, F.R.I.B.A., Architect.

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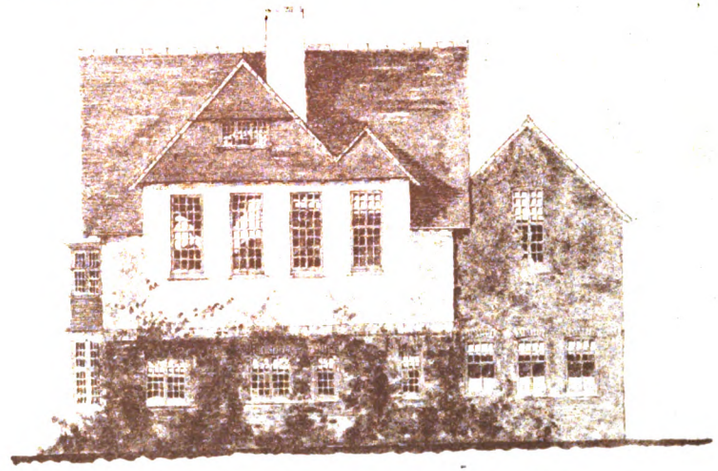
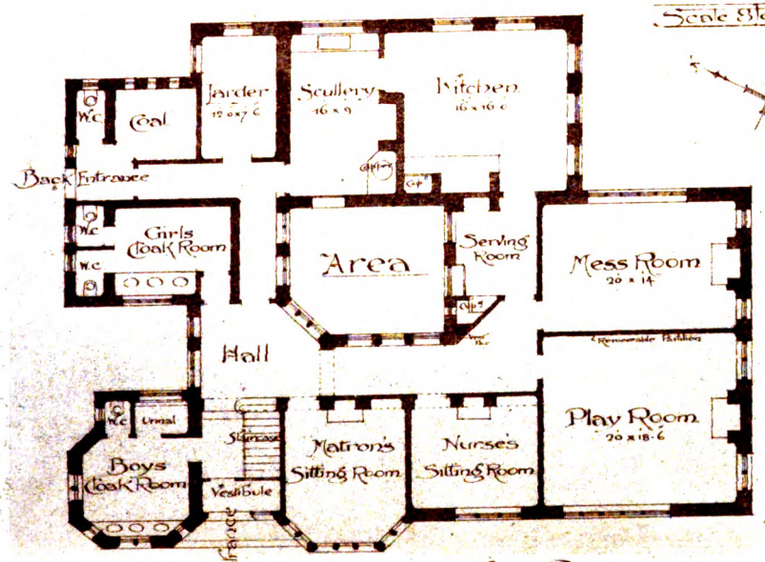
Proposed Seaside Convalescent Home for The East London Hospital for Children . . Preliminary Sketch Plans

Elevation of Entrance Front

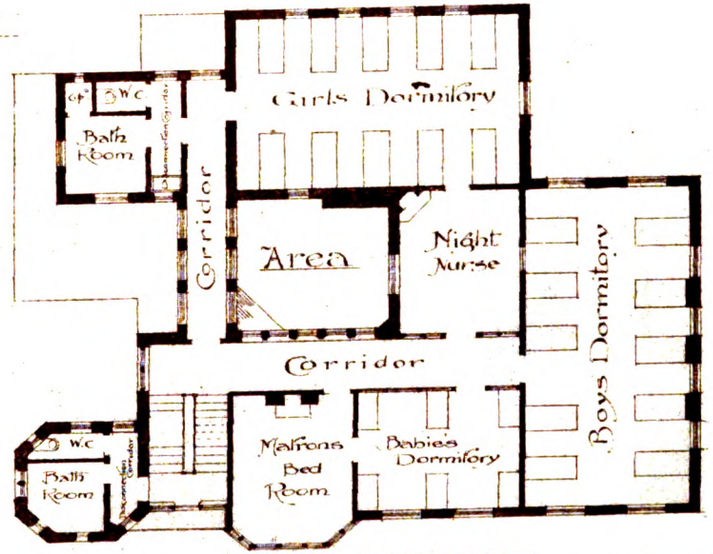


Elevation of Boys Dormitory Wing &c

Scale 8 feet to One Inch.



Ground Floor Plan



First Floor Plan

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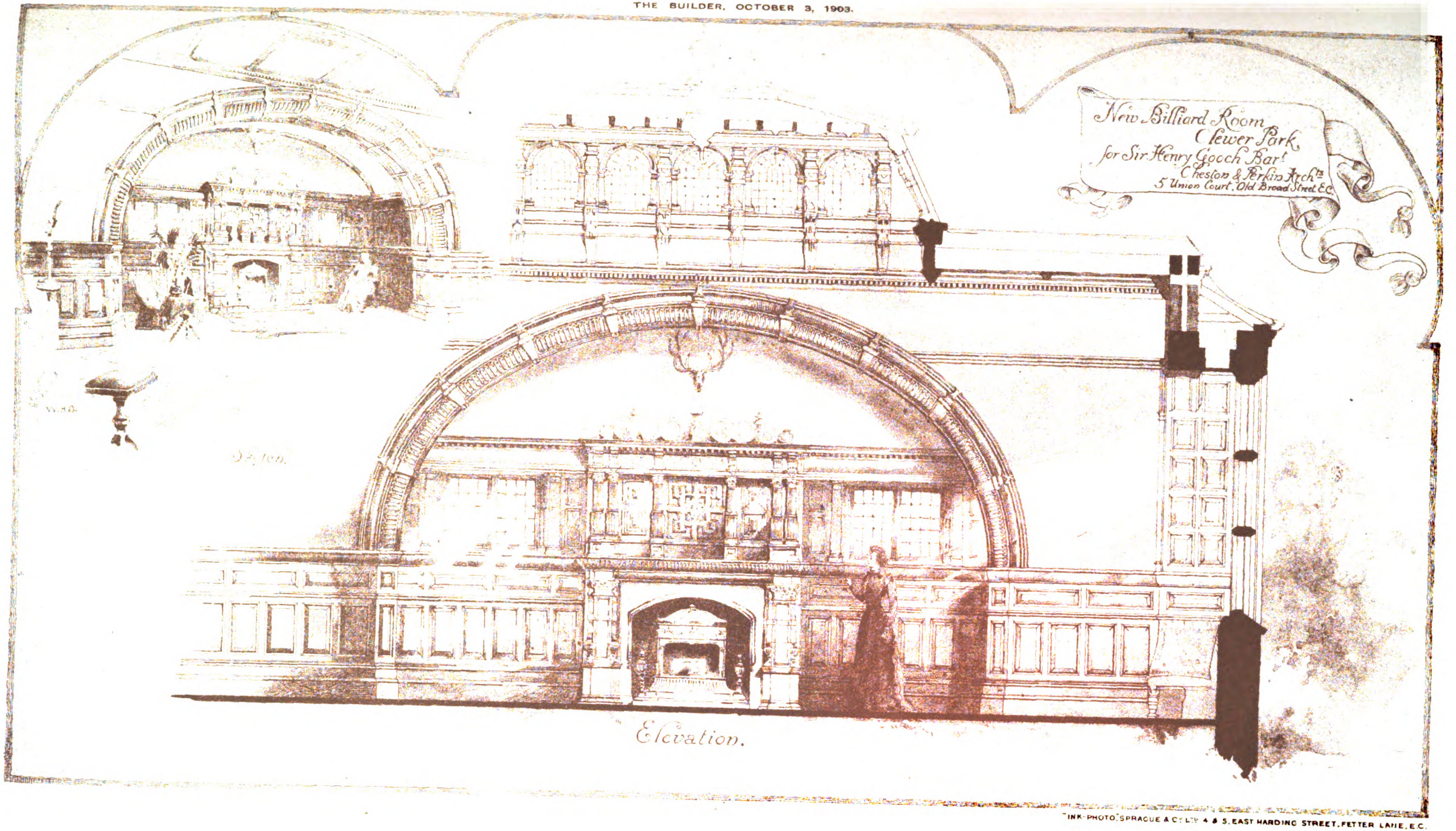

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The Builder.

VOL. LXXXV.—No. 2166. OCTOBER 10, 1903.

ILLUSTRATIONS.

Study for a Royal Memorial Chapel ..... Designed and Drawn by Mr. Andrew Hutton.
Proposed Blue Coat Hospital, Liverpool ..... Messrs. Briggs & Wolstenholme, F. B. Hobbs & Arnold Thornely, Architects.
Interior of Memorial Chapel, Blue Coat Hospital, Liverpool ..... Do. Do.
Exterior of Memorial Chapel Do. Do. ..... Do. Do.

Blocks in Text.

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A Great Architectural Artist.

ALL readers of the *Builder* will hear with regret of the death of Mr. H. W. Brewer, which was announced in the *Times* of Thursday. For the space of a quarter of a century he had been one of the most important and original contributors to the illustrated department of this journal; and though he had a wide reputation, and his work was seen in illustrated journals for general readers such as the *Graphic*, among architectural journals his connection has always been solely and entirely with the *Builder*, for which he produced work of a class which we do not know that any one else can at present supply.

Mr. Brewer's early contributions to our pages were simply illustrative; chiefly drawings of mediæval buildings in Germany, generally selected as rather out of the beaten track of architectural illustration. These he drew on the wood in a most masterly manner (the system of photographing on to the wood had not then come into use); they were noteworthy for the sense of composition and the breadth of light and shade effect which characterised them; and they were always cut by one engraver (Heaviside), who understood his work and could make the best of it; and these old engravings from Brewer's drawings have none of that hard mechanical style of execution which (at this distance of time we may admit) characterised many of our own as well as other illustrative wood engravings. These impressions in our old volumes afford fine examples of what could be done with the aid of wood-engraving, now unfortunately almost killed by the various forms of processing.

It was almost simultaneously with the introduction in our illustrative pages of lithography that Mr. Brewer seemed to perceive that there was a wider field for an architectural artist in black-and-white than the mere representation, in however powerful and artistic a manner, of existing monuments. Thenceforth, for our pages at least, he took up one or other of two new lines of illustration; one, the invention of architectural scenes purely with a view to picturesque effect; the other, the restoration in drawing (a wholly innocent form of restoration) of monuments of the past which had disappeared, but for the reconstruction of which a certain degree of documentary evidence could be found. To the first task he brought genius and imagination, to the second, learning and research. One of the first of his pen-drawings for lithography was one which in picturesque force and poetic feeling he perhaps never surpassed subsequently—the one entitled "Deserted," showing a mediæval city, with its cathedral rising in a heap in the centre of the composition, the houses clustering round and clinging to it, silent and deserted after a visitation of the plague—not an unknown occurrence in the Middle Ages. Among others of his architectural creations were two contrasted compositions entitled "Renaissance Gorgeousness" and "Romanesque Grandeur"; an exceedingly fine picture called "The Ancient Harbour," which will be within the recollection of many of our readers; and a remarkable drawing entitled "Measure and Value," which was not only an architectural composition but a critical protest. The drawing represented an immense massive Cathedral front, somewhat recalling Peterborough, and the bearings of the title lay in its application—in the implied conclusion that no such building would ever have been erected on the contract system, which Mr. Brewer regarded as being at the bottom of the comparatively weak and feeble character of much modern architecture.

More numerous, however, than his purely imaginative works were his archæological creations, of which a great number of most remarkable examples are in existence. To this kind of task he brought imagination based on careful research, and he spared no trouble in getting the materials for his restorations. His drawing showing a resuscitation of old St. Peter's at Rome was one of the most remarkable things of the kind ever done; of the value set on it by Roman archæologists we could judge by the repeated applications which have been made to us to allow of its reproduction in one or another historical publication. Among other remarkable drawings of this class were those of "London in the Time of Henry VIII.," Paris at the same period (bird's-eye views or panoramas), "Mediæval Oxford" (also a panorama); another panoramic view of "Some English architecture of the past fifty years," done for the Jubilee Number of this journal; Old St. Paul's; Nonsuch Palace; "Old Cheapside"; "Aldgate in 1531," and many others showing the same remarkable union of archæological study with picturesque power. We have in our possession the last two drawings of this class which he made, and which still remain to be published: restorations of two quarters of Old Paris. In our next issue we will give a list of all his works which are to be found in our volumes, with the dates of publication.

Mr. Brewer was one of the most simple-minded and unassuming of men; more interested in his art for its own sake than for any advantage he could make for himself out of it; and we know that some draughtsmen of architectural subjects far inferior to him in real accomplishment, but who had obtained a more popular repute, obtained terms far beyond what he asked, for work not to be compared to his in real value. From years of out-door sketching in all weathers, he had the weather-beaten appearance suggesting the life of a sailor rather than of an artist; and though he always appeared to have excellent health, perhaps this exposure shortened his life; he was only sixty-seven when he died.

Mr. Brewer was a devout Catholic, to which fact may be traced, no doubt, to some extent his special interest in the remains of extinct mediæval abbeys and other religious institutions: though architecture for its own sake was perhaps his leading interest. He was one who, both for his character and his talents, commanded the respect of all who knew him, and whose loss to us is one of the greatest which this journal could have sustained.

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THE USE OF GAS IN THE BUILDING TRADES.

By H. F. Hills, *Chemist to the Commercial Gas Co., London.*

THE last five years have witnessed an extraordinary and continually increasing growth in the volume of gas consumed for industrial purposes, and inquiry shows that this is largely due to the increasing use of gas in the building trades. In all buildings in which lighting by luminous flames has been superseded by the incandescent system of lighting, the quantity of gas required to yield a given intensity of light has been reduced to one-sixth part of the amount required before the change was made, and this would for a time have had a paralysing effect upon the gas industry throughout the country but for the fact that the use of gas for heating and power purposes has increased with unprecedented rapidity. The official returns relating to gas supply in the United Kingdom show that the output of gas at the present time is far greater than it has been at any previous period in the history of the industry; and as it is evident, in view of the very extensive substitution of small-consumption incandescent burners for large-consumption flat-flame burners, that a large proportion of this gas is used for purposes other than lighting, it may interest those who have not previously given the matter consideration to trace this portion of the gas output to its various points of consumption.

Large quantities of gas are, as is well known, used for domestic heating and cooking, but it is the purpose of this article to refer only to the gas consumed for industrial purposes in one or other of those businesses which are commonly classified as building trades. In London, in particular, the quantity of gas supplied to the building trades is increasing at a very rapid rate, and it is becoming more and more apparent tht if, as has been suggested by Mr. H. E. Jones, the President of the Institution of Gas Engineers, the London gas companies, instead of supplying gas having a calorific value of 620 B.T.U. at about 2s. 6d. per 1,000 cubic feet, as at present, were to supply gas having a calorific value of 500 B.T.U. at 1s. 6d. per 1,000 cubic feet, then the displacement of coal as a fuel would be almost universal throughout the metropolis. This cheap gas would have the same flame intensity as that at present supplied, and would yield, with the incandescent mantle, practically the same intensity of light for every unit of gas consumed as that which is now obtained. To induce manufacturers to consume gas in bulk, and to bring the day consumption of gas into closer approximation to the night consumption, and thus reduce the cost of storage and distribution, many companies make a reduction in the price of gas used for power purposes; but if the price for all classes of consumers were reduced to the suggested 1s. 6d., it is probable that the day consumption would equal the night consumption without any such artificial encouragement.

But even at its present price, gas is being used in so many industries that limitation of space prohibits even the mere enumeration of all the purposes to which it is applied.

That the building trades are materially concerned in the dispute as to whether gas companies ought to supply cheap low-grade gas suitable for industrial purposes and incandescent lighting, or costly high-grade gas suitable for flat-flame lighting, is demonstrated by the fact that most of the appliances mentioned in the following list, and which were mostly invented by the late Mr. Thomas Fletcher, are now in general use.

Gas Engines.—The most important gas-consuming appliance used in the building trades is the gas engine, which is now commonly used to operate saws, lathes, pumps, mortar-mills, haulage cranes, and a number of other machines used in connexion with building. The late Mr. Bryan Donkin estimated that the number of gas engines in use in the United Kingdom at the commencement of the year 1897 was 25,700. The number in use at the present time is estimated at 80,000, representing an increase of over 200 per cent. in less than seven years. At present London prices, the cost of operating a gas engine amounts to from one halfpenny to three farthings per hour per brake horse power, and as the cost for fuel per brake horse power is considerably less when a good steam engine is employed, the fact that many prosperous business firms are tearing out steam generators and erecting gas engines in their place may, for a moment, appear inexplicable. The factors which so often make gas cheaper than steam as a source of power are :—

1. No stoker is required. Instead of a stoker at 25s. per week having to be employed, a workman on the premises is glad to give the gas engine all the necessary attention for an addition of 5s. per week to his ordinary wage, and the time occupied in attending to the engine is inconsiderable.

2. No time is lost in starting work. The engine can be started or stopped at a moment's notice without waste of fuel.

3. The gas engine occupies only about one-fourth of the space occupied by a steam engine and boiler yielding the same power. This is an important consideration in town factories.

Other facts in favour of the gas engine are that it never occasions complaints of a smoke nuisance; that it does not necessitate the importation of coals into the factory, nor the removal of ashes; and that flue-cleaning and boiler-cleaning are not required.

Although a considerable number of 100 to 600 h.-p. engines are in use, the great majority are of lower power. Looking through a list of the gas engines in use in a certain London district, it is seen that there is a fairly general distribution of the smaller sizes; almost every size from ½ h.-p. to 100 h.-p. being represented, and no one size greatly predominating in number over the others. Large engines usually consume about 15 cubic feet of coal gas per hour per brake horse-power, and very small engines about 22 cubic feet.

An attempt has been made during the present year, by Messrs. Hacker Bros. to utilise electric power at their saw mill in Old Ford, but it has been found that the cost of power in this form is prohibitive. An electromotor of about 20 B.H.P. was supplied with electricity by the Poplar Borough Council, at an average price of a little under twopence per unit, and the electricity bill for eleven weeks amounted to 54*l.* 9s. 5d. The electromotor was then displaced by a Stockport gas engine, of about double the power, and although the gas engine did a little more work per week than the electromotor, the gas bill for twelve weeks amounted to only 20*l.* 5s. 5d. In this case, therefore, electricity as a source of power cost about three times as much as gas.

Lead Burning.—It was for many years believed that lead burning could only be accomplished with the aid of a hydrogen flame, but it has since been found possible to do the work equally well with coal gas and a small foot-blower. Coal gas is now commonly used for this purpose.

Water Heaters.—Water heaters and water boilers for use with gas are manufactured in a great variety of forms and sizes. They are used for many trade purposes, and are also useful in workshops for providing the employees with boiling water at trifling cost to the employer.

Metal Melters.—Lead melting is now very commonly effected in a gas-heated ladle furnace. One hundredweight of lead can be melted in half an hour, even when starting with everything cold. About two pounds of lead are melted for every cubic foot of gas consumed. Tin, zinc, or solder can, of course, be melted in the same furnace.

Drying Ovens for Varnishes.—The ease with which a gas-heated oven or drying chamber can be maintained at any required temperature for any length of time has caused these appliances to become indispensable in many industries. They are extremely useful for drying lacquers and varnishes, and can be made of any shape or size. The fact that many thousands of these ovens are in use is sufficient evidence of their value.

Blowpipes.—Gas blowpipes are now very largely used for brazing, and similar purposes. The development which has taken place in the adaptation of the blowpipe to industrial purposes during the last twenty years is remarkable. Small blowpipes in which the air-blast is supplied from the mouth, or from a small foot blower, are used in large and increasing numbers; but in addition to these, Messrs. Fletcher, Russell, and Company now manufacture blowpipes which when used in conjunction with a foot-blower will heat a 3-inch wrought-iron pipe to brazing heat in six minutes; and other blowpipes in which oxygen instead of air is used for the blast, which will in one minute fuse a hole through wrought-iron steam pipe ½ inch thick. With these instruments machinery can often be conveniently repaired without being removed from its working position.

Muffle Furnaces.—Gas-heated muffle furnaces are used in great numbers for firing painted glass or enamelled ware, and for many other purposes.

Rivet Heaters.—Gas reverberatory furnaces are already in use for heating rivets, tempering metal tools, and work of similar character. If these come into general use they will materially increase the demand for gas.

Blast Furnaces.—These are used for heating solid metal bars; and gas forges for ordinary smiths' work are manufactured.

Tinning Baths.—Baths for tinning tubes, wire, or sheet metal are most conveniently maintained at the required temperature with the aid of gas, and the same remark

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applies to the pots containing pitch, which are used in the manufacture of brushes.

Branding Irons.—These are either self-heating, like a gas-consuming laundry-maid's iron, or may be heated in a specially constructed gas furnace.

Tinman's Stoves.—These stoves for heating soldering bolts are so largely used and so well known that they require no description.

Sundry Utensils.—Among the appliances of minor importance which consume gas, and which are used in the building trades, may be mentioned self-heating soldering bolts for ordinary work; soldering bolts for jointing the lead in stained glass windows, and soldering bolts for use with an air blast for work which is too heavy to be performed with gas and air under normal pressure. Also safety glue pots heated by gas, and designed to meet the requirements of the fire insurance offices.

The foregoing list indicates a few of the purposes to which gas is applied in the building and allied trades. In many other industries which are in no way connected with building it is also being used in increasing volume.

For some years past it has been the fashion for the would-be smart journalist to call gas manufacture a decadent industry. Those who have watched the annual returns of the Board of Trade know this to be merely a betrayal of ignorance, whilst those who have observed the rapid growth in the volume of gas used for industrial purposes cannot but foresee that the supply of gas is likely to become a matter of vital national importance in the immediate future.

NOTES.

Safeguards Against Fires in the City.

A REPORT presented to the Corporation by the City Coroner, on the subject of precautions against fires in the City, has been referred to the Streets Committee for consideration. Although a Coroner is not usually regarded as an expert in structural matters, there are reasons why Dr. Waldo should be heard at the present time. It was his duty to preside over the inquest relative to the lamentable fire that took place in Queen Victoria-street, in June, 1902, and in the course of the inquiry much valuable evidence was placed before the jury. The City Coroner now directs attention to the opinion expressed by the jury, that the loss of life in that fire need not have occurred if suitable exits had existed in the roof, and in other parts of the building attacked. He suggests the desirability of obtaining powers so that the Corporation may be enabled to compel the owners of business premises to establish proper structural safeguards against fire. As matters stand, it is impossible for the authorities to demand adequate protection for persons employed in warehouses and factories, and revision of existing legislation is clearly desirable. We understand that the Streets Committee are now considering the possibility of joint action by the City Corporation and the London County Council, with the object of obtaining the amendment of the London Building Act of 1894. This is a very proper and reasonable step, and we learn with regret that there appears to be some difficulty in the way which is likely to delay the proposed reforms. There generally is some hitch when rival municipalities are required to act together, but the matter now in question is urgent, and the lives of the people must not be jeopardised by jealousy, obstinacy, or any other cause.

Motor Transport for Goods.

ATTENTION was once more called to this important subject by Mr. D. Mackenzie, at a meeting of the Society of Engineers this week. Dealing with goods in bulk, the author arrived at the conclusion that for loads of less than five and a half tons horse traction would be cheaper than motor transport, and he placed the ideal load at from five to ten tons for distances exceeding ten miles. If the journeys were too short, or the loads too light, he believed that motors could only be used when economy was not the first consideration. We cannot entirely agree with such opinions. At the present time there is need for cheaper and more rapid means of transporting farm produce from rural districts to the towns, and for conveying parcels and small consignments from town to town, or between town and country. The rates charged by railway companies are frequently so high as to cause the annual waste of tons upon tons of fruit, vegetables, and other food stuffs, that would be welcomed by those who dwell in cities, in replacement of foreign supplies now brought into England at unfairly low rates. Further, the delays apparently inseparable from the railway system directly tend to discourage transport. While it may be the case that isolated motor vehicles cannot compete with the horse or the locomotive, we firmly believe that properly-organised systems of rapid and comparatively light motor vans for different districts would find a large sphere of usefulness. Parcels and small consignments of goods or produce could be collected and delivered direct to their destinations without the delays caused by unloading and transhipment at railway depots; and market monopolies would no longer prevent farmers from selling produce direct to consumers on remunerative terms.

Another Lift Accident.

MOST mishaps in connexion with lifts are due to the absent-minded carelessness of passengers, or the culpable negligence of persons in charge. Some of them, but not very many, are due to defects in the mechanism, for which the makers may be held responsible. An inquest held on Monday last, at the City Mortuary, brings to light an extraordinary lack of care on the part of all concerned. The accident took place at a printing works in the City, It seems that while a workman was taking up some lithographic stones the lift chain snapped, and the cage fell to the basement. There were two safety clips that ought to have held the cage, but for some reason they did not act. A foreman mechanic, who erected the lift fifteen years ago, and who admitted responsibility for all repairs to machinery, stated to the court that so far as he knew the lift had never been thoroughly overhauled, nor the chain renewed since erection, and further, that he could not tell why the safety clips had failed to act. This witness believed a chain should last for twenty years, and he did not believe the examination of a lift every three months was at all necessary. On production of the broken part of the chain, it was found that many links were so worn as to render them unsafe, while the broken link had evidently worn to an abnormal degree. Altogether, it is clear that the misplaced optimism of the foreman had a great deal to do with the accident. His duty, among other things, was to see that the chain was safe, and that all safeguards were in proper working order. These vital points were neglected. Another extraordinary circumstance is that although a firm of engineers were recently employed to overhaul the lift, they did not take off or test the chain. Again, it is unsatisfactory that the factory inspector should have failed to make inquiry as to the condition of the lift in the course of the fifteen years during which it had been in use. The moral of the accident is that periodical inspection of lift gear is necessary for safety, and owners of lifts ought to be held responsible for seeing to it.

Testing Electric Machinery.

IN Vol. XIX. of the "Journal of the American Institution of Electrical Engineers" there is an admirable report on the standardisation of electric machinery. This report deserves most careful study by all electrical engineers, as it contains a great deal of information that cannot be obtained elsewhere. Very full instructions are given for the testing of all kinds of electric plant and machinery, and the tests have the merit of being both simple and conclusive. It seems to us that if the Institution of Electrical Engineers in this country issued a similar report, and adopted standard methods of testing, it would be a great boon to manufacturers and consulting engineers. At present manufacturers are sometimes asked to build machines that have to give quite impossible efficiencies under various conditions. Under these circumstances, it generally happens that only second-class firms tender for the contract, and unless the machine is very bad, the consulting engineer generally passes it, as the methods of testing in vogue in this country are in many cases extremely primitive. In the same way, manufacturers of iron for dynamos are often asked to guarantee that the losses due to eddy currents, etc., in the iron will not rise above a certain stated value. As the tests are only made in a few cases, and as it is extremely difficult to get the absolute value of the losses, manufacturers prefer to run the small risk of having their material rejected before the contract time is up, rather than go to the expense of having their materials fully tested. Now that such problems as the "ageing" of iron, the variation of the insulation resistance of cables with temperature, the maximum temperature which insulated wires will stand with deterioration, the sparking distances for various pressures, etc., have been almost completely solved, it seems a pity that the Institution of Electrical Engineers should not publish authoritative statements on these subjects to which manufacturers could refer.

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Water Supply in Norton Rural District.

Dr. Wheaton's Report to the Local Government Board on the water-supply in the Norton Rural District (East Riding of Yorkshire) shows a very bad state of things in this district, which it appears has repeatedly been subject to outbreaks of fever and diarrhoea in the eastern portion of the district, but in regard to the western portion we have the same story, with only slight variation, throughout the Report. Rillington, the largest village in the district, is supplied with water from wells constructed of bricks placed loosely together without mortar or cement, and without any external puddling of clay to prevent water entering them from the upper layers of the subsoil. The water of these wells is liable to pollution from many sources; frequently the well is situate in a foldyard, or by the side of a pigstye. Frequently in proximity to uncovered and leaking midden privies and defective catch-pits and house drains. In one place are nineteen dwellings with no other available source except the beck; the liquid refuse from these houses and from others higher up in the course of the stream enters the beck, in addition to the droppings from domestic animals, washings from manure heaps, and filth and refuse of all kinds thrown in the water. At Winteringham water is collected by drain-pipes in a tank in the graveyard of the parish church, whence it flows in pipes by gravitation to tanks in the village street. At Scagglethorpe water is obtained from a spring running for some distance in an open channel in a field, where the water was fouled by cattle. At Settrington about half the dwellings have no water except that which is obtained from a number of shallow holes in the banks of the stream which runs through the village, the water of which is very foul, and receives the liquid refuse from the dwellings. At Burythorpe many dwellings are without a supply of water, and there is no public supply. "A row of eleven cottages was provided with a well, fitted with a pump, but no water could be obtained from it at the time of my visit, and in consequence the occupiers had either to fetch water from a small beck about 250 yards distant, which received liquid house refuse and was otherwise liable to pollution, or to beg water from persons who were more fortunate in possessing available sources of supply. With respect to this well, it is doubtful if the water which would be furnished by it was fit at any time for domestic use, since it was situate in a garden, and manure heaps and pigstyes were in close proximity." The Rural District authorities seem to have done little or nothing, so far, towards getting a better water-supply.

Tyldesley-with-Shakerley Urban District.

The Report on the Tyldesley-with-Shakerley Urban District, by Dr. R. W. Johnstone, deals with the other usual kind of rural district evil, bad drainage and sanitary system. Middens constructed of pervious bricks, their contents in some cases thrown out on the public way preparatory to final removal; closets served inadequately with waste water, the District Council having refused to supply water free of charge for flushing water-closets. Result—frequent outbreaks of enteric fever. Dr. Johnstone's Report concludes with the remark that the Urban District Council should take steps to substitute water-closets for the existing middens, and adds that in this connexion it would be well if the District Council set an example to others by first setting their own property in water.

The Institution of Heating and Ventilating Engineers.

We have received a copy of the "recommendations suggested by the Council" of this Institution, for the purpose of obtaining uniformity of practice in the preparation of plans, specifications, and estimates for the heating and ventilation of buildings. Briefly stated, the recommendations are:—(1) That contractors tendering in competition should be provided, free of expense, with plans and sections of the building, and should be given full instructions in writing of the results desired. (2) That out-of-pocket expenses should be paid. (3) That if any special system is preferred, the contractors should be informed of the fact, and should be permitted to suggest modifications. (4) That full details should be given to the architect, so that he will be enabled to select the most favourable tender. (5) That sufficient time should be allowed for preparing estimates. (6) That tenders should be sealed, and should all be opened at the same time, and that if any tender is very much below the others the contractor should have the option of withdrawing it on forfeit of his deposit, but should not be allowed to amend it. (7) That, if guarantees are required, the contractor should not be held responsible, unless he has prepared the scheme. (8) That the terms of agreement should be equitable, the cost of preparation to be borne by the client; and (9) that certificates should be given during the progress of the work up to 80 per cent. of the value of the work done, a further 10 per cent. on completion, and the balance of 10 per cent. within six months. Some objection may be raised to the first and second recommendations, although they do not appear to us to be unreasonable. The others are entirely commendable.

The Old Dutch House, Bristol.

Those who know Bristol will be concerned to hear that the City Engineer has been ordered to report as to the safety of the picturesque half-timber building known as the "Old Dutch House," according to a doubtful legend that it was brought over from Holland and erected in its present situation. There really is nothing particularly Dutch in its character, but it is a most interesting specimen of English street architecture of the eighteenth century, and every effort ought to be made to preserve it. Mr. Harold Smith, an architect practising in Bristol, writes to the *Bristol Times* on the subject:—

"With regard to its preservation, I think there will be few educated people acquainted with the history of our ancient city who will differ from me when I say that every means known to the modern architect should be employed in effecting as thorough, and yet conservative, a restoration as possible. A short time ago one of the partners of our senior firm of local architects propounded a scheme in the columns of this paper. He proposed, generally speaking, to set back the base of the building, and to carry the superstructure on steel columns behind the glass front, and to support the failing timbers with steel brackets. The footpath would thus be widened, and the building secured against any further failure. There is not much doubt that this can be done; and there is certainly a sufficiency of talent in the city to do it both quickly and well. There only remains, then, the task of producing sufficient enthusiasm in the public mind to justify the authorities in giving the order and making the outlay."

Bishop King's House, Oxford.

It is remarkable that when so much is done, both by the University and the Corporation of Oxford, to retain the old characteristics of the place, Bishop King's house should remain in its present state. It is, and must continue, a charming example of seventeenth century architecture. But the gable nearest St. Aldate's-street is filled with a photographer's advertisement, and a hideous though small addition, next to St. Aldate's-street, takes away from the harmony and completeness of the north front. We presume that the house is private property; it is, however, so interesting a relic and example of past architecture—the front was rebuilt in 1628—that it should be purchased by the Corporation, and kept without defacement. At any rate, those who are interested in retaining all the old characteristics of Oxford might bring their influence to bear to mitigate the vandalism which at present defaces this charming building.

The Phil May Exhibition.

The collection of works by the late Phil May, at the Leicester Gallery, just out of Leicester-square, is calculated to raise one's opinion, not of May's powers as a draughtsman, which were already admitted to be of the highest, but of his versatility and of his delicacy of taste. When one got a whole collection of his studies of the lowest type of inhabitants of the London slums in one volume, and saw these studies, and little else, of his in *Punch*, one was apt to think that such talent in line drawing was rather thrown away on this repulsive class of subject, and that the author of them, with all his ability, had rather a vulgar taste. In the exhibition in Leicester-square "the elements are kindlier mixed." There is more variety of subject; and not only is the treatment of *line* work masterly throughout, but the insight into character in many of the subjects is most remarkable. Look at the face of the butcher in No. 61, for instance; the character of the two men in No. 16; the "street jeweller" in No. 26; the figure of the military uncle, with his back to the spectator, in No. 70. Among the pencil drawings the gushing young woman and the famous actor (80), which appeared in *Punch* quite lately, are admirably contrasted, and the power of expressing character in mere outline is well shown in "Ghetto Ways" (153), though one must admit that this is one of those that verge on vulgarity. The studies of figures sketched in colour are as clever as the black-and-white examples; those called "Costume Studies" especially. If the promoters of the exhibition wanted to convince visitors of the comparative refinement and good humour of Phil May as a satirical artist, they could hardly have done better than to place a collection of the work

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of Rowlandson in the adjoining room. The talent of Rowlandson in line and composition cannot be denied, but the hatred and brutality in his caricature is so offensive to all one's better feelings that one would almost wish his works were destroyed, as a discredit to human nature. Phil May has everything to gain by the comparison; his satire is that of a gentleman, Rowlandson's that of a ruffian.

The Parthenon Model.

PROFESSOR ERNEST GARDNER writes to point out that we were mistaken in saying that the Panathenaic frieze is omitted on the Parthenon model at the British Museum. It is not visible, to an eye at the average height, except by stooping and looking up under the outer entablature. What appears opposite the eye, in its ordinary position, is the empty course of wall, just about the size (by scale) that the frieze should be, which really represents the position, though not the function, of the architrave on the side wall of the cella. The writer of the "Note" forgot this at the moment. It may be added, in excuse, that three or four people who were looking at the model at the same time all had the same impression. The incident emphasises the fact, often commented on, how very curiously the Greeks were content to hide away so masterly a piece of sculpture almost out of sight of the spectator, as it must have been in the building as well as in the model.

THE ARCHITECTURAL ASSOCIATION:

OPENING MEETING OF SESSION 1903-1904.

THE opening meeting of session 1903-1904 of the Architectural Association was held on Friday evening last week in the Meeting Room of the Royal Institute of British Architects, No. 9, Conduit-street, W., the President, Mr. H. T. Hare, occupying the chair. There was a large attendance of members and others, including His Excellency Viscount Hayashi, the Japanese Minister, Mr. Aston Webb, R.A., President of the Royal Institute of British Architects, and Mr. T. Sudsuki, who is visiting this and other countries in order to study methods of architectural education.

The minutes of the last meeting having been read by the Secretary, Mr. Driver, and confirmed, the following gentlemen were elected members of the Association, *i.e.*, Mr. H. Whiteman Rising and Mr. A. J. Perrin, and the following were reinstated, *i.e.*, Messrs. L. Sage, C. Granville Baker, and W. J. Waghorne. Mr. Arthur Keen was also elected by acclamation.

The President said he wished to propose the election of Mr. T. Sudsuki, who had been sent over to England by the Japanese Government to study the methods of architectural education here and in other countries. Mr. Sudsuki would take about four years in completing his study of the various systems, and the members of the Association would, he (the President) felt sure, wish to give Mr. Sudsuki a hearty welcome, and give him every facility and assistance they possibly could.

The motion was heartily agreed to, and Mr. Sudsuki briefly replied, expressing his thanks to the President and members.

New Premises Fund.

The President then announced the following donations to the New Premises Fund:—Messrs. W. D. Caröe, 25*l.*; Clyde Young, 25*l.*; W. Campbell Jones, 10*l.* 10s.; J. Douglass Mathews, 10*l.* 10s.; A. N. Prentice, 10*l.* 10s.; G. Sherrin (second donation), 10*l.* 10s.; W. H. Bidlake, 10*l.*; T. W. Aldwinckle, 5*l.* 5s.; E. R. Barrow, 5*l.* 5s.; F. T. W. Goldsmith, 5*l.* 5s.; Lacy W. Ridge, 5*l.* 5s.; H. W. Stock, 5*l.* 5s.; W. J. Waghorne, 5*l.* 5s. 4d.; Felix Clay, 5*l.*; E. Greenop, 4*l.* 4s.; Somers Clarke, 4*l.*; Anonymous, 2*l.* 2s.; F. G. Allsopp, 2*l.* 2s.; R. E. Crossland (second donation), 2*l.* 2s.; W. Curtis Green, 2*l.* 2s.; Arthur Keen, 2*l.* 2s.; Halsey Ricardo, 2*l.*; J. H. Cooper, 1*l.* 1s.; W. H. Knowles, 1*l.* 1s.; W. J. M. Thomasson, 1*l.* 1s.; Butler Wilson, 1*l.* 1s.

On the motion of the President a vote of thanks was accorded to the donors.

The following class, it was announced, would commence on October 12, "Materials, their Nature and Application," Mr. H. A. Satchell, lecturer. It was also stated that the preliminary meeting of the School of Design would be held on October 15, and that the speakers would be Mr. Walter Cave and Mr. J. S. Gibson. The President said he hoped members would take full advantage of the various classes.

Election of Officers.

The President said that at the next meeting Mr. Louis Ambler would be proposed as Hon. Secretary, and Mr. G. B. Carvill as a member of Committee. It would probably be in the knowledge of most of them that Mr. Bolton having resigned the headmastership of the Day School, Mr. H. P. G. Maule was appointed in his place. This created a vacancy in the hon. secretaryship, and Mr. Ambler had consented to serve in that capacity. Mr. Ambler's acceptance of the office caused a vacancy on the Committee, and Mr. Carvill had consented to serve, subject, of course, to his election by the general body.

On the motion of the President, a hearty vote of thanks was accorded to the Bath Stone Firms for allowing the recent visit to their quarries,* and for entertaining the members in the generous manner in which they did; and also to Mr. Mowbray A. Green for arranging visits to a number of buildings in Bath. Those gentlemen who took part in the visit must have enjoyed the programme exceedingly, and have been instructed by what they saw. Their hon. member Mr. Sudsuki formed one of the party, and from what he (the President) saw Mr. Sudsuki must have brought away more information than any member who was present.

It was further announced that Mr. E. O. Sachs had invited members to visit on the following Wednesday the Exhibition for Fire Prevention at Earl's Court, and 100 tickets had been placed at the disposal of the members.

The Secretary announced the following donations to the library, *i.e.*, "The Arts in Early England," by Professor Baldwin Brown, presented by Mr. Arnold Mitchell; "Old English Doorways," by Messrs. W. G. Davie and H. Tanner, junior, presented by Mr. H. Tanner, junior; "Country Houses," by Mr. Ernest Newton, presented by Mr. B. T. Batsford; Mitchell's "Advanced Construction," presented by Mr. B. T. Batsford; "Academy Architecture, 1903." Part I., presented by Mr. Alex. Koch; "The Great House, Leyton," by Mr. Edwin Gunn, presented by the Committee for the Survey of the Memorials of Greater London; and Portfolio of Drawings for the use of the Day School, presented by Mr. R. Douglas Wells.

A vote of thanks was accorded to the donors.

Presentation of Prizes.

The President then presented the prizes and studentships for session 1902-1903. The following is the complete list:—

A.A. Travelling Studentship, value 25l., and Silver Medal.—A. G. MacNaughtan.

Second Prize, value 5l.—Vincent Hooper.

A.A. Medal, value 10l. 10s.—A. A. Carder.

Second Prize, value 5l. 5s.—L. G. Detmar.

Banister Fletcher Bursary, value 25 Guineas, and Medal.—J. Gillespie.

Hon. Mention.—A. A. Reeve.

A.A. Scholarship, value 4l. 4s.—T. W. Watkins.

Studio. Division I.

C. R. Pinsent, drawings of old work, book prize and volume of A.A. Sketch Book; T. A. Jaques, study of ornament, book prize and volume of A.A. Sketch Book; G. F. Royds, general work, book prize and volume of A.A. Sketch Book.

Studio. Division II.

T. J. Tatham, drawings of old work, book prize and volume of A.A. Sketch Book; J. F. Schneider, study of ornament, book prize and volume of A.A. Sketch Book; J. V. Gibberd, general work, book prize and volume of A.A. Sketch Book; A. E. Brooker, perspective, book prize.

Order of Merit.—Lectures. Division I.

Greek and Roman Orders.—1. J. H. Markham (book prize). 2. A. T. Groves. 3. T. W. Watkins.

Classic Ornament.—1. B. Chaikin (book prize). 2. A. Binning. 3. J. H. Markham.

Elementary Construction.—1. B. Chaikin (book prize). 2. A. T. Groves. 3. T. W. Watkins.

English Architecture.—1. C. R. Pinsent (book prize). 2. J. H. Markham. 3. T. W. Watkins.

Mediæval and Renaissance.—1. R. C. Foster (book prize). 2. S. W. Hill. 3. T. S. Atlee.

Elementary Physics.—1. T. W. Watkins (book prize). 2. R. C. Foster. 3. H. H. Whittington.

Plane and Solid Geometry.—1. T. W. Watkins (book prize). 2. B. Chaikin. 3. G. P. Bowie.

Lectures. Division II.

Materials.—1. E. Gunn (book prize). 2. A. Potter. 3. D. Anderson.

Construction.—1. E. Gunn (book prize). 2. D. Anderson. 3. J. V. Gibberd.

Drainage and Water Supply.—1. E. Gunn (book prize). 2. H. W. Currey. 3. E. Dru Drury.

Ventilation, Lighting, and Heating.—1. H. W. Currey (book prize). 2. E. Gunn. 3. W. S. Dakers.

Professional Practice.—1. E. Gunn (book prize). 2. H. W. Currey. 3. R. E. Stewardson.

Land Surveying.—1. E. Gunn (book prize). 2. J. R. Hobson. 3. H. W. Currey.

School of Design.—Elementary Class.—1. H. A. Hall, prize value three guineas and bronze medal. 2. M. E. Webb, certificate. *Advanced Class.* — 1. J. MacLaren Ross, prize value five guineas, bronze medal, and pass for modelling class. 2. G. Drysdale, certificate and pass for modelling class.

Essay Prize (value Ten Guineas, with a Silver Medal).—John Swarbrick.

Andrew Oliver Prize.—P. W. Lovell, prize value two guineas; B. Drummond and L. L. Jeeves, prizes value one and a half guineas each.

President's Address.

The President then delivered the following address:—

When we met together in this room a year ago you may remember that I expressed the hope that I should shortly be in a position to make an announcement that the pressing question of our new premises had at last reached a solution, after having constantly occupied the attention of your Committee for many years. Session after session allusion has been made to the subject in the Presidential address, and it may well be that your patience and hope have become well-nigh exhausted.

The anticipation is, however, now happily fulfilled, and after long negotiations we have been able to take possession of the Royal Architectural Museum, for so many years located in Tufton-street, Westminster, and formerly housed at the then Brompton Museum. *The Builder* chronicles the fact in 1857 that "the Architectural Museum has been removed from the quaint, dirty hole in Cannon-row where it was planted and grew."

This fortuitous consummation being reached, your Committee forthwith proceeded to the consideration of many proposals for the adaptation of the premises to our needs; were able to instruct their architect, Mr. Leonard Stokes, one of our past-presidents, to proceed without delay with the work; and to accept the estimate of Messrs. Holloway Brothers. To-day substantial progress has been made, and there is no doubt we shall be able to move into our new home at the end of March next.

I have no intention of wearying your patience with the long and deeply interesting history of the Royal Architectural Museum; that has already been written in part; and now, no doubt, the time is at hand when an authentic and detailed account of its origin and progress will become an obligation posterity may demand. It will be enough to say that it has had a long and brilliant past, and that it is a tangible evidence of the potency of the Gothic revival. Some may here be led to remark that that cult had become effete; that the institution had fallen upon evil days, and was passing away in senile decay. If such were the case it is but a surface truth, which accomplished events have abundantly disproved. True! the Museum had become out of sympathy with its environment through the trend and evolution of architectural progress,

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* See our last issue, p. 335.

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in which it had held such a pre-eminent position, and exerted such a widespread influence.

It is the fashion, in looking back on the Gothic revival, to speak slightingly of the enthusiasm which possessed its leaders, or to regard that enthusiasm as worthy of a better object. The direct effect, however, is with us to-day in our emancipation from the artistic paralysis of the first half of the last century. The leaven is still working, with full and perhaps increasing potency, and the wonderful renaissance is yet only emerging from its shell, and there is promise of such glorious developments as may perhaps eclipse the greatest triumphs of the past. Beneath the apparent desolation of the Museum was a latent vigour, based upon our indigenous architectural traditions destined to successfully receive the graftings of such a vigorous constitution as that of the Architectural Association, whereby to renew its strength, and with regenerated powers to influence for lasting good our noble profession. This sketch, I venture to think, is not overdrawn, and while we are accepting new responsibilities, we are also investing ourselves with a heritage in delightful associations and replete with potent possibilities.

The interests centred at Tufton-street are one thing; the collections are another; and without going further into that it may be said that the study and contemplation of the contents of the Museum and of the cognate studies there represented have had no small part in the great renaissance to which I have just referred. It will be impossible to adequately refer to the long roll of honourable names linked with the history of the Museum, but I cannot refrain from reminding you that among those in the past have been H.R.H. the late Prince Consort, Earl de Grey, Ruskin, Donaldson, Sir Charles Barry, Beresford Hope, Scott, Cockerell, Penrose, Pearson, Brandon, and a host of others; while in the living present we have Mr. John P. Seddon, Mr. Aston Webb, Sir William Emerson, and Mr. Maurice B. Adams, who for so many years has acted as honorary secretary, and through whose enthusiastic interest the idea of fusion has been translated into a reality. These are names which, I venture to think, will be for ever connected with the Royal Architectural Museum.

We see to-day noble blocks of Government buildings rising in Whitehall, which strangely seem to recall to memory the hot controversies and battle cries of the styles which raged when the Foreign Office designs were prepared by Sir Gilbert Scott in a manner alien to his sympathies. In all of this, no doubt, Tufton-street exercised a not unimportant influence. Scott is generally supposed to have vindicated in St. Pancras Station what he would have done in Whitehall had he been so permitted by the powers that then were. Time, however, has its revenges, and it is not a little entertaining to read a couplet in an antique volume of that valuable and enlightened journal *The Builder* of the period in question, being a reflection "on reading a discussion on the new Government offices":—

"Scott's windows may give us abundance of light,
But 'tis clear that Scott's windows will never fit Tite."

In those days the Museum was a centre of light and leading, and I trust that it may still be in a more extended way a factor to be reckoned with in the architectural movements and interests of the day.

The past year has not only been significant and epoch-making by what may be designated as the great departure, but it has been rendered notable by the successful completion of the first year's working of the Day school. This is a matter for sincere congratulation, and this fact is important enough in itself to have taken precedence of everything else. However, these two events have come together side by side; the school demonstrating beyond all dispute the inadequacy of our present premises. This climax may well encourage us in the highest anticipations for the future progress of our society under the more favourable conditions which we shall enjoy in our new home.

After two years of ungrudging labour Mr. Arthur Bolton has, greatly to everyone's regret, relinquished the post of headmaster of the Day school, which he has filled with unqualified distinction, and the success which has attended the school is doubtless due in a very large measure to his devotion. To undertake a mastership is one thing, to organise and originate is another. Mr. Bolton has done both. Our ideal has been to give definite and systematic instruction by a one year's course of training preliminary to office work, and, when desired, to supplement this by a second year's course of more advanced study. This instruction is partly intended to enable the student to gauge in a measure before life is too far advanced his capacity, and to test practically his inclination for entering the profession. The latter consideration need not be present, but had it been possible for many now alas! in practice, perhaps some careers would have been happier and architectural repute more unsullied. The instruction which our day students receive, at the hands of the master and his assistants, is based on principles which are intended to enable an intelligent interest to be taken in what they will see going on around them when they enter an office, and to assist them to assimilate the knowledge which will be at their disposal if they can but seize their opportunities.

Some of us can recall happy days of long ago, when enthusiasm was high and zeal, often misdirected, outran knowledge. This spirit Mr. Bolton has been able to foster, and to direct to sources of wise inspiration. I cannot do better than invite you to inspect the results evidenced by the students' work, and to come and see the schools in operation for yourselves. The progress so far has been most gratifying, and we shall watch with signal interest the subsequent careers of those students who have had the good fortune to pass through the school. The success is all the more remarkable as having been attained under the very difficult restrictions which the present premises imposed upon us. When we enter upon our new home next year we shall confidently expect to see corresponding developments.

To fill the vacant mastership has been a difficult and anxious duty. I am certain that the selection of Mr. Maule has the full approval of the Association. The responsibilities of the post are by no means light, and, whatever the new master's opinion of his own fitness may be, all will agree that no better choice could have been made.

In connexion with these two topics, before leaving them I have two appeals to make. First, in regard to the Day school. I take this public opportunity of commending it to the consideration of parents, guardians, and heads of public schools, as affording an excellent means of testing the aptitude of the coming man for his future profession. Should experience show within twelve months that he is unsuited for the calling of an architect, he will have been no loser thereby, but will have gained much information useful in other walks of life, and will have been spared the drudgery of an uncongenial occupation.

The other appeal I have to make is to a wider audience than that represented within this room. I refer to the building fund, which still requires to be largely augmented before we can hope to be free from debt. The work on which we have embarked at Tufton-street is one which is in the interests of every member of our profession; indeed, I do not think I am guilty of exaggeration if I say that it is of national importance. In every other great country it would be undertaken or heavily subsidised by the responsible government; here, however, it is left to private effort, and the greater need there is, therefore, for every member of the Association and the profession at large to afford the utmost support which their means will allow.

We are honoured this evening by the presence of His Excellency the Japanese Minister, and we have just elected as a member of our Association Mr. Sudsuki, who is visiting many countries for the purpose of studying the various systems of architectural education and reporting to his Government. This clearly shows the determination which exists in that far distant land not to be left behind in the promotion of the arts and sciences, and appears to me to be an example which our own country might well take to heart.

One cannot help hoping that in the extraordinary energy which the Japanese Government and people evince to assimilate all that is good in nations foreign to them, they may not lose sight of the delightful arts which are traditional with them, but that these may be fostered and promoted, rather than superseded, by the importation of extraneous methods.

I may perhaps be pardoned for making a very brief financial statement in respect of our new premises. The contract which we have entered for the remodelling of the Architectural Museum amounts to 8,400*l.*, and it is calculated that a further sum of perhaps 1,500*l.* will be required for equipment and furnishing, making a total of about 10,000*l.* Towards this we have donations and promises amounting to about 3,700*l.*, and it is proposed to transfer 1,000*l.* from the capital account of the A.A., making a total of 4,700*l.* We have therefore still to collect more than 5,000*l.* before we can hope to be free from debt.

The Association numbers nearly fifteen hundred members, and one might reasonably expect that each one of these would contribute to an object which is so much in their interest. Up to the present time, however (although we have to thank many generous donors), less than one quarter of our members have responded to the appeal. I feel that some great effort should be made to bring the general body into line, and I here invite every member to follow the example already set by your committee, by doubling the amount of his yearly subscription for this session only. This should be within the means of all, and produce a community of interest, which would be for the good of all.

The provincial societies have also an interest in this matter, and very welcome have been the contributions sent by some. I commend the good work heartily to the others, and indeed to all persons interested in the progress and advancement of architecture (and who should not be?) as a national British art, and ask them to show their practical sympathy by coming forward to assist us to complete the provision of the large sum necessary for the adaptation and enlargement of the Royal Architectural Museum to the purposes of the Association.

We have had to undertake certain financial responsibilities relative to and contingent on the acquisition of the property and its extension, while in addition to this there will be considerable outlay in the re-arrangement and exhibition of the valuable collection of casts, which will be open free to the public as heretofore. In regard to the latter, we hope to make the collection as far as possible representative, chronological, and useful in every way to students at large.

Many have laboured for the Association in the past and given ungrudgingly of their time and means. We to-day may enter into their labours and continue them. I feel sure I shall not appeal in vain, and that the provision of these highest and indispensable facilities will not be left to become a burden to the Association, and a drag upon its work and progress.

There is some danger that in the prominence which is necessarily being given at the present time to the establishment of the Day school and to our new premises, the valuable work which is being done in our studio and other evening classes may be lost sight of. I would wish here to urge the necessity of young architects continuing their studies in their spare time, and point out that there is no better means of organising and directing these studies than joining the various classes which are open to them, and which have worked so well in the past.

Death is ever too busy with us, and to-day we have to lament the loss of some valued colleagues whose sympathy and counsel have helped us in the past. The late Mr. F. C. Penrose was associated with the early days of the Excursion under Edmund Sharpe. We also deplore the loss of Professor Roger Smith, twice President of this Association, ever its kind adviser, and the friend and learned instructor of all young men brought under his helpful influence.

In drawing to a conclusion, I have a few reflections which I wish to offer to our student members. I might again advise the enthusiastic pursuit of the study and delineation of ancient buildings, or the fruitful results that await the diligent student of architectural literature, without enlarging on either, which I have done before. I would again heartily commend both to you. What I want to do is to venture to suggest the deliberate consideration of such studies as are the outcome of demonstration and experience, observation and research, rather than the perusal of books and the abstract theories of mankind. Sir Norman Lockyer, in his illuminating address before the British Association, made this pregnant statement, "From neglect of research comes imperfect education, and a small output of new applications and new knowledge to reinvigorate our industries."

Last year I made more than a passing reference to the necessity of brains in the active evolution of architecture, and perhaps the younger members will pardon me if I beg them to read what I then said in connexion with

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what I have to say now. Now, it seems to me that much of the deplorable wickedness which we unfortunately see abounding in the thoroughfares of our cities and towns is the result of (to put it in better words than mine), "old rule of thumb processes, which are preferred to new developments"—a conservatism too often resulting from the master's own lack of knowledge. This may seem a hard saying, but it should be our object, as much as lies within our circumscribed and limited powers, to develop and foster the abilities with which we are all more or less endowed. It is no crime to be young, and all possibilities lie with youth, so that in a way it may be said that to be young is to be successful.

To secure our well-being as a profession it is highly important to see to our organisation and equipment, the consideration of which is to us personally as important as the provision of "battleships and big battalions." It is brains therefore that we want, fortified by the experience and research of others, and it is the practical personal study of the design and execution of modern work by modern masters, reinforced by the rich heritage of art which has come down to us. It has been recently said, "It is a great thing to learn to use other people's experience, and to get it first hand, not trusting entirely to books. Knowledge obtained from men is the most mentally nourishing and the most easily assimilated."

What I would leave with you is the picture sketched by Robert Browning:—

"Here, work enough to watch
The master's work, and catch
Hints of the proper craft, tricks of the tool's true play."

Mr. G. H. Fellowes Prynne, in proposing a vote of thanks to the President for his address, said that the duty of doing so would have fallen on their friend Mr. W. H. Seth-Smith had he been well enough to be present. They would feel more especially sorry that Mr. Seth-Smith was not present because the work he had done for the Association had been the main cause of his bad health, and they would not forget that Mr. Seth-Smith's name was inseparably connected with both the Day school and the new premises scheme. The President had achieved two records. The first, in being able to make the definite announcement, so long looked for, so long hoped for, so long deferred, of the approaching removal of the Association to more adequate premises, and he congratulated the President on being able to make the announcement. Every member of the Association, knowing the difficulties there had been in carrying on the work of the Association in the present limited space, would welcome the move, and appreciate the great value the new premises would be. The second record was—and he said it with all deference—that the President had taught them how to make a short address. It was probably the shortest presidential address ever delivered in that room. But conciseness had been the President's aim, *Multum in parvo* his motto, and no other address containing matter of such value and importance to the Association in all its many evolutions had been delivered. The removal from Great Marlborough-street was an event second to none in importance in the history of the Association, though the move into the Great Marlborough-street premises must at the time have seemed just as great a leap in the dark. With the knowledge gained in the past, and with the success which had so far attended their efforts, he thought they could go forward in the strong belief that their endeavours and sacrifices—enormous sacrifices of time and money on the part of many—would not be lost either to the profession or the nation. He congratulated the President on being able to make the announcement he had. They were all glad to see a man of the President's standing in the chair for a second year—"a man who is a good architect, a good fellow, and is anxious to devote time and energy to the welfare of his younger brethren." The announcement made that evening meant that the Association was really progressing with true life and energy. The work which had been done in the Studio, for instance, under the careful guidance of Mr. Lewis, had been of very great value to students. Then, again, the enthusiasm of the lecturers, amongst whom were some very able men, who had come forward to impart their knowledge to others, had inspired many students to persevere. In speaking of the day classes, he must again mention Mr. Seth-Smith, who was the originator of these classes to a large extent, and to whom they owed a debt of gratitude for what he had done in the matter. The knowledge of the existence of the school should, as the President had said, be brought before the heads of public schools and teachers, but it should also be brought before the notice of members of the profession. Parents often came to architects and asked them to take their sons as pupils, but in future it would be a good and proper thing to send these pupils for one year to the Association school before letting them come into the office. He had tried it, paying the fees of the student, which seemed only right and just. He was sure that such students would do justice to the school. The President had not lost sight of the value of the social side of the Association. There was in the Association an *esprit de corps* which did not exist in all societies—that club-like feeling which existed in the Common room, during the Excursion, and in other ways, and made the carrying on of work not so hard and machine-like—made it, in fact, more of a pleasure, and made students feel that they were working with one common object. The members of the Association ought to take to heart the appeal of the President for funds on behalf of the new premises. It seemed remarkable that so few members had responded to previous appeals. Some, no doubt, were unable to help; but so far only one-fourth had done so. Surely no one who had the interests of the profession at heart could fail to have sympathy with the movement, and he heartily supported the President's appeal. He was glad that the President had referred to the fashion of speaking slightingly of the Gothic revival. The fashion existed, but it surely was the result of ignorance, and could not be followed by those who had studied what these early revivalists did, and the motives by which they were led. Their enthusiasm had been of enormous value to us in whatever style of architecture we design. The President had said that the work of the revivalists was not lost, but that the leaven was still working. Surely that was so! He wished that we saw to-day more of the enthusiasm which animated the Gothic revivalists, including men like those whose names had been mentioned and others who were not so well-known, and who were always ready, sketch-book in hand, to study all styles, and not necessarily Gothic. That was the chief point. It was not a question of style—the Gothic, Classic, or Renaissance—but of seeing what was good, and trying to see what was good in all work, ancient or modern; and he hoped that by its students the Association would help on that spirit. "First try to find out the good in all work, and not the bad. Let us find the good points, and study them with a broad and sympathetic mind." He was glad to hear the President's remarks on Japanese work. They welcomed the presence of a Japanese architect amongst them, for they valued the beautiful art of his country.

Mr. J. S. Gibson seconded the vote of thanks. The President's address would interest them as architects, for the facts he had put before the meeting were of great moment, affecting, as they did, the future of the Association. There was no doubt that the work of the Association was one which affected the welfare of the nation. The beauty of our streets and cities was largely in the hands of architects, and as ordinary citizens they ought to do everything to interest the Government in their little part of the work of the world. As voters, probably they did not carry much influence, but however small, it should be brought to bear upon political bodies with the object of getting help to clear off the debt the Association had incurred. He had listened to a good many presidential addresses, and it had always astonished him how the Presidents had found anything new to say, but year after year their Presidents had come forward with interesting and valuable addresses. The President had referred to the days of the Gothic revival, when the great battle of the styles was on, but they all knew that we live in very changed times. During that period, the battle of the styles was probably the most enjoyable comedy to the bulk of the people, and if they took up the literature of the period—the writings of Pugin, for instance—they would, even though they knew little or nothing about architecture, enjoy it greatly, so clever was it, and so full of fun. But now we live in days that are antagonistic to this, for there were many rival forms of entertainment—musical comedy, etc.—which more readily interested the bulk of the people, and it was hardly to be expected that such abstruse questions as to Gothic or Classic styles suitable for the climate of this country should take hold of the people.

His Excellency Viscount Hayashi, in supporting the vote of thanks, thanked the Association for electing Mr. Sudsuki as an honorary member. Mr. Sudsuki had already shown much promise before he left Japan, and a large field existed for the exercise of his professional skill. A Japanese architect had, besides and beyond ordinary architectural work, a great difficulty to contend against, and that was in the frequency of earthquakes. By examining and studying the methods of construction in European countries, it might be possible, as the President had hoped, for the Japanese artist to continue the art of his country; and not only to continue, but perhaps to find, from the study of the work of enlightened followers of European art, a means of improving native art. Many tourists and travellers in Japan had written and spoken to the effect that a Japanese house is no more a house than a tent-like erection supported by posts, and could only last a short time, and no doubt they might think from this that Japanese houses were blown away by the first shock of earthquake, or burnt up by the careless use of a lighted match. He had been asked by several people in this country how a Japanese house stood a heavy shower in summer time or a heavy snowfall in winter, and no doubt it was generally thought that these houses were nothing more than houses of cards, and that they could not last long enough to be called old. Such ideas were incorrect, for there were many old houses existing. As to the houses being built low because of earthquakes, there were many buildings in various parts of Japan five stories in height, and there were many pagodas 150 ft. to 200 ft. high, built on a comparatively narrow base, which had stood for the last 200 or 300 years. The oldest building in Japan he knew of was called the Shō ō in, Nā á, in the province of Yamato, which used to be the capital of Japan long ago. These buildings had been used to store the personal effects of an Emperor who existed 600 years ago, and they were more than 1,200 years old, and there was no reason why they should not continue for another 1,000 years. Buildings in the former capital of Kyoto had existed for 800 years, and buildings 200 and 300 years old were to be found in every part of the Empire. If they thought of the antiquity of the Tower of London and Westminster Abbey, and then of some of these buildings, they would surely see that there were some elements of strength in them, but at the same time perhaps some principle of European art might be discovered which would strengthen and improve the buildings of Japan.

Mr. Arnold Mitchell, in supporting the vote of thanks, said that the statement they had just heard that some Japanese buildings dated back some 1,200 years must astonish a good many of them. He did not know that any of our buildings, that were complete buildings, went back anything like that time. On an occasion like that their chief interest was to congratulate the President on the commencement of another year of office, and to wish the Association one more year of prosperity. Mr. Hare had set them one excellent example, *i.e.*, that the only road to success was that of downright hard work, for there was no man in the profession who had worked harder than Mr. Hare, and no one, as a consequence, occupied a more honourable position. Mr. Hare was a sort of pioneer, for he was the President for the time being who would inaugurate the new premises, which were the most interesting premises the Association could possibly move into. They should hear what foreigners had to say about the Architectural Museum in London. In no country in Europe was there a more interesting collection of mediæval casts than there were in that museum, and, largely because of the trouble Mr. Hare had taken in the matter, they were to step into this rich heritage. He hoped that when Mr. Sudsuki returned to Japan that he would take back, not all he would see—for he might see much that he ought not to see in European architecture—but all that he ought to take back; and in their President's work he would see what he ought to take back. Then there was another matter, *i.e.*, the value of the Association schools in relation to the architecture of the future. They knew with what success the Day School had been started, and they knew with what success it had been carried on, but they must not forget, as Mr. Prynne said, the work of the old school under

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Mr. Lewis. He would like to add his tribute as to the invaluable work Mr. Lewis had done for the Association. Few of them had had the advantage of studying in the new Day School, but many of them had started their career, in all their ignorance, in the Evening School, under Mr. Lewis. Evening after evening it had been, and was still possible, to learn under Mr. Lewis.

Mr. Henry Lovegrove supported the vote of thanks to the President, and congratulated the Association on having arrived at a definite point in its career. He hoped that its successful history would be continued, and that good men would continue to come forward to help on the work. At the time he was working in the Architectural Association the idea of an educational scheme came like a gleam of light in the eastern sky. To-day the light seems approaching the meridian. As to the buildings of Japan, he did not think they could be improved as the result of a study of buildings in other countries. Japan had at least one advantage—it did not seem to have a Building Act, and architects there did not build their brick walls with large battered buttresses and cover the whole with rough cast. He thought that what appeared to be the leading feature in the present-day architecture, outside Venetian blinds painted green, might be very useful in Japan. As to the work of Sir Gilbert Scott, he admired his St. Pancras Station, and thought it was a fine building. He was thoroughly in sympathy with the inauguration of the new Day School. Several people had been to him about putting their sons to the architectural profession, because they thought it was such a thriving profession, and he had advised them not to waste their money in putting their sons to cleaning drawings, etc., as pupils. He had advised the sending one pupil on to the Day School and he hoped to be able to do so in the case of another. In Mr. Maule, the new headmaster, they had a man of great skill, energy, and ability. He was glad that the Association was removing from Great Marlborough Street because students complained that the premises there were not healthy, and were detrimental to work.

Professor Beresford Pite joined in the congratulations. These annual addresses served a useful purpose if they made members look backward and look forward and try and get a general aspect of the profession, and take stock, so to speak, from their own point of view. The very instructive papers read at the ordinary meetings were more or less specially directed to one point, happily, and it must impress the non-professional mind that the members of the profession had to take up a great number of specialised subjects. Added to the necessity of the knowledge that these subjects indicated was that of enthusiasm for the architectural form of art. In recent days there had been a cry for architectural education, but that seemed about to be replaced by a cry for professional status. In looking backward and forward, the most important thing they had to consider was that they were an Association of students, with absolute liberty to think for themselves—a liberty which he hoped they would cherish amid all the advice of masters, and professors, and teachers, and papers, and curriculum. And he hoped they would maintain that sturdy enthusiasm for architectural art without which, and in the absence of prejudices, which were nearly as good—in fact, they were only products of enthusiasm—it could not exist. What was the standpoint of the student to-day? What was he looking at? He (the speaker) was pessimistic in regard to the architectural designs of the younger architects, in spite of Mr. Aston Webb, who was an optimist. Were they satisfied with the modern school of design? It was that question that the modern architect had to settle, and on the answer of the rising generation their architecture would depend. They could make it what they liked. In it would be read their mental position, infallibly, unmistakably. "Whatever that mental position is will be reflected in your work; and as we look at that work we shall see in it before long, not your education, not your training, but what you are yourselves, and what you aim at. And we shall go underneath the style, not perplexing ourselves whether Sir Gilbert Scott was finer at St. Pancras or at the Home and Colonial Offices—and see what the man thought. That is what we want, and what we do not get. So long as we are concerned with the clap-trap of style, so long shall we be unable to take a part in the art movement of the world. I want to leave this thought, that the art of architecture is as much an expression of human thought as music; that it bears as much an impression of intellect, of soul, of mind, as any other expression of human activity, and that among expressions of man's activity, architecture takes a very high place indeed. It has been said that of all impressions of human mental activity, literature is the highest, and that in literature poetry is necessarily the best; but there is room for great doubt about that. My mind was opened on that by Professor Flinders Petrie, who is not absorbed only in Egyptian mummy dust, who pointed out that there are aspects of feeling and thought which are too high to express in words. Literature fails; poetry can only suggest. Certain of these aspirations are, of course, readily expressed in music, and words will fail to describe the impression which grand and solemn music convey to the soul. Architecture is like music—though whether we are conscious of the existence of any recent works of architecture which are indescribable in words, is another matter. Architecture speaks to you, excites you, enthuses you in a way that words cannot. Take the solemn impression caused by Westminster Abbey. Describe the impression of the architecture! You cannot! You may take the Greek Parthenon, and be examined by the Board of Architecture as to its columns and all the rest of it, but they dare not ask you why it is beautiful. But we are conscious that it is. The architect has to get to the inner meaning of the thing. As he sits down to his measured drawings and plans they open this meaning, and these documents speak to him. Have you felt this? Has this spirit of architecture set you on fire? Until it does, you are not worthy to be called an architect."

Mr. Prynne then put the vote of thanks to the meeting, and it was very heartily agreed to.

The President, in reply, said he should like to refer to what Mr. Mitchell said as to the new premises. Mr. Mitchell had given him a great deal more credit than was due to him for the initiation of the new premises scheme. The credit was due to Mr. M. B. Adams, through whose enthusiasm the Association was able to avail themselves of such an advantageous offer. He would like to assure them how much he felt the honour of being elected a second time to occupy the chair.

The President then announced that the next meeting will be held on the 16th inst., when Messrs. Arthur T. Bolton and H. P. G. Maule will read papers on "The Day School in Relation to Architectural Pupilage."

The meeting then terminated.

MAGAZINES AND REVIEWS.

The *Magazine of Art* contains two articles on Whistler, the first of which, by Mr. Val Prinsep, is the most sane and moderately-written article on the late artist that we have seen; but then Mr. Val Prinsep does not belong to the clique of worshippers of whatever is odd and eccentric. Future generations, says Mr. Prinsep quite truly, will admire Whistler's art not because of his eccentricities, but in spite of them. "They will find that he has left much interesting work and some half-dozen pictures that may be called first-rate. After all, of how many of his contemporaries can more, or indeed as much be said?" That is a reasonable view of the subject, and about sums up the truth. Mr. Prinsep's personal reminiscences of Whistler show his amiable side, and entirely confirm the view we have already expressed, that his assumption of superiority and of contempt for every one else in art was merely a kind of joke. One remark of his which is quoted is interesting for the light it throws on Whistler's view of painting. There was a picture of his in which there was a ship, and he said, "a stupid painter out there" (Biarritz) "complained that I had not made out what kind of ship it was, but I said to him, 'to me it is not a ship, but a tone.'" That is the modern impressionist all over, and it is a perfectly false view of the art of painting; pictures painted on that system will not last. The other article is by the Editor, and is a general critical estimate rather more admiring in its artistic attitude. Mr. Spielmann observes that Whistler "was essentially a decorator, thinking primarily of the composition, the pattern, as the main element in his design." This quite agrees with the impression created by the above-quoted remarks about the ship; but a picture is something more than a pattern. Among the other articles in the number is one by Mr. Hamilton Jackson on "Electric Light Fittings of To-day," a very good critical *résumé* of the subject. The English examples illustrated, by Liberty and Co. and Verity and Co., are much better than the foreign ones, with the exception of the set designed by Herr Berlieus, of Dresden. Mr. Spielmann's essay on "Artistic Forgeries," Part V., is as interesting and instructive as its predecessors. Two illustrations are given of a casket lately presented to Mr. Chamberlain by the Constitutional Club, and designed and executed by Mr. H. Wilson. There is a little want of coherence and simplicity about the design, but in artistic feeling and effect it is a wondrous contrast to the kind of presentation-casket generally produced in England by Messrs. Middleman and Co.

In the *Art Journal* Lady Victoria Manners continues her article on "The Rutland Monuments in Bottesford Church," the illustrations to which entirely justify the space given to the subject. They are of great interest both in an artistic and historic sense. The monument to the 4th Earl of Rutland (1563-1587) is especially remarkable. Mr. Addison McLeod contributes an article on "The St. Anna Cartoon of Leonardo da Vinci," an interesting critical examination of four versions of the same subject, two of them attributed to other painters than Leonardo; but it is not very clear what is the main point and object of the article. The same number includes an article on "Cloisonné Enamel," with some interesting illustrations. The writer seems to think that cloisonnè enamel has been neglected; we should rather be inclined to say that it had been overdone, as far as writing and illustration are concerned. At one time art publications were so constantly on the subject that one almost got tired of the words. It is a beautiful form of work, however, and one would not complain if there were more production of cloisonné enamel and less talk about it.

The *Architektonische Rundschau* commences by an illustrated article on lamp pendants and standards, chiefly as designed for electric light. Few of the designs are good, some of them very bad. Among the better ones are one of a hanging lamp by the Aktiengesellschaft, Berlin, and a corona of simple design by a Munich artist. The architectural illustrations, of about average interest, hardly present anything for special comment.

In the *Berlin Architekturwelt* the most important building illustrated is a large private mansion called the Palais Cohn at Dessau, by Herr Wessel. This shows a dignified street front of stone, with a recessed loggia with an Ionic coupled order on the upper floor in the centre portion; a cold and formal piece of architecture, but quite free from the eccentricity which is the bane of so much modern German architecture. The staircase hall is dignified and palatial in effect, showing a very sumptuous metal balustrade to the stairs, which however does not harmonise well with the simple stone (or marble) balustrade of the gallery. The Academy of Church Music at Charlottenburg, by MM. Adams and Mebes of Berlin, is a severe and unpretentious structure in a kind of Romanesque Gothic. There seems to be no fixed tendency in modern German architecture; we have sometimes, indeed too often, buildings of the most rampantly sensational character; then we come suddenly on designs, such as the two just mentioned, of almost severe simplicity. Following these indeed, in the present number of the *Architekturwelt*, are several examples of the gymnastics of the picturesque country house. Some studies of birds and animals by Herr Otto Köhler, very well reproduced, form two admirable pages showing quite exceptional talent in this class of work. Two sketches of old buildings by Herr Eberhardt, forming separate plates, are also excellent examples of reproduction from pencil drawing.

The September number of the *Burlington Magazine*, a publication which is issued to subscribers only (such a magazine could never be produced on the ordinary terms of public sale), commences, we are glad to see, a series of illustrated articles on that rarely-gifted though frivolous painter Fragonard—frivolous (sometimes worse) in his feeling and his choice of subjects, but a painter of real genius. Boucher's advice to him, quoted in the article, is highly characteristic of the

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school and of the time—"You will see in Italy the works of Raphael and Michelangelo, but in confidence and as a friend I will tell you—if you take those fellows seriously you will be a lost man!" The society of the Louis Quinze age, indeed, could have had little to say to the genius of Michelangelo, nor would Fragonard have profited artistically by any attempt to emulate it; he would only have drowned his own really original genius in an attempt at a grand style. In his own way, however, he is almost inimitable. The illustrations in the present number do not show him at his best, except perhaps the "Music Lesson"; there are far more remarkable works by him in existence. We cannot share the admiration for the "Swing" picture in the Wallace Collection; it has not the *spirituel* character of Fragonard's best work, and as to subject, it is really a piece of vulgarity. The illustrations from Mr. Webb Singer's collection of eighteenth-century drinking-glasses are most interesting, and show an almost Venetian grace and refinement of line. Mr. Massé's article on the pewter in South Kensington Museum is accompanied by some splendidly executed illustrations of beautiful pieces of work. Some illustrations are devoted to the new panels in the Brussels Town Hall, which are pictures rather than decorations, but pictures with a very good purpose—that of preserving the memory of scenes and sites which are being destroyed in the course of engineering works and public improvements; it would be well if London followed the example, and made a point of preserving a record of the aspect of places which are being spoiled or destroyed in the march of "improvement." There is much other matter of interest and many other fine illustrations in this issue of the *Burlington*, a publication which is a boon to lovers of art in its contents and its form and make-up; we hope it will receive sufficient support from subscribers to keep it up permanently.

The *Antiquary* contains an article by Miss Isabel Robson on "Bridge Building in the Middle Ages"; on the general history, not the structure, of mediæval bridges. It is noteworthy that the Early English bridge over the Trent at Burton, of thirty-six arches, served its purpose to as recent a date as 1864; a testimony to the soundness of its construction. We do not see any allusion to the very long late Gothic bridge over the Tweed at Berwick. An interesting article is that by Miss F. Moore on the Isle of St. Honorat, near Cannes; an isle of sacred memories.

In *Knowledge*, readers who are interested in radium will find a long article on the subject, which may be regarded as a summary of what is known about it so far. The subject of "Man's Place in the Universe" again turns up in the shape of a comment by Mr. Walter Maunder on Dr. Wallace's reply to his critics; in all of which we agree except as to one statement made in passing, viz., that even if dark stars (all in movement) were a thousand times more numerous than the bright ones, the chances are a million to one against any diminution of the light of a bright star, by a dark star passing before it, having ever been observed. But the new astronomy believes that the bright stars are only the result of collisions among innumerable dark ones. If the dark stars are innumerable, are the chances of occultation less than the chances of collision? It would be difficult to get us to believe that.

The *National Review* contains an article by Mr. F. B. Behr on "The Practical Aspects of the Mono-Rail." It may enlighten many persons as to the actual structure and working of this form of railway, and gives reason for thinking that this is really a form of railway safer from accidents of derailment at high speeds than the ordinary railway. Mr. Behr describes the horizontally acting guide wheels which remain in touch with the guide-rails at whatever curve by the action of a spring, which is adjusted so as to automatically counter-balance the centrifugal impulse when going round a curve, allowing the right inclination from the perpendicular for the particular curve, and no more. One can understand that a carriage which inclines to the curve is safer going round curves, just as a bicycle under similar circumstances is safer than a tricycle. And it is urged that whereas the safety of the two-rail carriage depends upon a flange of the depth of three-quarters of an inch, the mono-rail carriage depends on a flange of four feet deep, the height of the rail above the guide-rail. The writer seems to forget, however, that the ordinary railway carriage wheel does not depend mainly on the flange, but on the dishing of the rim of the wheel. However, the article is calculated to weaken the prejudice against the mono-rail, except in respect of the speeds contemplated. These may no doubt be looked upon as safe—so long as no unexpected defect occurs in rail or wheel; but that cannot be absolutely guarded against, and the effects of an accident at 120 miles an hour are such as the imagination does not like to contemplate.

In *Harper* Mr. Max Uhle, of the University of California, writes a short but able summary of what is known and conjectured as to "Ancient South American Civilisation," the old and half-effaced chapter of Mexican and Peruvian art. Two archæological expeditions into this part of the South American continent, undertaken at the cost of an American lady of wealth, have resulted in a change as to the traditional conceptions in regard to ancient Peru; things which were formerly believed to be contemporaneous being now recognised as belonging to different successive periods of cultivation. The collections gathered during the first expedition are now housed in the Museum of Art and Science at Philadelphia; those of the second will be exhibited in the future museum of the University of California. A third expedition is to be undertaken shortly. Some of the objects illustrated in this article show that bad taste in pottery and such articles is older than good; a duck with a handle and spout coming out of its back, a vessel formed of the head of a bearded man with the orifice at the top of the head—these we now rightly regard as monstrosities in taste, but they are among the oldest things known. It is only a more complete and less barbaric culture that rises superior to these eccentricities, as we now consider them, but which were once a prevalent form of art.

The *Pall Mall Magazine* contains an article by the Editor on Phil May as man and artist. As to the art, the article is a fair *résumé* of its quality, accompanied by some illustrations which are out of the usual run of May's sketches as best known, and show that he could draw other types of humanity as well as he drew the gutter-snipe. One of his latest sketches, "The Smoker," is an admirable piece both of character and of drawing.

In *Scribner*, under "The Field of Art," Mr. W. H. Low writes a good article on "The American Art-student in Paris," giving advice as to the way to make the most of the advantages which Paris presents to the art-student, and particularly dwelling on the serious manner in which art-training is undertaken, where the limit of age for the great prize of the art-student, the "Prix de Rome," is fixed at thirty years, entailing four subsequent years of study in Rome, so that the fully-equipped artist is not supposed to begin his career till the age of thirty-four. And Mr. Low contrasts this with the desire for rapidly acquired facility in a sketchy form of production which is too often the ambition of the American art-student, enticed by the commercial reward offered for rapid and facile illustration for magazines. He tells "a true story" of how an eminent French artist, whose son at the age of twenty had achieved a facility in coloured etching which became a fashion and gave him an early success of its kind, represented to the dealer who gave him these commissions that the young man was still under age, and that no further encouragement was to be given to him in this work. The son recognised that his father's decision was a wise one, returned to his severer studies, and four or five years after made a brilliant *début* at the Salon. Some remarks on the influence of the commercial spirit in regard to art-work in America, coming from an American critic, are significant:—

"Twenty years ago there was a most hopeful and promising school of etchers here. Lack of standard enabled anyone who could scratch a copper plate to put his wares on the market, the printsellers and department stores saw the business opportunity, and to-day etching here is virtually dead with none to do it honour. Almost at the same time the art of the glass stainer was reinvented, to all intents and purposes, in our new land, and there was promise that this most delightful of arts would flourish in the pious desire to commemorate our dead, translated through the sympathetic art of the designer. But no sooner had some notable results been achieved than the business sense of the American saw again his opportunity, and to-day, discredited by architects in their buildings though it may be, great business organisations turn out vast quantities of coloured glass, while in their offices stacks of alleged designs, appropriately assorted to the needs of widows, orphans, or building committees, await the moment when their commercial traveller, akin to the cheerful person known as the 'ambulance chaser,' can present himself in the house of mourning with his already prepared 'appropriate' design."

Longman's Magazine contains an article on "Egyptian Irrigation Works" by Mr. Lawrence Gibbs, M.Inst.C.E., which is a *résumé* of the subject, so written as to be fully intelligible to the general reader. It should have attention, for it gives a good idea as to what we have done for Egypt in this respect. As the writer concludes—"Enough has been said to show that if British rule should cease to-morrow the country would be the lasting gainer by our twenty years' occupation." The only thing we object to is the half-sneer with which "the archæologists" are referred to who were instrumental in preventing the total destruction of the temples of Philæ. Engineers, of course, think only of the present, never of the past; but if the result of our work in Egypt were to obliterate her ancient monuments the loss to the intellectual world would be a good deal more serious than Mr. Gibbs perhaps appreciates.

By a curious coincidence, the *Century* for this month actually contains a statement on the other side of the Philæ question, by Mr. A. Clark Robinson, which Mr. L. Gibbs had perhaps better read; it may be as well for him to know how the matter is regarded from a non-engineering point of view. The illustrations given, from photographs, of Philæ as it was and as it is, show how serious has been the effect on the beautiful and ancient remains. We quote a portion of Mr. Robinson's remarks:—

"Beneath the brilliant blue sky and perpetual sunshine of Nubia a tragedy is going forward, murder is being done. It is a sad spectacle, but, like all sad spectacles, interesting. . . . The world has rung with the praises of those who conceived and executed the 'Great Barrage,' the largest dam on the globe; scientific and enlightened Europe has held up its hands in admiration; Egypt expects to derive an increase in revenue of two million six hundred thousand pounds per annum and one third her present arable land. But there is another side to the picture. Thousands of people have been driven from their homes and forced to watch from a safe eminence their little mud huts, their fig and date-trees, their all, whether of livelihood or association, disappear beneath the waters of the river which they were wont to worship. There is now a lake where stood the two villages of Shellall and el-Monhata, and of the island of Philæ only a portion of the more lofty edifices struggle, like some over-wrought swimmer, to maintain their heads above the destroying flood. . . . There remains to-day above water only a portion of the colonnade, the top of the kiosk, and a part of the temple of Isis. The traveller approaches the ruins in a small boat, in which he may pass down the colonnade and row about in the once sacred chambers. It is a novel and interesting experience, but to those who were familiar with the island in all its beauty it is full of sadness. . . .

But the future is even darker. Already the soft stone is beginning to crumble, the water to thrust its persistent finger through this crevice and that; hour by hour the river, held in check by the great dam, creeps farther up the columns. The island is doomed. In a few years, perhaps months, perhaps even at the next flood-time, it will be utterly destroyed."

In the *Cornhill* will be found an interesting and useful article by Mr. W. A. Shenstone, F.R.S., on "The Constitution of Matter"—useful, because it brings within general comprehension an idea of the exceedingly refined researches which have been for some time carried on in regard to the constitution and behaviour of bodies too small to be known anything of except by reasoning and deduction from known mechanical principles, and from those phenomena which can be visibly apprehended. It is admitted that to some extent the conclusions arrived at by science in regard to the constitution and action of atoms are based upon assumption; but it is assumption with a very high degree of probability; and all educated people should know the outline of it, at all events.

In the *Gentleman's Magazine* Mr. E. V. Heward, in an article under the title of "The

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Planet of Romance," gives an account of an astronomical controversy of the middle of the last century, now known to few, but in which no less a person than Leverrier took some part. This concerned the assumption of the existence of an inter-Mercurial planet; an assumption not in its nature improbable, but which was announced as a certainty by an amateur French astronomer, one Lescarbault, who declared that he had seen the planet with his own telescope, in transit across the sun's disc. Leverrier took the sceptical side, but seems to have found Lescarbault's observations and calculations much more connected and logical than might have been expected from the imperfect instruments at his disposal. However, the supposed discovery was finally discredited, and the subject is now only of interest as a nearly forgotten chapter in astronomical annals.

Among the variety of subjects treated of in *The World's Work* we may mention an article on "The National Physical Laboratory" by Dr. Carpenter. The article on "Russia in Manchuria," by Mr. Alfred Stead, includes some information in regard to the Chinese-Eastern Railway, together with illustrations of some of the bridges and other works on the line—of a popular, not of a technical kind.

The *Revue Générale* contains an article on "Les Phases de l'Assyriologie" by M. Delattre, a clear and well-written summary of the history of modern archæological research in Assyria, down to the latest work of the University of Pennsylvania at Nippur.

COMPETITIONS.

University College, Cardiff.—A special meeting of the council of the University College of South Wales and Monmouthshire, was convened on Monday, to receive the report of the assessor on the four sets of plans submitted for competition for the new college buildings to be erected in Cathays Park. It was resolved that the plans and designs marked A be accepted and forwarded to the Cardiff Corporation in accordance with the terms of the draft grant of the site. The successful architect proves to be Mr. W. D. Caröe, London, The buildings, says the *Western Mail*, to be erected on Cathays Park, according to his plans, are symmetrically grouped round a great court, but this is not entirely surrounded. On either side of the great hall are openings merely screened off in order to give architectural unity, but admitting at once of better airing and some view of the interior of the great court from Park-place. The great hall is thus an isolated block. Provision has been made for the preservation of the trees in the park. From the park the main entrance is on the central axis, and is emphasised by a loggia in the architectural treatment. From Park-place there are three entrances, one central under the great hall, and two gates in open screens between the blocks of buildings. The staff entrance from the great court is under the library, and axial with the great hall entrance from Park-place, the library and great hall being symmetrically placed, the first along and the second across the main axis. The men's and women's cloak and common rooms are symmetrically placed on either side of the entrance hall, from which they are separated by small courts screened off from the great court by a colonnade surmounted by bridges. A dominating feature of the plan is the formation of the interior courts architecturally screened off from the great court. These convex angle screens provide the entrances from the great court for men and women students respectively in corresponding angles of the building, adjoining the cloak-rooms of each. The ground level of the brick courts is conveniently lowered to allowed for the adequate lighting of the metallurgy department, research cellars, store cellars (if erected), and the shops under the sanitary blocks. A small inner court is also formed to serve as entrance to the engineering school and for the mortuary department attached to the medical school, whereby all mortuary operations can be carried on in entire privacy, and convenient access is supplied to the lift which connects with the anatomy school. The arrangement indicated does not unduly reduce the area of the great court. Three suitable and well-lighted positions for memorial statuary in the entrance-hall are indicated. The women's department is on the ground floor, and the rest of the teaching department on the first floor. Provision has been made for a library, and the council chamber has been designed to seat 82 persons. What are described as the future buildings include a physics wing, with rooms for the study of electricity, zoology, botany, geology, and mining, departments of chemistry, metallurgy, physiology, materia medica, anatomy, and engineering. The grand staircase leads up to the great hall, the landing being arranged to avoid a crush. At the platform end is a second staircase, which also serves the debating-room gallery, and for entertainments there is green-room accommodation for both sexes, also with its own staircase access. A gallery with organ space, if desired, and balustrade specially devised to aid acoustics, completes the scheme. The seating accommodation is, without crowding, for—on the floor, 1,000; in the gallery, 190; making a total of 1,190. In consideration of the indifferent head of water, a large tank will be paced in the theatre tower of the chemistry block. This will be filled by a pump in the engineering laboratory, or, failing the erection of that department, by a pump in the shop under the men's lavatories. This tank will be of large size to meet the exigencies of fire hydrant supply. The whole building will be lighted with electricity.

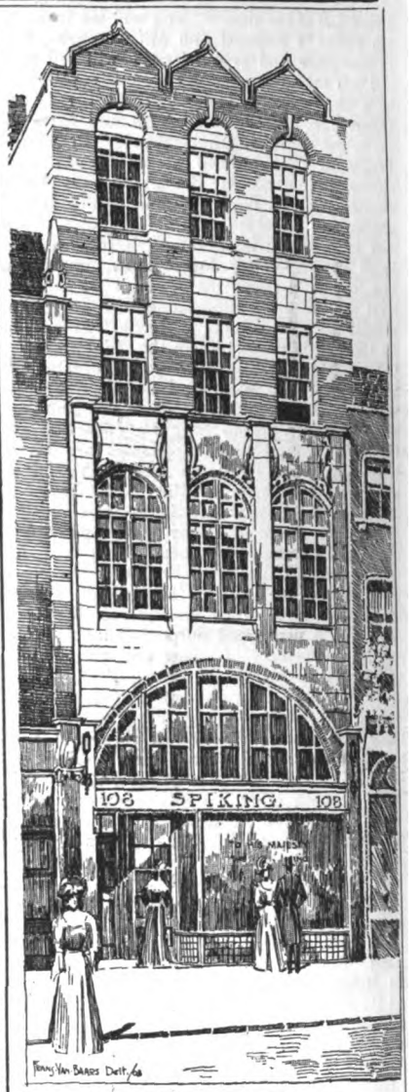
Pierhead Baths, Liverpool.—The Baths Committee of the Liverpool Corporation submitted the following recommendation on Wednesday:—"That the design for the erection of baths on the St. George's Dock site marked No. 6 be approved, subject to the elevations and treatment of open space being amended to the satisfaction of the Baths Committee, and that the author of the design, Mr. Alfred Saxon Snell, F.R.I.B.A., 22, Southampton-buildings, Chancery-lane, London, be engaged to carry out the scheme, and that he be paid a commission of 5*l.* per centum upon the original contract price of the building, in accordance with the terms of the conditions of the competition, and that an application be made to the Local Government Board for sanction to borrow the sum of 75,000*l.* to carry out the work."

Railway Station, Johannesburg.—Eight designs for the new railway station and offices in Johannesburg were submitted. The successful competitor is Mr. T. A. Moodie, A.R.I.B.A., architectural assistant to the Chief Engineer of the Central South African Railways. The work is estimated to cost 400,000*l.*

Board School, Fraserburgh, N.B.—In the competition for a new higher grade school for Fraserburgh, the plans under the motto "Scholastic," by Messrs. D. and J. R. McMillan, of Aberdeen, have been selected.

Subways for Gas and Water Pipes, etc.—A meeting of the Court of the Company of Paviors was held on the 30th ult. at the Great Eastern Hotel, when the Master, Major Lewis Henry Isaacs (Mayor of Kensington), declared the awards in connexion with the recent competition by essays, drawings, and models on the subject of "Subways, or other means of placing and maintaining without interference with the surface the main pipes and services of gas, water, and other undertakings below the carriage ways or footways of cities, boroughs, and towns," as made by the judges, viz., The Master; Mr. D. J. Ross, Engineer of the City of London; Mr. J. W. Bradley, Engineer of the City of Westminster; and Mr. William Weaver, Engineer of the Borough of Kensington. Twenty-six competitors submitted essays, drawings, and models, and ultimately the awards were made as follows:—First premium, 105*l.*, to Mr. R. M. Parkinson, 93, Lincoln-road, Peterborough; second premium, 31*l.* 10*s.* (competitor's name at present unascertained); third premium, 21*l.*, Mr. F. M. Royle, A.M.Inst., C.E., Third Avenue, Sherwood Rise, Nottingham. The premiums will now be remitted to the first and third prize-winners at once, and to the second competitor as soon as his name can be ascertained. It is hoped that the drawings will shortly be on exhibition at the Guildhall, London, and that Mr. Parkinson's essay will be published in due course.

Workhouse, New Cross, near Wolverhampton.—A new workhouse, which has been erected for the Wolverhampton Board of Guardians at New Cross, near Wolverhampton, was recently opened. The new buildings have been built on a site 50 acres in extent, and will provide accommodation for 1,246 poor people, 20 nurses, and 60 other officials. The total cost of the scheme will amount to nearly 200,000*l.* Mr. Marchall is the architect.



New Bakery, Brompton-road.
Messrs. Blangy & Van Baars, Architects.

NEW BAKERY, ETC., BROMPTON-ROAD.

These premises, of which two plans and the elevation facing Brompton-road are shown, will be finished and occupied during the course of this year.

The ground floor consists of a large bake-house 11 ft. 6 in. high, containing 10 English ovens of the latest and most approved pattern, built on the double decker principle, the lower ovens being worked from pits sunk in floor, and having iron sliding covers to same. A drying-room also is provided in the centre. The breadroom adjoining has accommodation for over 4,000 loaves.

In the basement, the men's lavatories, water-closets, and lockers have been placed, with a cellar for 10 tons of coal, which will be hoisted into bakery as required, with a special hoisting appliance. A large store room has also been provided.

The Vienna bakery, with two ovens, is situated on first floor, with a confectionery-room adjacent and a flour-room, capable of storing 70 tons of flour, in which the blender and elevator is situated.

In the mixing-room two electric-driven dough mixers are placed with sifters over. A dough trough washing space adjoins this room. The proving-room has a capacity for 12 troughs and a shoot delivering into bakery.

The whole of bakery interior is being built with white glazed bricks, and will have a dado of salt glaze, with a skirting of blue Staffordshire bricks, all angles being bull-nosed. The floors are all fireproof, and are finished in terrazzo mosaic, executed by Messrs. Diespeker, of Holborn-viaduct.

Special construction has been adopted to reduce vibration to a minimum and to prevent heat penetrating into adjoining owner's premises, the ventilation also has had careful consideration and can be easily regulated as necessary.

The front part of building will be occupied by shop and gallery (for refreshments), which is panelled in walnut. The panels in gallery have

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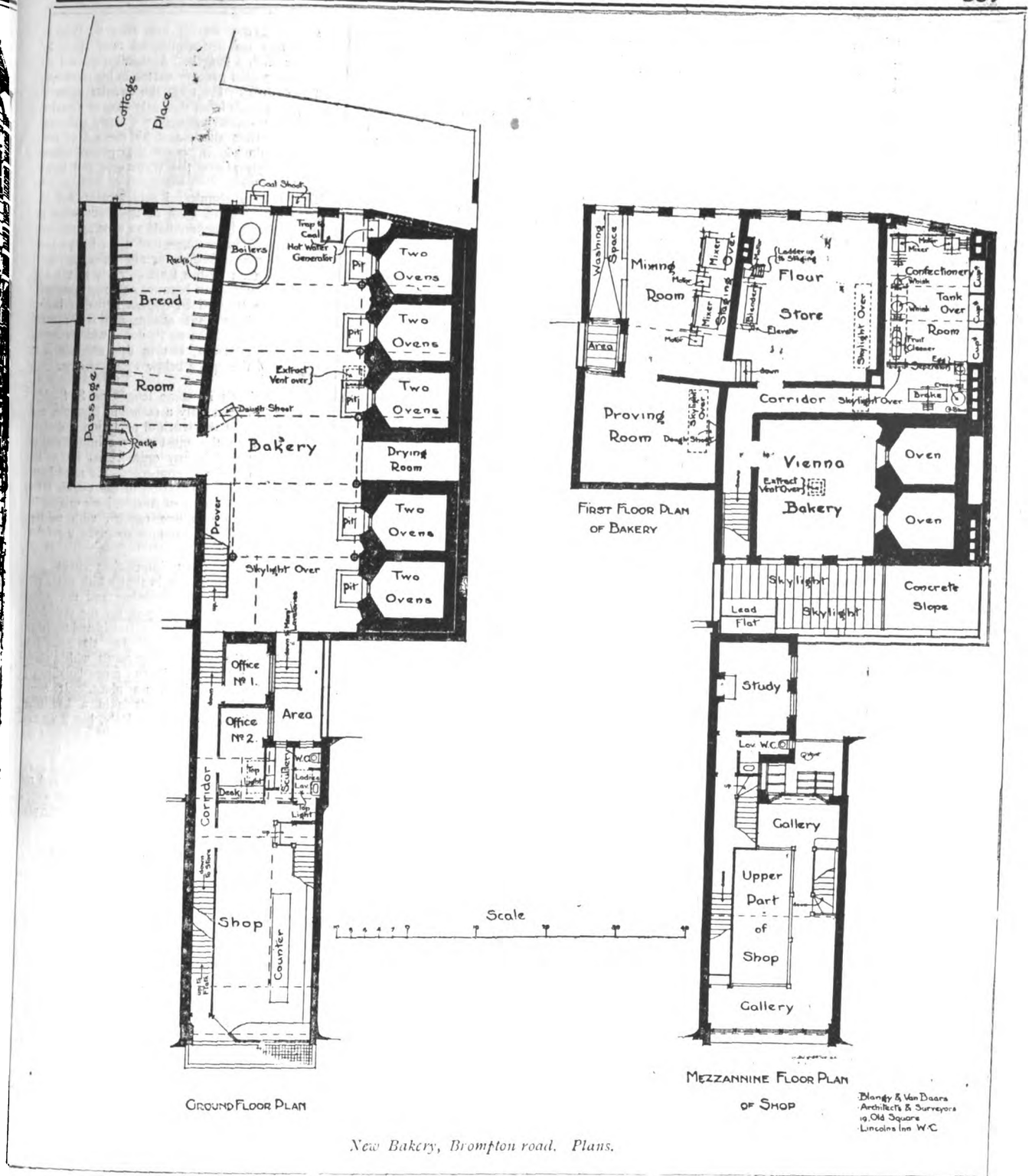

New Bakery, Brompton road. Plans.

scenes in Dutch tiles inserted. The whole of the upper part will be given over to offices and flats.

The principal elevation will be faced with Lawrence's No. 1 T.L.B. red bricks and Bath stone, and the whole of building will be lighted by electric light with Nernst lamps in bakery.

The general contract has been let to Messrs. Turtle and Appleton, of Clapham Junction, S.W., and the oven-builders are Messrs. H. Smith and Sons, of Lambeth. The whole of the machinery is being installed by Messrs. Robert Morton and Sons, of Wishaw, N.B., and the hot water and steam supply by Messrs. Heaton and Sons, of Leytonstone.

Messrs. Blangy and Van Baars, of Old-square, Lincoln's Inn, London, W.C., are the architects, under whose supervision the whole of the works are being carried out.

MISSION COAST HOME, SALTCOATS, N.B.—On the 23rd ult. the new wing which has just been added to the mission coast home at Saltcoats was opened. The new structure is two stories in height, and a verandah runs the entire length of the buildings. Mr. Hugh Thomson, Saltcoats, was the architect.

ARCHITECTURAL EVOLUTION.*

BEFORE commencing my paper to-night, may I be allowed to say a few words about the work of the Chair to which I have recently had the honour to be appointed.

The Chair was founded in 1840, and is therefore the oldest chair of architecture in England. T. L. Donaldson was the first professor, and his memory is kept green in the college by the silver medals presented annually which bear his name; Hayter Lewis was the second; and the third was Roger Smith. Those who knew Professor Roger Smith will bear me out when I say that his kind heart and lovable disposition made him many friends. He was ever willing to give his time to younger men who came to him for advice, and his ripe experience was always at their service. My acquaintance with him, although slight, commenced many years ago, shortly after he was appointed to this chair. Recently I had occasion to see him two or three times on a certain matter, and nothing could exceed his courtesy and kindness. His death will, I feel certain, be keenly felt by the many who during his long tenure of the chair had the good fortune to be his students.

Professor Roger Smith, like his predecessor, confined himself chiefly to lectures arranged for students whose work in the daytime in offices left them only a few spare hours for outside study. No other course, doubtless, was possible in the days when the pupilage system was the only method by which men could study to be architects. But architectural education, like education in other subjects, is undergoing a change. The pupilage system will continue, but it seems probable that it will continue in a modified form. It will continue, because only in an office can men get thoroughly in touch with actual practical problems and learn the inner mysteries of their profession; it will probably be modified because the feeling is growing that to enable a student to reap the full benefit from the work placed before him in an office, a preliminary training is necessary. Lectures after office hours are unsatisfactory for many reasons. Moreover, in any systematic course of study for our profession—and

* Inaugural address read at the opening of the School of Architecture, University College, London, on Wednesday, the 7th inst., by Professor F. M. Simpson, F.R.I.B.A.

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I think I may say for any other also—interest centres not in the lecture-room, but in the studio, laboratory, or classroom, as the case may be. Lectures in any course of study of a practical character are but interludes; they have their value, but they require supplementing so much, that to make any course of real value, a student's whole time has to be devoted to it.

The Council and Faculties of this college have realised the necessity for a more systematic course of training for architectural students than has been regarded as possible in the past. I believe with them that the time is ripe for a departure from former methods, and I also believe that before many years have run, University courses in architecture will be as general in England as they are now in America, and in some of our Colonies.

Architectural evolution is not merely a matter of academic interest. It has its practical side which is of value to all architects. To trace the workings of a man's mind in his work; to see how, ever observing the requirements of his time and adapting himself to his materials, he took an idea from here and an inspiration from there, and so treated them as to give them new expression, is in itself excellent practice for all who are called upon to design. As a historical study it is the most fascinating of any. That all styles, from the earliest days of Egypt to the time of the great Renaissance of the fifteenth century, form an unbroken sequence, few will deny. A few links here and there may be missing in the chain, especially in the earlier work, owing to the lapse of years, but these are becoming fewer and fewer daily. In a short paper like this it is impossible to mention every instance, or to trace every step. All that can be done is to illustrate the truth of the contention by reference now to an individual building, now to a group of buildings, and now to some constructive point which had considerable bearing on the development of a style.

Other instances doubtless will occur to many of you of like importance, which might with equal fitness have been given. Of the many factors which determined architectural development in different countries and at different periods, climate, religion, the nature of buildings, the materials available, and the state of the labour market, may be regarded as the most important. All these exercised their influence in turn. Rome, with its teeming population enclosed within its walls, a population which demanded not only houses to live in, but also vast public palaces for their recreation and amusement, required buildings very different from those of simpler Athens. To have built these, many stories in height as most of them were, with the lintel of the Greeks would have been an extremely difficult, if not an impossible, task. The Romans, therefore, would have been forced into using the arch, even if they had not early acquired a taste for it from the work of their neighbours the Etruscans. But the arch by itself would not have been sufficient to overcome all the difficulties they had to contend with in the erection of a huge building such as the Colosseum, if it had not been that, in the neighbourhood of the city there existed ingredients which formed a remarkably strong cement. This enabled them to use concrete to a far greater extent than had been done before, or has been possible since. For the mixing of the concrete and its employment for walls and vaults, unskilled labour was all that was required.

The Greek temple, with its small naos and external peristyle, was eminently appropriate in a country where the people lived much out of doors, and where public worship was performed outside and not inside the building, but when Christianity became general, the services demanded a different type of building even in countries where the climatic conditions were much the same as those of Greece. The changes which were made are well illustrated in the present cathedral of Syracuse, which is one instance out of many of the conversion of a temple into a church. A wall was built between the columns of the external peristyle, so that the ambulatory became the aisles; openings were pierced in the naos wall to connect the aisles with the nave, and a chancel was built out at the east end. The entrance was reversed, and the posticum of the temple became the porch of the church. When new churches were built, the idea for these was taken from the colonnaded timber-roofed basilicas of ancient Rome. In the early days of Christianity money was scarce, and workmen, as a rule, unskilled, and the basilican plan and methods of construction provided the largest possible floor space for the congregation at the lowest possible cost. Moreover, after the time of Constantine, old marble columns to divide the nave from the aisles were to be had almost for the asking from the ruins of the secular buildings of the great city, and by their aid a decorative effect could be obtained without much expense.

In claiming that all architecture is evolved from previous efforts, one is merely reiterating the old truism that nothing comes out of nothing. The contention does not rob an artist of his claim to originality. It merely emphasises the fact that true originality—the originality that produces lasting good, and is not merely a passing fashion—is the outcome of knowledge. This knowledge may be either traditional, as in the days when the secrets of a man's craft were handed down from father to son for generations, or it may be acquired by study, as was the case with Brunelleschi, Bramante, and other great early masters of the Renaissance. An architect of the present day has to conform to much the same requirements, and to work with much the same materials, as the myriads of his predecessors. All that he can do is to try and advance one step further than they have. Behind him is a vast store of accumulated treasure, and if he can extract from it a few grains and infuse into them his own spirit, his own individuality, he has done as much as anybody can expect to do. What is "art nouveau" is seldom true art, and what is true art is never entirely new.

To say that Anthemius of Tralles learnt much from his Greek and Roman predecessors, is not to detract one iota from his reputation. To hint the opposite is only to suggest a doubt as to his sanity. In his beautiful detail, the inspiration drawn from ancient Greek mouldings and carvings is so undoubted, that even if the connecting links were lost—which is far from being the case, as the work in Syria of the fourth and fifth centuries shows—the similarity between the two is proof enough.

Not quite so apparent at first, but really quite as great is the connexion between the plan and construction of his great Church S. Sophia, Constantinople, and such a Roman building as the Basilica of Constantine. In both buildings the supports are few, and consist of two great piers on each side, which separate the nave from the aisles and mark the three compartments of the central area. The side buttressing to resist the thrusts is similar in both, and each building has or had a screen of columns between the great piers which served to support the galleries and at the same time to give scale to the building. The screens in the church still remain and form one of its most beautiful features; those of the basilica have long since disappeared. Where the church differs principally from the basilica is in the plan of the ends of the central area, and in the substitution of the dome for the intersecting vault. Each bay of the basilica is square and all three are equal. In the church the central bay alone is square, the ends are semi-circular, and opening out of each big semi-circle are colonnaded niches. The double apse arrangement is a Roman device. One of the large halls in the Baths of Diocletian, Rome, has an apse at each end the full width of the hall, and a similar plan was also followed in many of the entrance vestibules to buildings such as the baptistry of Constantine and the tomb of Constantia. The idea of the colonnaded niches is also Roman, if the restoration of the baths of Gallienus, of the 3rd Century, are correct. Even if they are not, S. Sophia is not the earliest Byzantine building in which they occur. They form the most characteristic feature of the interior of some of the circular and multangular churches of the period. Of these S. Sergius, Constantinople, San Lorenzo, Milan, and S. Vitale Ravenna were commenced before the old church of S. Sophia was burnt and consequently before the design for the new one was made. But although the idea was old, the application of it was new. The plan of the central nave of S. Sophia is as though one of these circular buildings had been cut in half and one half tacked on to each end of a central square. The result is a noble hall which for about 220 ft. has an average width of over 100 ft. No other building of architectural pretensions in the world, not even S. Peter's, Rome, has an unencumbered floor space so wide for such a length. Anthemius showed his genius to a still greater extent in his treatment of the ceiling. He took the circular dome of the East, which from the early days of Assyrian art, many centuries before Christ, had ever been a feature there and by the aid of pendentives placed it over the great central square, high above the transverse and longitudinal arches.

This was a wonderful achievement, not because of the mere span of the dome—that of the Pantheon is nearly half as wide again—not because a circular dome had never before been placed over a square by the aid of pendentives—examples exist in the East as early as the 2nd or 3rd Century—but because no dome approaching in size that of S. Sophia had ever before been raised in that manner. The nearest approach to it is the 80 ft. dome which covered S. Lorenzo, Milan, but in this example it is doubtful if the space below was ever other than octagon.

I have dwelt at some length on S. Sophia, because it is not only a standing example, and a great one, of the truth of evolution in design, but it is also the most truly original and at the same time, in my opinion, so far as the interior certainly is concerned, the most beautiful architectural creation in the world. It is a proof of the extent of Anthemius's originality that he could combine eastern with western traditions and yet produce so great a masterpiece.

One of the most interesting chapters on architectural evolution is that which deals with the development of groining and the substitution of the clustered pier for the cylindrical column. The two must be considered together; they are inseparable. In the basilican churches, the intersecting vault which played so important a part in the large buildings of Imperial Rome finds no place. It occurs occasionally in early work in a few small churches in some parts of Italy, but it was not until the 11th Century was well advanced that it became general in large ones. Basilican churches have timber roofs, which as a rule are ceiled on the underside—the 15th and 16th Century flat coffered ceilings at present in many of these churches probably took the place of earlier ones of similar design. These ceilings are continued without a break from east to west. In the Church of S. Miniato, Florence, however, built at the commencement of the 11th Century the timber roof over the nave is broken in its length into bays by means of transverse arches thrown across from pier to pier, with corresponding arches across the aisles. Whether these arches were introduced in the first instance because it was found by experience that the lofty, and not over thick, nave walls required lateral abutment, or because the builders had come to regard an unbroken ceiling as monotonous and unsatisfactory in appearance, is uncertain. The fact remains that about the time mentioned they began to be used, and consequently S. Miniato and one or two other churches of the same period may be regarded as the connecting links between the earlier church with its unbroken timber roof, and the later church which was divided into bays, each bay being vaulted.

The vaults themselves were at first constructed much in the same way as the Roman vaults without transverse arches, except that they were not so massive and heavy. The first alteration was that transverse arches were added, and the vaulting formed into bays. This innovation, slight though it appears at first, led to important changes. Diagonal ribs were next introduced under the groins—or points of intersection of the vault—and these, together with the transverse arches, formed a skeleton on which rested the severeys, or compartments of the vault. The vault now became a groined and ribbed vault which required specially designed piers to support its different parts. The cylindrical column was ill-adapted for the purpose, although it is true that in some of the finest of the mediæval churches in France it continued to be used a century after the principle of vault supports had been perfected. The clustered pier therefore took its place. Piers, oblong and square in plan, had, it is true, been occasionally used in certain places in some basilican churches before this, but for the development of the complicated clustered plan from these more simple forms vaulting is entirely responsible. The change commenced with the introduction of transverse arches. In the small church of S. Eustache, Milan, of the 9th or 10th Century, in which arches span the

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aisles but not the nave, the piers are not oblong but T-shaped, and the arches rest on the ribs at the back of the piers and on corresponding pilasters on the aisle walls. When arches spanned the nave as well as the aisles the piers became cruciform. In S. Miniato, Florence, those that support the transverse arches are quatrefoil in section. This form or the cruciform, was satisfactory so long as only transverse and longitudinal arches were employed, but as soon as diagonal ribs were introduced it became insufficient, and shafts had to be inserted in the four internal angles of the cross to support them. In the nave of S. Ambrogio, Milan, built in the second half of the 11th Century, the system is complete, and every rib and arch has its corresponding member in the pier.

The buildings of the 11th and 12th Centuries throughout Europe are heavy in appearance and massive in all their parts, but as the workmen grew more skilled the work becomes much lighter. Nowhere is the change so conspicuous as in the vaulting and in the size and form of the piers. It was soon discovered that there was no necessity to carry the groining shafts down to the floor, and that they were better corbelled out from the wall, as then they offered more resistance to the thrust of the vault. Sometimes the corbelling is just above the piers as in Exeter and Lincoln Cathedrals, sometimes it is at the level of the string course above the arches of the arcade, as at Carlisle, and sometimes higher up still above the triforium, as at Salisbury and Wells. In consequence of this change the piers could be made more slender, and beautiful forms such as are to be seen in Exeter Cathedral and in other churches of the 14th Century were the result. Other modifications all tended in the direction of lightness. As the number of ribs of the vault increased, instead of attempting to provide a separate skewback and separate support for each—which in England would have been impossible in late work owing to their number—the builders brought them together to a common springing and the *tas-de-charge* with its many advantages, was produced. In France the architects, as a rule, even as late as the end of the 15th Century, clung to the simple and dignified quadripartite vault, in which only transverse arches and diagonal ribs are employed. In England, however, they departed from it and multiplied the ribs to such an extent that the vault became a net work of ribs so close together that little room was left for any filling in. As soon as this point was reached the reason for the construction followed for so long disappeared, and the workmen said to one another "Why form a skeleton and fill in afterwards? Why not build both rib and filling in together?" Thus was born the fan-vault—an English design pure and simple, and a logical outcome of the multiplication of ribs—in which both moulded rib and panel are worked on the same stone.

I have taken groining as an illustration because it is the most characteristic feature of mediæval architecture, but a similar sequence of development is just as noticeable in other parts of a building. I might have shown, for instance, how the design for the blind arcading on walls changed its character until the large windows of the fourteenth century left little wall space on which arcading could be placed, and how, as the windows became more and more like panels pierced for light, what wall space remained was covered with sunk panelling to such an extent that in some churches, especially in those which retain their old stained glass, it is often somewhat difficult to tell at a glance which is wall and which is window.

The shock of the Renaissance, first felt in Italy at the commencement of the fifteenth century, was a shock which the builders there richly deserved. In England it came 100 years later, partly because the traditions of mediæval art were far stronger here than in Italy, and partly because the revival of letters had not yet taken a strong hold in this country. The great men of the Italian Renaissance, in seeking for inspiration from the ruins of ancient Rome, did a grand thing for architecture. They felt that the old art was moribund, and needed strong measures to bring it back to life. They had no qualms about taking hints from their predecessors of centuries before; from the men who built so sturdily, if somewhat roughly, and on so noble a scale. They felt that in the old buildings there was a virility that was deathless. The more they studied them the more they became imbued with their spirit; and in this absorbing process they lost none of their own individuality. They sacrificed nothing to archæological correctness. They never allowed tradition to interfere with utility. They abandoned none of their building science—science which had been accumulating for centuries; in fact they added to their store. No one can say that Brunelleschi's dome in Florence is a copy of anything which had gone before. Its construction is different, its form different, and its detail. Sansovino's library in Venice, although reminiscent of the Colosseum, only shows what can be done by a man with fine ideas and rich imagination, who is also a student of architecture. Peruzzi's charming Palazzo Massimi in Rome—a gem which stands alone amongst the colour-washed palaces of the city— has a refinement which no ancient Roman building possesses, and shows that the Greeks had not taught in vain the value of simplicity and the full beauty of the lintel. These men picked up anew the thread of Classic traditions, which, although entangled for centuries with other threads, had never been entirely lost in Italy. Their work, although not coming in natural sequence like the Byzantine, Romanesque, and Gothic, has still a place in the history of architectural evolution. It was not so much a Renaissance as a recovery.

What chance have we to-day of a similar recovery in England? The conditions which exist here now are not so far different from those which prevailed in Italy in the fifteenth century. It is true that the fine traditions, started by Inigo Jones, and continued by Wren and his followers, were all destroyed by the two revivals of the last century, but we still have their buildings almost as fresh as ever. The lapse of years since they were built is trifling compared with that which separates the early days of the Italian Renaissance from the time of the Roman emperors. The threads ought not to be so difficult to pick up. In fact one may fairly say, when one considers much of the work of the last ten or fifteen years, that this has already been accomplished. How long, however, shall we continue to hold them? When one remembers the see-saw of the last half of the century just passed, he would be a bold man indeed who would venture to prophesy. And yet agreement amongst architects is absolutely essential if our art is to progress as it should progress. No art can advance satisfactorily when its exponents are pulling in different directions. Such a state of things is bad for architects, and worse still for workmen, as they are called upon to work in one manner one day and in another the next. Is it to be wondered at that under the circumstances they so often fail to take an interest in what they do? It is unsatisfactory also for the general public, who, seeing no standard, are apt to believe that there is no art.

For a real advance, harmony between architect, builder, and client, is essential. It existed in the eighteenth century in England, it existed in the fifteenth century in Italy, it is the secret of the strides made by architecture in the Middle Ages. It is true that in one sense the old war of the styles is now over. It is true that men are no longer eager to cut one another's throats over the rival merits of two phases of architecture, or to dispute with each other regarding the correctness of the curve of a moulding. But is it peace? There are still two camps. There are still Classicists, although they are no longer pedants, and there are still Romanticists, although they have ceased to be mock-mediæval. A fusion between the two, if it be possible, although it would take time, would be worth some waiting for. Some years must elapse before one can be expected to lie down with the other. But as the Classicist gets a little more playful and the Romanticist a little more formal, the two may meet. After all, the principles underlying good work are much the same in whatever language they are expressed, and the differences perhaps are not so great as appear on the surface.

In the last century men fell into the evil of a too literal rendering of old work, but that is no reason for going to the other extreme and ignoring it altogether. It seems to me that the folly is quite as great to refuse to profit by the successes and failures of the past as it is to remain indifferent to, and ignore new developments in building science. The masters of the Renaissance succeeded because, although they studied old work, they did not copy it. They blended its essence with the requirements of the time, and so produced new art. As they worked, so might we. What is wanted is a basis from which to start; something that the weaker can fall back upon, and the stronger advance from. And if there can only be agreement as to what that basis should be, there is every chance that the end of the century will see a traditional vernacular style once more flourishing in England, and that another chapter will be added to the history of architectural evolution.

THE LONDON COUNTY COUNCIL.

The first meeting of the London County Council after the summer recess was held in the County Hall, Spring Gardens, on Tuesday, Lord Monkswell, Chairman, presiding.

The Chairman's Address.—The first business was the reading of the Chairman's annual address. We take the following paragraphs from it:—

There is a special sub-committee of the Asylums Committee charged with considering the best methods of housing and treating lunatics. Among so many reformers one would hardly have thought such a committee necessary. The sub-committee have had under consideration sketch plans for a new asylum of a modified villa type designed by the asylums engineer, to whom the Council is much indebted for an immense amount of work of first-rate quality. The epileptic villa colony has been completed, but drainage difficulties retarded the reception of patients. The drainage is now connected with the Epsom Council's sewage farm, and there are now some 200 persons at the colony. We may hope that before long the plans for a villa asylum will be proceeded with; but for the moment the question of finding accommodation with the least possible delay has induced the Committee to recommend the Council to sanction the erection of a replica of the Horton Asylum.

The Bridges Committee, under Lieut.-Col. Sheffield, has again had trouble over the Vauxhall Bridge. For reasons which, if my memory serves me, are not exhaustively stated in the report, it has been decided to build the bridge of steel, instead of concrete with granite facings. This alteration will effect a slight economy.

The Building Act Committee, under the chairmanship of Dr. Longstaff, has been busy during the past year in considering the question of amending the London Building Act, 1894, with special reference to the safety of the inmates of high buildings in case of fire. A bill with this object was introduced, but encountered a great deal of opposition in Parliament, and the subject was referred jointly to the Building Act, Fire Brigade, and Parliamentary Committees for report.

The Establishment Committee had under consideration the question of the accommodation for the staff. It appears that only 481 persons are housed in the main building, and 578 outside. That is not an ideal state of things; but another feature is much worse—namely, the shockingly inadequate accommodation, both in the main building and elsewhere, for the persons in our employ who, in return for the excellent service they give us, are entitled to ask that the conditions of their service should be such as to afford them a reasonable amount of comfort in the discharge of their duties.

The extremely satisfactory feature of the fire statistics of the year is that the proportion of serious to slight fires, which has been decreasing steadily during the last five years, has now reached the very low figure of 1 in 46. This result is no doubt partly due to the gradual increase in the number of fire alarms, hydrants, and other appliances for dealing with outbreaks of fire, but also the brigade may justly attribute some part of the improvement to increased smartness and promptitude of the men in the discharge of their duties. Indeed, it seems to me that there can be no better test of the efficiency of the fire staff than the extent to which serious fires have declined.

The Parks and Open Spaces Committee thus summarises the work of the Council in providing open spaces—"The Council has already assisted in preserving for ever no less than 88 playing spaces for London, and has, as occasion has arisen, enlarged several of them, and also some of the places which were under the control of the Metropolitan Board of Works, and has expended about 600,310*l.* in so doing." During the year Avery Hill, 84 acres, was acquired for 25,000*l.*; Parliamentary power was

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sought to authorise the purchase of about 41½ acres of the Eltham Park estate, the Woolwich Borough Council contributing one-half, and in the contract for purchase the Council is, on the insistence of the vendor, bound not to allow the sale of intoxicants on the land. At Golder's Hill the Council has endorsed the action of the Committee in throwing open an orchard of 2½ acres to the public. During the year the negotiations for the purchase of Marble Hill and for the preservation of the view from Richmond Hill proceeded satisfactorily. The owner of the estate adjoining Marble Hill voluntarily gave a valuable covenant not to build on a property adjacent to that estate, and in other respects very materially assisted the special committee having the matter in charge to bring the negotiations to a successful issue. On 28th February, Brockwell Park extension, 42¼ acres, was opened by the chairman of the Committee, who also on 14th March opened Northbrook Park, 7 acres, and on 19th May (Whit Monday) the Manor House Gardens, 8¾ acres. On 28th Febraury, Wandsworth Park, about 20 acres, was opened. The Council agreed during the past year to buy two small open spaces in Stepney, amounting together to ¾ of an acre, for 13,000*l.*, towards which the vendor will contribute 3,000*l.*, and the Stepney Borough Council 1,500*l.* The most striking purchase of the year, and one that has been abundantly discussed, is the acquisition of 803 acres at Hainault Forest, outside the county, at a cost to the Council of 10,000*l.*, various societies and private persons, particularly Mr. E. N. Buxton, who has taken an immense amount of trouble in the matter, contributing the remainder—in round figures 12,000*l.*—or 22,000*l.* in all. The Committee estimate that an expenditure of 1,500*l.* on capital account, and 300*l.* a year for maintenance, will suffice. The conveyance to the Council of the Ranger's house, Blackheath, was completed during the year. The Council contributed 12,000*l.* towards the laying out of an addition (8½ acres) to Fulham Park, the Borough of Fulham undertaking to maintain the park. I may state that during the year the Committee has been instrumental in adding more than 1,000 acres of land to the open spaces of London.

The Works Committee under the chairmanship of Mr. Torrance, was constituted in March, 1902, not only to carry into effect the non-contract work of the Council, but also to make recommendations as to rates of wages and hours of labour in work carried on for, as well as by, the Council within the London radius. The Committee has, during the year executed work to the amount of 349,153*l.* 0s. 8d., of which 304,951*l.* 8s. 6d. consisted of estimated works and 44,201*l.* 12. 2d. of jobbing work. For the year ended September 30, 1902, in the case of estimated works the balance of cost was 16,968*l.* 17s., or 7.47 per cent. below the final estimate, and in jobbing works there was a balance of cost below schedule value of 995*l.* 17s. 4d., or 4.15 per cent. The Council will observe with pleasure that no fatal accident occurred to any workman; but a sum of 1,515*l.* 14s. 1d. was paid to workmen sustaining injury, being considerably more than the legal obligation. The total capital expenditure on the Works Department up to March, 1903, is 112,267*l.* 2s. 4d., of which 15,462*l.* 14s. 2d. has been repaid. The value of the plant and machinery at the various depots was on March 31st last, 40,678*l.* 5s. 1d. The total amount paid in wages during the year was 171,601*l.* 13s. 9d., and some modification in the rates of wages and hours of labour have been effected.

The report of the Technical Education Board of which Mr. Ward is chairman, contains matter of the deepest interest. It is satisfactory to note the large increase in the number of trade classes from 121 in 1894 to 309 this year; the instruction, too, is much more complete than it was, and the classes larger. It is calculated the the number of apprentices and workmen attending has increased at least fourfold in the nine years. The number of artisan students in polytechnics is also increasing fast and steadily, the number attending in 1902 being 6,731, against 5,193 in 1901. The Board's evening exhibitions of 5*l.* a year for two years, in science and technology, have been much appreciated, and the demand for all grades of county scholarships greatly exceeds the supply. Polytechnic buildings are being enlarged in every direction, to a great extent out of a sum of 40,000*l.* provided by the trustees of the London Parochial Charities. The Council has also several buildings on hand in connexion with its own schools.

Loans.—On the recommendation of the Finance Committee the following loans were agreed to:—Bermondsey Borough Council, 5,000*l.* for paving works; Bethnal-green Borough Council, 6,000*l.* for a similar purpose; Hammersmith Borough Council, 2,942*l.* also for a similar purpose; Poplar Borough Council, 3,910*l.* for paving and channelling works; Shoreditch Borough Council, 869*l.* for furnishing offices, etc., at Town Hall; Fulham Borough Council, 13,509*l.* for various purposes; Hampstead Borough Council, 16,600*l.* for paving works; Woolwich Borough Council, 10,000*l.* for erection of public hall; Battersea Borough Council, 8,081*l.* for works at public baths; Camberwell Borough Council, 12,000*l.* for purchase of site and erection of buildings; Bethnal-green Guardians, 9,674*l.* for poor law purposes; Guardians of Wandsworth and Clapham Union, 3,250*l.* for the same purpose. Sanction was also given to the following:—Hackney Borough Council, 906*l.* for electric lighting works; and Westminster City Council, 1,383*l.* for street improvements.

Springfield Estate, Upper Clapton.—It was agreed to contribute the sum of 20,000*l.* towards the purchase of this estate.

Mitcham-road Widening, Wandsworth.—It was agreed to contribute not more than 11,091*l.* towards the cost of widening Mitcham-road to 60 ft.

Works Committee.—The Fire Brigade Committee recommended as follows:—

"That an expenditure of 7,300*l.* for the work of erecting the Kilburn sub-station be authorised; that the work be executed by the Council without the intervention of a contractor; and that the drawings, specification, quantities, and estimate be referred to the Works Committee for that purpose.

That an expenditure of 898*l.* in connexion with the electric light and electric bell installations at the Kilburn sub-station, and other incidental expenses arising out of the erection of the building, be authorised.

That an expenditure of 7,500*l.* for the work of erecting the Bayswater sub-station be authorised; that the work be executed by the Council without the intervention of a contractor; and that the drawings, specification, quantities, and estimate be referred to the Works Committee for that purpose.

That an expenditure of 848*l.* in connexion with the electric light and electric bell installations at the Bayswater sub-station, and of incidental expenses arising out of the erection of the building, be authorised."

On the first recommendation an amendment was moved to the effect that the work should be put out to contract, but it was defeated, and the Committee's proposals were agreed to.

Housing, Tooting.—The following recommendation of the Housing of the Working Classes Committee was agreed to:—

"That the terms of the contract with Messrs. Roberts and Co. for the erection of the cottages on Section B of the Totterdown Fields Estate, Tooting, be so varied that payments under the contract may be made at the rate of 80 per cent. of the value of the permanent work executed until the sum due and remaining unpaid shall amount to 5,000*l.*, and thereafter to the full value of the further work certified by the superintending architect."

Street Dangers.—Mr. Beachcroft moved:—"That, having regard to the serious interference with ordinary traffic caused by the passage through the public streets of heavy road locomotives, more especially when drawing trucks; to the danger to the public from the terrifying effect such locomotives have upon horses; to the injury to property from vibration; and to the noise and annoyance caused to inhabitants, it be referred to the Public Control Committee to consider and report as to the powers of the Council for restricting and regulating the use of such locomotives in the public streets, and to what extent those powers have been exercised."

Mr. Torrance seconded the motion, which was carried.

Public Health.—After some discussion it was agreed, on the motion of Mr. Macdonald, that, in view of the different standards of thoroughness adopted by the various Medical Officers of Health in London in their administration of the Public Health Act, the Public Control Committee consider the question of convening a conference of the Medical Officers of the Metropolitan Boroughs to consider the advisability of a more uniform administration.

The Council soon after adjourned.

Illustrations.

DESIGN FOR A ROYAL MEMORIAL CHAPEL.

THIS design by Mr. Andrew Hutton, of Dundee, was submitted in the Institute competition for the Tite Prize two or three years ago, and was noticed with commendation in our review of the design at the time.

Some points in the detail may be rather crudely treated, but as a whole it shows power both in architectural conception and in the drawing.

NEW BLUE COAT HOSPITAL FOR LIVERPOOL.

THE drawings here reproduced are those of the new Blue Coat Hospital, which is in course of construction between Prince Alfred-road and Church-road, Wavertree, near Liverpool. The main entrance will be from Church-road, and from here the external aspect will be that of a range of buildings one story in height, with a central tower over the entrance, and gymnasium and swimming bath on the right hand (neither of these three features being included in the present contract, though essential to complete the design of the front), and a memorial chapel on the left, of which we reproduce two views, exhibited at this year's Royal Academy. The chapel is octagonal on plan, surmounted by a flat dome constructed in concrete.

As will be seen by reference to the plans, the main entrance gives direct access to the central hall, with the boardroom on the left hand and the headmaster's apartments on the right. The central hall is 75 ft. by 46 ft., with a stage and retiring rooms at the far end. Beneath it is the dining hall, of the same dimensions and 18 ft. 6 in. high, for although the entrance from Prince Alfred-road is on the ground level, the buildings, owing to the declivity of the site, admit of a lower ground floor on the west side. The main front of the building, which is towards Prince Alfred-road and overlooking the Wavertree playground, is three stories high, and contains on the lower ground floor the boys' and girls' classrooms and staff library, and a main corridor leading to the boys' wing on the north and the girls' on the south. The accommodation provides for 250 boys and 150 girls.

The materials used for the main building are 2¾ in. Red Ruabon wire-cut bricks, with Grinshill stone dressings and green slate roof; all the external cupolas will be in oak, and the corridors and class rooms have dados of salt-glazed brick and terrazzo and wood-block floors.

The chapel inside will be faced up to the cornice level with Bath stone and treated above with plaster; all furniture, pulpit, doors, etc., will be in oak. The foundation stone was laid last August by the Earl of Derby.

Messrs. Morrison and Sons, of Wavertree, are the builders for both contracts, and the architects are Messrs. Briggs and Wolstenholme, F. B. Hobbs, and Arnold Thornely.

ARCHITECTURAL SOCIETIES.

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—The sixteenth annual report of the Council shows that during the year the net membership has decreased by two—four associates and two students have resigned on leaving Sheffield, one new associate, two new students, and one lay member elected, and two students transferred to the associateship, thus leaving the total membership 109, as compared with 111 last year, but the same number as in 1900. As in 1901, the Council again offered prizes amounting to 5*l.* 5s. for the best set of measured drawings of buildings within the Society's province, but regret to say there was no response, and it was decided to apply the amount to the library fund. The same fate has been shared by the President's prize for

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an original survey, and he has also given one half of the prize to the library fund. The Council are again prepared to offer similar prizes, and the President is prepared to add the remaining half of the prize he offered last year to these; the Council therefore hope that the students and younger associates will take advantage of the same, and make the competition a success. With regard to the Draft Building By-laws upon which the Council reported last year at some length, an amended draft was sent by the Town Clerk and considered by the Council, and was referred to and again considered by a committee, and a further letter was sent to the Town Clerk on the matter in June last. Since then a draft copy has, it is understood, been sent to the Local Government Board, and been returned with many alterations. Up to the present time no further communication has been received from the Town Clerk. A circular has been received from the Competition Reform Society, having for its object the reform of the methods now too often seen in the competitions given out by Public Authorities. The Council, however, considered that the Royal Institute of British Architects was the proper body to deal with this difficult question, and decided, therefore, to take no part with this new Society in the matter. The Committee has been engaged in the revision of the library catalogue, and also in the preparation of a list of standard books of reference, the intention being to prepare for a systematic purchase of books in the future. Suggestions from members which will assist in the preparation of this list will be welcomed. In furtherance of this scheme, it has been decided to establish a fund to be devoted entirely to the improvement of the library. The Committee has been requested by the Council to consider and report on the educational facilities offered to architectural and surveying students, with a view to supplementing their deficiencies where possible, and also suggesting to students a scheme of general study. The matter is an important one to the profession generally, and the Committee will be glad to receive from students and other members statements of difficulties met with by them in the pursuit of their studies. The Committee has also dealt with the subject of classes for the younger members of the Society. A preliminary meeting was held, at which there was an attendance of twenty-one. Various proposals were discussed, and it was resolved to commence with a class for design, and also to organise sketching excursions during the summer. A meeting of this class was held on March 10, when eleven designs were submitted. The designs were reviewed in detail by Messrs. W. J. Hale and J. R. Wigfull, who were of the opinion that the standard was very satisfactory. With regard to public matters affecting the interests of the profession, the Council have considered the Sheffield Corporation Bill of 1903, and find that as drafted there is nothing to which exception can be taken. The attention of the members is, however, called to an important legal decision affecting members and their clients, which is as follows:—The case was the Corporation of Harrogate against Dickinson, and the decision of Mr. Justice Wright on February 20 last turned upon the construction of a clause in the Harrogate Corporation Act, 1893, Section 27. "The deposit with the Corporation of any plan of any street or building shall be null and void if the execution of the work specified in such plan be not commenced within the following periods. . . . as to plans deposited after the passing of this Act within three years of date of such deposit. . . . and at the expiration of these respective periods fresh notices and deposits shall, unless the Corporation otherwise determine, be requisite." This is almost identical with Section 73 of the Sheffield Corporation Act, 1890, and hitherto it has been the practice of the Sheffield Corporation to allow of the erection of part of the buildings shown on any plan as being a commencement within the meaning of this section, so that if over three years had expired, it would be possible to complete the remaining buildings shown on the plan without the re-deposit of future plans. The result of this decision is most important to the architects and building public of the city, as, acting upon it, the Sheffield Corporation may require fresh sets of plans to be deposited in cases where only a portion has been commenced.

SURVEYORS' INSTITUTION.

WE have received from the Secretary of the Surveyors' Institution a copy of the Amended By-laws.

By-law 4, relating to Professional Associates, contains the following new paragraph, which confers some new privileges on the Associate Members. It runs as follows:—

"Professional Associates shall not be eligible for the office of President or Vice-President, but shall be eligible for election on the Council, and for election or appointment to other offices of the Institution, and shall be entitled to all its rights and privileges."

The following By-law 5A is new:—

"5A. The designation of Members, by distinguishing initials or words, shall be as follows:—

Every Fellow shall be entitled to use after his name the initials F.S.I (*i.e.*, Fellow of The Surveyors' Institution) or, at his option, the words "Chartered Surveyor."

Every Professional Associate shall be entitled to use after his name the initials P.A.S.I. (*i.e.*, Professional Associate of The Surveyors' Institution) or, at his option, the words "Professional Associate Chartered Accountant."

By-law 18, giving power to the Council to suspend a member, has a new paragraph at the end providing that in such case there must be twelve members of the Council present and voting.

A new By-law, 19A, in reference to By-law 19 which gives power to expel any member who has "violated one of the fundamental rules of the Institution," defines the fundamental rules as follows:—

"19A. The Rules next hereinafter set forth shall be deemed fundamental rules of the Institution (that is to say):—

(1) A Member shall not engage in or be connected with any occupation which in the opinion of the Council is inconsistent with the profession of a Surveyor.

(2) A Member shall not directly or indirectly allow or agree to allow of participation by any Solicitor or his representative, or by any accountant or liquidator, or by any of their clerks, in his charges for professional work.

(3) A Member shall not accept or give any illicit or secret trade or other discounts, commission, or allowance, in connexion with any works the execution of which he may be engaged to superintend, or with any other professional business which may be entrusted to him, or any goods he may order on behalf of clients."

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Lewisham.†—Permission to retain a building on the west side of Lewisham-road, to the northward of No. 170 (Messrs. Martineau and Reid for Messrs. Whitbread and Co., Ltd.).—Consent.

Westminster.—That the application of Mr. F. G. Richardson for an extension of the period within which the erection of shops in front of Nos. 80 and 84, Grosvenor-mansions, Victoria-street, Westminster, was required to be completed, and the railings at present existing in front of No. 84 removed, be granted.—Agreed.

Bermondsey.—A one-story addition upon part of the forecourts of Nos. 88 and 89, Grange-road, Bermondsey (Mr. H. G. Bailey for Messrs. Heinke and Co.).—Consent.

Wandsworth.†—A wood, brick, and tile porch to "Narford," Lyford-road, Wandsworth, to abut upon Herondale-avenue (Messrs. Holloway Brothers for Mr. C. J. Byworth).—Consent.

Chelsea.—A school building at the Ashburnham Schools, on the north-west side of Lots-road, Chelsea, to abut upon Tetcott-road (Mr. T. J. Bailey for the School Board for London).—Consent.

Clapham.—A bakehouse building in the yard at the rear of No. 94, Northcote-road, Battersea, to abut upon Salcott-road (Mr. A. S. Gover for the House Property and Investment Company, Ltd.).—Consent.

Fulham.—Twelve buildings on the north-east side of Stephendale-road, Fulham (Mr. I. Wilson).—Consent.

Kensington, North.—A one-story addition to the shop at No. 14, Elgin-crescent, Notting-hill, to abut upon Kensington Park-road (Mr. E. W. Fagg for Mr. H. Geissler).—Consent.

Kensington, North.—Two four-story bay windows in front of No. 46, Chepstow-villas, Kensington (Mr. T. P. Figgis for Mr. W. H. Clark).—Consent.

Marylebone, East.—A building to be used as a keepers' mess-room and dormitories in the garden of the Zoological Society, on the south side of the outer circle, Regent's Park, St. Marylebone (Messrs. Hudson and Hunt for the Society).—Consent.

Strand.†—Permission to retain advertisement frames at No. 1, Green-street, Leicester-square (Mr. W. M. Brutton for Mr. J. Buchan).—Consent.

Dulwich.—A one-story shop upon part of the forecourt of No. 26, Peckham-rye, Camberwell (M. W. L. Dowton for Mr. W. T. Champion).—Consent.

Hackney, North.—A covered way at the rear of No. 88, Mountgrove-road, Stoke Newington, to abut upon Finsbury Park-road (Mr. E. Bates for Messrs. Welford and Co.).—Consent.

Islington, West.—Two two-story dwelling-houses upon the garden at the rear of No. 330, Liverpool-road, Islington, to abut upon Orlestone-road (Mr. A. M. Torrance for Mr. A. J. Bellew).—Consent.

Paddington, South.—An iron and glass porch at the entrance to No. 23, Hyde Park-gardens, Bayswater-road, Paddington (Mr. F. Wheeler for Mr. C. D. Rudd).—Consent.

St. George, Hanover-square.—A building on the site of No. 15, Hanover-square, St. George, Hanover-square (Mr. P. Hoffmann for Mr. H. O'Brien).—Consent.

St. George, Hanover-square.—An open stone portico at the entrance to No. 157, New Bond-street, St. George, Hanover-square (Mr. C. H. B. Quennell for Messrs. F. and R. Speaight).—Consent.

St. George, Hanover-square.—The enclosing of a portico at the entrance to No. 19, Upper Brook-street, Mayfair (Messrs. W. H. Romaine-Walker and Besant for Mr. A. W. Davis).—Consent.

Wandsworth.—Dwelling-houses with bay windows, on the north side of Fawe Park-road, Wandsworth, between Disraeli-gardens and Brandlehowe-road (Mr. E. Cannell for Messrs. E. H. Wallis and Co.).—Consent.

Wandsworth.—A building on the south side of New Park-road, Brixton, eastward of Streatham-place (Mr. T. J. Bailey for the School Board for London).—Consent.

Hammersmith.†—Buildings at the rear of Nos. 176, 178, 180, and 182, Goldhawk-road, Hammersmith, to abut on Cathnor-road and Conningham-road (Col. E. Clarke).—Refused.

Holborn.†—An iron and glass shelter in front of the main entrance to the Hotel Russell, Russell-square, Holborn (Messrs. J. W. Singer and Sons, Ltd., for the Fredericks Hotel Company).—Refused.

Kennington.—An iron and glass conservatory on the one-story addition in front of the Horns Hotel, No. 214, Kennington Park-road, Kennington (Messrs. F. J. Eedle and Meyers for Mr. R. J. Brinkley).—Refused.

Kensington, North.—An addition to No. 133, Westbourne-grove, Kensington, to abut upon Pembridge-villas (Mr. F. W. Hunt for the London and Westminster Bank, Ltd.).—Refused.

Kensington, South.†—Buildings on a site on the south side of Kensington-road, Kensington, to abut also upon Palace-gate (Messrs. W. N. Millard and Pryce for the Royal Exchange Assurance Company).—Refused.

Norwood.—One-story shops in front of Nos. 23, 25, 27, and 29, Hinton-road, Norwood (Messrs. Cole and Wood for Mr. W. Crocker).—Refused.

Paddington, North.†—An addition to No. 1 Blomfield-crescent, Paddington, to abut upon Harrow-road (Messrs. J. G. and H. G. Needham for Mr. M. L. Capua).—Refused.

Clapham.—The retention of a wood and glass addition at the side of No. 32, Bolingbroke-road, Clapham, abutting upon Gorst-road (Mr. A. Dent for Mrs. F. Dent).—Refused.

Islington, South.—One-story shops upon part of the forecourts of Nos. 237 and 238, Upper-street, Islington (Messrs. Drivers, Jonas, and Co. for Mrs. C. E. Merson, Mr. R. J. Hayward, and others).—Refused.

Lewisham.†—Wooden overhanging eaves and barge boards and projecting wood and slate pents to nine houses on the south-west side of Ewhurst-street, Lewisham, between Bexhill-road and Salehurst-road (Mr. T. W. H. Standen).—Refused.

Paddington, South.†—An open portico at the entrance to No. 9, Stanhope-place, Hyde Park, Paddington (Mr. G. E. Streatfeild for Mr. L. W. Evans).—Refused.

St. George, Hanover-square.—An iron and glass hood over the entrance to No. 1A, Dover-street, Piccadilly (Messrs. G. Trollope and Sons for the Grosvenor Club Syndicate, Ltd.).—Refused.

Wandsworth.—Two houses with shops upon a site on the south side of Brookwood-road, Wandsworth, abutting upon Clonmore-street

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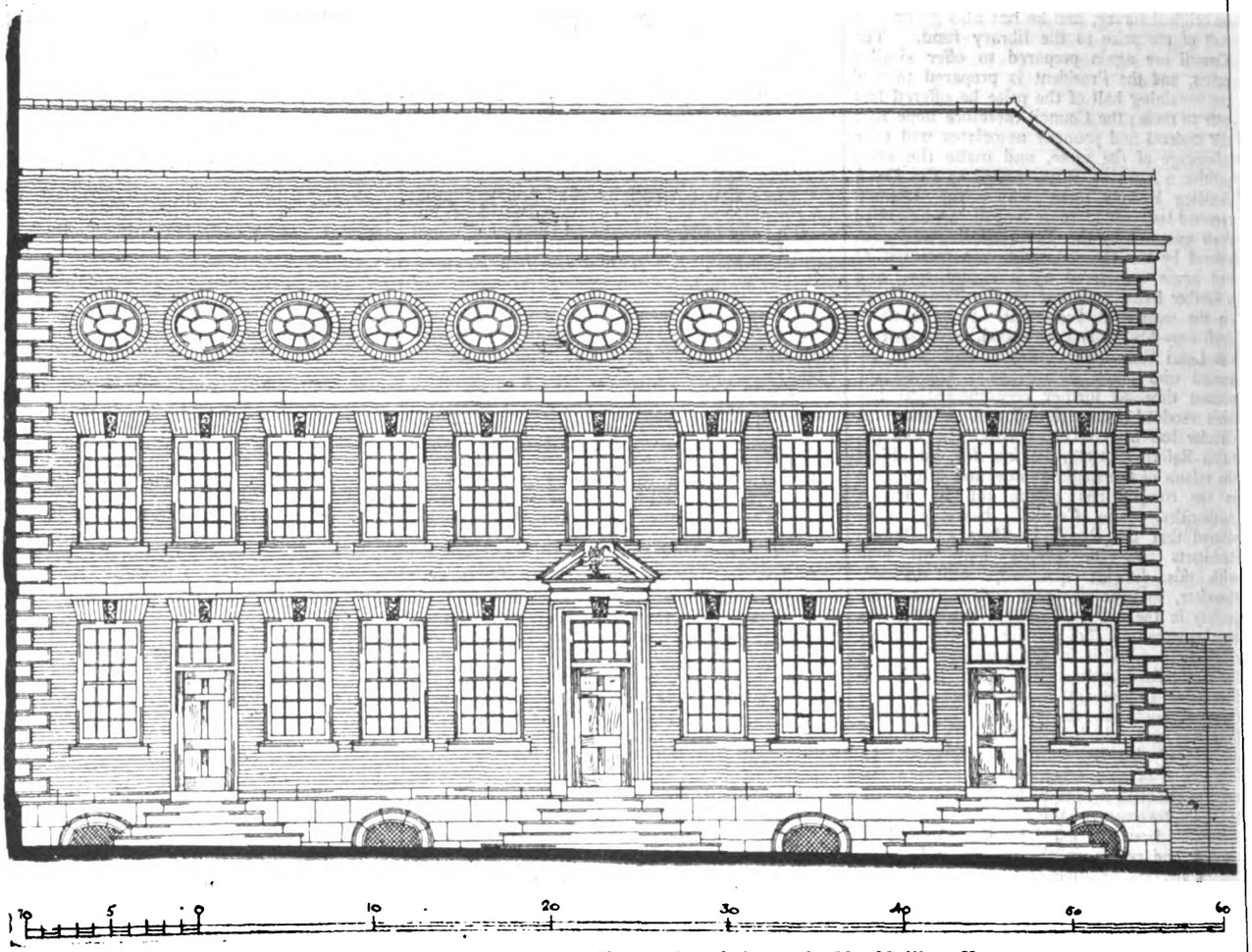

The Old Blue Coat Schools, Liverpool. Measured and drawn by Mr. Matthew Honan.

(Mr. J. M. Jones for the Land Development Syndicate).—Refused.

Wandsworth.—A dwelling-house on the north side of Fawe Park-road, Wandsworth, to abut upon the west side of Brandlehowe-road (Mr. E. Cannell for Messrs. E. H. Wallis and Co.).—Refused.

Width of Way.

Marylebone, West.—Working-class buildings upon the site of No. 9, Paradise-place, St. Marylebone (Messrs. T. H. and A. M. Watson for the Portland Industrial Dwellings Company, Ltd.).—Consent.

Hackney, North.—An addition at the rear of the Public Library, Church-street, Stoke Newington, to abut upon Edwards-lane (Mr. S. G. Goss for the Metropolitan Borough of Stoke Newington).—Consent.

Hackney, Central.—Retention of two buildings at the rear of the Hackney Polytechnic Institute, Dalston-lane, Hackney, with the forecourt boundary at less than the prescribed distance from the centre of the roadway of Institute-place (Mr. A. W. Cooksey for the Governors of the Institute).—Consent.

Woolwich.—A one-story building on the north side of a public footpath leading from Maxey-road to Lee-street, Woolwich (Messrs. Church, Quick, and Whincop for Mr. J. Murray).—Consent.

Hackney, South.—A one-story office building on the north-west side of Wallis-road, Hackney-wick (Mr. G. H. Lovegrove for Messrs. Orrock and Co., Ltd.).—Refused.

St. Pancras, North.—Permission to retain a forecourt fence on the eastern and southern sides of Greenwood-place, Highgate-road, St. Pancras (Mr. J. P. Crosby for Messrs. Maple and Co., Ltd.).—Refused.

Width of Way, Lines of Frontage, and Projections.

Norwood.—A block of flats on the north side of Ardville-road, Brixton, eastward of the Brixton Theatre (Mr. E. C. Homer).—Consent.

St. Pancras, North.—An external iron staircase at the Imperial Laundry, Ingestre-road, St. Pancras (Mr. C. J. Shaw for the London United Laundries, Ltd.).—Consent.

Woolwich.†—Two shops and dwelling-houses on land adjoining No. 27, Herbert-road, Plumstead (Messrs. A. H. Edward and Co.).—Consent.

Chelsea.—The re-erection and enlargement of the porch at the entrance to No. 125, Sloane-street, Chelsea, and the retention of a half-basement addition to such building, each abutting upon Cadogan-terrace at less than the prescribed distance from the centre of the roadway of that street (Mr. R. G. Hammond for Mr. J. Garlick).—Consent.

St. George, Hanover-square.—The retention of a glass and iron hood over the entrance to No. 1, Bolton-street, Piccadilly (Messrs. J. Shoolbred and Co. for Mr. H. A. Attenborough).—Consent.

Brixton.†—A building with a one-story addition in front, on the site of Nos. 242 to 258 (even numbers only) inclusive, Ferndale-road, Brixton, to abut also upon Stockwell-avenue (Mr. J. W. Chapman for the Bon Marché, Ltd.).—Refused.

Kensington, North.—A one-story building upon a site abutting upon Blechynden-street and Blechynden-mews, Lancaster-road, Kensington, to an advanced line in Blechynden-street (Mr. W. Daniell for Messrs. Lane Brothers, Ltd.).—Refused.

Marylebone, West.—A one-story addition and bay-window in front of No. 11, Gloucester-mews, West, St. Marylebone (Messrs. C. Brown and Sons for Sir J. Walton).—Refused.

Space at Rear.

Marylebone, East.—Three blocks of flats, with two warehouses in the rear, on the site of Nos. 31 to 36, Foley-street, St. Marylebone (Mr. W. H. Woodroffe for the Trustees of the late R. Ankerson).—Consent.

Wandsworth.—Three houses on the north side of Fawe Park-road, Wandsworth, with an irregular open space at the rear (Mr. E. Cannell for Messrs. E. H. Wallis and Co.).—Consent.

Whitechapel.—Alteration and addition to a dwelling-house on the west side of Brick-lane, Whitechapel (Messrs. Truman, Hanbury, Buxton, and Co., Ltd.).—Consent.

Width of Way and Space at Rear.

Strand.†—A building upon the site of No. 14, Duke-street, St. James's, Westminster, abutting at the rear upon Mason's-yard (Mr. L. W. Green for Mr. C. Staniforth).—Crescent.

Width of Way and Deviation from Certified Plan.

Marylebone, East.—A building on the site of Nos. 120 and 122, Marylebone-lane, St. Marylebone, abutting also upon Cross-Keys-mews (Mr. W. Woodward for Mr. S. H. Griffiths, trading as Messrs. Blyth and Co.).—Consent.

Means of Escape at the Top of High Buildings.

Strand.—Means of escape in case of fire on the third, fourth, fifth, sixth, seventh, and eighth stories of the Savoy Hotel Extension, Strand (Mr. T. E. Collcutt).—Consent.

Buildings for the Supply of Electricity.

Norwood.—Three water cooling towers in one block, and a motor-house at the generating-station, Bengeworth-road, Loughborough-junction (Wheeler Condenser and Engineering Company for the South London Electric Supply Corporation).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

THE OLD BLUE COAT SCHOOL, LIVERPOOL.

As we are publishing in this issue the designs for the new Blue Coat School, near Liverpool, it may be of interest to give these illustrations of the old Georgian building in Liverpool (behind the churchyard of the present pro-cathedral), which will shortly be pulled down.

We are indebted for the illustrations to Mr. Matthew Honan, an architect residing in Liverpool.

THE DEVELOPMENT OF ARCHITECTURE.

Professor Beresford Pite delivered the first of a series of lectures on architecture, at the Municipal School of Art, Leicester, on the 25th ult. Mr. Pick presided.

According to the *Leicester Post*, Professor Pite said in this series of lectures he proposed to endeavour to induce the students to think for themselves, apart from the teaching of the architectural picture-books. Architecture did not lie in a study of form any more than good poetry lay in a study of words. Every building embodied the thought of those who built it; the arrangement of a building denoted its purpose. It was obvious, therefore, that the forms those arrangements took denoted the intellectual condition of the persons who gave those forms being. He had the advantage, in working at South Kensington, that his students knew nothing about architecture. They came with open minds, and they did not sit down and say

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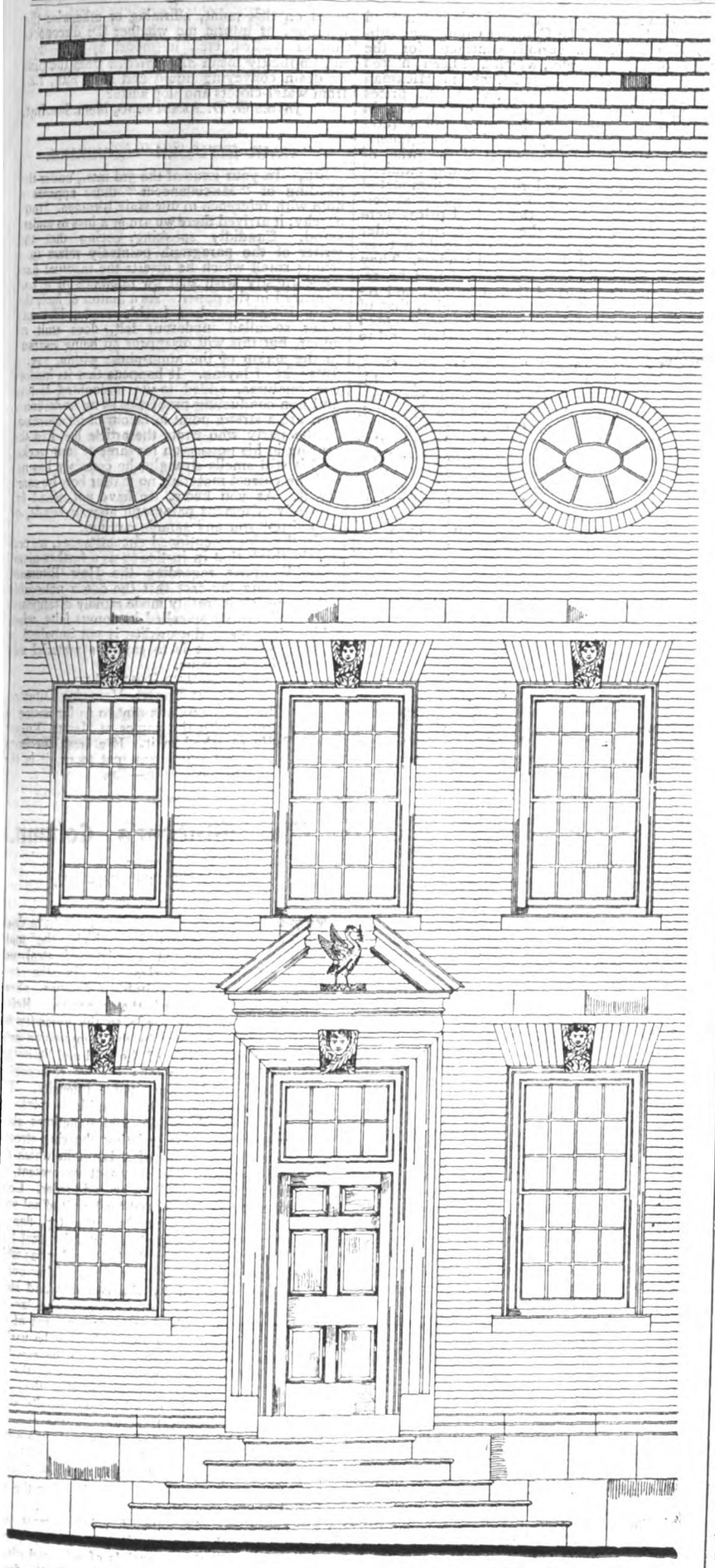

Old Blue Coat Schools, Liverpool: Detail of Centre of Elevation.

at once that there was only one form that they liked; that they hated everything that was red and liked everything that was green. He was delivered from all that at South Kensington, and he hoped with regard to this work that the students would begin without prejudice, and think for themselves. Let them dismiss from their minds all prejudices as to style, and see if they could not learn something from each particular style. Their programme was to consider the whole subject of architectural development, with a view to understanding how to develop our architecture. He was going, therefore, to very briefly review the development of style.

The progress of architectural development was the progress of the knowledge of the building art. Architecture was the art of building reasonably, sensibly, and beautifully. It was not that sort of application of art to the outside of a building which the man in the street thought was architecture. The progress of building art had been a simple process of evolution. With regard to Egyptian architecture, for instance, Professor Petrie held the theory that the well-known Egyptian style was a development from the rush and mud huts of the Upper Nile. It was a copying in fine material of the forms of the erections in commoner material. It, of course, augured a want of intellect, but the forms survived. The Grecian styles were more beautiful, but were the Greeks more intellectual? Not a bit. Vitruvius, who flourished in the reign of the Roman Emperor Augustus, wrote a treatise on the laws of architecture, and said the proportions of the Doric style were based upon manly proportions. A man's height was six times the length of his foot, etc., and the Doric column was six times its diameter. The Ionic column was seven times its diameter, because it was based upon feminine proportions, and so on. Greek architecture was a translation into fine material of the forms which arose from the employment of wood in building. The architectural development of the Greeks had left its impress on the whole world. Then they came to the Romans. They originated nothing. They were great builders and engineers, and they used Greek art to decorate their great works. They had an art repository in Greece. Then the Roman Empire fell to pieces, and they came to the Byzantine Empire. The barbaric forms of their architecture were a blend of what had gone before. At the close of the Roman Empire the whole of society was in the melting-pot, and when it came out there was little distinction between the architectural and the constructive man.

Then came the great Christian era, and the great buildings of the Middle Ages were ecclesiastical. The Roman Church practically replaced the Roman Empire, and exercised a world-wide influence for good in architectural education. Then came those great, domed buildings which were so impressive and beautiful. The question might here be asked whether architecture could get on without artists. In his opinion it could not. Imagination was as necessary in designing beautiful churches as in anything else. They could not get design out of limbo, and imagination must have material from which to work. Now they came to England. England, in the absence of means of communication, was cut off from Greece and Rome. Our only connexion was through the Church, and we saw, therefore, the establishment of Italian ideas through the influence of Italian bishops, priests, and through the pilgrims. Building energy developed largely in England after the time of Canute. Previously churches were built of wood, but afterwards stone was used, and craftsmen worked with common sense, and developed the few ideas that had been brought from Italy. Whatever views they held to-day as to proportion in design, they would find that they could not get away from certain proportions, and the proportions, too, that Vitruvius laid down. They would find that there was a certain mean that was satisfactory, and they could not get beyond it. Why it was so he could not say, but he urged on students that there certainly was a canon of proportion. If that was more generally recognised there would not be so many of the ghastly buildings which were the result of architects endeavouring to create their own proportions.

COURT OF COMMON COUNCIL.

The usual Court of Common Council was held on Friday last week, at the Guildhall.

Mr. W. R. Horncastle said that he thought that members of the Court would be interested to hear that in the course of the demolition of Newgate some remains of the "Ballium"—the Roman external wall of defence which was built round the City in the fourth or fifth century—had been brought to light in a marvellous condition after 1,500 to 1,600 years, and had been uncovered to a depth of 20 ft. The excavations had also revealed, at the north end of the site, an archway, in a fine state of preservation. That was apparently a portion of a subterranean passage way what one time connected Newgate—built about the year 1100—and the gaol. Newgate itself was pulled down in the year 1767. No doubt members would like an opportunity of seeing the remains, and the special Sessions House Committee had arranged that they should not be disturbed until the following Thursday. Unfortunately the remains would have ultimately to be removed altogether.

On the motion of Mr. W. H. Williamson, it was agreed to hand over the bust of the late Cecil Rhodes to the custody of the City Lands Committee.

Mr. T. V. Bowater moved: "That the designs for the new Southwark Bridge be put out

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to competition, with instructions that the designs be as ornamental as possible." He said that on the Continent the bridges were generally of an ornamental character, and London seemed to be the only place where they were not so.

Mr. Deputy Pryke objected that it would mean delay if a competition were decided on. They might not get the Bill through Parliament next session.

Mr. Carl Hentschel said that they should not hurry over the matter, but should endeavour to obtain as artistic a bridge as possible.

Mr. Deputy Wilkinson moved that the words after the word "competition" should be struck out, and this was seconded by Mr. Deputy Matthews.

The amendment was lost, however, and the original motion carried.

Some discussion took place with regard to the proposal to run tramways across Southwark Bridge, Mr. F. G. Day moving that it be referred to the Bridge-House Estates Committee to consider and report as to the desirability of allowing the L.C.C. to continue the tramlines on the south side of Southwark Bridge over the bridge. He said that the bridge was one used largely by the working classes, to whom the trams would be a great benefit.

The motion was seconded by Mr. James, but on being put was lost.

METROPOLITAN ASYLUMS BOARD.

An ordinary meeting of the Managers of the Metropolitan Asylum District was held on Saturday last, at the offices, Victoria Embankment. Letters were received from the Local Government Board relating to the following matters:—Sanctioning a proposal to enter into a contract with Messrs. Buchanan and Curwen for the wiring of the children's home, Tooting Bec Asylum, for electric lighting purposes, at a cost of 398*l.*, without advertising for sealed tenders; authorising the erection of additional buildings at Joyce Green Hospital at a cost not exceeding 8,680*l.*, and the borrowing of that amount, to be repaid within a period of thirty years; authorising the erection of cottages at the Brook and Grove Hospitals respectively, for the accommodation of the resident engineer, at a cost not exceeding 1,070*l.* for the two; and sanctioning certain minor building works at the Caterham Asylum and the Park Hospital.

Banstead-road School.—The Works Committee reported that they had instructed the Engineer to the Board to prepare schemes for the establishment of telephone and fire-alarm systems at this school, and had authorised the necessary works being carried out at a cost of 123*l.* 14s. 0d. The action of the committee was approved and confirmed.

Northern Hospital.—The same committee further reported on the proposed alterations and additions at the Northern Hospital. At a previous meeting of the Board the Committee were instructed to report upon a letter, dated August 15, from the Local Government Board, with reference to a proposal to spend a sum not exceeding 797*l.* (in addition to 1,300*l.* already authorised) in respect of the proposed work. The Local Government Board had inquired whether the managers had considered the question of reducing the cost of those works so as to bring it within the original estimate of 1,300*l.*, upon which sum the Board's order was based. The Works Committee submitted a copy of a report on the subject which had been prepared by the Northern Hospital Sub-Committee. That report stated that the sub-committee having carefully considered the matter, adhered to their opinion that the proposed additions, etc., were necessary, and went on to say, "With respect to the details of construction of the various buildings, after careful investigation in consultation with the assistant surveyor, we find that although slight modifications might be introduced, the consequent saving in cost would be very small, and the effect would be that the new buildings would not harmonise with the general character of the rest of the hospital." The Works Committee accordingly recommended "That a reply based upon the report which the Hospitals Committee received from the Northern Hospital sub-committee with regard to the cost of the proposed additions and alterations at the Northern Hospital be forwarded to the Local Government Board in reply to their letter of the 15th August last," and this was agreed to.

Darenth Asylum.—The Asylums Committee presented a report dealing, among other matters, with a report made by two Commissioners in Lunacy on Darenth Asylum, which report contained certain remarks with regard to the arrangements at the asylum for the escape of inmates in case of fire, and had been submitted to the Asylums' Committee for their consideration and report. The Committee now submitted some extracts from reports which they had received from their Darenth sub-committee. The Asylums Committee recommended "That the action taken upon the report of the Lunacy Commissioners be approved, and reported to the Local Government Board," and this was agreed to by the Board. The Contract Committee submitted a report on various contracts for the supply of materials, etc., which had been entered into, and stated that Messrs. Buck and Hickman had pointed out that by a mistake the prices quoted for the supply of drain canes, etc., in their recent tender for the supply of certain descriptions of builders', smiths', and engineers' ironmongery, had been quoted at the price of each article and not per dozen, as was required by the conditions of tendering. The firm stated that they were willing to supply goods at certain other prices, but as the revised prices were higher than those in the next lowest tender originally received, the committee could not see their way to accept the amended tenders. They thought, however, that the firm should be released from that part of their contract, and recommended that the next lowest tender, that of Messrs. Pryke and Palmer, should be accepted for the supply of the articles in question, and to this the Board agreed.

South-Eastern Hospital.—The Hospital Committee submitted a lengthy report on this hospital, and recommended "That the proposals for reconstructing the South-Eastern Hospital, as contained in the report (24th September, 1903) of the Hospitals Committee, be adopted; that the plans, now submitted, be approved and forwarded to the Local Government Board for their approval; and that when such approval has been given, the matter do stand referred to the Works Committee to deal with under the powers delegated to them by the managers." This being agreed to, the Board, after other business, adjourned.

Correspondence.

FROSTERLY MARBLE.

Sir,—Architects and others interested in marble will be glad to know that the famous Frosterly marble, found in the carboniferous limestone of Weardale, which was used so extensively in Durham Cathedral for shafts, etc., doing the same work that Purbeck did in the South, is now again obtainable.

Some years ago Messrs. Pease Bros., who were working limestone quarries, came across the bed. This was chiefly used for the new Roman Catholic Cathedral at Norwich, designed by the late Gilbert Scott, and for numerous fonts and altar tables.

Another find has now been made in the quarries of the Harehope Company, who are quarrying the ordinary limestone for fluxing purposes in the iron furnaces. It is found some ten feet below the surface, and extends entirely over the property, cropping out in the bed of the river, where it can be seen through the clear water. There is no doubt that most of that used in mediæval times was obtained from the bed of this river, the upper beds having been taken away by river erosion.

This marble is very trustworthy. It will bear great pressure, and to a certain extent withstands atmospheric action in the open air.

The marble is a black marble, full of Actinozoa corals of the name of "Dibunophyllum," which would seem to be one of a class of corals that have been handed down with slight alteration probably from the Silurian period, having become in this district almost one compact mass.

When we look upon the occurrence of this single bed of fossils, only appearing once throughout the great depth of rock, it becomes somewhat astounding; but a similar thing occurs in the carboniferous limestone of Derbyshire, where the Encrinite fossil marble is, comparatively speaking, only one thin continuous band—though probably some thousands of feet in thickness. The same thing happens in the Purbeck formation, which has practically only one Purbeck marble bed in the whole of the formation.

W. Brindley, F.G.S.

CONSTRUCTION OF DRAINS.

STRANGE STATE OF THE LAW.

Sir,—Recently the Sheffield Stipendiary decided (in a case prosecuted by the Corporation for breaking their by-laws) that all rain-water pipes and waste pipes must be trapped immediately that such pipe enters the ground, as the point where it enters the ground is the *inlet to the drain* under by-law — of the Model By-laws, notwithstanding that at some distance away all such wastes and rain pipes emptied into a disconnecting gully next the drain from the water-closet, and further, that as the bottom of a rain-water is next the wall, there the gully must be.

This decision is against the modern method of collecting waste pipes and rain-water pipes to one central disconnecting gully, and if his decision be correct law—which decision I very much question—our sanitary laws are in a deplorable condition.

Can any of your readers refer me to any Court cases on this point, affirming or otherwise the decision, or inform me whether the disconnection of wastes, etc., in model by-laws—does not implicitly mean *disconnection* from the pipe or drain conveying liquid and solid filth, *i.e.*, from water-closets and slop sinks?

James G. D. Armstrong, Mem.San.Inst.

"HAIR BITUMEN" COVERING.

Sir,—In your issue of the 3rd inst., under the heading of "Miscellaneous" there appears a note with reference to our Hair Bitumen. How, or why, it arrived there we are at a loss to understand. Candidly speaking, seeing that the writer of the paragraph pointedly refers to a strong smell which he asserts the material has, we earnestly wish that no reference to it had appeared in the paper. As a matter of fact, the Hair Bitumen, when freshly made, like any other so-called inodorous felt, does emit an odour, but this will disappear on being exposed to the action of the atmosphere within, say, a fortnight of laying. It happens that its inodorous bualities, added to its undoubted lasting and non-conducting properties as an underlining felt, are a strong point in favour of its adoption. If the party who wrote the article has had the cutting in his possession for three or four weeks, and it still smells strongly, he certainly has not got the correct material, no matter how he came by it. As you know, we have not asked for any advertisement paragraph at your hands, or submitted you any sample cuttings.

In the afore-mentioned circumstances, we certainly think that in justice to us a further mem. should appear regarding the Hair Bitumen, emphasising the fact that the odour noticeable when the felt is freshly made rapidly disappears, but unlike other so-called inodorous felts, when this takes place the quality is not impaired in the slightest, that is to say, the material still retains its full virtue.

Engert and Rolfe, Ltd.,
Cyrus Engert, Managing Director.

*** The specimen was sent to us for notice in this journal, with the names of Messrs. Engert and Rolfe attached to it. If a fresh specimen with a decided smell was sent to us, it is the fault of those who sent it.—Ed.

The Student's Column.

CONCRETE-STEEL.—XV.

BRACED GIRDERS.

In the preceding chapters we have dealt with beams in which the main reinforcement consists of steel rods or bars placed horizontally in the tension area at a suitable distance above the lower surface of the concrete. Reference has also been made to the necessity for similar reinforcement in the compression area when the magnitude of the load and limitation of the beam dimensions involve compressive stress beyond the permissible intensity. We have further shown that auxiliary reinforcement may be desirable, and sometimes absolutely necessary, for resisting shearing stress.

Assuming the case of a beam in which the three elements of reinforcement are present, we have what is essentially a braced girder. Compressive stress is resisted by longitudinal steel bars and concrete, forming the top flange; tensile stress is similarly resisted by steel bars and concrete, forming the bottom flange; while compressive and tensile stresses arising out of shear are resisted by the concrete and steel, constituting the web that connects the flanges.

The precise design and arrangement of the steel ties included in the web may be varied, and the number of the ties may be small or great, but, as we have already shown, the ties should be placed diagonally so that they may be the better able to withstand tensile stress coming on diagonal planes in the concrete. Compressive stress, due to shear, in the web is resisted by the body of the concrete, which, so far as concerns resistance to compression, resembles the continuous plate forming the web of an ordinary rolled steel girder.

The three elements of reinforcement combined with the compressive strength of the concrete give all the essentials of a braced girder, and therefore suggest variations in the design of concrete-steel beams. We will take two types of construction for the purpose of illustrating the possibilities open to the designer who has made himself familiar with the essential principles governing the application of concrete-steel to structures.

Let us first assume a solid rectangular beam to be the most convenient form for adoption in a particular situation, and that no reinforcement is necessary other than horizontal bars in

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the tension area, and diagonal reinforcement in the connecting area, or, as we may briefly term it, the web of the beam.

When discussing the general theory of concrete-steel we showed that, in order to develop to the utmost extent the distinctive qualities of the new material, it is desirable to subdivide the reinforcement as far as may be practically possible, with the object of bringing the whole area of concrete within the sphere of influence of the steel. When this is done we have no longer "concrete and steel," but the remarkable combination "concrete-steel." Not only the longitudinal reinforcement, but the diagonal reinforcement also, should be finely sub-divided. The former may be taken to consist of thin rods disposed about the axis of tension in the lower part of the beam, to resist the effects of bending movement in an adequate manner. The latter must satisfactorily protect every part of the concrete from tensile stress due to shear. If, as generally happens in building construction, the load be uniformly distributed, the effects of shearing force will be relatively great at the ends of the beam, gradually diminishing to zero at the centre. But, with the exception of an infinitesimal point at the centre, no part of the beam can possibly be free from shearing stress. Consequently, the most efficient form of reinforcement for resisting tension on diagonal planes must be one in which the planes of reinforcement are equal in number with the planes subject to tension. As the number of such planes is necessarily infinite, it might seem that a continuous plate of metal would form the most adequate type of reinforcement. If such a plate were of graduated thickness in accordance with the progressive graduation of shearing stress towards the centre of the beam, it would satisfy some theoretical requirements. But it would not afford a satisfactory bond between the concrete and the steel, and it would not ensure that co-operation which is invariably demanded between the two materials. These objections might be overcome in part by punching holes all over the plate, with projecting rims; or by cutting triangular tongues to project into the surrounding concrete. A better plan would be to employ steel netting, or expanded metal, preferably the latter.

By taking a flat sheet of expanded metal, of suitable mesh and thickness, and bending it into a trough-like shape to suit the dimensions of the beam, the whole length in a longitudinal section of the beam could be adequately protected against shear, in whatever way its influence might be directed. Moreover, every part of the longitudinal section would be brought within the influence of the metal reinforcement. Towards the centre of the beam the shearing stress would be so small as to render reinforcement unnecessary, but considerable advantage would follow the employment of a continuous trough from one end of the beam to the other, and the saving to be expected from the omission of a few feet of metal would be quite insignificant.

In small beams the most simple course would be to use a single sheet of expanded metal for forming the trough-like reinforcement, selecting a gauge and mesh appropriate to the maximum shear.

In large beams, where the amount of metal might form a considerable item of expenditure, the proper course for adoption would be to employ two or more troughs of varying length and fitted one inside the other, so as to give the required graduation of resisting power, somewhat after the manner in which engineers graduate the flange-plates of a built-up girder.

The form of reinforcement here suggested for protecting a beam against the vertical, horizontal, or diagonal effects of shear, could be cheaply and easily applied. It would clearly be more efficient, and more in accordance with theory than reinforcement consisting of ties or stirrups at more or less widely separated intervals. Tension on diagonal planes could be calculated at the option of the designer to be met entirely, or in part, by the metal, and the greater part of the compression on diagonal planes at right angles would come upon the concrete.

This type of construction represents a simple and effective form of braced girder, and the calculations required for its design are perfectly free from complexity.

We will next assume that it is not necessary to have a solid rectangular beam, and that the top and bottom flanges may be connected by any convenient number of members, after the manner of a "Warren" or other variety of braced girder. Of course, the ties or struts so employed must be partly or entirely formed of concrete, in order to come within the type of construction under consideration, and to ensure safety against fire and corrosion. The arrangement of the web members may be varied at the discretion of the designer, and while those intended to resist tension must be reinforced, those subject to compression may be of concrete alone.

When diagonal ties are employed for resisting tension due to shear, one of two conditions is evidenced. Either the concrete between the ties must be subject to tensile stress of such intensity as to constitute a source of possible danger, or the concrete intervening between the ties must be of no value, and therefore unnecessary.

In small beams of this kind the saving to be expected from the omission of unnecessary material is too small to be taken into account, but, as we shall presently show, other circumstances may tend to recommend such omission to the architect.

In larger beams the construction of ties and struts as individual members, but securely built up and connected with the flanges, may often be advantageous for the purpose of saving unnecessary weight and expense.

Up to the present time very little use has been made of the type of design here indicated, but M. Visintini, a Swiss architect, has availed himself of its advantages by devising a complete system of construction which is now being introduced both on the Continent and in this country.

As a general rule the "Warren" type of girder is adopted, with a single system of triangulation, but use is also made of the "Linville," or N truss. Although it is frequently the case that the compression flange of a concrete-steel girder requires no reinforcement, steel rods are employed in this as well as in the tension flange, because a simple and effective means of connexion is thereby afforded for the ties. Moreover, the thickness of the top flange can be reduced, and the two flanges need not contain much more concrete than the amount necessary for the efficient protection of the metal. The rods serving to reinforce the ties are connected by bending their ends round the horizontal rods in the flanges, and they are held firmly in position by the enclosing mass of concrete.

The struts—whether diagonal, as in the "Warren" girder, or vertical, as in the "Linville" truss—are simply of concrete, but if circumstances rendered such a course necessary they could be suitably reinforced.

We are now concerned with general questions of beam design, and it would be inappropriate to go into full details relative to the application of such a system of braced girder construction. It may be remarked, however, that the spaces between the web members may be filled up solid, if thought desirable, or when a series of beams is employed in floor construction; the flues formed by the spaces can be left for use as ducts for pipes, wires, and air for heating or ventilation.

In order to make clear the method of calculating the proportions of beams designed in accordance with the system now under discussion, we give the following rules, which are those employed by M. Visintini. We have, however, adopted the notation hitherto used, and made the equations suitable for British units of measurement.

In ordinary building construction it may be assumed that the total load is applied to the top flange.

Denoting the reaction of the abutments by the symbol S, we have—

$$S = (n - 1)\frac{w\,\delta x}{2}$$

Where n = number of bays formed by the diagonals.
w = load per unit length.
δx = distance between diagonals, or length of bay.

For the moment of resistance in any member γ of the top flange we have—

$$R = \frac{w\,(\delta x)^2}{2}\left[(n + 1)(\gamma - \tfrac{1}{2}) - \gamma^2\right],$$

where γ = numerical order of any member of the top flange from the abutment.

For compression in any member of the top flange we have—

$$P_c = \frac{w\,(\delta x)^2}{2\,d}\left[(n + 1)(\gamma - \tfrac{1}{2}) - \gamma^2\right],$$

where d = distance between the top and bottom flanges.

As the top flange is built up uniformly, it is only necessary to calculate the moment of resistance for a cross section at the middle of the beam. This, of course, gives the maximum value, or $R_{max.}$ and the corresponding compression—

$$P_{c\ max} = R_{max} \div d.$$

From this the requisite area of concrete can easily be computed, due allowance being made for the resistance afforded by the steel reinforcement.

For the moment of resistance in any member γ of the bottom flange we have—

$$R = \frac{w\,(\delta x)^2}{2}\,\gamma\,(n - \gamma).$$

For tension in any member of the bottom flange—

$$P_t = \frac{w\,(\delta x)^2}{2\,d}\,\gamma\,(n - \gamma).$$

Having found the amount of tension, it is easy to proportion the reinforcement for the bottom flange, and as the beam is of uniform dimensions, calculations will be made at the centre of the beam, as in the case of the top flange. Following the usual practice, no account is taken of the resistance to tension afforded by the concrete.

In calculating tensile and compressive stresses on the diagonals, the method adopted is very similar to that we have already mentioned in connexion with shearing stresses.

Tension is calculated for any diagonal by the equation—

$$P_t = \frac{w\,\delta x}{2\cos\theta} \times (n - 2\gamma + 1).$$

For small beams it would be inconvenient and scarcely necessary to employ rods of different diameters to suit the diminution of tension towards the centre of the beam, and it will be sufficient to calculate the stress for the first diagonal from the abutment. The sectional area of steel suitable for the stress so found may then be adopted for all the ties. For larger beams calculations should be made for successive diagonals until the tension becomes so small that further diminution in the area of the rods would be attended with no practical advantage. Here, again, no account is taken of the tensile strength of the concrete.

Compression on diagonal struts is similarly calculated by the equation stated above, but compressive stress is resisted by the concrete without the aid of reinforcement. For small beams a uniform sectional area of concrete may be adopted, while for large beams the sectional area of the struts should be proportioned to the amount of stress to be resisted.

If the struts be vertical, as in the case of a "Linville" or "N" girder, the rule requires modification, and becomes—

$$P_c = \frac{w\,\delta x}{2} \times (n - 2\gamma + 1).$$

The type of girder described above may not be thought the most desirable for universal employment, but its application may often be attended with advantage.

BOOKS RECEIVED.

THE PLANNING AND FITTING-UP OF CHEMICAL AND PHYSICAL LABORATORIES. By T. H. Russell, M.A. (B. T. Batsford.)

THE PLUMBERS' COMPANY'S DIAGRAMS: For the Use of Classes of Technical Instruction for Plumbers. (The Plumbers' Company. 1s.)

THE BUSINESS ENCYCLOPÆDIA AND LEGAL ADVISER. By W. M. S. Knight. In six volumes. Vol. V. (Caxton Publishing Co.)

OBITUARY.

MR. H. W. BREWER.—We greatly regret to announce the death, in his 67th year, of Mr. H. W. Brewer, the architectural draughtsman, which occurred on the 6th inst. at his residence in St. Quintin-avenue, W. Some remarks on the deceased gentleman will be found in our leading article this week. In our next issue we shall be able to give some further particulars of his work.

MR. T. A. PAGE.—The death is announced of Mr. Thos. A. Page, a South Shields architect, aged 70 years. He was a native of Peterhead, and removed to Shields 40 years ago. He took an important part in the development of several estates in the borough, and retired a few years ago.

NEW CHURCH, LLANDILO.—The new Church of St. John, Maesteilo, Llandilo, was opened recently. The building has been erected at a cost of 2,650*l.*, and will provide accommodation for 150 persons. Mr. David Jenkins, of Llandilo, was the architect, and Messrs. Thomas Bros., of the same place, were the contractors.

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GENERAL BUILDING NEWS.

Car Depot, Sunderland Municipal Tramways.—A new tramcar shed which the Sunderland Corporation has had built was opened on the 30th ult. The new structure is 346 ft. long, 62 ft. 6 in. wide, 21 ft. high to the trolley wire, and 36 ft. to the apex of the roof. The site of the building has a total area of 5,430 square yards. Besides being a car depot, the structure contains fitting, repairing, and painting shops, a smithy, several offices, and rooms for the use of the employees. The architect was Mr. F. E. Coates (Sunderland), and the contractor Mr. Samuel Warburton (Manchester).

Proposed New Mission Hall at Hull.—A scheme has been formulated for a new Methodist Mission Hall in Lowgate, Hull, to carry on the work of the George-street Chapel. The proposed structure will be close to the present George-yard Chapel, and will front Alfred-Gelder-street and the new Town Hall-square. Messrs. Gelder and Kitchen are the architects. The large hall will seat 1,750 people, each provided with a chair; the school-room will accommodate 600 children; while, in addition to 16 rooms for church and other purposes, there will be six lock-up shops with basement. The cost of the building, including electric lighting, furnishing, heating, etc., is estimated at 22,000*l.*

Memorial Church, Belfast.—The ceremony of laying the foundation-stones of the John White Memorial Church, to be erected in Tennent-street, Belfast, took place recently. The new church is designed in the style of the Classic Renaissance. The walls are of best red facing bricks, backed with stocks, and the dressings of Giffnock stone. The principal elevation is toward Tennent-street, and contains the two main entrance doorways, one opening into a vestibule in the centre of the front, and the other into a square tower at the south corner of the front. All the principal doors are fitted with double-action swing hinges. The tower, 12 ft. square inside, will be used as a vestibule on the ground floor, and will contain the stairs to a future gallery. Opposite the tower entrance is a 3 ft. doorway, leading to a corridor, off which are the minister's vestry and lavatory, a second door opening from the vestry to the church for the convenience of the minister. Beyond the vestry is the heating chamber, which is on a lower level, and is reached from the 9 ft. passage on the south side of the buildings. The wood to be used in the joinery is pitchpine, slightly stained, the roof trusses and purlins, which will be exposed inside, being of the same material. The ventilation will be on Boyle's system, and the heating will be by means of small-bore high-pressure pipes. The windows will be glazed with leaded glass. The dimensions of the church are 60 ft. long, 43 ft. wide, and 33 ft. high to level of the beam. When completed with gallery the church will accommodate 860 persons. The present contract price is about 1,800*l.* The contractors are Messrs. C. and W. M'Quoid, of Belfast, and Mr. John Seeds, also of Belfast, is the architect.

Roman Catholic Schools, Gorton, near Manchester.—The memorial-stone has just been laid of the new schools of the Church of the Sacred Heart at Gorton. The schools, of which Messrs. Longworth and Son, Manchester, are the architects, will cost 1,200*l.*

Proposed New Museum, Cardiff.—A meeting of the Cardiff Museum Committee was held recently, when Mr. Edward Seward (architect) submitted amended plans of the proposed new museum. He estimated the cost of the buildings, according to these plans, at about 30,000*l.* It was pointed out that the committee were authorised to spend only 25,000*l.* Eventually the plans were referred to the honorary curators.

Roman Catholic Church, Brooks's Bar, Manchester.—On the 26th ult., Dr. Casartelli, the Bishop of Salford, laid the memorial-stone of the new St. Alphonsus' Church and schools, which are in course of erection in Ayres-road, Brooks's Bar. The church and school are contained in one building. The ground floor has three class-rooms for boys and girls, and two rooms for infants, and will accommodate about 300 children. The upstairs room, which will be used for the present as the church, will seat 500 persons, and, when used as a school-room, will accommodate 604 children. The clergy house adjoins the church. The buildings are estimated to cost about 6,000*l.* The architect is Mr. O. C. Hill, of Manchester.

Nurses' Home, Birkenhead.—A new nurses' home in connexion with the Borough Hospital has just been opened at Birkenhead. The building, which contains about twenty bedrooms, accommodation for servants, a nurses' dayroom and sitting-room, dining-hall, etc., is situated with a frontage to Livingstone-street. Special provisions have been made for egress in case of fire. The dining-hall and dayroom on the ground floor may, if required, be converted into one assembly-hall. Mr. Edmund Kirby was the architect and Mr. Peter Rothwell the contractor. The cost of the site and building was 5,400*l.*

Masonic Hall, Moville, Ireland.—On the 24th ult., a meeting of the Provincial Grand Lodge of Derry and Donegal was held in Moville for the purpose of dedicating the hall built by the brethren of St. Columb's Lodge No. 297. The hall is a two-story building, erected with local stone and relieved with bands and cornices. It is 47 ft. by 25 ft. The hall was erected from plans supplied by Mr. Thomas Wright, and the builder was Mr. Thomas M'Candless.

Church, Beeston Hill, Leeds.—The foundation-stone of the new Church of the Holy Spirit at Beeston Hill, Leeds, was laid on the 26th ult. The church will be built of stone, from the plans of Mr. A. Prothero, of Cheltenham, which were selected in a limited competition, and will cost altogether 11,000*l.*

Church, Cullyhanna, Ireland.—The new church erected in the parish of Cullyhanna, County Armagh, was dedicated recently. The church was designed by the late Mr. Hague, and after his death the designs for the internal work were supplied by his successor, Mr. M'Namara, architect, Dublin, and the contract for its erection was entrusted to Mr. James Wynne, of Dundalk. In addition to the new church, new schools and parochial houses have been erected.

College Improvement, Dundee.—It is proposed to reconstruct Dundee College from plans prepared by Sir Rowand Anderson, LL.D., who has estimated the cost at 80,000*l.* It is suggested that the scheme might be carried through in sections, a beginning being made at the western end.

Town Hall, Horbury, Yorkshire.—The new Town Hall and Council offices which have just been erected at Horbury were opened on the 30th ult. The building, which has been erected at a cost of more than 6,100*l.*, is built of stone, and is in the Renaissance style, freely treated. The accommodation includes a Council chamber—the main feature of the building—which is 37 ft. long by 24 ft. wide. The windows are of stained glass. On the ground floor are offices for the collector and surveyor, and rooms for the clerk are also provided. The architects were Messrs. W. Hanstock and Son, of Batley.

Baths, Southport.—On the 30th ult. the Mayor of Southport (Mr. T. T. L. Scarisbrick) opened the new baths which the Corporation has constructed in Canning-road. The baths are principally for boys, and consist of an open-air swimming bath, 70 ft. long and 30 ft. wide, with a depth varying from 2 ft. 6in. to 3 ft. 6 in. There are also four private slipper baths and two needle baths. The water is heated by waste steam from the destructor. Mr. Hirst, the Borough Surveyor, designed the baths.

Workhouse and Infirmary, Hunslet, Yorkshire.—The new Workhouse and Infirmary at Rothwell Haigh have been erected for the Hunslet Union on a site of eighteen or nineteen acres, which provides ample space for future extension, the present accommodation being for 450. The buildings consist of six groups—entrance buildings, main building, laundry and boiler-house, infirmary, lunacy wards, and isolation hospital. The main building, or workhouse proper, has the administrative block placed in the centre, in the front of which are the committee-room, business-offices, and master's house, and in the rear the dining-hall, kitchen, scullery, work-rooms, matron's office and stores, bakery and flour store. Upon each side of the administrative block, and connected by glazed conservatory corridors, are the pavilions for the male and female aged and able-bodied classes, with the necessary day-rooms, officers' rooms, offices, etc. The laundry and boiler-house buildings are placed in a central position between the main building and infirmary. The infirmary is a complete building in itself, and is connected with the main building by a covered corridor, from which the central portion of the building is entered, and from this point conservatory corridors to the left and right lead to the male and female pavilions. The infirmary faces the south, and from it there is access from all wards to large covered balconies at the level of the first and ground floors. The lunacy block provides accommodation for thirty-six inmates. The aged married couples' cottages are on a high part of the site near Rothwell Haigh, entirely separated from the main buildings by the Leeds and Rothwell road. The heating and hot water supply is on the low pressure principle. The buildings are lighted throughout by electricity, with 1,130 lamps from two combined compound engines, each of about 41 horse-power. There are two electric lifts at the centre of each infirmary pavilion. The electric current is also used for working ventilating fans and for three motors, one driving the economiser, another the bake-house machinery, and the third the automatic boiler stokers. Nineteen telephones have been fixed in various parts of the building. The total cost of the buildings is approximately 85,850*l.*, or 182*l.* per bed. The buildings were designed by Mr. J. H. Morton, of South Shields. The general building contractors were Messrs. Harold Arnold and Son, of Doncaster. The consulting engineers for the electrical work were Messrs. Shepherd and Watney, Leeds.

Village Church, Gosberton, near Spalding.—A new village church was opened at Gosberton Clough, near Spalding, recently. The new church, which has been built to accommodate 120 persons, consists of a nave, chancel, and vestry. The cost of the building is about 1,300*l.*, and of this sum over 1,000*l.* has been raised. The architects were Messrs. W. Bucknall and J. N. Cooper, of Westminster, and the contractor was Mr. Wm. Wade, of St. Neots, Hunts.

New Buildings, Glasgow Technical College.—From the annual report of the Glasgow and West of Scotland Technical College we learn that the new buildings have been carried on during the year as rapidly as was anticipated, although unexpected difficulties were met with in the foundation work. The whole of the first section of the buildings has now reached foundation level, and certain portions are at a much more advanced stage. The total expenditure involved by the erection of the buildings, exclusive of equipment, will be not less than 210,000*l.* Of this sum the Governors announce promises of donations and grants amounting to 182,382*l.*

New Baptist Church and Schools, Twickenham Green.—Designs have been approved for this church and schools. The block comprises church, seating 619 adults, two vestries, cloakroom, church parlour, large schoolroom, infants' room, seniors' classrooms, kitchen, and the usual conveniences. The buildings are designed in a late period of Perpendicular Gothic, freely treated. A bold square tower forms a prominent feature at one corner. The estimated cost is about 5,550*l.* The architects are Messrs. George Baines and R. Palmer Baines, Clement's Inn, Strand, London, W.C.

United Methodist Free Church, Highams Park, E.—The foundation-stone laying ceremony of this church took place on the 3rd inst. The building occupies a prominent corner site. The design is in a late period of Gothic, freely treated. The facings are in pressed red bricks, and the dressings are in white Costessey work. The block comprises church, with transepts and apse, and two vestries, and the usual conveniences. The contract amount of the building is 1,828*l.* This building will form the school when the future church is erected, and is only the first portion of a large scheme. The architects are Messrs. George Baines and R. Palmer Baines, Clement's Inn, Strand, London, W.C.

School, Pengam.—The foundation-stone of the new Lewis' Endowed School, Pengam, was laid recently. The structure is being erected according to plans drawn by Mr. R. S. Griffiths, architect, of Tonypandy, by Messrs. E. Turner and Sons, builders, of Cardiff.

School, Cwmaman, Aberdare.—A new school has been erected at Godre Aman, a suburb of Aberdare. It provides accommodation for 250 scholars, having five classrooms and a central hall. It was built from plans prepared by Mr. T. Roderick, architect, Aberdare, and the contract was carried out by Mr. J. Jones, Aberdare, at a cost of 26,000*l.*

SANITARY AND ENGINEERING NEWS.

St. Helens Water Supply.—The new pumping station at Melling, near Ormskirk, which has been provided by the St. Helens Corporation as an additional source of water supply, was opened by the Mayor of St. Helens (Councillor F. R. Dixon Nuttall) on the 1st inst. The new pumping station includes two boreholes, each 24 in. diameter and 560 ft. deep, with horizontal compound engine, designed by Mr. J. J. Lackland, the Borough Water Engineer, and constructed by Messrs. Robinson, Cooks, and Co., of St. Helens. The contract for the boreholes was let to Messrs. Timmins and Son, of Runcorn, and for the work generally Messrs. Hughes and Stirling, of Bootle, were the contractors.

Reservoir, Buxton.—A meeting of the Buxton Urban District Council was held on the 2nd inst. Messrs. Hill and Sons, engineers, Manchester, wrote stating that the work of constructing the new Stanley Moor reservoir, which will cost 100,000*l.*, would be shortly commenced. Contracts were sealed with Messrs. G. and T. Earle for the supply of cement, with Messrs. Oates and Green for pipes, and with the Staveley Coal and Iron Company for cast-iron pipes.

Sewerage Works, Skegness.—Recently Col. A. G. Durnford, R.E., Local Government Inspector, conducted an inquiry at Skegness concerning the Urban Council's application to borrow 10,360*l.* for new sewerage works. The scheme was explained by Mr. J. R. Elliott, A.M.I.C.E., representing the engineers, Messrs. Elliott and Brown, of Nottingham. It consists of new bacterial purification works, additional pumping station, and improvements and

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extensions to the sewerage rendered necessary by the rapid growth of the district. There was no opposition.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Messrs. George Munday and Sons, builders, have removed from Catherine House to Muscovy House, Trinity-square, E.C.—Mr. C. F. Hayward, architect, has removed his offices from 47, Museum-street, to 50, Great Russell-street, W.C.

NEW THEATRE, HOLLOWAY-ROAD.—The New Marlborough, in Holloway-road, is the latest addition to North London theatres. In arranging the plan, Mr. Matcham has taken full advantage of an exceptionally favourable site, and has successfully utilised the free access to it. In the main facade to Holloway-road is the vestibule through which the principal seats are reached, while the sides are used for gallery and pit entrances and emergency exits. From every seat in the house a clear and free view of the proscenium is easily obtained, and the variation in the sweep of the upper circle gallery adds greatly to the value of the dress circle below, which thereby obtains free air space to the roof. The gallery is well arranged, and has the advantage of a lantern in the centre, which acts as an air-outlet to the whole theatre. The exits throughout are direct and easy; and in an emergency the full complement of 3,000 persons could be emptied into the streets with a minimum amount of risk. The wide staircases, with dividing handrails for each person, are invaluable safeguards in the event of a panic. The Holloway-road facade is finished in red brick and stone, and is designed in a Renaissance of well-known modern character. The vestibule is treated in a similar style, while the foyer shows a more decided French influence in the decoration of an unhappily-fashioned three-quarter dome. The auditorium is decorated in fibrous plaster in "L'Art Nouveau" style, the eccentricities of which are happily toned by a quiet colouring of cream and white. In general the effect is unobtrusive, and although the detail is of a debased nature, it is much more pleasing than the great majority of our London and suburban theatres. The builders are Messrs. Patman and Fotheringham.

GORDON BOYS' HOME, NOTTINGHAM.—The Duke of Portland recently laid the memorial-stone of the new buildings which have been erected at Nottingham by public subscription for the local Gordon Home for Destitute Boys, after plans and designs by Mr. Ernest R. Sutton. The new building will accommodate seventy-two boys; and a sum of 7,000*l.*, whereof a little more than one-half is already subscribed, is needed to complete the work. The home was first established shortly after the death of General Gordon in 1885, and the stone bears an inscription to his memory.

CITY-SQUARE, LEEDS, AND THE NEW STATUARY.—The new statuary recently presented to the citizens, and set up in City-square, consists of Mr. Brock's equestrian group of the Black Prince, with four sets of nude figures, emblematical of Morn and Even, and monuments of Dr. Hook, a former vicar of Leeds, and Joseph Priestley, these being the gift of Colonel Harding. The two figures of James Watt and John Harrison, a Leeds philanthropist, both sculptured by Mr. H. C. Fehr, are given by Mr. Richard Boston and the late Mr. R. Wainwright. Colonel Harding, an alderman of the city, has taken a prominent share in promoting a taste for art in Leeds. The Woollen trade was founded in the West Riding through the influence of Philip Van Artevelde, who induced Edward III. to extend his patronage and protection to the immigrant Flemish artisans, but it was not until the middle of the seventeenth century that Leeds obtained pre-eminence over its once successful competitors in Bradford and Halifax. The improved machinery for working cloth was invented and introduced by William Hirst, a native of Leeds.

WORKING-CLASS RENTS AND WAGES IN LONDON.—A blue-book lately issued by the Board of Trade states that the average rental of a working-class family in London is estimated at from 5s. to 6s. per week. Returns show that whereas the Peabody Trust received an average rental per room of 1s. 10d. in 1874, the same rental had increased to 2s. 3½d. in the years 1800, 1900, and 1901. The increase, 24 per cent., is found to have been almost uniform throughout the period under review. The wages earned by workmen, including what their families also may earn, vary from 20s. to 40s. per week, the average being 29s. 10d., as compared with 15s. to 22s. per week, with an average of about 18s. 6d. earned by all classes of agricultural labourers and their families in England. Food and rent are the highest items of expenditure. Out of 18s. 6d. per week an agricultural labourer's family expend no less than 13s. upon food alone. The tables emphasise the fact that the expenditure upon food is highest, relatively, in the case of the small incomes, and evince that during the interval 1877-1901 a large decrease, about 30 per cent., has taken place in the price of food. It is stated that the expenditure on bread does not increase with the amount of the income; thus, whilst 3s. 6d. on bread and flour, and 4s. 8¾d. on meat are spent by families having incomes of less than 25s. a week, the corresponding amounts are 3s. 4¾d. and 7s. 1¼d. for families whose incomes range from 35s. to under 40s. per week.

LIVERPOOL CATHEDRAL.—A special meeting of the Liverpool Cathedral Committee was held on the 28th ult., when samples of various stones were submitted, and it was resolved, after very careful consideration, to employ the local red sandstones in the erection of the Cathedral. The architects also submitted plans of details, and it is expected that the arrangements will be made for laying the foundations early in the new year.

COLLAPSE OF A WALL AT BELFAST.—The wall of the moulding shop of Messrs. Fairbairn, Lawson, Combe, and Barbour's foundry, Belfast, collapsed on the 28th ult., the result being that several men were killed and others seriously injured. At the time the accident occurred, eight men and two boys were engaged executing structural alterations at the foundry, and they all were buried in the ruins of a very high wall. It was not known for the moment what was the extent of the disaster, but willing hands at once set to work to extricate the unfortunate sufferers. It was soon apparent, however, that so heavy had been the fall of material that it was hopeless to expect to rescue all the entombed men alive. Six dead bodies were subsequently recovered, while two men who were brought out alive were so seriously injured that but little hope was entertained of their recovery.

RAILWAY DEVELOPMENT IN IRELAND.—The directors of the Great Northern Railway Company, Ireland, at an extraordinary meeting of the proprietors convened at Amiens-street, Dublin, on Tuesday, the 6th October, passed the necessary resolutions authorising that company, under the powers conferred upon them by the Castleblayney, Keady, and Armagh Railway Extension of Time Act, 1903, to subscribe the necessary capital, namely, 350,000*l.*, for the construction of the Castleblayney, Keady, and Armagh Railway, which will now be proceeded with. A Bill for the construction of a line from Drogheda to Mullingar, in connection with the steampacket service to that port organised by the Lancashire and Yorkshire Railway, was passed last Session of Parliament, the capital for which is 350,000*l.* The engineer for both these lines is Sir Benjamin Baker, C.B., and the contracts for construction, amounting to 613,000*l.*, have been placed in the hands of Mr. Robert Worthington, of Dublin.

UNIVERSITY HALL, CLARE MARKET.—The award of Mr. Thomas Blashill, F.R.I.B.A., in an arbitration, held in connexion with the erection of University Hall, Clare Market, has now been published. The contractor, Mr. Howell J. Williams, claimed 3,061*l.* 17s. 2d., and has been awarded 470*l.* 14s. 6d. The claimant conducted his own case, and the architect, Mr. Maurice B. Adams, acted on behalf of the trustees. No solicitors were employed.

THE JUNIOR INSTITUTION OF ENGINEERS.—On the invitation of the British Fire Prevention Committee a large number of members of this Institution paid a visit to the International Fire Exhibition at Earl's Court on the 2nd October. They were received by Mr. Edwin O. Sachs, the Chairman of the Committee, Mr. Ellis Marsland, the Hon. Secretary, and Colonel Dickson. Under their guidance the whole of the exhibits were closely inspected, where possible the apparatus being shown in operation. Modern fire appliances, including engines and escapes, were demonstrated, and the London Salvage Corps turned out from their station in the Western Gardens, the Chief Officer, Colonel Fox, being present. The party subsequently witnessed the performance of "Fighting the Flames" in the Empress Theatre, the historical and technical features of which were much appreciated.

LABOUR MARKET IN THE COLONIES.—The October circular of the Emigrants' Information Office states that work has been plentiful in Canada in all branches of labour during this year. In New South Wales it will be some time before the State can recover from the recent drought. At Sydney many men are out of employment; there is a fair demand at Young for farm labourers, stonemasons, carpenters, bricklayers, and smiths. In Victoria the effects of the drought continue, and there is no demand for labour. A report from Adelaide in South Australia states that there are "great numbers of unemployed among artisans and labouring classes generally." Only workmen of exceptional ability, who have a little money to live on at first, can hope to succeed. In Queensland there is no demand for labourers in any building trade. In Western Australia there is a demand for mechanics in the building and other trades at Northam, for men in the building trades only at Guildford and Bunbury, and for carpenters on the Murchison goldfields; at Perth the supply is sufficient, though some reports say that bricklayers and plasterers are much wanted; in no other part of the State is there any demand for more mechanics. In New Zealand there is a good opening for carpenters, bricklayers, painters, plumbers, tinsmiths, plasterers, sash and door makers, turners, gasfitters, etc. In Cape Colony, mechanics, if they are really skilled workers, have good chances of employment, but there is no opening for half-trained men. The best demand is for skilled carpenters, bricklayers, masons, painters, coachsmiths, plumbers, and wiremen. In Natal the building trades continue busy, and there is a demand for skilled carpenters, joiners, bricklayers, and plasterers, as well as for metal turners, fitters, blacksmiths, machinists, moulders, carriage builders, and wood turners. But all such mechanics must be thoroughly competent, for there is no opening for second-rate men. Permits are still required by those proceeding to the Transvaal; they are not issued in this country, but must be applied for at the Permit Office at the Port in South Africa at which the emigrant lands. Application forms may be obtained at the Emigrants' Information Office, and elsewhere. The building trades have become slacker, and there is a fair demand only for carpenters, bricklayers, stonemasons (wallers and cutters), plumbers, and plasterers, but they must be expert. In the Orange River Colony there is a fluctuating demand for good carpenters, masons, fitters, and painters.

CAPITAL AND LABOUR.

SUNDERLAND JOINERS.—The Sunderland house joiners returned to work on the 28th ult., but employment could be found for only half of the men who desired to start.

LEGAL.

RUSHING UP A WALL.

IN the Vacation Court on Wednesday, counsel applied, ex parte, to Mr. Justice Bucknill on behalf of the plaintiff in the case of Slaters, Ltd., *v.* Potter, to restrain the defendant from continuing to erect a wall so as to interfere with the plaintiffs' ancient lights, and for leave to serve the defendant with notice of motion with the writ for Wednesday next.

His lordship asked how he was to know that the defendant's wall interfered with the plaintiffs' lights.

The learned counsel read an affidavit which had been filed by the plaintiffs, stating that on the 6th inst. defendants commenced to build a wall within about 6 ft. 7 in. from the plaintiffs' ancient lights without their permission. The affidavit also stated that the wall had been already built up to a height of 10 ft., and that the same had very materially indeed darkened their lights.

His lordship: Very well; you can take an interim injunction over Wednesday next, restraining defendant from building the wall higher than will darken your premises. They must not be restrained from building a wall which will not darken your premises.

The learned counsel: No. Then I may serve notice of motion for next Wednesday?

His lordship: Yes.

STRAND ANCIENT LIGHT CASE.

THE case of the Hotel Cecil, Ltd., *v.* the Savoy Hotel, Ltd., came before Mr. Justice Bucknill in the Vacation Court on Wednesday, on a motion by the plaintiff company for an interim injunction restraining the defendant company from building so as to obstruct the plaintiffs' ancient lights.

On the case being called on, Mr. Bramwell Davis, K.C., for the plaintiffs, said that his learned friend, Mr. McCall, K.C., appeared for the defendants, and wished for time to answer affidavits. If the case stood over for this purpose the plaintiffs required an undertaking from the defendants that they would not build higher before the case was heard. He understood that defendants were willing to give that undertaking.

Mr. McCall said that was so, and that the terms of the undertaking were practically settled. He suggested that the case should stand over for a week on the terms endorsed on the briefs.

This was agreed to.

ARRANGEMENT IN ANCIENT LIGHT DISPUTE.

THE case of Godson *v.* Robinson and Fisher was mentioned to Mr. Justice Bucknill in the Vacation Court on Wednesday, on an application by the plaintiff for an interim injunction restraining defendants until the trial from building so as to obstruct the plaintiff's ancient lights.

On the case being called on, counsel stated that on the evidence there was considerable con-

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flict of fact, and the parties had agreed to take the following order, without prejudice to any question enabling the plaintiff to apply for a mandatory order at the trial, the defendants would undertake to abide by any order the Court might make at the trial to pull down any building erected since September 21, 1903; that the action should be set down at once, the costs of this motion to be costs in the action.

His lordship assented to this arrangement.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

22,144 of 1902.—A. Paillett: *Swing Doors.*

A swing door comprising in combination a main door, a carriage to which the main door is suspended by means of a centre pivot, rails in the top of the door frame on which said carriage runs, arc-shaped jambs of the door frame, four side wings hinged to the inner and outer side of the ends of the main door and stays for securing said side wings in their position at an angle to the main door.

24,647 of 1902.—J. Kulhanek: *Construction of Flights of Stairs or Steps.*

The construction of flights of stairs or steps by means of reinforced concrete, consisting in that the supporting members are constituted by vertical ribs of cement arranged at equal intervals one from the other and running longitudinally of the flight from one landing to the next.

11,394 of 1903.—F. W. Johnson: *Venetian Blinds.*

A method of gathering the laths of Venetan blinds at the top, by which method the laths are each in succession, and commencing with the uppermost one, caught up and raised by spiral terminations to vertical spindles hanging from the top board and rotated by any suitable means, the said spirals working in slotted holes in the laths and the tapes being attached by piping to rollers provided on the edge of the laths.

17,061 of 1903.—J. D. Wilson: *Brick Kilns.*

In brick kilns a continuous flue overlying the chambers of the kiln and connected thereto by means of smaller flues and valves, in such a manner that the hot gases from the burning bricks must pass on their way to chimney the apertures through which the vapours from the drying bricks are ascending.

16,950 of 1903.—J. H. Murphy and E. M. Camp: *Retaining Material for Plaster and the like.*

The object of this invention is to provide an improved retaining material for mortar or plaster cheaper than other forms of metallic lath, which prevents loss or waste of plastering material and reduces thickness of plaster ordinarily used. It consists of a flexible sheet of metal or of paper or cloth or other material which may be treated to render the same fireproof, and which is secured as a backing in close relation with a sheet of reticulated material having open meshes such as fence netting constructed of wire. The netting may be permanently fastened to the backing sheet on one or both sides in contact therewith in any preferred manner. The backing sheet serves to receive all of the plastic material pressed through the meshes of the net, and by resistance to said pressure acts to spread the material behind the net entirely during the clinch round the wire and retaining the plaster until it sets.

23,932 of 1902.—T. Caunt, Sen., T. Caunt, Jun., and F. Caunt. *Sash Windows.*

This invention relates to sash windows fitted with a swinging frame carrying the window panes and pivoted to a sliding strip or fixed frame, the swinging frame being capable of turning through an angle of 180 degrees. A weather-tight joint is obtained between the fixed and swinging frame parts by means of a bead and groove device.

21,143 of 1903.—J. Fooks: *Casement Stays for Windows.*

This invention has for its object to provide a stay to be bolted to a mullion or in a socket fixed on a mullion for single or double casement windows. A perforated flat iron stay is provided at one end with a handle and at the other with a long slot, through which a pin is passed loosely, which pin is riveted to two lugs cast upon a perforated back-plate which is fixed to the window mullion sash or frame. A running perforated block is passed over the stay, and is provided with a screw set pin. The perforated block is loosely riveted to a back-plate, which is fixed to the window-frame, so that thus the stay connects the window to the window-frame and is fixed in any position by means of the set screw.

15,176 of 1902.—J. Knox: *Producers and Kilns for Burning Bricks, Terra-cotta Goods, and the like.*

The use of a hollow radial or other brick in the inside of a kiln for the heating of the secondary air or producer gases.

19,366 of 1902.—W. E. Hitch: *Electric Cable Conductors.*

In the manufacture of an electric cable, the combination with a pair of insulated conductors of a magnetic screen formed of a separating strip and of an enclosing casing, both of magnetisable metal, the separating strip being spirally twisted about its own axes, and the insulated conductors being laid along the spiral convolutions of the separating strip at opposite sides thereof, and the enclosing casing being formed of a tape or wire of magnetisable metal coiled about the whole, and in metallic connexion with the edges of the spirally twisted separating strip.

24,295 of 1902.—J. A. Shepherd: *Manufacture of Embossed Wall Coverings and like Material.*

The manufacture of embossed wall coverings and like materials, which consists in compounding wood dust or other ingredients with gum tragasol and linseed oil.

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

MEETINGS.

SATURDAY, OCTOBER 10.

Sanitary Institute (Demonstrations for Sanitary Officers).—Inspection at the Sewage and Destructor Works, Ealing. 2.15 p.m.

MONDAY, OCTOBER 12.

Sanitary Institute (Lectures for Sanitary Officers).—Dr. H. R. Kenwood on "Elementary Statistics." 7 p.m.

Liverpool Architectural Society.—Opening address by the President, Mr. John Woolfall. 6 p.m.

TUESDAY, OCTOBER 13.

Architectural Association.—Preliminary meeting of the School of Design. Speakers: Messrs. Walter Cave and J. S. Gibson. 7 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Dr. A. Wellesley Harris on "Water: Composition, Pollution, and Purification." 7 p.m.

Institute of Sanitary Engineers, Ltd.—Mr. A. A. H. Scott on "Building Construction so far as it Relates to Sanitation." 7 p.m.

WEDNESDAY, OCTOBER 14.

Architectural Association Camera and Cycling Club.—Mr. C. H. Oakden on "Little Known Irish Abbeys," illustrated with lantern slides. 7.30 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—(1) Inspection in the district of Islington and at the Borough Disinfecting Station, 2 p.m. (2) Mr. J. Wright Clarke on "Details of Plumbers' Work." 7 p.m.

Institute of Sanitary Engineers, Ltd.—Discussion on the paper read by Mr. G. Freebairn Stow on February 11 on "The Biological Treatment of Sewage: Some Facts and Figures Compiled from Three Years' Practical Working of Bacteria Beds." 7. p.m.

Carpenters' Company (Lectures on Sanitary Building Construction).—Dr. A. Wynter Blyth on "Sanitary Arrangements of Buildings." 7.30 p.m.

THURSDAY, OCTOBER 15.

London Master Builders' Association.—Council meeting at 4 p.m.

FRIDAY, OCTOBER 16.

Architectural Association.—Messrs. A. T. Bolton and H. P. G. Maule on "The Day School in Relation to Architectural Pupilage." 7.30 p.m.

Institution of Mechanical Engineers.—Mr. H. Davey on "The Newcomen Engine." 8 p.m.

The Southern Counties Master Builders' Federation.—Council meeting at 12.0 in King's Rooms, Royal Pavilion, Brighton. Half-yearly general meeting at 12.30.

SATURDAY, OCTOBER 17.

Junior Institution of Engineers.—Visit to the new Vauxhall Bridge Works. Members will assemble at the Westminster entrance at 3 p.m.

Sanitary Institute (Demonstration for Sanitary Officers).—Inspection at Battersea Municipal Milk Depot and Disinfecting Station. 3 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

September 24.—By Grimley & Son (at Birmingham).

Belbroughton, Worcester.—Whitehouse's Farm, 29 a. 0 r. 4 p., f., y.r. 43*l.* 10s.	£860
Dordale Farm, 55 a. 3 r. 3 p., f., y.r. 89*l.* 5s.	1,875

By David Burnett & Co. (at Llandudno Junction).

Trefriw, Carnarvon.—Conway-rd., enclosures of land, 21 a. 0 r. 19 p., f. (including net fishery rights)	780

By Hall, Pain, & Goldsmith (at South Hayling).

Hayling Island, Hants.—The Hayling Island Gas Works, f. (as a going concern)	1,800

September 25.—By C. F. Moore (at Nailsworth).

Leighterton, Gloucester.—The Church or Slait Farm, 428 a. 3 r. 22 p., f.	3,700
Royal Oak Inn and 9 a. 1 r. 0 p., f., y.r. 24*l.*	2,100

By Spelmans' (at Norwich).

Norwich.—42, Unthank-rd., f., p.	1,030
Trory-st., freehold stabling, p.	145
4, Oxford-st., f., y.r. 24*l.*	405
Great Plumstead, Norfolk.—Two cottages, f., w.r. 9*l.* 10s.	165

By Simmons & Sons (at Reading).

Shinfield, Berks.—Church-rd., etc., various enclosures of land, 97 a. 3 r. 37 p., f.	3,480
Reading-rd., etc., various building sites, 106 a. 1 r. 24 p., f.	£6,420
May's Farm, 28 a. 3 r. 11 p., f.	1,500
Clare's Green Farm, 40 a. 2 r. 24 p., f.	1,400
Spencer's Wood, four cottages and 1 a. 3 r. 33 p., f.	500
Two cottages and 2 a. 2 r. 27 p., f.	250
Church Lane Farm, 81 a. 0 r. 32 p., f.	2,400
Six Bells p.-h., and 5 a. 1 r. 33 p., f., y.r. 20*l.*	500
Three cottages and 6 a. 2 r. 36 p., f.	930
Lane End Farm, 145 a. 0 r. 1 p., f.	6,100
Shinfield Grange Estate, 163 a. 1 r. 37 p., f.	6,500
Four small holdings, 20 a. 2 r. 1 p., f.	1,785
Badger's Farm, 8 a. 0 r. 8 p., f.	1,500
A freehold estate, 49 a. 0 r. 2 p.	1,575
Parrott's Farm, 81 a. 0 r. 27 p., f.	2,400

By Gillart & Sons (at Towyn).

Llanfrothen, Merioneth.—Hendregwenllian and Ogof Llechwyn Farms; also two small holdings, 655 a. 2 r. 37 p., f.	3,250
Towyn, Merioneth.—Tan-y-Coed Issaf and Bod Gadfan Farms, 213 a. 3 r. 7 p., f.	2,830
Dolgelly, Merioneth. — Freehold premises, formerly the Old Shire Hall, County Hall, and House of Correction	600

September 28.—By Phibbs Gibson.

Southall, Middlesex.—Abbott's-rd., eight plots of freehold building land	420

By Kemsleys'.

Woodford.—Wavertree-rd., two plots of freehold building land	310
Ilford, Essex.—29 to 39 (odd), Wilton-rd., f., w.r. 117*l.*	1,280

By Elliott, Ellis & Co. (at Plymouth).

Plymouth.—14, Old Town-st., and 5 and 6, Market-pl. (S.), area 4,450ft., f., y.r. 375*l.*	9,050

By James Stooke (at Totnes).

Buckfastleigh, Devon.—Hayford Estate, 144½ a., f.	3,280
Ugborough, Devon.—East Peeke and Pennaton Estates, 127 a., f.	2,560

September 29.—By C. Rawley Cross & Co.

Shepherd's Bush.—279, Uxbridge-rd., u.t. 59 yrs., g.r. 6*l.* 5s., e.r. 50*l.*	535
Kensington.—62 and 64, Masbro'-rd., f., w.r. 67*l.* 12s.	815
68, Masbro'-rd. (S.), f., y.r. 62*l.* 8s.	720
14, Faroe-rd. (with workshop), f., p.	195
Fulham.—Lillie-rd., three freehold building plots	870
Mitcham, Surrey.—30 to 42 (even), Bath-rd., u.t. 55 yrs., g.r. 36*l.* 15s., w.r. 119*l.* 12s.	550
Willesden.—18 and 20, Burns-rd., u.t. 87 yrs., g.r. 11*l.*, y.r. 62*l.*	480

By Fisher, Stanhope & Drake.

Dalston.—83, Sandringham-rd., u.t. 62½ yrs., g.r. 8*l.*, e.r. 60*l.*	850

By Herring, Son, & Daw.

Regent-st.—33 and 34, Carnaby-st. (S.), area 1,370ft., f., p.	3,800

By W. F. Laing.

Stepney.—132, Jamaica-st., u.t. 10 yrs., g.r. 4*l.*, q.r. 34*l.*	100
Mile End.—65 and 75, Carlton-rd., u.t. 23 yrs., g.r. 6*l.*, y.r. 56*l.*	440
12 and 13, Carlton-sq., u.t. 24 yrs., g.r. 6*l.*, y.r. 56*l.*	470

By Robins, Gore, & Mercer.

Soho.—173, Wardour-st. (S.), beneficial lease for 8¼ yrs., y.r. 100*l.*, with goodwill, stock, etc.	125

By Frederick Warman.

Stroud Green.—131, Ferme Park-rd., u.t. 86 yrs., g.r. 8*l.*, e.r. 45*l.*	450
Hornsey.—Priory-rd., Olivette, u.t. 96 yrs., g.r. 10*l.* 10s., e.r. 60*l.*	575

By Wiltshire & Thurgood.

Lewisham.—19, Avenue-rd., f., w.r. 32*l.* 10s.	360
Catford.—10, Westdown-rd., u.t. 70 yrs., g.r. 8*l.* 10s., e.r. 45*l.*	400

By J. M. Leeder & Son (at Swansea).

Llanebie, Carmarthen.—Dogsbrook Farm, 15 a. 3 r. 22 p., f.	650

By Long & Sons (at Masons' Hall Tavern).

Turnham Green.—High-rd., Crown and Anchor Tavern, u.t. 2¾ yrs., y.r. 100*l.*, with goodwill	2,400

September 30.—By Buckland & Sons.

Windsor, Berks.—The Windsor Race-Course, area 121 a. 3 r. 0 p., u.t. 19 yrs., y.r. 700*l.*, p.	22,000

By John Bott & Sons.

Herne Hill.—205 and 217, Norwood-rd., f., e.r. 87*l.*	1,175

By Mark Lidell & Son.

Greenwich.—7 to 12, Chevening-rd., u.t. 90 yrs., g.r. 28*l.* 10s., w.r. 249*l.* 12s.	1,790

By Linnett & Lane.

St. John's Wood.—32 and 34, Henry-st., u.t. 14 yrs., g.r. 8*l.*, w.r. 104*l.*	230
Harleeden.—70, St. John's-av., u.t. 97 yrs., g.r. 6*l.*, e.r. 34*l.*	330

By Windrum & Cleeve.

Upton Park.—8, 10, 12, and 14, Thackeray-rd., f., w.r. 130*l.*	1,550
Poplar.—158 and 160, Brunswick-rd., u.t. 70 yrs., g.r. 8*l.*, w.r. 72*l.* 16s.	660
47 and 49, Willis-st., u.t. 39 yrs., g.r. 6*l.*, w.r. 52*l.*	300
26, 28, and 30, High-st. (S.), u.t. 64 yrs., g.r. 15*l.*, w.r. 92*l.* 6s.	410
Bromley-by-Bow.—13 to 23 (odd), Wyvis-st., u.t. 62 yrs., g.r. 22*l.* 10s., w.r. 197*l.* 12s.	1,580

By Perkins & Sons (at Southampton).

Itchen, Hants.—Highlands-rd., The Self Defence (business premises, with off-licence), u.t. 966 yrs., g.r. 7*l.*, y.r. 80*l.*	1,900

By Breadmore & Webb (at Richmond).

Barnes.—High-st., freehold building site, area 5,230ft.	1,080

October 1.—Newbon, Edwards, & Shephard.

Catford.—44, Bushey Green, area 4,574ft., f., p.	1,000
Marylebone.—21, Seymore-pl. (S.), u.t. 26 yrs., g.r. 23*l.*, e.r. 150*l.* 16s.	650
Peckham.—35, Willowbrook-rd. and 8, Colgrove-rd. (S.), u.t. 51 yrs., g.r. 5*l.* 5s., y.r. 40*l.*	300

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Victoria Park.—21 to 27 (odd), Dagmar-rd., u.t. 35 yrs., g.r. 16*l.*, w.r. 150*l.* 16s. £855
Barnsbury.—107, Offord-rd., f., y.r. 38*l.* 750
Balls Pond.—42 and 44, Norfolk-rd., u.t. 56 yrs., g.r. 16*l.*, e.r. 84*l.* 665
Finsbury Park.—15a, Eade-rd., u.t. 81½ yrs., g.r. 5*l.*, y.r. 36*l.* 350
Stoke Newington.—61, Brooke-rd., u.t. 74 yrs., g.r. 7*l.*, y.r. 42*l.* 465
109, Brooke-rd., u.t. 74 yrs., g.r. 6*l.* 10s. e.r. 40*l.* 390
Wood Green.—Waverley-ter., f.g.r. 9*l.*, reversion in 88 yrs. 205
New Barnet, Herts.—Lytton-rd., four freehold residences, y.r. 135*l.* 1,630
Lytton-rd., freehold corner plot of building land 400

By T. B. WESTACOTT.

Fitzroy-sq.—16, 18, and 20, Southampton-st., u.t. 21 yrs., g.r. 22*l.* 1s., y.r. 195*l.* 1,530
Camden Town.—123, Albert-st., u.t. 20 yrs., g.r. 7*l.* 7s., y.r. 48*l.* 360
Somers Town.—14 and 19, Charles-st., u.t. 24 yrs., g.r. 20*l.*, w.r. 108*l.* 5s. 405
Holloway.—21, Langdon-rd., f., e.r. 38*l.* 460

October 2.—By BRADSHAW BROWN & Co.

Hoxton.—21 and 23, Holt-pl., f., w.r. 52*l.* 545
61, Hyde-rd., f., w.r. 41*l.* 12s. 415
Millwall.—1 and 3, Mellish-st., u.t. 28 yrs., g.r. 4*l.* w.r. 50*l.* 14s. 260

By P. J. DIXON & SON.

Bethnal Green.—21, 23, and 25, Dinmont-st., u.t. 13½ yrs., g.r. 12*l.*, w.r. 106*l.* 12s. 300
104 and 106, Treadaway-st., u.t. 33 yrs., g.r. 8*l.*, w.r. 78*l.* 450
17, Clarkson-st., u.t. 33 yrs., g.r. 4*l.*, w.r. 36*l.* 8s. 255

By WALTER HALL.

Norwood.—16, 20, 22, and 24, Rockmount-rd., u.t. 73½ yrs., g.r. 30*l.*, y.r. 140*l.* 800
Hendon.—Pollard-rd., f.g.r. 42*l.*, reversion in 78 yrs. 860
Bexley, Kent.—Ivy Villas, f.g.r. 27*l.*, reversion in 92 yrs. 590

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 16 0	per 1,000 alongside, in river.	
Rough Stocks and Grizzles.....	1 13 0	"	" "
Facing Stocks....	2 12 0	"	" "
Shippers	2 5 0	"	" "
Flettons	1 10 0	"	" "
Red Wire Cuts ..	1 13 0	"	at railway depôt
Best Fareham Red	3 12 0	"	" "
Best Red Pressed Ruabon Facing	5 0 0	"	" "
Best Blue Pressed Staffordshire ..	4 5 0	"	" "
Do. Bullnose	4 11 0	"	" "
Best Stourbridge Fire Bricks	4 8 0	"	" "
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers.....	13 0 0	"	" "
Headers	12 0 0	"	" "
Quoins, Bullnose, and Flats.....	17 0 0	"	" "
Double Stretchers	19 0 0	"	" "
Double Headers..	16 0 0	"	" "
One Side and two Ends.....	19 0 0	"	" "
Two Sides and one End	20 0 0	"	" "
Splays, Chamfered, Squints.....	20 0 0	"	" "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	"	" "
Quoins, Bullnose, and Flats.....	14 0 0	"	" "
Double Stretchers	15 0 0	"	" "
Double Headers..	14 0 0	"	" "
One Side and two Ends.....	15 0 0	"	" "
Two Sides and one End	15 0 0	"	" "
Splays Chamfered, Squints.....	14 0 0	"	" "
Second Quality White and Dipped Salt Glazed	2 0 0	"	less than best.

	s. d.	
Thames and Pit Sand	6 0	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	20 6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12s. od. per yard, delivered.
Sturbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

PRICES CURRENT (*Continued*).

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes(under 40 ft. sup.)	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry. dep.
20×12 " " " ..	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16× 8 best "	7 0 0	" "
20×10 best blue Portmadoc ..	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green....	15 2 6	" "
20×12 best Eureka unfading green....	17 2 6	" "
18×10 " "	12 10 0	" "
16× 8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16× 8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles..	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles 52	6	" " "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do. 60	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do. 54	6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles 48	0	per 1,000 " "
Do. Ornamental Do. 50	0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
⅜ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.) ..	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

PRICES CURRENT (*Continued*).

WOOD.

JOINERS' WOOD.	At per standard. £ s. d.	£ s. d.
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10 0
" " " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	. . .
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— Per ft. cube	0 4 0	. .

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns ...	7 2 6	8 5 6

METALS.

IRON—	Per ton, in London. £ s. d.	£ s. d.
Common Bars.....	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars" ..	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price.....	9 5 0	9 10 0
" " galvanised.....	17 0 0	. . .

(* And upwards, according to size and gauge.)

Sheet Iron, Black.— Ordinary sizes to 20 g.	9 15 0	. . .
" " to 24 g.	10 15 0	. . .
" " to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.....	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:— Ordinary sizes to 20 g.....	16 0 0	. . .
" " 22 g. and 24 g.	16 10 0	. . .
" " 26 g.....	18 0 0	. . .
Galvanised Corrugated Sheets:— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
" " 22 g. and 24 g.	13 5 0	. . .
" " 26 g.....	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker ..	11 15 0	. . .
" " 22 g. and 24 g.	12 15 0	. . .
" " 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0

(Under 3 in. usual trade extras.)

[*See also next page.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Pump Room and Colonnade, Valley Gardens	Harrogate Corporation	Not Stated	Oct. 26
Library	Glasgow Corporation	Not Stated	No date.
*New Cotton Exchange	Liverpool Cotton Association, Ltd.	Not Stated	do.

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
*Making up Roads	Beckenham U.D.C.	Council's Surveyor, Beckenham	Oct. 12
*Roadmaking and Paving Works	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	Oct. 13
Road Metal, &c.	Carshalton U.D.C.	W. W. Gale, Civil Engineer, High-street, Carshalton	do.
Sewage Works	Ilford U.D.C.	H. Shaw, Civil Engineer, Town Hall, Ilford	do.
Heating Works at Asylum, Donegal	Committee	J. P. M'Grath, Architect, Foyle-street, Londonderry	do.
Road Works, Birkbeck and Clovelly Roads	Hornsey U.D.C.	E. J. Lovegrove, Engineer, 99, Southwood-lane, N.	do.
Refuse Destructor Buildings, Roselands	Eastbourne (Sussex) Corporation	D. J. Rowe, Borough Surveyor, Town Hall, Eastbourne	do.
Clock Tower, Middlesbrough Docks	N.E.R. Co.	W. Bell, Central Station, York	Oct. 14
Alterations, Shakespeare Hotel, Roper-st., Whitehaven	Messrs. J. Dalzell	W. Carmichael, Architect, Parton, Whitehaven	do.
Alterations to the Brow Top Beerhouse, Whitehaven	do.	do.	do.
Water Supply Works, &c., Whippingham	I. W. R.D.C.	H. E. Stratton, Council Offices, Pyle-street, Newport, I.W.	do.
Unclimbable Iron Fencing, Mortlake	Richmond Town Council	W. Fairley, Engineer, West Hall-road, Kew Gardens	do.
Sewage Works, &c., Richmond Green (Contract No. 2)	do.	do.	do.
Railway Offices, York	N.E.R. Co.	W. Bell, Architect, Company's Offices, York	do.
Generating Station, &c.	Kilmarnock Town Council	R. Blackwood, Burgh Surveyor, Market Bridge, Kilmarnock	do.
*166 Yards of Brick Sewer in Jermyn-street, &c.	City of Westminster	Works Department, Westminster City Hall, Charing Cross-rd., W.C.	do.
*Shops and Sunday school Premises, Swindon	Wesleyan Methodist Trustees	W. F. Bird, Architect, Midsomer Norton, Somerset	do.
*Concrete & Granolithic Roadway, Newington W'k's, &c.	Southwark Union	G. D. Stevenson, Architect, 13, King-street, Cheapside, E.C.	Oct. 15
Thirty-two Artisans Dwellings, Steynburg-street	Hull Corporation	J. H. Hirst, City Architect, Town Hall, Hull	Oct. 16
Road Works, &c.	Pontypridd U.D.C.	R. P. Wilson, Engineer, 66, Victoria-street, S.W.	do.
Canteen Building, Phœnix Park	Public Works Department Dublin	Surveyor, Public Offices, Dublin	do.
Farm Buildings, Low Netherscales, Embleton	Executors of the late T. Leathes	E. Jackson, Civil Engineer, Whitehaven	Oct. 17
Warehouse, Dewsbury	Peebles Town Council	Holtom & Fox, Architects, Dewsbury	do.
Gasworks, Eschiels	Shipley U.D.C.	Wm. Buchan, Town Clerk, Peebles	do.
*Extension of Sewage Disposal Works	Hendon U.D.C.	Office of the Engineer, 35, Manor-road, Bradford	Oct. 19
*Road, Sewer, and Tarpaving Works	G.W.R. Co.	Council's Engineer, Council Offices, Hendon	do.
Engine House, &c., Old Oak, Acton, Middlesex	Fulham Borough Council	G. K. Mills, Paddington Station	Oct. 20
*Wrot Iron Entrance Gates and Railings	Fulham Borough Council	Borough Engineer, Town Hall, Fulham	Oct. 21
*Making-up and Paving Studdridge-street	do.	Borough Surveyor, Town Hall, Fulham, S.W.	do.
*Making-up and Paving Wingrave-road (section I.)	Portsmouth School Board	do.	do.
School, Milton-road	Admiralty	Rake & Cogswell, Architects, Prudential Buildings, Landport	Oct. 23
*Coast Guard Detachment, St. Govan's Head, Pembroke	Ilford (Essex) U.D.C.	Civil Engineer, H.M. Dockyard, Pembroke Dock	do.
Depot Buildings, &c., Ley-street	Woodford U.D.C.	H. Shaw, Civil Engineer, Town Hall, Ilford	Oct. 26
Sewage Disposal Works	Bury (Lancs) Corporation	W. Spinks, Civil Engineer, 20, Park-row, Leeds	do.
Warehouse, Bradford-street, Dewsbury	London County Council	Holtom & Fox, Architects, Dewsbury	Oct. 27
Shops, &c., Water-street	do.	A. W. Bradley, Borough Engineer, Bank-street, Bury	do.
*Dwellings for Working Class, Nine Elms	Dorset Standing Joint Committee	Architect's Department, 19, Charing Cross-road, W.C.	do.
*Dwellings for Working Class, Hackney	Thames Valley, &c., Water Co., Ld.	do.	do.
*Additions to Police Station, Portland	Ipswich Town Council	County Surveyor, Shire Hill, Dorchester	do.
*Water Supply Extensions	H.M. Office of Works	G. H. Robus, Engineer, Manston House Chambers, E.C.	Oct. 28
Public Convenience, Alexandra Park	City and County of Bristol	E. Buckham, Borough Surveyor, Town Hall, Ipswich	Oct. 29
*New Postal Stores at Islington	Tregaron D.C.	H.M. Office of Works, Storey's Gate, Westminster, S.W.	Oct. 30
*Erection of New Central Library, Deanery-road	Tottenham U.D.C.	Bernard & Son, 4, St. Stephen's Chambers, Baldwin-street, Bristol	Oct. 31
Reservoir, &c., Pencefn, Wales	Tredegar Building Society	J. Davies & Son, Civil Engineers, Llanelly	do.
*Three Underground Conveniences		Council's Engineer, Coombes Croft House, 712, High-rd., Tottenham	Nov. 3
Works at Sanatorium, Bridge of Allan, N.B.		C. G. Souttar, Architect, 30, Whitehall-street, Dundee	No date.
Ten Houses		W. S. Williams, Architect, Tredegar	do.
Warehouse, &c., Wood and Bradford-streets, Dewsbury		Holton & Fox, Architects, Corporation-street, Dewsbury	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Sanitary Inspector	U.D.C. of Northfleet	£150l.	Oct. 15
*Chief Draughtsman (Straits Settlements)	Commiss. of George Town, Penang	240l., &c.	Oct. 23

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvi. & xix.

PRICES CURRENT (*Continued*).

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
Lead—Sheet, English, 3 lbs. & up.	13 15 0	. . .
Pipe in coils	14 5 0	. . .
Soil pipe	16 15 0	. . .
Compo Pipe	16 15 0	. . .
Zinc—Sheet—		
Vieille Montagne ton	26 0 0	. . .
Silesian	25 15 0	. . .
Copper—		
Strong Sheet per lb.	0 0 10½	. . .
Thin "	0 0 11½	. . .
Copper nails "	0 0 11	. . .
Brass—		
Strong Sheet per lb.	0 0 10	. . .
Thin "	0 0 11	. . .
Tin—English Ingots "	0 1 4	. . .
Solder—Plumbers' "	0 0 6	. . .
Tinmen's "	0 0 8	. . .
Blowpipe "	0 0 9	. . .

PRICES CURRENT (*Continued*).

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered
" fourths	1¾d. " "
21 oz. thirds	3¼d. " "
" fourths	2¾d. " "
26 oz. thirds	3¾d. " "
" fourths	3¼d. " "
32 oz. thirds	4⅜d. " "
" fourths	4¼d. " "
Fluted sheet, 15 oz.	2⅜d. " "
" 21 oz.	3⅜d. " "
½ Hartley's Rolled Plate	1¾d. " "
⅝ " " "	2d. " "
¾ " " "	2¼d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 10
" " in drums	"	0 2 2
Boiled " in pipes or barrels	"	0 2 1
" " in drums	"	0 2 5
Turpentine, in barrels	"	0 3 8
" in drums	"	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	"	19 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 16 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 1s. 6d. each; also

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Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

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TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

TO CORRESPONDENTS.

M. & C. W. V. (Amounts should have been stated.)
C. W. & Son (Too late; next week.)

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ABBEY WOOD (Kent).—For the erection of temporary schools, Crossness, for the Erith Education Committee. Mr. W. Egerton, architect, 12, Queen's-road, Erith :—

J. McManus	£1,046 0	Mitson & Harrison	£763 0
Humphreys, Ltd.	863 0	Hawkins & Co.	760 0
W. Harbrow	845 0	Hes. Ltd.	647 0
Enness Bros.	798 0	Squire & Co., 20, Victoria-street, Westminster, S.W.*	645 0
Smith & Co.	792 15		
Spencer & Son	785 15		

BARRY (Glamorgan).—For the erection of a central public library, Holton-road, for the Urban District Council. Messrs. C. E. Hutchinson & E. Harding Payne, architects, 11, John-street, Bedford-row, London, W.C. :—

	A		
Davies & Francis	£9,287 10 0	...	£9,183 11 0
J. Prout	7,745 10 6	...	7,620 5 0
H. S. Rendell	7,624 15 0	...	7,507 12 0
Lloyd & Tape	7,600 0 0	...	7,554 0 0
A. N. Coles	7,465 17 7	...	7,350 15 2
Stephens, Bastow & Co., Ltd	7,413 0 0	...	7,312 0 0
Lattey & Co., Ltd.	7,362 14 8	...	7,212 14 8
W. Britton	7,307 2 8	...	7,228 4 2
J. Gibson	7,162 0 0	...	7,068 0 0
Watkin Williams, Cardiff*	6,900 0 0	...	6,830 0 0

"A"—Deduction for Blue Forest of Dean.

BILLERICAY (Essex).—For the execution of sewerage works, Back-street, and other streets, for the Rural District Council. Mr. R. J. W. Layland, surveyor, Billericay :—

F. Johnson	£748 8 6	Ilee & Son	£545 0 0
Parsons & Parsons	649 2 6	Brixton & Jenner	519 0 0
T. W. Marsh	680 0 0	Chas. Ansell	508 0 0
Potter & Son	656 0 0	Wilson Border & Co., Ilford*	491 13 0
A. T. Catley	650 0 0	Roberts & Co.	471 0 0
J. Jackson	627 0 0		

[Surveyor's estimate, £540.]

BUNTINGFORD (Herts).—For the execution of drainage works at the Workhouse, for the Guardians. Mr. G. Thody, surveyor, High-street, Buntingford :—

George Jennings	£210 0	W. Hinkins	£148 16
W. Long	195 0	Gilmson & Co.	137 0
D. Robinson	180 0	C. Poulton, Buntingford*	96 15
Jacklin & Co.	152 0		

[Surveyor's estimate, £151.]

CASTLEFORD (Yorks).—For the erection of fifty-two houses, Frystone, for the Wheldale Colliery Co., Ltd. Messrs. Garside & Pennington, architects, Pontefract :—

Rainey Bros.	£9,950 0 0	Wilson & Son	£7,873 17 6
Albert Elstule	9,776 2 0	J. & J. Hallewell	7,850 0 0
J. H. Carr	9,365 0 0	Wright & Sons	7,248 10 0
C. Martin	9,325 0 0	Gallagher Bros.	7,278 14 0
C. A. Howson Jackson & Dimberline	9,243 0 0	Perry & Son	7,203 4 6
	8,449 10 0	Wood & Son	7,093 3 4
Thompson & Son	8,230 0 0	T. Thompson	7,100 0 0
Henry Neal	8,069 10 0	Cyrus Birkill	6,863 0 0
		H. Mollekin, Park-av., Pontefract*	6,724 19 0

EASTBOURNE.—For alterations to the Princess Alice Memorial Hospital, for the President and Governors. Messrs. R. Plumbe & Harvey, architects, 13, Fitzroy-square, W. Quantities by Messrs. Fowler & Hugman, 9, Craig's-court, S.W. :—

John White	£1,412	Miller & Selmes	£1,300
Cornwall & Son	1,307	Mark Martin	1,270
Mark Hookham	1,307	Joseph Martin*	1,245

[All of Eastbourne.]

ELGIN (N.B.).—For rebuilding business premises, for Mr. William Ramsay. Mr. R. B. Pratt, architect, Town and County Bank Buildings, Elgin :—

Masonry.—Davidson & May, Elgin	£3,818
Carpentry.—A. & R. Dunbar, Elgin	
Slating.—George Murray, Lossiemouth	
Plumbing.—Lyon & Sons, Elgin	
Painting.—Kintrea & Son, Elgin	
Ironwork.—P. & W. McLellan, Glasgow	

EPSOM.—For destructor buildings and shaft, for the Urban District Council. Mr. E. R. Capon, Town Surveyor :—

Buildings.

Myles & Warner	£1,982	Smith & Son	£1,587
Meldrum Bros.	1,867	Cropley Bros.	1,585
J. Wilson	1,707	J. Ferguson	1,578
Denton Lee	1,675	Radford & Greaves	1,483
D. Stewart	1,658	Roll & Taylor, Epsom*	1,474
Knight & Son	1,624		
W. Wallis	1,595		

[Surveyor's approximate estimate, £1,450.]

Shaft.

Myles & Warner	£418	Meldrum Bros.	£330
J. Wilson	390	Alphons Custodel Co.	319
D. Stewart	360	Radford & Greaves	299
J. Ferguson	360	Knight & Sons	299
Smith & Son	350	Roll & Taylor*	295
Cropley Bros.	349	Universal Engineering Co.	290
W. Wallis	335		
Denton Lee	335		

[Surveyor's approximate estimate, £339.]

EXETER.—For the erection of a pair of cottages, East Woodley Farm, Newton St. Cyres, for the trustees of the Quick Estate. Messrs. Ellis, Son, & Bowden, surveyors, Exeter :—

Dart & Francis	£575 0	J. S. Brook	£502 0
L. Small	564 0	Gillard & Son	498 7
Geo. Setter	540 0	Nicks Bros.	485 0
W. Homes	539 0	W. Backwell, Crediton*	459 9
M. T. Treeman	527 5		

HALIFAX.—For the execution of private improvement works, Back Brinton terrace, for the Corporation. Mr. James Lord, C.E., Town Hall, Halifax :—

T. Wade, Thornton, near Bradford, £133 2 11

HOLMWOOD.—For pair of cottages at Holmwood Surrey, for Mr. C. Taylor. Mr. Arthur L. Dartnell, architect and surveyor, 62, High-street, Croydon :—

Cummins & Sons	£780 0 0	W. J. Pierce	£647 0 0
L. & F. Pledge	743 15 6	W. Roberts*	585 0 0

IMPINGTON (Cambs.).—For first contract in erection of house for Mr. J. F. Horrocks. Mr. Paul Bausor, architect, 9, St. Andrew-street, Cambridge :—

Mortlock & Sargent	£463	King & Tolliday, Histon*	£450
M. Christmas	454		

LITTLEHAMPTON.—For laying water mains, and other work, for the Urban District Council. Mr. H. Howard, Surveyor, Town Offices, Littlehampton :—

H. Braybon	£432 14 0	E. H. King	£360 0 0
Duke & Ockenden	402 15 0	W. Wallis, Littlehampton*	349 10 0
A. E. Nunn	383 16 6		
Snewin Bros.	362 0 0		

LONDON.—For repairs to sheds, &c., Barking Outfall for the London County Council :—

Stokes & Son	£516 0
F. W. Bull	407 10
William Harris*	278 15

LONDON.—For docking and repair of the s.s. *Bazalgette*, for the London County Council :—

Fletcher, Son & Fearnall, Ltd.	£1,218 0 0
Reeler & Co.	1,151 3 9
London Graving Dock Co., Ltd.	1,148 9 6
Brown's Dry Dock and Engineering Co., Ltd.	948 10 0
Mills & Knight*	828 3 10

LONDON.—For the extension of the tramway at Joyce Green Hospital, for the Metropolitan Asylums Board. Messrs. A. & C. Harston, architects :—

Leslie & Co., Ltd.	£610	Dickson, St. Albans*	£430

[Architects' estimate, £530.]

LONDON.—For alterations and repairs at Southfield House, Joyce Green, for the Metropolitan Asylums Board :—

Nightingale	£536	Enness Bros., Erith*	£374
Lonsdale	416	Woollaston & Co.	297

[Engineer's estimate, £495.]

SHERINGHAM.—For making up public and private street works, for the Sheringham Urban District Council. Mr. T. Inglis Goldie, Surveyor to the Sheringham U.D.C. Norwich and Sheringham :—

	West Cliffe.	The Driftway.	Crown Inn Plain.	Church-street.	South-street.	Vincent-road.	George-street.	Cromer-street.	Church-street.	Victoria-street.	Leicester-place.	Passage No. 2.	Totals.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Edwards	74 0 0	199 0 0	250 0 0*	39 0 0	267 0 0*	404 0 0*	138 0 0*	118 0 0	24 0 0	221 0 0	49 0 0	133 0 0	1,916 0 0*
Rackham	60 0 0	217 0 0	280 0 0	39 0 0	289 0 0	437 0 0	142 0 0	131 15 0	25 5 0	203 0 0	50 0 0	115 0 0*	1,989 0 0
Bradshaw	82 4 6	224 11 3	272 19 0	38 10 6	290 11 2	422 6 1	146 0 6	113 11 5	23 1 3	235 3 10	48 11 10	123 3 1	2,020 14 5
Baker	54 7 11*	195 1* 7*	264 10 3	27 18 0*	333 17 9	457 15 0	160 0 0	127 5 0	23 2 5	256 9 6	48 10 0*	135 15 0	2,085 8 11
Burgoyne	82 7 11	236 5 0	300 15 9	37 10 0	286 5 6	455 9 9	153 14 1	1 2 19 10*	23 0 0*	234 4 6	51 6 7	122 5 5	2,146 4 4
Weston	76 10 0	222 0 0	279 10 0	30 0 0	323 0 0	512 0 0	167 15 0	137 7 7	23 10 0	232 0 0	48 10 0	129 0 0	2,182 2 0
Parkinson	96 0 0	255 0 0	294 0 0	35 0 0	323 0 0	500 0 0	167 0 0	135 0 0	25 0 0	310 0 0	60 0 0	150 0 0	2,350 0 0
Watling	92 0 0	215 0 0	324 0 0	49 0 0	295 0 0	599 0 0	190 0 0	155 0 0	30 0 0	249 0 0	49 0 0	124 0 0	2,371 0 0
Sadler	102 0 0	261 0 0	289 0 0	37 0 0	337 0 0	489 0 0	165 0 0	142 0 0	24 0 0	307 0 0	58 0 0	157 0 0	2,378 0 0

[See also next page.

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LONDON.—For low-tension switchboards for New Cross and Camberwell Sub-stations, for the London County Council:—

General Electric Co., Ltd.	£3,639	0	0
Clift Manufacturing Co.	3,630	0	0
Elliott Bros.	2,836	2	0
Torque Electrical Engineering Co.	2,699	3	0
International Electrical Engineering Co.	2,684	4	0
Reyrolle & Co., Ltd.	2,682	4	0
Ferranti, Ltd.	2,336	0	0
Berry, Skinner & Co.	2,270	0	0
British Westinghouse Electric and Manufacturing Co., Ltd.	2,223	0	0
Dorman & Smith	2,202	0	0
Cowans, Ltd.	2,110	5	0
Electric and Ordnance Accessories Co., Ltd.	2,098	19	0
Siemens Bros. & Co., Ltd.	2,090	0	0
William Sanders	2,027	0	0
Electric Construction Co., Ltd.	2,026	0	0
Frank Suter & Co., Ltd.	2,021	8	0
Kelvin & James White, Ltd.	2,006	2	0
Electrical Co., Ltd.	1,984	1	0
Statter & Co.	1,935	19	6
Bertram Thomas, Manchester*	1,746	2	6

MONTROSE (N.B.).—For the erection of the Carnegie Public Library, for the Town Council. Mr. J. Lindsay Grant, architect, 2, St. Peter's-square, Manchester. Quantities by Messrs. G. Morham & Gardner, Hanover-street, Edinburgh:—

Masonry.—Ford & Son, Montrose	£3,362	14	9
Joinery.—Black & Sons, Brechin	1,159	0	0
Plastering.—Scott & Son, Aberdeen.	443	0	2
Plumbing.—J. L. Warden, Montrose	265	9	8
Iron Work.—J. Oswald, Brechin	452	18	0
Glazing.—W. Milne, Montrose	93	15	0
Slating.—Lindsay & Son, Montrose	197	3	10

[Total amount of tender, £5,974 1s. 5d.]

NEWTON-ON-AYR (N.B.).—For the erection of hospital buildings, Heathfield-road, for the Corporation. Mr. J. Eaglesham, architect, Wellington Chambers, Ayr:—

Masonry and Brickwork.			
Watson & Son, Ayr*	£4,569	8	11
Carpentry and Joinery.			
John McIntyre, Ayr*	2,798	14	0
Slating and Plumbing.			
Alex. Dalrymple, Ayr*	1,751	2	6
Plastering and Cement Work.			
W. A. Vass, Ayr*	656	12	8
Painting.			
Jas. H. Fulton, Ayr*	229	17	7
Tiling.			
Kean & Wardrop, Glasgow*	451	12	7½

NUNHEAD GREEN.—For external painting and repairs required to be done at the Metropolitan Beer and Wine Merchants' Asylum, Nunhead Green, Surrey. Mr. W. F. Potter, architect:—

Harris & Co.	£148	0	0	G. W. Newman	£118	15	6
H. J. Rogerson	120	0	0	F. C. Honey*	118	0	0

PORTSMOUTH.—For the construction of a sewer, &c., Copnor-road, for the Corporation:—
W. W. Learmouth, Emsworth-road, North End, Portsmouth.* Schedule of prices.

SCARBOROUGH.—For the erection of an ice factory and stores for the Pure Ice and Cold Storage Co., Ltd. Messrs. Freeman, Son, and Gaskell, architects, 11, Carr-lane, Hull:—

W. R. Birkinshau	£4,826	0	0
C. L. Hopkins for Good & Sons, Ltd.	3,782	2	9
J. Hinton Wilson	3,743	0	0
Cooke & Co.	3,710	0	0
Bastiman & Sons	3,600	0	0
Hunter & Smith	3,564	6	1
J. Watkinson	3,472	5	9
T. Petch	3,452	0	0
Barry & Son	3,450	0	0
Wilson & Bland	3,370	0	0
Jaram & Sons*	3,255	0	0

WELLINGBOROUGH.—For the erection of two cottages at sewage farm, Irthlingborough Grange, for the Urban District Council. Mr. J. E. H. de Key, engineer, Park-road, Wellingborough. Quantities by the engineer:—

Harris Bros.	£486	2	0	Harrison & Winsor	£440	0	0
T. H. Dorman	486	9	6	Berrill & Green	424	0	0
R. Marriott	474	0	0	Woodland & Mortlock, Wellingborough*	384	17	0
J. H. Smith	463	0	0				
F. Henson	460	0	0				
W. Berrill	449	0	0				

[Engineer's estimate, £450.]

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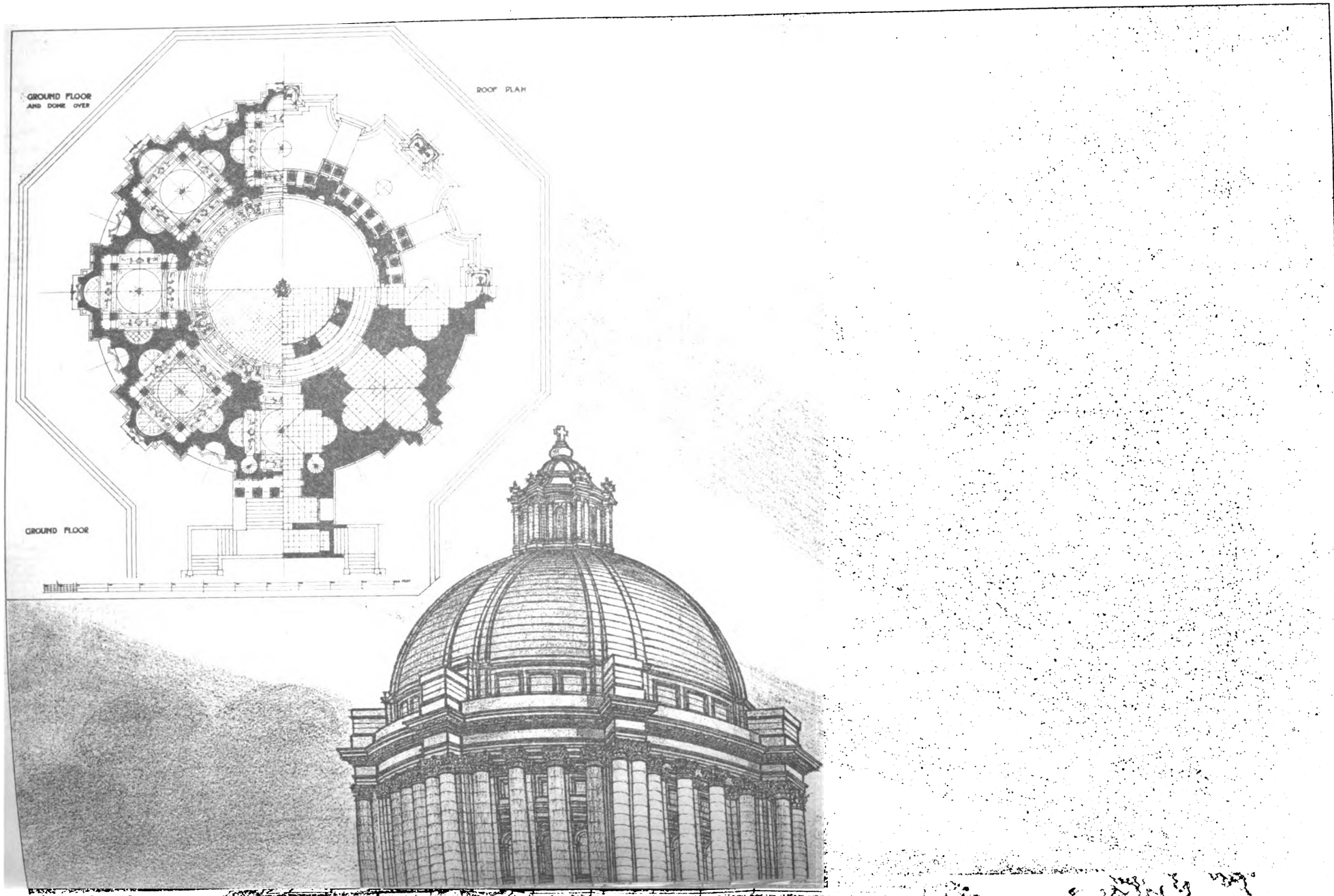

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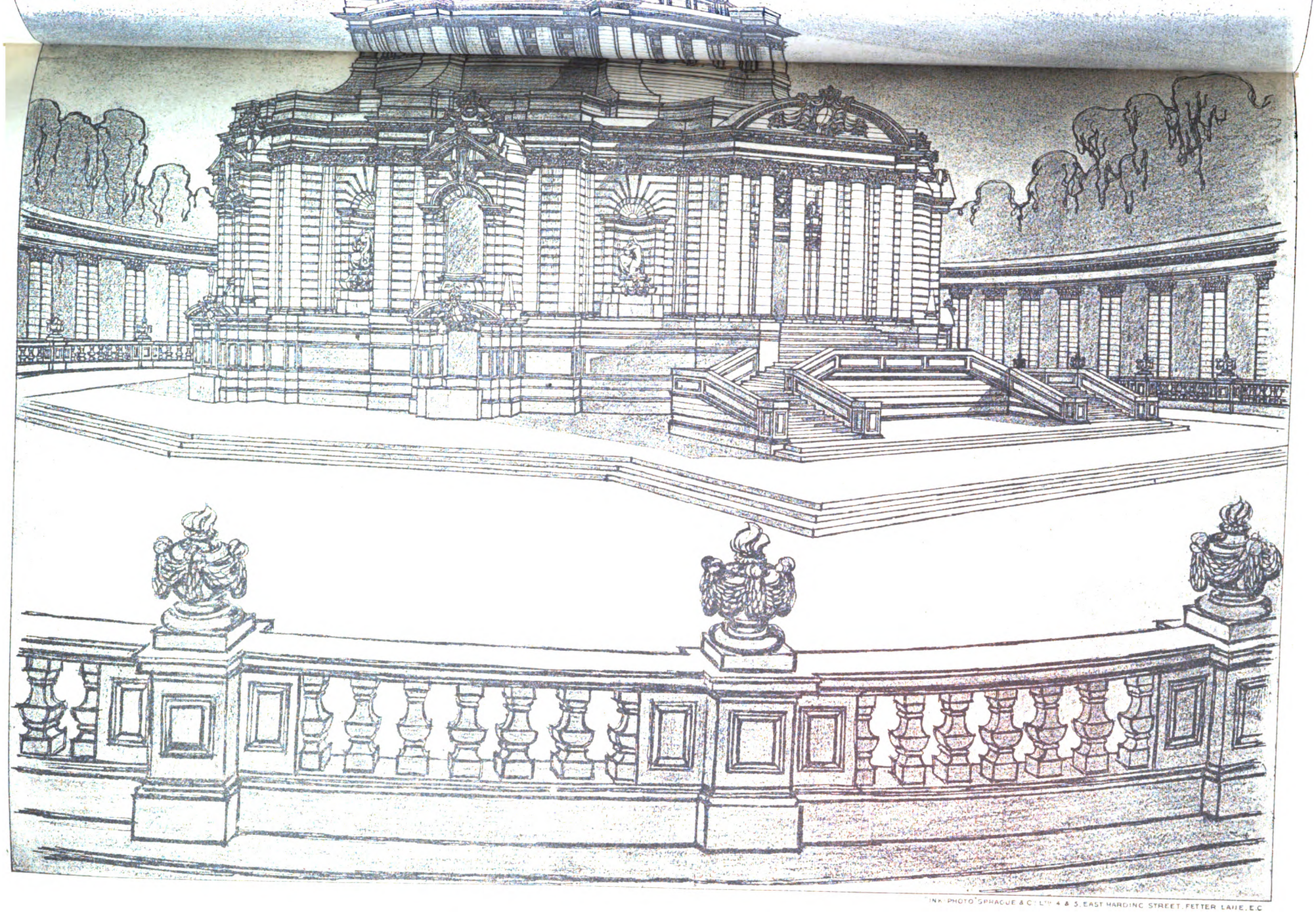

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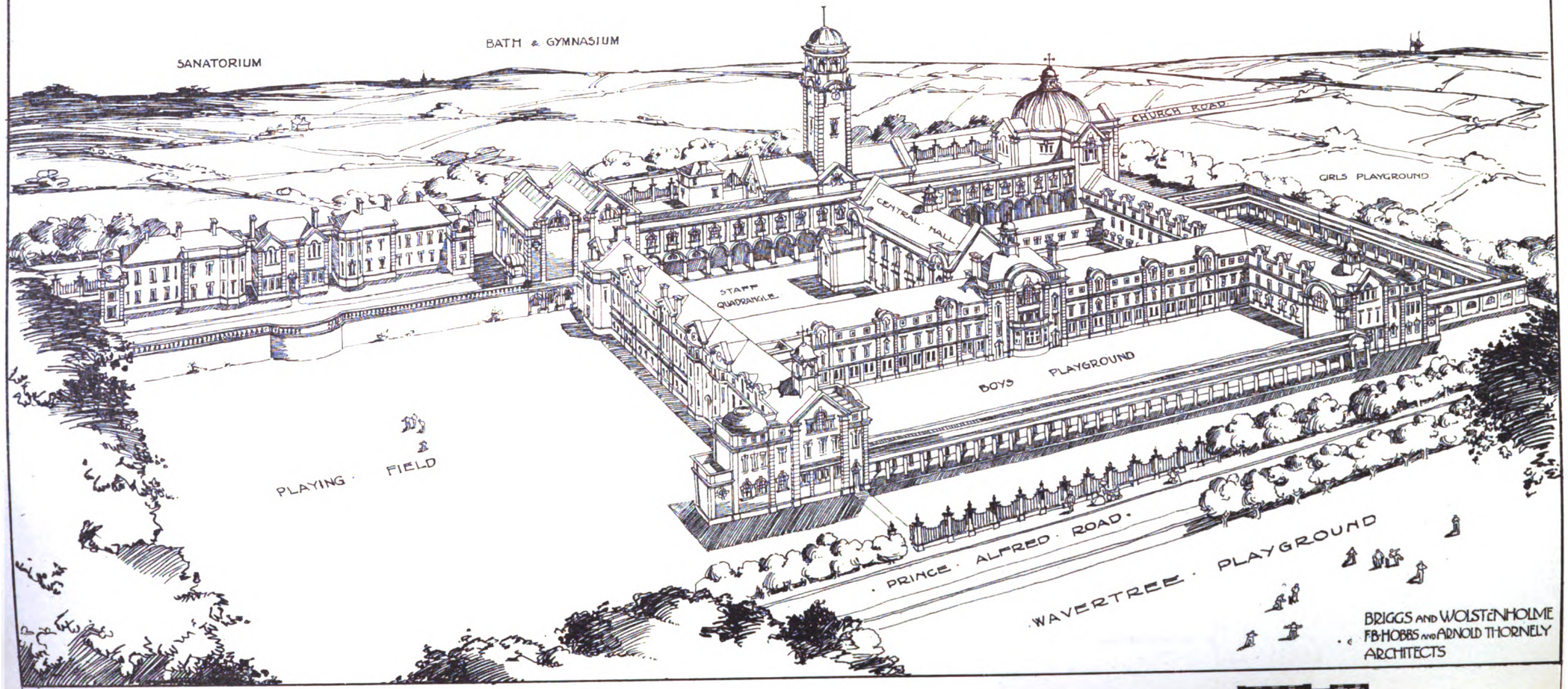

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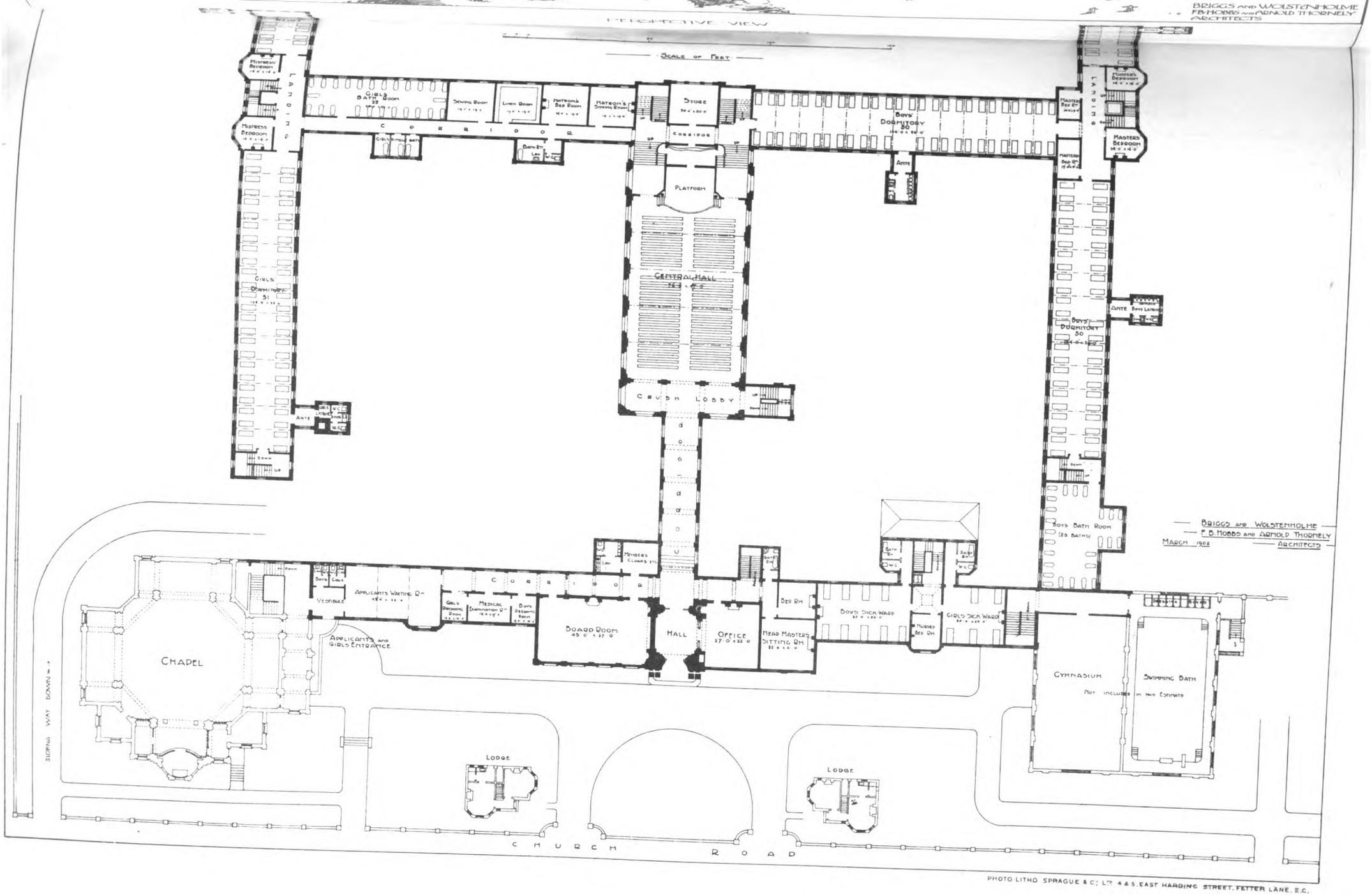

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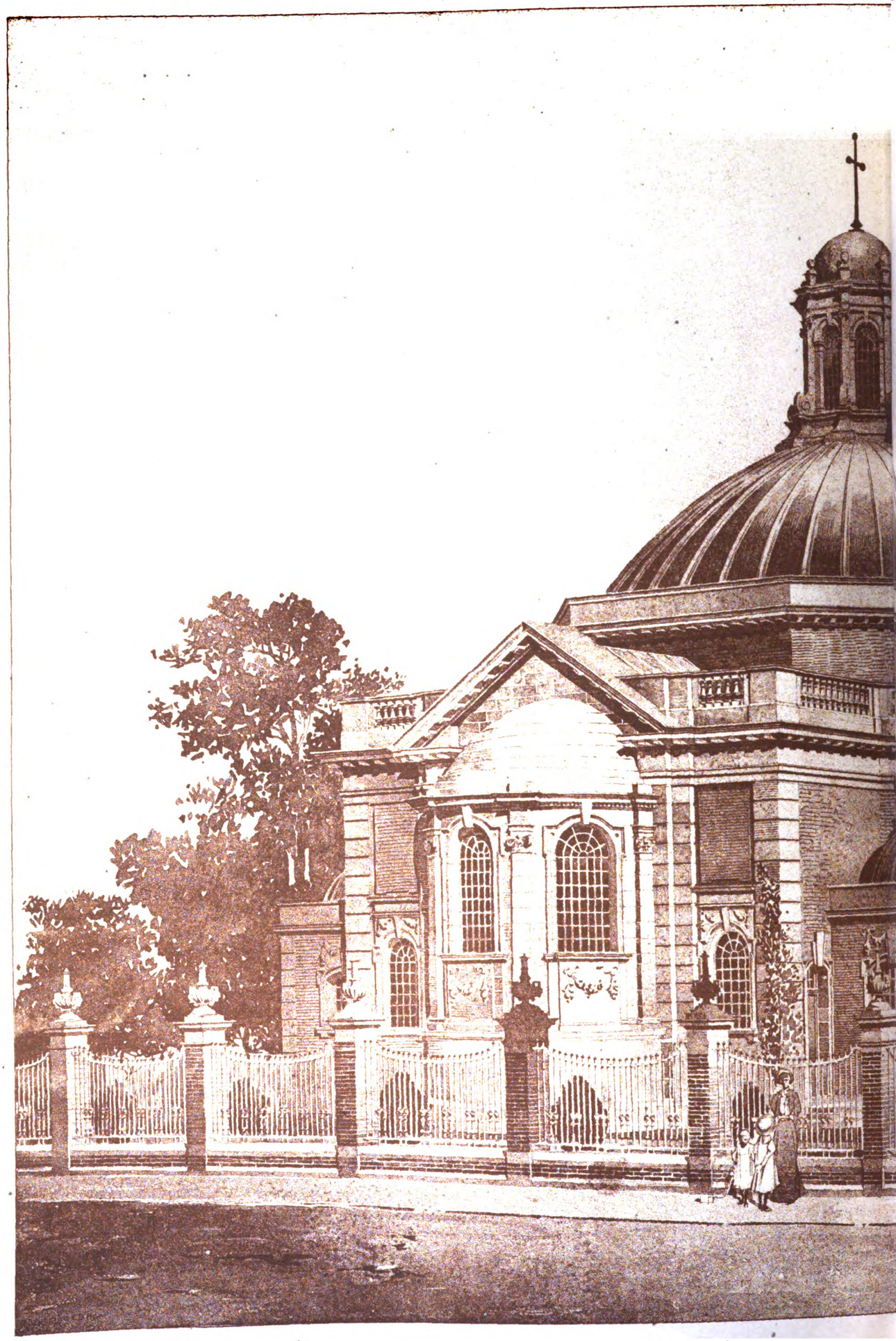

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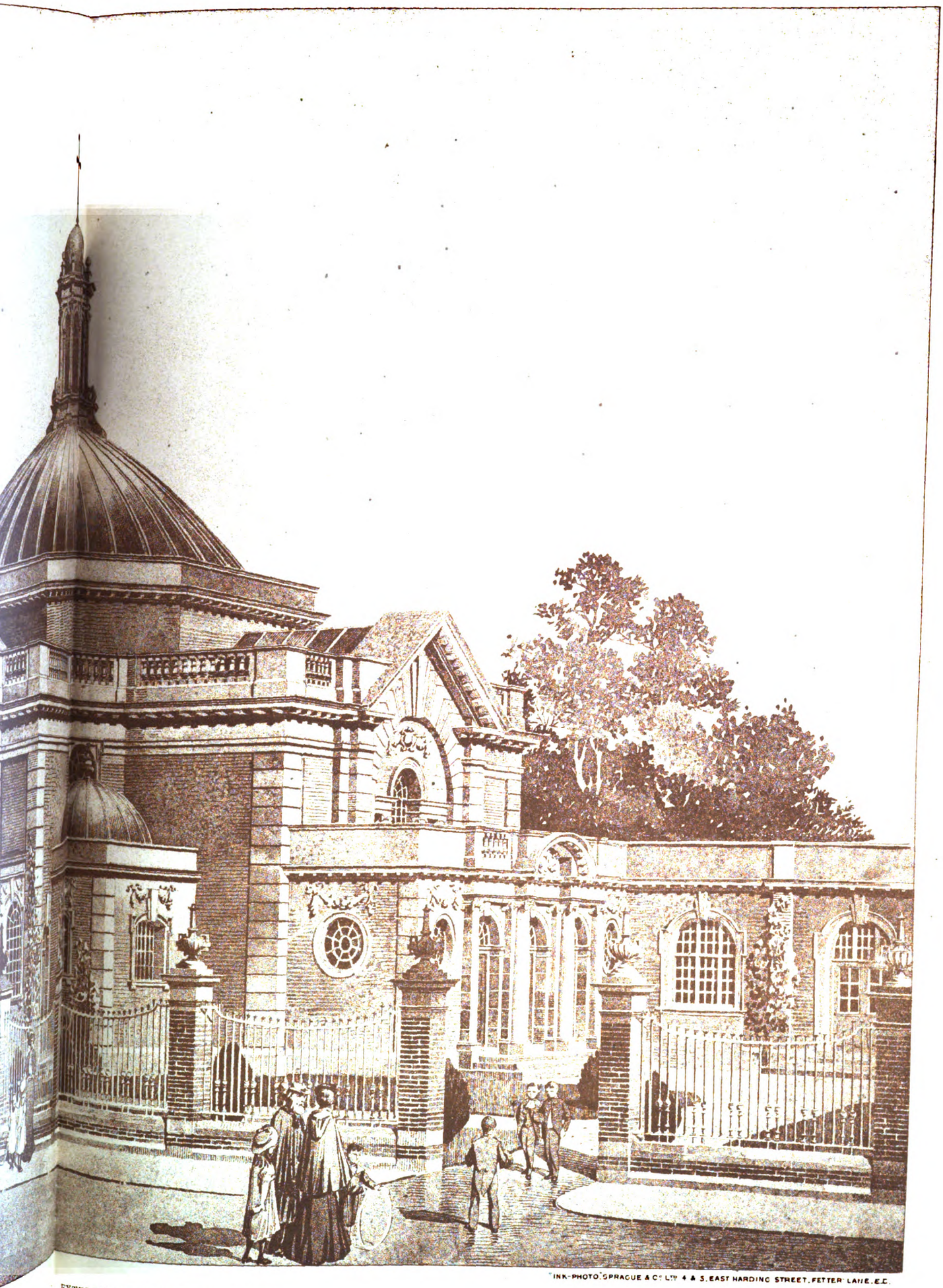

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South Wales University College Competition.

ANOTHER great building is projected for Cathays Park, Cardiff, the district in which the new Municipal Buildings and Law Courts are now rising. This is the proposed University College of South Wales and Monmouthshire, for which four London architects, Mr. Caröe, Mr. Champneys, Mr. Belcher, and Mr. W. C. Marshall, have been invited to compete, and Sir Rowand Anderson has acted as Assessor. The competition has resulted in the selection of Mr. Caröe's design, and the four sets of drawings have been on view in the present Cardiff Town Hall during this week. The selected architect is to be employed, of course, to carry out the work, and no premium is offered in his case; he has what the French call the *prix d'exécution*, which of course is a very important commission, and as the scale has been limited to 1-16 in. to the foot and the terms encourage the avoidance of elaborate drawings ("the plans may be in ink or pencil"), this is not perhaps a cause of complaint in the present case, though we do not approve of the system of paying the successful competitor nothing for his competition drawings, as they always mean a great deal of work extra to the preparation of working drawings. The three non-successful competitors receive 150*l.* each, and "in the improbable event of the services of the successful architect not being required" in carrying out the building within three years, he will receive 200*l.* in compensation.

The College is essentially a technical one. The scheme includes, first, Arts Department, Normal Department, Library, General Offices, and Research Laboratory, which portion of the buildings is to be proceeded with at once, if the carrying out of the remainder has to be deferred. This is not much more than a quarter of the whole, since it is estimated at 60,000*l.*, the expenditure on the whole being estimated at 200,000*l.* Then there are Physics Department (to be near the Research Laboratory); Botany, Zoology, Geology, and Mining (to be grouped together in order that they may have a common museum); Chemistry and Metallurgy Departments (under one Professor and therefore to be contiguous); Engineering Department; Medical School, including Anatomy, Physiology, and Materia Medica; Public Health Department; and a large Hall to seat 1,000 persons, to be put "where most convenient."

The detailed requirements of rooms for the various departments we cannot attempt to give here, though some of them may have to be referred to in passing. Two or three special requirements should be mentioned however. The Library is a memorial building, presented by a certain donor at a cost of 10,000*l.*, which comes off the 60,000*l.*, though it is hinted that more would very likely be forthcoming, and that the competitors need not design it with a strict view to a 10,000*l.* limit. This memorial character of the Library of course includes the necessity, or desirability, of treating it architecturally as a defined feature. The Research Laboratory must in any case be at the north-west corner of the building, to be as far as possible from the railway on the east. The west side faces the park, and is therefore the quiet side, a circumstance which has obviously influenced all the plans more or less. A memorial statue to the late Principal is to be included as a feature, and it is suggested that it should be so placed as to be within the observation of those of the public who would have access to the building. One more special condition that should be mentioned is that the women's department of the College should be entirely self-contained, all their rooms being placed together, with a separate entrance if possible, though with means of communicating with the rest of the building internally.

It will be at once recognised that to arrange so large a building with regard to all these several requirements, along with many other minor ones which further complicate the plan, and to combine this with architectural symmetry of treatment, presents no easy problem.

The principal façade of the building will be the west one towards Cathays Park, and Mr. Caröe's plan places the main entrance in the centre of this front. The vestibule, between the Principal's and the hall porter's rooms (which are specified to be near together) leads into a large entrance hall on the axis of the building, at the top of which an alcove or apse two or three steps up leads to the passage giving access to the professors' and lady lecturers' rooms, which form a small department of their own. The central passage between these would be very deficient in light as planned, and the entrances to the professors' and the ladies' rooms, on opposite sides, would have been more suitably arranged with each a small vestibule, instead of the doors opening straight out of the passage. The proposed statue is arranged for on the top of the steps up to the alcove, in front of the door leading to the professors' and ladies' passage; as far as placing the statue is concerned, the position is a very good one, though it seems to mask the door into the passage rather awkwardly. The general plan of the building is that of a long block facing west, with return blocks eastward at each end, the great hall forming a separate block running north and south, on the east side of the ground. Corridors run north and south from the vestibule, along the west block, and are returned along the two return blocks. In each of the re-entering angles is a pretty large open court, partially occupied by a circular latrine block; closets all round the outer circle, lighted from a flat roof; lavatories in the inner circle, lighted from a glass dome. This architectural treatment of the latrines is one of the best points in the plan. As the women's department is all

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arranged in the front block to left of the main entrance, the latrine pavilion on the left becomes theirs, and that on the right is for the men. The common-room for women and the common-room for men, which form an important item in the plan, and which are required to be in a quiet position, are symmetrically placed on either side of the centre and lighted partly from the inner court, partly from small light areas between them and the staircase hall. We should fear they would not be as well lighted as might be wished, being wide and deep rooms, for though there are plenty of windows, those on one face open into a small area and are partly under a bridge, and those towards the inner court look into an arcaded loggia which seems introduced mainly for exterior architectural effect. It does make a good feature towards the quadrangle, but in a practical sense it would be better thrown into the rooms.

The general arrangement and grouping of the various departments, which it would be impossible to follow out or describe in detail without reference to a plan, seems in all important particulars to comply with and fulfil the conditions laid down in the instructions to architects. As a matter of detail, the balance-room, which opens direct out of the corridor leading to the chemistry theatre, seems not quite cut off sufficiently from the chance of disturbance by movement, though it may be said perhaps, that it would not probably be in use at the same time that students were on their way to the theatre. On the upper floor the memorial library occupies the space over the hall and professors' and ladies' rooms before mentioned, forming the upper portion of the axial block projecting into the quadrangle, except that on the west front the first floor at this part is occupied by the council-room, placed across the axis and lighted towards the park. This is a good position in every way, as the park is the quiet side, the central position is suitable, and there is a good look-out from the windows. The upper portion of this central block, with the exception of the Council-room, becomes therefore the Memorial Library, and in its projection towards the quadrangle could be easily distinguished as such. The Library has a semi-circular ceiling into which semi-circular clearstory windows project; there are besides sky-lights in the ceiling. Nevertheless, we doubt if the book-cases at right angles to the wall, forming a series of bays, would be quite adequately lighted. To look up the titles of books you want a light rather near them, not a distant one, and we do not see why there should not be small lights in the outer walls in each bay. The great hall forms the first floor of the block of building on the east side, and is separated from the wings by an open space and gates on each side. The great hall and the Library blocks, of somewhere similar character and proportion but varied in detail, standing at right angles to each other at opposite sides of the quadrangle, each with its lantern on the roof, would combine in a picturesque effect. The quadrangle is laid out in lawns with walks between and a fountain in the centre; this was perhaps put in rather hurriedly, but it should be reduced to a more complete and symmetrical design; a *parterre* with plots which do not answer to each other and which leave irregular shapeless bits of grass-plot cut off at the angles, is more like a surveyor's than an architect's gardening.

What should be the architectural expression of a Technical University? One of the competitors, whose design we shall refer to subsequently as No. 3, seems to have aimed at repeating the very plain quiet domestic gothic of late type, to be found in some of the older colleges of Cambridge. One can hardly think this æsthetically defensible. A Technical College for the study of subjects so essentially modern as the latest developments of chemistry, biology, physics, engineering, etc., can hardly be regarded as on the same footing or of the same character as an anciently-founded University for the study of *literæ humaniores*; and the *genius loci* of Cambridge is not the *genius loci* of Cardiff. We think we can see that Mr. Caröe, as well as one of the other competitors, has been partly influenced in his design (and if so, quite rightly) by a wish to keep the general lines of the building more or less in harmony with those of the Municipal Buildings and Law Courts which will be its near neighbours in the same park, and of which the outer walls are already nearly completed. The design is a free classic, with a rusticated ground story with for the most part arched openings, and mullioned windows above between flat piers. Over the Council Chamber front (or side) is a pediment, with a sculptured frieze below it, between the order which divides the windows. The end of the Library block towards the quadrangle is differently treated, with a segmental gable and square turrets at the angles ending in little decorative pavilions; over the principal central window there is a niche for a statue, perhaps of the donor; an inscription escutcheon might have found place on this elevation. On the whole, while it will be a fine building, we should say that a little too much of the Town Hall architectural element has got into it (we do not mean of the Cardiff Town Hall in particular, but of the Town Hall element in the abstract); that, for a college, it would bear pruning down and simplifying into greater severity of style; and it has some features which are architecturally redundant. For instance, on the west elevation, the small intermediate pavilions, two on each side, between the centre and the wings, do not arise out of anything in the plan; they are merely needless projections in some of the rooms, and therefore are at variance with the idea of architectural unity between plan and design. The exterior design would be better without them, and without some of the ornament. The north elevation, with its long row of rusticated arched windows below and mullioned windows above, is really the most satisfying portion of the exterior, from its breadth and simplicity of treatment.

We should add that Mr. Caröe's whole set of drawings show that great pains and consideration have been given to the work, and they are more elaborated than those of any other of the competitors.

The other sets of plans were exhibited without either name or number. Of the authorship of one we have no doubt, and not much doubt between that of the other two; however, we will not affix names, but consider that with the title on an ornamental cartouche as No. 2; that with the title in plain lettering as No. 3; and that with no titles on the drawings as No. 4. No. 2 is a much more simple and symmetrical plan than Mr. Caröe's. It also is formed round a quadrangle, but with a wide opening on the centre of the east side, and the great hall to the right of that, instead of in the centre. The main entrance is again in the centre of the west side, but opens into a much smaller hall, behind which are the Professors' and Lady Lecturers' rooms, but better planned, and each with its entrance lobby branching from the central passage. The inner quadrangle is perfectly symmetrical in plan, and the library in this case also is pushed out into the quadrangle on the axis line. Its elevation towards the quadrangle is very well treated, with a campanile, with a lantern in two stages, projecting from the centre; turrets at the angles; and a lofty oriel on either side of the campanile. The women's department is concentrated on the left of the west front, much in the same general position as in Mr. Caröe's plan, but their common room is near the north-west angle, and the men's at the south-west angle, both well lighted. The lavatories and cloakrooms connected with each are in the basement, reached by stairs, which on the women's side land below in a very dark angle. The special entrance for male students is at the right re-entering angle of the quadrangle, the women's in the corresponding portion at the left. One of the good points of the plan is the simplicity and directness of the corridor communication. Another is the arrangement of the chemistry department in the south wing, the "quantitative" and "qualitative" rooms arranged symmetrically with the chemistry theatre between them, the balance-room got in on one side of the theatre, and the preparation-room on the other. The Council Room is placed on the first floor at the south-west angle; a more central position would have been better for access. The Arts lecture-rooms are well concentrated over the women's quarter. The engineers' drawing office, on the east wing, faces west; not the best aspect. The wide opening on the east side is occupied by a grille and gates with gate-piers crowned with armillary spheres, and domed side porches, each of which gives access to a loggia running inwards to the quadrangle. This would have a good effect, but it is a piece of rather illogical symmetry, since on the south side the loggia forms a porch to the entrance to the staircase of the Great Hall, etc., while on the north side the only door in it leads merely to the caretaker's house. Positions for two statues are shown, one on each side of the entrance hall, which they rather crowd, as it is not large, and only one statue site was asked for; but this may be a hint that the present Principal also should have his monument when proper time arrived.

The architectural treatment of the exterior is exceedingly broad and simple, and we must confess is more to our liking, on that account, than that of the accepted design, and more suitable to a college.

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The ground floor shows a succession of square-headed mullioned windows with rusticated piers between, the upper floor a range of somewhat similar windows with plain piers and niches between. In the centre of the principal façade is a pavilion with a low dome in the rear (over the staircase), and the angles are marked by smaller pavilions. On the centre pavilion some sculptured figures and an armorial escutcheon are sketched in; but otherwise there is little ornament, the whole being marked by severity and restraint of treatment. It would be a fine building and very suitably treated architecturally.

The competition must really have lain between these two, for the other two designs can hardly be considered to be in the running in comparison. In No. 3 the architectural treatment, as already observed, is in the old collegiate style; plain mullioned windows (rather small), in-and-out-gables, and here and there a door flanked with pilasters in the orthodox manner. It is all in good taste, but, as we said, unsuited to the occasion, and presenting almost a deliberate renunciation of anything like impressive architectural character. Without wanting such a building to be ostentatious, surely a little more than this mildly imitative architecture might be attempted with such an opportunity. The plan is not a good one; in some points the arrangements are naïve to a degree. For instance, the Professors' and Lady Lecturers' rooms all open on one side of a corridor running north and south, with intercommunication doors all through between the rooms, and their respective lavatories at the two ends of the passage. The Hall and staircase is a poor and confined one, and yet the staircase cuts a great piece out of the library on the first floor, in a very awkward manner. The Council room is placed on the west front to right of the centre, partially balanced by the museum of antiquities to the left; the one marked by three oriels, the other by two. The general plan is that of a west block with return wings, as in the two designs already described, but the return wings are wider and with central light courts. The two common rooms are well placed facing the inner court, the women's on the left and the men's on the right, with lavatories adjoining lighted from an internal court. The Great Hall forms a square isolated block on the east side of the site, with an entrance on the east side; the staircase and cloakrooms are not well planned, and the hall itself, on the upper floor, is an octagon plan with an octagon dome ceiling; a very bad form, acoustically, for a meeting-room, where speakers are to be heard.

Of No. 4 there is not much to be said. The author has sought for effect in the west entrance by scooping a semi-circular piece out of the plan, with the result of having some very awkward corners inside to deal with. The octagon hall, with a fountain in the middle, is so planned that after the visitor has got into it he has to get out at one side and retrace his steps in the reverse direction to get to the main corridor running along the front block. The women's department is to the right of the centre, but they have to pass the men's Normal Department door to get to it; and to get over the look of this the men's department has a "private corridor" running side by side with the main corridor, and similarly, on the left hand side of the entrance there is a "private administrative passage" alongside of the main corridor. Contiguous parallel corridors are the last resource of bad planning; but the plan generally suggests the work of a student or an amateur. The exterior architectural design is an exceedingly simple and cold classic, which however might not necessarily appear so bald and uninteresting in the actual carrying out as it does in the stiff and formal drawing. Something might be made of it in this sense, but the plan must have thrown it out in any case.

NOTES.

A Question of Official Duties. A CORRESPONDENT requests us to "open our columns" to a discussion of the question—what is the effect of an undertaking on the part of an official, holding such a post as that of borough surveyor, sanitary inspector, etc., to "devote his whole time to the duties of his office?" It is a point that has been raised from time to time between officials and public bodies, on various occasions, and if any reader has anything of importance to say on the subject, we shall be glad to print his remarks. Our own opinion on the point is this—that when an official in the service of a public body makes an undertaking to "devote his whole time to the duties of his office," it means that he is not to undertake any other work during the business hours of the office; not to make his official room a place of meeting on other business, or carrying on correspondence on other business but that appertaining to his employers' concerns; not to absent himself from the office, during business hours, on work of his own. Beyond that, we consider, the undertaking does not extend. Outside of business hours, his employers have nothing to do with his occupations, or with any other work that he may carry on. It has been attempted to be held, in some cases, that an official architect or surveyor has no right to carry on any private practice after office hours and in his own time. Whether this is law or not, we cannot undertake to say; but we do not think it is common sense. In support of this opinion, we may say that we knew a case of a professional man of exceptional ability who had a post in a Government office, which closed at 4 p.m. After this he adjourned to his own private office and carried on his own practice, and did so with the knowledge and approval of his chiefs in the Government Department.

The Garden City. IN the selection of a site the First Garden City (Limited) have been fortunate in securing a tract of land possessing considerable natural advantages, and within a convenient distance from London. The estate purchased at a cost of about 150,000*l.*, covers an area of some 3,800 acres between Hitchin and Baldock, affording ample space for the establishment of the new community. We understand that the proposal is to build a town near the centre of the estate, and to limit the number of houses to that suitable for a population of 30,000 inhabitants. To prevent the possibility of overcrowding, the area of dwellings will not exceed about ten per acre, and ample spaces will be reserved for the purpose of recreation grounds, as well as for public buildings of various kinds. It is also proposed that a belt of land shall be preserved around the town, on which no buildings are to be erected. The greater portion of the estate will be reserved for agricultural operations, but due provision is contemplated for the erection of manufactories in suitable sites, where workpeople may have the opportunity of living in healthy homes and amid pleasant surroundings. A good many London manufacturers have already recognised the advantage of removing their works into the counties of Hertfordshire and Bedfordshire; and, as an additional inducement, the promoters of this scheme hold out the promise that an installation of power gas will be available for the generation of electricity for power and light. The laying out of this estate and the design of the proposed buildings affords a good opportunity for the exercise of architectural genius, and it is to be hoped that the promoters of the enterprise will not permit its success to be imperilled by insufficient attention to this point.

Cost of Production. THE legislation recently obtained by the working classes in their interests has had an important influence in raising the cost of production, and too much attention cannot be given to this question by the responsible heads of labour organisations, in view of the important bearing this has on the trade of this country, quite apart from its fiscal relations. There is too great a tendency apparent to consider such legislation as purely humanitarian, as surely lessening the profits of the employers of labour, but its influence on our foreign trade cannot be too strongly emphasised Take such a measure as the Workmen's Compensation Act, and consider the charge on production which is thereby imposed; for not only have the sums annually paid to workmen to be considered, but the fact that an annually increasing number of workmen whose total incapacity has supervened are in the receipt of annuities. If the sums thus to be paid are estimated after the Act shall have been in operation for the lives of a whole generation, it will become apparent what an additional burden has been imposed on our trade by this measure alone. This Act is, however, only one of many, and in addition to this we have to bear in mind the additional burdens now being laid upon this generation by our extravagant policy in local government and successful loans. The working community have such common sense that they are hardly likely to look upon their employment as the goose that can lay golden eggs, as many of their leaders wish to persuade them, but should be urged to recognise that their trades form parts of a very delicate piece of machinery, easily placed out of gear, but which is connected with the world's trade.

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Emanations from Radium.

As Professor Sir William Ramsay pointed out on a recent occasion, a great advance has been made since the fact was demonstrated that a material constituent is to be traced in emanations from radium, and that this constituent already exists in the atmosphere. Although the commonly accepted definition of pure air as a mixture of oxygen and nitrogen is roughly correct, we are now aware that several obscure constituents exist. Helium is one of these, and it is now proved to be an integral factor in the composition of radium. The emanations from radium appear to be of threefold character. (1) A discharge of gas; (2) a stream of particles small enough to pass through thin sheets of metal; and (3) a discharge of which the nature is yet unknown, but that is able to penetrate blocks of almost any thickness. Professor Rutherford and Mr Soddy have shown the discharge of gas to be composed of helium, but this fact is not immediately evident to the investigator. It appears to be necessary that the gas should be exposed after collection for about a month, and at the end of that period a pure spectrum of helium may be obtained. From this, it is clear that radium cannot be an element, as we at present understand the term, but a compound of helium and some other element, or, perhaps, elements. The constant discharge thus seems to be due to gradual spontaneous decomposition. Whatever views may be held by theorists as to the ultimate nature of matter, it is tolerably certain that the investigations of modern chemists point clearly to the probability that many bodies, now believed to be elementary, will be found capable of analysis.

Railway Motor Services.

We have previously made reference to the adoption of motor carriages on the London and South-Western, London, Brighton, and South Coast, and the North-Eastern Railway systems An interesting experiment of similar character is now being made on a portion of the Great Western Railway, by the institution of a motor service between Chalford and Stonehouse stations in Gloucestershire, these points being about seven miles apart. At the present time, the number of trains calling at these and intermediate stations is very small, and it is anticipated that the new service will constitute a great convenience, as a motor car will run over this section of the line every hour for twelve hours daily. This vehicle will stop at every station, and passengers will be picked up and set down at four level crossings on the route. The innovation illustrates in a very striking manner the advantage to be gained by the new system of locomotion. It would not pay the company to increase the number of ordinary trains, and it may be doubted whether those hitherto run have paid expenses, but a compact and self-contained carriage of the kind now available can be operated at so little cost, that there is reason for anticipating satisfactory results. There are several small towns and villages in the district where industries are carried on, and it is almost certain that the frequent service will encourage travelling on the part of the inhabitants. The Great Northern Railway is another line on which the application of motor carriages is under consideration, and the directors of the Great North of Scotland Railway have found their receipts so much diminished by electric tramways in the neighbourhood of Aberdeen, that the adoption of a motor service is being discussed. The developments to which we refer are interesting, because they afford evidence of the fact that our railway companies are preparing to adapt themselves to altered conditions.

Sewage Floods in Kensington.

The last monthly report of the Medical Officer of Health of the "Royal Borough of Kensington" contains some information about the flooding of basements with sewage in consequence of the severe thunderstorm on September 4, and, coming as it does so quickly on the heels of previous reports describing similar nuisances in June, July, and August, cannot fail to be regarded as a document of great importance. Inquiries showed that, as a result of the heavy rains on September 4, "storm-water and sewage found entrance" to at least 881 houses in six wards of the borough, "and probably the actual number exceeded this large total." An extract from one of the letters of complaint received by the medical officer reveals the offensive nature of the nuisance—"about 19 in. of water invaded the premises, and when drained off—through the floor-boards and openings—half a cart-load of solid sewage had to be shovelled up and carted out into the garden where it now lies for inspection; the rest is under the flooring, stinking." That the probability of such floods had been foreseen is shown by the fact that a pumping station is being constructed at Lot's-road, Chelsea, for the purpose of lifting some portion of the sewage from the sewers into the river at high water, at times of heavy rainfall. The full equipment of the station will consist of eight pumps, but only one of these was at work on September 4; the others, it was expected, would be fitted up before the end of the month. The medical officer points out that at low water the sewage from the main sewer can flow by gravitation into the river, and as the height of the storm on September 4 occurred at low water, he draws the conclusion that the capacity of the sewer is insufficient, and fears that it is "very doubtful" whether, even with the assistance of the pumps, the flooding of basements can be prevented. If his fears are justified, it is clear that more burdens will have to be borne by the ratepayers of London; but it is highly desirable that, before a new main sewer is constructed, the possibility of constructing one for surface-water only should be carefully considered. The existing sewers are of ample capacity for receiving all the sewage and some portion of the surface-water, and a new sewer at a higher level can probably be constructed to receive the remaining surface-water and to discharge it normally into the existing low-level sewers and, during severe storms, directly into the river. Such a sewer would be much less costly than a new and larger main sewer, and would undoubtedly reduce the risk of flooding, but whether it is feasible or not is a question which can only be decided after careful consideration. We trust, however, that the pumps at Lot's-road will be of more use than the medical officer thinks.

Architectural Association Camera and Cycling Club.

On account of the unavoidable absence of Mr. C. H. Oakden, his paper on "Little Known Irish Abbeys" was deferred, and in its place a paper on "Tele-photography" was read by Mr. G. H. Lovegrove. The subject was treated in a technical manner, and valuable hints were given as to the management of the apparatus, and the many ways in which efficiency under varying conditions could be best obtained. For the architect there is no more valuable adjunct to a camera than a tele-photograph lens, and the wonderful crispness with which distant detail can be taken opens endless possibilities to the more thorough study of our ancient buildings. Among the many admirable slides thrown on the screen were some details from inaccessible parts of Chartres Cathedral and St. Pierre, which showed how satisfactory were the results. The effect of rising heat or haze on the definition, and the necessity of working only when the air is at its clearest, was illustrated. The immense value of tele-photography in the study of animal life, and its great pictorial possibilities in the hands of a capable manipulator, were shown by a variety of slides. After the reading of the paper, a number of interesting slides of Beverley Minster, York, Ely, and Lincoln Cathedrals was shown from the club collection.

The Modern Sketch Club.

The second exhibition of the Modern Sketch Club, at the Modern Gallery, 175, Bond-street, contains a good many clever and interesting sketches. Among them two or three by Mr. Moxon Cook are noticeable for fine broad landscape effect—"Cottages on Achill Island" (16), and "Storm Passing Gramont Range, Lake of Geneva" (29). Mr. E. S. Annison has a fine sketch with a very good sky, "On the Lea, Cheshunt" (5). Others others we may mention Miss Jex-Blake's "Evening on the River" (19); Mr. J. Whipple's "Fishing Village, North Devon" (28); Mr. Quinnell's head, "Sybil" (55); Miss Dorothy Grover's "On the Downs" (76); Mr. Samuel Read's clever impressionist sketch of "Henley Regatta" (82); Mr. Lionel Edward's study of a cow (92); Mr. Hamilton Jackson's "Twilight" (101); Mr. Alexander Colles's "Old Mill, co. Mayo" (106); and "Wicklow Pastures" (107), the latter especially good; Mr. Oswald Garside's "Timber Waggon" (151), a fine pictorial suggestion both in colour and composition; and Mr. A. Romilly Fedden's pencil studies of heads (10, 36, 167). Among the few architectural subjects Miss Jex-Blake shows a good study of "The Piazza, Verona" (192); Mr. T. Simpson's 'Monuments, Layer Marney Church" (140), is in a good style of handling, but the architectural lines are out of the perpendicular, a fault we not unfrequently find in artists' sketches of architecture Generally speaking, the works exhibited maintain the character proper to "sketches," viz., suggestions for pictures worked up to a certain point, without finish in details.

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Drawings by Charles Keene.

It is perhaps owing to the exhibition of Phil May's drawings that a demonstration of the late Charles Keene's work has been made at the Dutch Gallery; so that with that and the Rowlandson collection at Leicester-square already referred to, we have now three collections of satirical drawings by eminent deceased artists open at the same time. Of the trio, we think Keene still takes the first place. He hardly surpasses Phil May as master of drawing and line, but for humour and character he is far superior. His freedom of execution is so remarkable also, and the manner in which he hit off the character and expression he wanted with so few touches and with such apparent ease. Look at the varied character in the small boys' faces in "Natural Advantages" (71), as slight as possible in execution, and looking as if they were done *currente calamo*, so to speak. The composition and management of light and shade are admirable in "Pauca Verba" (50), the figure in a white jacket giving such a capital effect of contrast. In character and expression perhaps the finest thing in the collection, or one of the finest, is "Responsibility" (39); the old grandmother and the schoolboy are each typical of their class, and the drawing of the old lady's face is a masterpiece of minute but unlaboured workmanship. There is not a drawing, however, in the collection that is not worth study, both for power of execution and humour. We do not think Keene will be beaten out of the field for a long time to come.

THE LATE H. W. BREWER.

As promised in our last issue, we give here a complete list of the drawings of original subjects, or of old work, made by Mr. Brewer for the *Builder*, with the dates of publication.

In addition to the remarks made in our article last week, which under the circumstances was necessarily short, we may say that, besides his work in black and white, Mr. Brewer was equally accomplished in the treatment of architectural subjects in water-colour. Among his works in this medium were two drawings of the Mausoleum at Frogmore, specially commissioned from him by Queen Victoria. Although he never practised as an architect, he had a keen perception as to problems in practical architecture. At a very early period of his connexion with this journal, he suggested and illustrated a method of gas-lighting in churches, by enclosing the lights in small glazed shrines against the walls, with an opening to the outer air for carrying off the products of combustion. He took an interest in the question of the organ in churches, and made a fine design for the treatment of a large organ on an arch carried over the chancel, so as to get it near to the choir without having recourse to the undesirable "organ-chamber." He was first also to suggest, and illustrate by drawing, the treatment of the Strand by the formation of a long garden connecting St. Mary-le-Strand and St. Clement Danes, which has recently been revived.

The following is the list referred to, of his drawings published in our pages:—

A Proposed Method of Lighting Churches	Aug. 25, 1877
Ancient Structure recently destroyed in Germany	Aug. 25, 1877
Ancient Woodwork in Holland	Feb. 16, 1878
Ancient Sepulchral Monuments	Apl. 27, 1878
St. Wolfgang's Church, Rothenburg, Bavaria	May 4, 1878
The Frauenkirche, Nuremberg	Dec. 21, 1878
An Architectural Patchwork	Jan. 4, 1879
London in the time of Henry VIII.	Jan. 7, 1880
Domestic Architecture, Ratisbon	Mar. 20, 1880
St. Eustache, Paris	June 5, 1880
Towers at Maestricht	June 19, 1880
Brick Architecture in Germany: Tower at Lubeck	June 26, 1880
Sulzfield, Germany	July 31, 1880
Staircase, Ashburnham House, Westminster	Jan. 14, 1882
The Water-gate: A Composition.	Feb. 25, 1882
Peterborough Cathedral, Tower, etc.	Jan. 27, 1883
Christ Church, Dublin	Jan. 27, 1883
Design for an Organ	Feb. 10, 1883
"Deserted"	Jan. 5, 1884
The Rathhaus Market, Breit, Bavaria	Jan. 19, 1884
"Cheapside, *temp.* Henry VIII."	Feb. 2, 1884
The Cathedral and Neumunster-Kirche, Wurzburg	Mar. 29, 1884
"Old London Bridge, and around"	May 10, 1884
Monstrance in the Münster Kirche, at Roermond, Holland (restored by Dr. Cuypers)	Nov. 8, 1884
"Westminster, *temp.* Henry VIII."	Nov. 15, 1884
"The Tower, in the time of Elizabeth"	Jan. 3, 1885
Monuments in Old St. Paul's—the N. choir aisle	July 4, 1885
Design for Widening the Strand	Dec. 26, 1885
"Church and State"	Jan. 2, 1886
The Rath-haus, Limburg-on-the-Lahn; and the Three Crowns, Wurzburg	June 26, 1886
"The 'New Work,' Old St. Paul's Cathedral"	Nov. 6, 1886
Castle of Lowenstein, Wertheim-on-the-Main	Nov. 27, 1886
"Measure and Value"	Jan. 1, 1887
Bindon, Axmouth, Sketches of	Nov 19, 1887
Château and Grounds of Brochem	Nov. 26, 1887
"Châteaux of the Low Countries"	Nov. 26, 1887
"London, *temp.* Henry VIII."	Jan. 7, 1888
Whitechurch Canonicorum Church, St. Candida	Jan. 14, 1888
"The Two Bridges"	Mar. 17, 1888
"Renaissance Gorgeousness" (a church interior)	July 7, 1888
"Paris, in the time of Francis I."	Jan. 5, 1889
"Paul's Walk"—the nave of Old St. Paul's, as in *circa.* 1641 (a restoration)	July 6, 1889
"The Palace"	Jan. 4, 1890
"Some Churches upon the Lower Rhine"—Altenberg; Calcar, St. Quirinus, St. Victor, Xanten, gateway, etc.	Mar. 8, Apl. 5, May 3 & 17, June 7 & 21, 1890
The Old Bridge, Prague (partly destroyed by floods)	Sept. 20, 1890
"Mediæval Oxford"	Jan. 3, 1891
St. Alban's Cathedral	Mar. 7, 1891
Rochester Cathedral	Oct. 3, 1891
Old St. Paul's Cathedral	Jan. 2, 1892
Old St. Peter's, Rome	Jan. 2, 1892
The Old High Altar, Westminster Abbey	July 2, 1892
St. Stephen's Chapel, Westminster	July 23, 1892
"Some English Architecture of the Last Fifty Years—1842-92"	Jan. 7, 1893
Railway Views at Home and Abroad	Jan. 7, 1893
Durham Cathedral: View in South Aisle	June 3, 1893
"The Picturesque in Chimneys"	July 1, 1893
"An Ancient Harbour"	Sept. 30, 1893
"On various Types of Fountains"	Dec. 2, 1893
"On No Man's Land"	Jan. 6, 1894
Nonsuch Palace, Surrey (a restoration)	Jan. 27, 1894
Old Grey Friars and Newgate	Apl. 21, 1894
The Colleges of the Ancient University of Paris (leading article)	Aug. 18, 1894
The High Altar, Moosburg, Bavaria	Nov. 3, 1894
The Old Palace, Richmond—from the river	Jan. 5, 1895
Sketches of Portuguese Buildings	Feb. 7, 1895
The Fugger Chapel, St. Anne's Augsburg, and the Reredos, Schnekin Chapel, Augsburg	Apl. 20, 1895
"Some Norwich Churches"	Oct. 5, 1895
Ludgate, *temp.* Henry VIII.	Jan. 4, 1896
Carved Woodwork, Spanish Churches	Apl. 25, 1896
"Structures over the E. ends of some English Churches"	Dec. 5, 1896
"Aldgate in 1531"	Jan. 2, 1897
W. Choir, Bamberg Cathedral	Jan. 9, 1897
Sketches: "The Uglification of London"	Mar. 27, 1897
"A Monastic Suburb of Old London in the Sixteenth Century"	Jan. 1, 1898
"A Half-century's Change in London"	Jan. 7, 1899
"Lights and Shadows of a By-gone Day"	Jan. 6, 1900
External Crosses and Pulpits	July 21, 1900
"The Heart of Rouen"	Jan. 5, 1901
"Antwerp, at the close of the Sixteenth Century"	Jan. 4, 1902
"Commercial Art"—a composition (Flemish town "to show how commercial buildings can be invested with picturesqueness"	Jan. 3, 1903

We have arranged to have a small exhibition of Mr. Brewer's drawings which have been made for this paper, at the Office of the *Builder*. They will be on view (on presentation of address card) on week days from October 26 to November 6, Saturday excepted, between 12 and 3 p.m.

ARCHITECTURAL SOCIETIES.

Manchester Society of Architects.—Mr. J. W. Beaumont, President of the Manchester Society of Architects, gave his address on the 8th inst. at a special meeting in the Board Room of the Chamber of Commerce, Mosley-street. He looked forward, he said, to the time when architectural societies may become so important in large towns that they may be consulted by the public authorities in cases of proposed improvements or new streets to be formed in those towns. It will never, he admitted, be possible for a public body to say that the buildings in an important street shall all be carved out of a certain design, nor that a certain architect shall be appointed to carry out all the buildings in such a street; nor would this be desirable. Variety of street architecture was, to his mind, much better than uniformity. Generally each building had its own use, and should by its architecture express the purpose for which it was erected. It would be absurd to confine the elevation of a street to one architectural design, where one building may be used as shop premises, another as a set of offices or chambers, and another as a warehouse. But it would be held that some control should be exercised to see that proper and suitable heights are maintained, and that materials are used in the various buildings that will harmonise with neighbouring buildings. One thing he wished to impress on his hearers was that more control should be exercised by public bodies in seeing that all new buildings are erected in such a manner as to minimise the risk of fire. Several subjects of great importance had received a large amount of attention during the last twelve months, and the greatest of these was the question of the statutory registration of qualified architects. The time was at hand, he said, when architects must make up their minds on this question. In order to ascertain the general feeling on the subject, he had invited the opinion of various societies in different parts of the country, and out of twelve from which he had received replies, six were in favour of registration, one against, two were divided in opinion, and three had not discussed the question. The Manchester Society had already pronounced in favour of registration. Of course, as was the case in other professions, no form of registration would suffice to suppress "quacks," but it would enable the public to discriminate between qualified and unqualified architects. It would also be an advantage to a man to employ an architect who was legally qualified, and against whom he would have legal redress in case of neglect or incompetence. As to education, he said it was important that architectural students should pass all the examinations of the Royal Institute of British Architects, and not simply the first and second. In this connection, he referred to the establishment of a School of Architecture in Manchester. He was glad that this school had been established. The time of apprenticeship might perhaps be shortened for those who had passed through the school, but nothing in the shape of theoretical or academic training would enable a student to dispense with the practical training of an architect's office. He believed that this Manchester School of Architecture will become, under the care of Mr. S. H. Capper, one of the foremost centres in the kingdom for the instruction of architectural students. Turning to the question of competitions, he suggested that the principle had been overdone. He recognised the value and need of competitions in the case of public buildings, but in all cases they should be conducted on an equitable basis. He indicated certain ways in which a useful reform in regard to competitors might be brought about.—Mr. Alfred Darbyshire moved a vote of thanks to the President for his address, and that it be printed and circulated forthwith.—Mr. Capper, of the School of Architecture, in seconding the motion, gave the result of his experience of the working of a registration law in the province of Quebec. Whilst he was at the head of the School of Architecture in that province architecture was made a close profession, in the same sense as the bar and medicine are close professions. Some of the results were not exactly what one would wish. One of the immediate results was to flood the profession with unqualified men, because every

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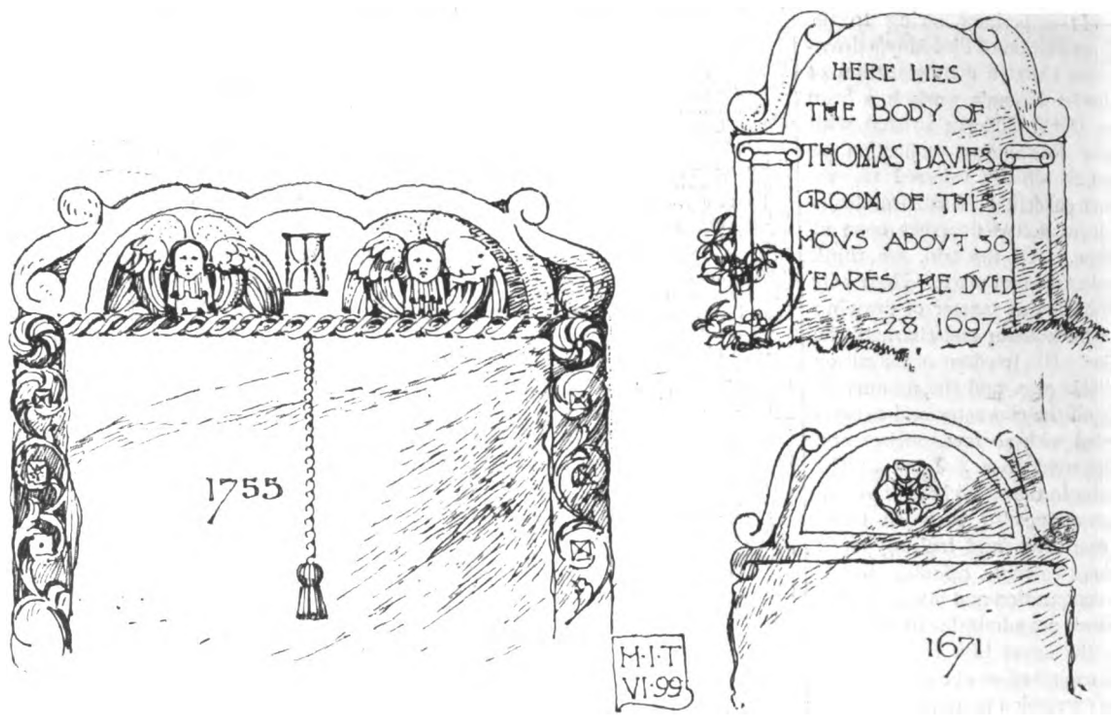

Old English Gravestones. Fig. 1.

person who had had a sign-plate with the word "architect" upon it had to be admitted as a qualified architect. Of course, time would cure such an evil. With regard to the School of Architecture in Manchester, he fully appreciated the necessity of practical training. He suggested, however, that arrangements might be made whereby students, in some cases, might carry on their collegiate training side by side with their practical work.

Birmingham Architectural Association.—The President of the Birmingham Architectural Association (Mr. Arthur Harrison) delivered his presidential address to the members on the 9th inst. at Norwich Union Chambers, Congreve-street. He took as his subject the housing question, and dealt at some length with the construction of block dwellings. At the outset he alluded to the evils of overcrowding and to the necessity, in the interests of health, of a clearance being effected as far as possible in insanitary areas. He explained various schemes which had been suggested for bringing about an improvement, and pointed out that a scheme which might be suitable for one town might be unsuitable for another. The flat system in Birmingham, for instance, seemed to be regarded with disfavour, but that was largely on account of its novelty. Still, the fear that the people would not take to flats no doubt influenced the Corporation when they produced the Milk-street tenements, as they were in the nature of a compromise. They were built on the principle of flats, but only two stories high, and that he regarded as a mistake. Whether there was any prejudice against four-story flats would soon be proved, because two schemes of block dwellings were being carried out in this city. He had inspected the buildings of many municipal and private enterprises, and had been disappointed with the block dwellings because better results might have been obtained for the money expended. The two schemes which were in progress in Birmingham, however, were different. He described in considerable detail the erection of these dwellings, explaining the improvements and conveniences which were secured in comparison with other dwellings, and said the tenements could be let at remarkably cheap rents to the poorest tenants, and still yield a return of 5 per cent. on the capital. Judging by the number of applications for the tenements, he did not think there was anything to fear from prejudice. As Municipal Corporations had facilities for borrowing money at cheap rates, it would be possible for them to do much towards solving the housing problem, and in bringing about an amelioration of the condition of the working classes, but most Corporations had already borrowed up to the hilt. Moreover, it was often said that Corporation work was more costly than private work, and, further, it was often contended that if the Corporation embarked in the erection of artisans' dwellings they would stop all private enterprise. Still, whoever undertook the work it would have to be carried out. It was probable a solution of the problem would be found ere long, and in the carrying out of the work the architects would play a by no means unimportant part.—Mr. Harrison was cordially thanked for his address.

SOME OLD ENGLISH GRAVESTONES.

For these sketches of some old English eighteenth century tombstones we are indebted to Mr. H. Inigo Triggs.

Those included under Fig. 1 are all from Brympton, Somersetshire, and are executed in Ham Hill stone, quarried about four miles off.

Figs. 2 and 3 are from Chiswick Churchyard. Both are in Portland stone. Fig. 2 is 2½ in. thick, the other 3 in. Fig. 2 bears on one side a relief of an hour glass, on the other side the serpent with its tail in its mouth; the emblems respectively of Time and Eternity. The date and inscription on this example are worn out.

THE ARCHITECTURAL ASSOCIATION SCHOOL OF DESIGN:

OPENING MEETING OF THE SESSION.

The preliminary meeting of the Architectural Association School of Design was held on Tuesday in the Meeting Room of the Royal Institute of British Architects, No. 9, Conduit-street, Regent-street, W., Mr. H. T. Hare, President of the Association, in the chair.

The Chairman said they had met to hear some remarks from Mr. Walter Cave and Mr. J. S. Gibson at the opening meeting of the School of Design. The design classes were, he thought, quite the most important part of the courses of the Association. The whole end and aim of an architect was to be able to design. It was the most important function he exercised, and it was the most difficult thing he did. All the other studies which students undertook were more or less subsidiary to this great one of design, and the only way in which they could obtain any facility in design was constantly to practise it, and the more they did the better they would be able to design. They could not possibly do too much. He was extremely pleased to see such a large gathering as he saw before him, and he hoped that this meant that the classes would be full. There was one cause for a little regret, and that was that though these classes commenced with a full attendance at the beginning of the session, that attendance fell off towards the end of the session. At the last two or three meetings, although the subjects were of as great interest as those at the beginning, the attendance was very small, and the designs submitted were very few, and the work went on in a half-hearted way. He did not know why this should be, for the subjects given were not of such an extensive nature that they called for a great sacrifice of time; and although it was quite true that these later classes were held in the spring, when the evenings were light and there were more out-of-door amusements, still, he did not think it would entail a great sacrifice of time to take up the various subjects and go through with them without dropping off, as had hitherto been customary. He hoped that this would not be the case in the coming session, and that a large number of students would continue to work right through to the end.

Mr. Walter Cave said that the subjects to be dealt with this winter in the School of Design were all to be thoroughly discussed by the different visitors, and it would be impossible to enter into any of them that evening. He felt, like all those who work, a curious powerlessness to talk about what one is doing. He had often noticed that when an acknowledged expert on any technical subject attempted an explanation of his art or craft he took it for granted that either his audience knew nothing, or else as much as he did himself, and, as a natural consequence, either his explanations were extremely tedious, or else quite unintelligible to the ordinary listener. He (the speaker) could not lay claim to be an expert in any subject, but he could enter into the other side of the case, *i.e.*, that of the audience who wish to learn; and so he was going to suggest a reversal of the ordinary procedure and see what he could learn from them during that part of the autumn's work which had been entrusted to him; and in order to do this to their mental advantage, he would indicate briefly that evening some of the points on which they might both benefit by special study.

"Tradition" and "experience" were both very important words to the young and to the old architect. Reverence for the first (tradition) was, he hoped, common to both, and experience was the fascinating goal to the young—and sometimes, alas, a bitter memory to the old. It had been truly said that we can only learn by experience, but he would go farther, and say that it was only by paying for our experience (sometimes in actual cash) that our lesson was really learnt, and it was with some such object in view, *i.e.*, of saving them bitter memories in the future (if not their pockets, also), that he would offer a few hints on the work before them—both there in the school and in their after life work.

Let them first begin by reverencing tradition—they, on their part, to try and make a wise use of it in working out their designs—carefully weighing past work, and seeing how it could help them in solving more modern problems, and so, by utilising intelligently the experience bought by the practice of older and possibly wiser men, they would, in their turn,

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Fig. 2.

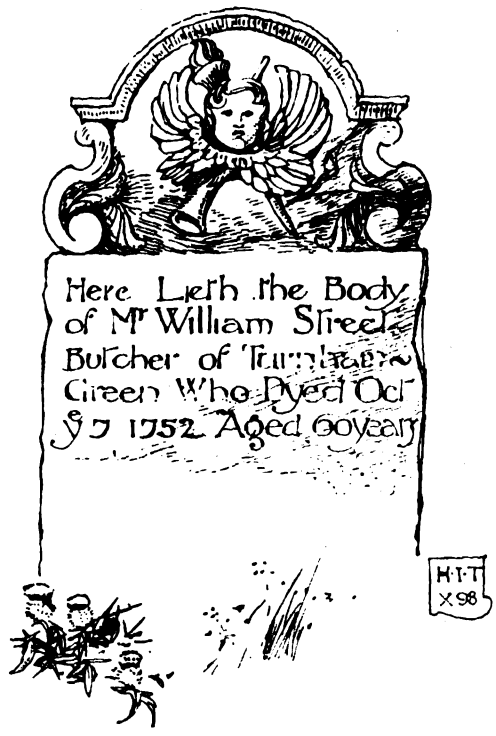
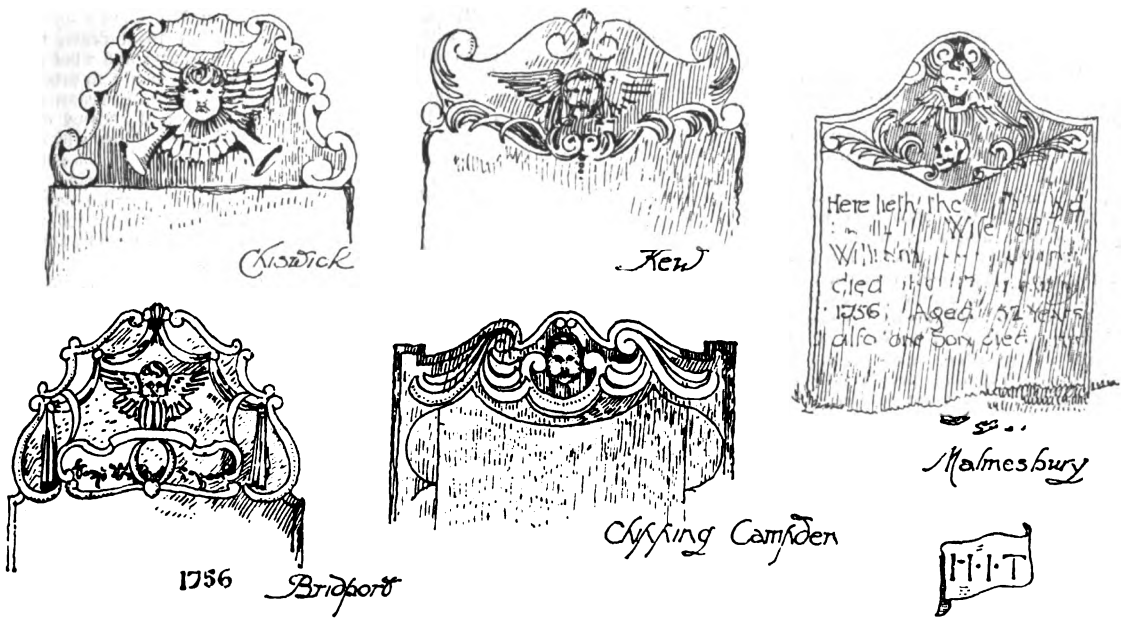


Fig. 3.



Old English Gravestones. Fig. 4.

be adding another stepping stone towards success for future generations. All really sound, fine, and successful architecture had been in the past built upon and evolved from what had gone before, and why should they, with all the wealth of examples before them, ignore those lessons which tradition and experience alone could teach them. He, for his part, would endeavour to keep tradition in view when their drawings came before him—not necessarily setting up a fixed and unalterable model on which he should expect all their designs to be based, but seeing how far fresh views based on older examples could be fairly considered as improvements, and to what use an intelligent and broad-minded study of the past could help in elucidating the problem in question.

Next he would like to say: Do not take anything for granted. They would find in every question which they had to answer, and every problem which they had to solve, both there and in their future practice, that at first sight certain arrangements appeared inevitable. "Do not trust these appearances without a very careful search and honest endeavour to prove that these things are inevitable. Certain traditional methods, short cuts to success, which you have seen used, or a personal predisposition for certain forms, will be almost sure to rise in your mind at the beginning of your work. Do not trust them without a severe mental cross-examination to prove that they really are the best and most fitting solutions of what is before you. Do not be content to do always exactly the same thing even in the simplest matters, but endeavour to improve and advance. If you do this at the beginning of your work you will be saved the mortification of finding, when your drawings are approaching completion, that with a little more thought at the start you might have produced a far finer design. You then may have to face the work of beginning all over again, or sending in a design which you know is not the best you could have done."

He would try to avoid any prejudice for any special arrangements when looking at their drawings; and very possibly would gain by admitting a different solution from the one which he had thought the most convenient, and so avoid, on his part, the error of taking anything for granted.

Avoid eccentricity. This was a warning which he knew had often been given, but it was of such importance that he made no apology for saying it again. It was the besetting sin of many architectural students (and, indeed, of some full-grown architects). Originality and eccentricity were very nearly related, and it required an exceptionally strong character to adopt the first without the second. To the student, the danger of becoming eccentric, in his desire to be original, was such a real one that he felt almost inclined to say: Do not be original; but this would hamper all progress if followed literally. So his earnest advice was not to strive for originality, but to let it grow naturally, as he said before, from a careful study of the past. "And be sure that your variations *are* improvements." A careful inspection of those designs which he had seen during his short experience of the Architectural Association, and which offended on the score of eccentricity, invariably showed a large amount of imitation from some modern designer whose work was labelled "original," and, as a rule, the points which were selected for imitation were the worst ones in the design of the unfortunate model selected. So he said again: "Avoid eccentricity and any desire for originality for its own sake"; and he hoped that he might be saved from further learning the lesson of seeing "what to avoid."

Next, their designs should be suitable. This sounded easy, but it might not prove so simple as it appeared. "Think well of the object for

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which you are striving—the uses to which the building will be put—and try and place yourselves in the position of the people who will use it. Do not think only of the exterior elevation. Begin with the plan in all its branches, and design from the interior to the exterior, remembering that however attractive you make the outside, it will be judged principally by those who inhabit the inside, and an attractive elevation will not compensate for an ill-arranged plan. Remember the story of the unfortunate client who, having expostulated with his architect on his ill-lit rooms, was told that the orders and proportions of the façade were exceptionally perfect, and who answered that he had better take a lodging on the other side of the street that he might fully appreciate his own house!

Let your design grow in your mind, and not on the paper. This is, perhaps, the most important point of all, and I have kept it to the last. One of the greatest helps to this end is the habit of sketching from memory, and I would advise you all to cultivate it. At first you will be astonished to find how difficult it is, and how very inaccurate are your powers of observation; but with practice these will improve, and the gain will be great, both to your memory and critical faculties, as well as to your powers of design. Try and carry the design in your head as a whole."

Sketching of all sorts was an admirable habit, and measured sketching of the greatest importance to all students, not with the view of reproducing what they sketched, but as a means of ascertaining how certain proportions and effects had been produced, and of generally obtaining a real and intimate knowledge of architecture. One of the greatest masters of literary style at the close of the last century, Robert Louis Stevenson, had told us that it was his custom as a boy to carry two books in his pocket—one to read and one to write in. He (the speaker) thought they might all follow Stevenson's example with advantage: a book to read and a book to sketch in.

As to drawing, they should not attach too much importance to mere draughtsmanship. Careful and accurate drawings were of immense value, but they were not everything. "Remember that the builder who may have to execute your plans requires as much assistance as you can possibly give him. He has not followed your thoughts in your office, and unless your meaning is made very clear, much time may be wasted in discovering what is really your intention. Make your drawing as straightforward as possible, giving plans, sections, and elevations in their proper relative positions on the sheet, so that not only will the builder (and those who have to look over your designs) follow you with ease, but you yourself will be sure that each point is fully considered and will 'work.' I always attach the greatest importance to explanatory notes written on the drawings, which save an immense amount of trouble and hunting through the specification. Avoid fantastic lettering and writing on your drawings, and use clear figures for all the main dimensions; and never draw a single line which does not mean something, for vagueness on your part is simply bewildering to the unfortunate translator. I, for my part, shall endeavour to judge of the thoughts displayed rather than the draughtsmanship.

To sum up, the main points I should like to draw special attention to are (1) Reverence for tradition and experience; (2) Take nothing for granted, but prove each step; (3) Avoid eccentricity; (4) Aim at suitability; (5) Design in your head rather than on paper; (6) Cultivate the habit of sketching from memory; (7) Make your drawings clear. With these points borne in mind, I hope the work before us will prove both interesting and instructive, and that we shall each and all benefit by loyally carrying out our share of the work."

Mr. J. S. Gibson said that in beginning the work of the new session there were some points to which all workers should direct their attention. Foremost among these was the necessity for the proper application of labour to produce the best results. Misdirected labour was worse than laziness, for while the latter did not add to the sum of the community's possessions, the former added thereto the undesirable things. For this reason the School of Design existed to help them to direct their labours in the right channels—to draw their attention to the cardinal principles governing all design, the fitness of the article to the purpose it had to serve, the nature of materials influencing their æsthetic treatment and the immense value of beauty for its own sake. They all knew that "a thing of beauty is a joy for ever," and the reason it was joy-giving was because of the expression of soul which its maker put into its fashioning. If the maker took no delight in its creation, they might be sure the beholder would take little delight in its existence. In this school they had the benefit of the experience of those men who had walked further up the hill than those who were just beginning to climb with their faces turned skywards; men whose horizons were perhaps wider and vision clearer; and these men, by their criticism, help, and guidance would enable students to direct their efforts to the best advantage. Persistent application would overcome many obstacles; those almost impassable barriers that genius lightly vaulted over could also be surmounted by that dogged determination to succeed which ought to possess their minds at this period of their work.

"A healthy curiosity is also desirable at your age—a spirit that desires to know not merely that what is, is right, but the why and wherefore of its rightness; and I would counsel you not to be diffident in seeking information from your visitors. They come to impart information, as far as they are able, but it will also help them if you will give a hint of the kind of information that your state requires."

The next point that he would emphasise was that of observation, and the necessity of using this power at all times. "Do not think that only in the office or the school you will learn all that is to be known in the matter of design. If your faculties are all alive there, so much the better, but it is also imperative that you should have them fully awake in the street, the shop, and wherever else you may be. When you are worried as to the proportions of a door or a window, whether its height should be twice its width, or just a little more or a little less, a ride on a 'bus will give you an opportunity to view the proportions of thousands of doors and windows, the widths and projections of their architraves, the inclination and curvature of their pediments, all this being valuable information, keenly appreciated because observed. This habit of observation is also valuable, because it trains the eye and enables the mind to form quick and accurate judgments. You may perhaps be struggling with a design where your mind suggests absolute symmetry of treatment, and yet the exigencies of plan demand some variation. While these two contraries battle in your mind, it is well to walk about the streets and note that if the rhythm of a building is preserved variation of detail enhances its charm; that absolute symmetry is not the chief constituent of beauty or the evidence of artistic ability. The thousand and one trivialities that go to make up the bulk of our daily tasks will interest us more and worry us less if we keep our eyes open and note how other men have performed their tasks. Our work has to be done under a most stringent and sometimes galling Building Act—our client insists in having his shop front project 10 in. in front of the main building, and be chiefly filled with plate glass, and while we wonder how we can reconcile our artistic conscience to his business requirements we may gain practical suggestions by looking at what our fellow architects have done in similar cases. It is not that we want to find a precedent for all our work—that would be a poor and profitless task; but that the things seen will convey impressions to the mind which drawings can never so clearly express."

The last point he would commend to their notice was usefulness. Let their work be directed to a practical and useful end. A large proportion of their time was spent in their master's service, and by making themselves useful to him, by making his interests matters of moment to them—they would increase their own experience, develop their responsibility, and further their education. It was a grave mistake for an assistant to do other than render the fullest assistance he could to his employer; it was also as grave a mistake for an employer to place any hindrance in the way of the development and improvement of his assistants, for thereby he injured himself, as the more capable the assistant so much the more valuable the services rendered. The main factor for the older man's guidance was to remember that the mind of the younger one required, as new facts, those experiences of his that to him were almost commonplaces; not to be tired and bored with the continual searching after new facts which was the sign of a healthy young personality; and to bear with the desire for a little change or relaxation; while the younger man should think that there may be worries and vexations attached to a practice that inevitably ruffle the temper on occasions, and that a mind filled with the complexities of a modern town hall design could hardly manifest an overwhelming interest in the niceties of a thick versus a thin line in a student's drawing. And while on the subject of lines he would say that it should always be their aim to clearly express in their drawings what was in their mind, to make them workmanlike, practical and complete, so that when they had finished them they would be dismissed as something done, and could be clearly read by an intelligent person. Perhaps this was not a high ideal, no dreaming of sermons in stones and the glorious mysteries of mighty cathedrals; but they would find the realisation of it would save them many pin pricks that go to make up life's experiences, and perhaps form the mind so as to enable them to conceive those grand architectural visions which he hoped it might one day be their good fortune to see realised.

Mr. H. Tanner, Junr., proposed a hearty vote of thanks to Mr. Cave and Mr. Gibson for their remarks. He should like to emphasise one point made by Mr. Gibson, i.e., the importance of observation. By observation—by riding on a 'bus, for instance, for the purpose—a great deal could be learnt—and a great deal of what to avoid, too, which was a matter that helped students sometimes. As Mr. Cave said, they should not copy, but they could learn the good points of other people's designs.

Mr. H. P. G. Maule seconded the vote of thanks. Those who heard Mr. Cave last session on the bay window subject would look forward to his treatment of the subject he was going to take this session.

The Chairman said he would like to refer to one point in Mr. Cave's address, which was made expressly to students, and that was in regard to tradition and what had gone before. It was so much better to produce even a more or less commonplace design providing it was on safe lines, and showed evidence of study than to do something which was eccentric; and although they might not be producing a design which pleased their own fancy so much he was sure they were doing themselves as students more good by following tradition in their present stage than by attempting anything too original.

The vote of thanks was heartily agreed to.

Mr. H. Tanner, Junr., announced the following meetings:—Elementary Class—November 3rd. Subject "A Stone Chimney Piece and a Wooden Chimney Piece," visitor Mr. E. Guy Dawber. Advanced Class—November 10th. Subject "Country Bank and Manager's House," visitor Mr. Walter Cave.

The meeting then terminated.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The following is the list of ordinary general meetings for session 1903-1904.—November 2, President's opening address. November 16, "Le Trésor de Cnide et les Monuments de l'Art Ionien à Delphes," by Monsieur J. T. Homolle (Hon. Corr. M.). December 14, the Royal Victoria Hospital, Belfast: Its Inception, Design, and Equipment," by Messrs. Wm. Henman and Henry Lea, C.E.

1904:—January 18, Award of prizes and studentships; paper, "Architecture in Lead," by Mr. J. Starkie Gardner. February 1, President's address to students; presentation of prizes. February 15, "The Bacteriological Disposal of Sewage from Isolated Buildings," by Professor Frank Clowes, D.Sc. March 14, "Plaster Decoration," by Mr. J. D. Crace. March 28, "Electric Generating Stations," by Mr. C. Stanley Peach. April 18, "The Statues of Wells Front, with some Contemporary Foreign Examples of Sculpture," by Mr. E. S. Prior. May 16, "The Planning of Collegiate Buildings," by the Rev. J. B. Lock, M.A., Bursar of Gonville and Caius Coll., Camb. June 20, Presentation of the Royal Gold Medal.

War Memorial, Derby.—A memorial has been erected at Derby by the Midland Railway Company to those of their employees who fell in the late war. The memorial consists of a plate of red bronze chiselled so as to leave the names in relief. The size of the tablet is about 9 ft. by 4 ft., and it is in a frame of green faience tiles. Messrs. Hardman and Powell, of Birmingham, have executed the work, and it has been fixed and chiselled under the supervision of Mr. C. Trubshaw, the architect.

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LIVERPOOL ARCHITECTURAL SOCIETY.*

PRESIDENT'S OPENING ADDRESS.

GENTLEMEN,—Allow me to thank you for the pleasure and privilege you have given me in re-electing me as your President for the ensuing year. I deeply value this confidence reposed in me, and appreciate your courtesy and kindness.

At the present time, when the country is being agitated by the fiscal policy, and questions of future prosperity are being carefully considered, the thoughts that naturally arise in our minds will be those that touch the prosperity and well-being of our city, and to watch carefully the signs of the times as regards our own profession. I feel confident that the opinions and actions of the great bodies that control this City will be a satisfactory index to show that Liverpool is rapidly increasing, and that good architecture will be more and more in demand.

Take first the Dock Board, the finest business combination in the world; this Board does not consider we have reached the summit of our commercial success, or it would not now be building the new magnificent block of offices for future administration of its trust. The merchants of Liverpool do not think business has gone to the dogs, or why should they contemplate a new Cotton Exchange? The City Councillors are not standing still; their schemes are almost Utopian in their magnitude, and their borrowing powers for millions are always eagerly sought after by capitalists and investors. The Church does not think Liverpool's progress at an end, or why should she contemplate placing in her midst the greatest cathedral of modern times for the use of the diocese? Education looks forward to a greater City, and has inaugurated a University.

These all point to the conclusion that our City must occupy the proud position of being one of the great commercial centres of the world, and in its advancement architecture must and will take its full share in the making of it.

It is a good sign when our municipal rulers are determined to beautify the City as far as lies in their power, thereby attracting visitors who will be a benefit to its residents. Their task is a difficult one, for the City has simply grown haphazard and the streets anyhow.

Consider that, with the exception of the Exchange flags, we have no really grand finished street or square that is not marred by some mean or unsightly block of property, nothing that is in advance of what you can find in other cities, no part that the inhabitants are really proud of, such as Princes-street, Edinburgh, for the Scots, or Sackville-street, Dublin, for the Irish. I say it is a good sign of the times that our Corporation is alive to this defect, and is doing its best to remedy it.

The past generation left us St. George's Hall, and this has continued to be the pride of the City; round this the various committees of the Corporation have spent, and are spending thousands and tens of thousands of pounds to make it one of the centres worth a visit. The north side of this square is now practically finished, but the completion of a grand scheme is spoiled by the surrounding property on the other sides.

What I should like to see would be new law courts, such as Birmingham possesses, planned for conveniently carrying out the law, and St. George's Hall used for one purpose only, say a people's hall, with exits on to the new terraces and gardens adjoining, now being developed, where music could be heard the year through, either inside or out. Or St. George's Hall used exclusively for the courts, and a new hall built on the same scale as a people's hall with the organ removed into it, and where the enjoyment of the one would not mar the business of the other.

May I advise the students, who want to study the various methods of planning steps, to take the several buildings surrounding St. George's Hall? The Sessions House has one method, the Art Gallery one a little more pretentious—but this is not very comfortable. Then we come to the Library, and here is a difficulty; the way in is not the way in, but the public entrance is next door, and equal to that of a small suburban villa; then the final and last effort, the grand approach to the building which contains our odds and ends; all these wonderful flights of imagination and steps, beautifully joined together with their little grass plots, are very interesting, but one might possibly have wished that a stone terrace had been carried from one stair to another, either on columns or otherwise, so that it would have been unnecessary to have such a going up and down stairs to the Public Galleries. The Technical Schools are not in competition, the architect placing them round the corner.

Soon most of these buildings will be too small for their work. The Art Gallery is only a pigmy compared with those in continental cities, which are not so important as Liverpool, and no doubt it will have to make room for one much more pretentious and commodious. The art interest will last, and a picture gallery worthy of encouraging it will be a necessity. The Library will some day, let us hope, be able to absorb the public room beneath for its own work, and provide cloak rooms and other modern requirements.

I sincerely hope the Corporation will watch the streets which lead to the site of the proposed Cathedral, as opportunities may occur to open up a grand thoroughfare from the centre of the City.

These are some of the greater works with which the Corporation will doubtless deal, but there are many other matters smaller but quite as important. We acknowledge they are an artistic body, for have they not made by-laws as to posting advertisements on the hoardings of buildings in erection to avoid startling the sensitive feelings of the passers-by? Then why should the unfortunate passengers of the tramcars be sandwiched between all kinds of advertisements—milk, biscuits, blacking and what not? Why the tramcars? There are many other vehicles which could be utilised for this purpose—dust carts, water carts, patrol waggons and water barrels. If it is necessary to decorate the cars, the present way of covering them with advertisements is very ordinary. I don't think it is even done in Glasgow.*

The question of greater Liverpool is a very interesting one, many considering that all thoroughfares leading into a city should be under the administration of that city; but it has been decided otherwise, and the courtship of Liverpool and Bootle has almost equalled the courtship of Miles Standish. When the wooing seemed to be prospering, and our gay City seemed almost within distance of attaching the last rib to complete the body municipal, Bootle turned coy, and now prefers single blessedness, and by this whim retains possession of her own property and the management of her own estate. Whether this will be an advantage or not time will show.

Those members who followed the proceedings of the Congress of Health recently held here, and who have studied the handbook issued by the Local Executive Committee, will form some idea of the enormous amount of administration which goes on from day to day for the health and well-being of the inhabitants. In the handbook a considerable space is taken up with the subject of artisans' and labourers' dwellings. The subject is threadbare, but, nevertheless, important. I think the housing of the middle classes should command further attention. The pitiful line of ugly streets, the everlasting repetition, the want of grouping and planning is the ruin of our suburbs. There is a demand for more artistic small houses, and men will pay more for them, but the supply is absurdly small.

This important subject has not escaped the eyes of our secretaries, and they have the promise of a lecture by Mr. Frank Rimmington on small houses of to-day and their architects. Further than this, Mr. Austin Taylor's address on the Housing Question, published in the "Journal of State Medicine," shows that at least one of our City Councillors has many valuable suggestions to offer on the subject.

The importance of residential flats for a place like Liverpool, with its ever-changing population, is a subject worth discussing, as well as the difficulties of erecting them under the present building by-laws. It is surely advisable to keep the citizens, who would inhabit them, rather than compel them to go to some suburban district to get the accommodation they want.

The method of conducting competitions is now being carefully watched by the Competition Reform Society, and there is one point I cannot allow to pass without comment. I refer to the several cases where the assessor is made joint architect with the successful competitor. It can be easily seen that such an arrangement is opening the way to what may in the end turn to a serious abuse of the honour and confidence reposed in an assessor, and I think the Society should strenuously oppose such partnerships.

These thoughts, strung together, may be taken as a sample of the many subjects upon which architects are supposed to be fully alive, and make one wonder what is the limit of the requirements of our profession. Who can sum them up, the questions we are constantly asked to advise and decide on, the subjects with which we are supposed to be familiar? Art, of course, both constructional and applied, every material new and old, from marble to nails; everything required inside and outside of buildings, whether palace, workhouse, asylum, office or residence, from the ground they stand on to the smoke that issues out of the chimney. Cannot the cook make a good dinner? It cannot be the fault of the cook, it must be the range. Send for the architect. The water is not always hot—never mind if the fire is out the tap is stamped "hot," so send for the architect to find out the defect; and thousands of such troubles weekly. Surely an architect is a living Encyclopedia Britannica, to be applied to whether the world goes right or wrong.

I feel sure the syllabus you have received will testify to the vitality of our Society; and also to the labour and indefatigable interest taken in it by our Secretaries. Take one or two only of the prospective subjects. Mr. H. Chatfeild Clarke will lecture on the Bill for altering the law of Ancient Lights, a subject full of importance and interest. Light is certainly an ancient question, for if I quote right, when the word went forth, "Let there be light," it certainly was the beginning of the contract for making the earth, and is certainly very ancient; but why when it goes through a window it should be called ancient after only twenty years' tenancy is rather an insult and a conundrum—a time not sufficiently long to season good wine.

We hope to have the pleasure of welcoming amongst us Mr. G. Gilbert Scott, to read as a paper, "Notes on the Liverpool Cathedral." There will be other lectures upon subjects equally interesting.

In opening this the fifty-sixth session of our Society, I hope it will continue to do the good work it has already accomplished. Liverpool has as many good examples of modern architecture as can be found in any city of its size, many of which will remain as long as she exists, but nevertheless I feel we are only at the beginning of the making of a great city. The growth of the population is by leaps and bounds. The streets are too narrow, the trams of yesterday can hardly cope with the demands of to-day. The overflowing traffic congests the already enlarged railway stations, places for public meetings and amusements are only in their infancy, and when provision has to be made for the airships of the future and other modes of conveyance, you will agree with me that we are only yet emerging from the dark ages. Later on we shall find the Mersey clear and the water its natural colour, no filth will be allowed to be poured into it without being purified; we shall find that the smoke problem has been for ever settled, and soot and fumes banished from the atmosphere, and Widnes transformed into a Garden City. Even when all these changes are still in progress and accomplished, the architect will still be a necessity for the realisation of the highest and best, for the comfort and progress of mankind.

I cannot close without expressing my regret at the loss the Society has sustained since our last meeting. We have lost from our midst a member who had all the possibilities of a successful career, one who, last session, took a prominent part in the debates of the Society, and who will be a missed man amongst us. I refer to Mr. James H. Cook.

The other loss is the removal of Professor Simpson from this city to a more extended sphere of work in London. To the members of the Committee who have been in constant touch with him in regard to this Society, I feel I am only expressing their views when I say his place will be difficult to fill. The care, enthusiasm and hard work he did have been of great benefit to the Society, and in parting we wish him every success and prosperity in his new and extended sphere of work.

* Address delivered by the President, Mr. J. Woolfall, F.R.I.B.A., at the opening meeting of the Session on the 12th inst.

* Mr. Woolfall is quite right. The Glasgow tram-cars are entirely free from advertisements.—ED.

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EXHIBITION OF BUILDING IMPROVEMENTS, BRIGHTON.

The following are the awards made by the Jurors appointed by the Committee :—

The silver cup, to the Art Pavements and Decorations, Ltd.

Class 1.—A gold medal to the Art Pavements and Decorations, Ltd.; a bronze medal to Messrs. Meed, Bros.; a bronze medal to Messrs. Elliott and Son, of Hastings; a diploma to the Crowborough Brick Co.

Class 2.—A silver medal to Messrs. Gilkes and Son; a bronze medal to Messrs. Perry and Sons (Duke-street); a diploma to Mr. Boekbinder; a diploma to the Sussex Cement Co.

Class 3.—A diploma to the Uralite Co.

Class 4.—A gold medal to Messrs. Morris and Co.; a diploma to Mr. A. W. Loomes; a diploma to the British Challenge Glazing Co.

Class 5.—A silver medal to Messrs. Elliott, of Caversham; a diploma to the Karri Co.; a diploma to the Lift and Hoist Co.

Class 6.—A gold medal to Messrs. George Jennings and Co.; a diploma to Maughan's Geysers (E. Long and Co.); a diploma to Messrs. E. G. Brown, Ltd.; a diploma to Mr. Shoesmith.

Class 7.—A silver medal to Messrs. Yates, Haywood, and Co.; a bronze medal to Mr. Saunders, of Black Rock; a bronze medal to Elphicks Fire Alarm; a diploma to Mr. F. V. Hadlow.

Class 8.—A diploma to Mr. Phillips for photographs.

Class 10.—A diploma to Messrs. Foulger and Co.

Class 11.—A bronze medal to the Herne Hill Rustic Works.

INSTITUTE OF SANITARY ENGINEERS.

On Wednesday evening a meeting of this Institute was held at 19, Bloomsbury-square, when a discussion took place on the paper read before the Institute on February 11 on "The Biological Treatment of Sewage; some facts and figures compiled from three years' working of Bacteria Beds." by Mr. J. Freebairn Stow, Surveyor to the Uxbridge Rural District Council. Mr. W. J. Dibdin (President) was in the chair.

Mr. E. Durrent Cecil (Croydon) opened the discussion, and said the chief point he wished to refer to was as to the efficiency of upward filtration. He would like to know why upward filtration should not be a means of dealing with sewage. The action of the bacteria must be taking place both in the upward filter and in the large open beds, and if the filter in upward filtration became clogged with anærobic matter that was no great objection, because the upward filter simply became a modified septic tank.

Mr. E. R. Palmer (Beckenham) observed that the results described in the paper showed that the biological treatment of sewage adopted at Uxbridge was good, and therefore he did not see why it should be necessary for the effluent to be passed over land again. Surely if the bacteria beds were working satisfactorily this was unnecessary, and the effluent might with safety be discharged into the stream. The expense of working, however, appeared to be unduly heavy, and the figures given worked out at 8*l.* 15s. 4d. per annum per million gallons. Presumably the pumping required to lift the sewage accounted for this expense. With regard to the precipitation tank he agreed that this would help the process very much in partially preparing the sewage for the bacteria beds. He agreed with the increase in the depth of beds, and so far as upward filtration was concerned considered it was entirely a wrong principle to apply to the purification of sewage.

Mr. Martin remarked that there was little in the paper with which he could quarrel, and he felt that the various conclusions arrived at by the author were such as any fair-minded man was bound to come to. He desired to emphasise in the strongest possible way what Mr. Stow said as to the fatuity of laying down expensive works for sewage disposal and then turning them over to the tender mercies of unskilled labourers. The management of sewage farms required skill, knowledge and experience, and this fact ought to be recognised by local authorities. With regard to the loss of capacity in coarse beds, while undoubtedly solid matter could be broken down in them it was a waste of money to provide space for the distribution of solid matter or to load it up with inert material of any kind. So far as he could see the whole of the space available was required and should be devoted to the working of decomposition through the agency of bacteria. Many experts whose opinions were entitled to weight resorted to the practice of sending their liquid on to the beds without distribution, but he found himself in agreement with Mr. Stow that it was eminently desirable that every part of the bed should have its fair share of work. If there was any point on which he disagreed with the author it was with regard to the depth of the beds. He had been connected with installations in which he had only been able to get a fall of 2 ft. or 18 in., and the result had been eminently satisfactory. He was in fact now about to provide a bed with a depth of only 9 inches, and he believed the effluent would not be objected to by the rivers authority.

Mr. Griffen (Chingford) said he was in agreement with the author that burnt clay was an unsuitable medium to use in the bacteria beds. His experience of a couple of burnt clay beds was that for a time they worked admirably, but now they had gone back to nearly their original condition, and the effluent which came from them was as bad as it could possibly be. That was in spite of previous precipitation.

Mr. J. W. Chilvers (Newmarket) considered that the cost of the scheme—120,000*l.*—seemed an enormous amount of money for a population of about 12,000, and he took it that it went over a very wide area. The author had stated that the engineer was mislead as to the subsoil at Hillingdon, but seeing that the scheme took nine years to carry out, he was surprised that the engineer did not find out the nature of the subsoil by then. The author did not tell them what became of the sludge. As to no smell arising from the sewage works, his experience was that whenever they came into contact with sewage works in the ordinary way there was a smell.

Mr. Jenkins (Harlow) was struck with the expense of the working—800*l.* a year. Mr. Cecil had also told them that he was told the system was offensive.

Mr. S. Flint (Grays) pointed out that in the first scheme described there was a receiving tank capable of holding a night's flow, while in the second system there was no such tank. He suggested that some of the solid matter got broken up in the receiving tank. Even in long sewers, if there was only a slight fall, septic action would take place before the sewage got to the works where it was to be treated. He knew a place where the sewage after it reached the works was not treated at all, and was passed by the inspector. He did not think many of them were blessed with beds capable of being so well aerated at 3 ft. depth. Most of them had to have them deeper. At the same time, the beds could be made too deep, and he had found by taking samples from a bed 6 ft. deep, that the effluent from the top 3 ft. was decidedly better than that taken from the bottom, because the first 3 ft. had the better chance of being aerated.

Mr. Hadwick thought the top 3 in. of the bed was better than the lowest 3 in., as the top got more aeration, and therefore he could not understand why it was that Mr. Stow got no good results from the top 3 in. of the bed.

Mr. Hughes (Hampton) referred to the author's remarks on the distribution of sewage on coarse beds. He himself had had some experience of channels in the beds, and had no doubt that they collected the sludge. That sludge, however, had to be removed, which necessitated walking on the surface of the bed, which consolidated the surface and broke up the material. His experience was that the least the bed was disturbed the better. With regard to the bed doing its work, he maintained that it was immaterial whether the front of the bed received the sludge or whether it went all over the surface. As to upward filtration, his idea was that it should work properly if properly constructed.

Mr. Fieldhouse (Chichester) considered it would be well if they could decide on a certain type of tank for a certain type of sewage. He believed in having distributing channels for the bacteria beds. He considered that clinker was best for the beds, but some persons advocated shingle, and he would like to hear opinions on it.

The Chairman touched on various points which had been raised, and said it was well recognised that sludge was always with them, and the question was how to get rid of it in the most economical and inoffensive manner. To his mind, that was the crux of the whole question. He did not suppose there was one there who would have the slightest difficulty in getting a good effluent, but if the question was put, "How to get a minimum sludge at a minimum cost, with a minimum nuisance," there would probably be a considerable divergence of opinion. There was a thing which had occurred to him which might overcome the difficulty of sludge, but it had not yet been practically tested. He thought they might lay down stoneware flat plates in the beds, to which the sludge would adhere; these plates could easily be lifted and cleaned. With regard to the use of burnt clay, this was important, as it affected cost. He had had burnt clay beds at work for five years, and if only the clay was burnt properly, it formed an excellent material at a very cheap rate. As to the depth of the bed, he had put down a bed of only 12 in. depth, and it was satisfactory. As a general rule, it was desirable that the bed should not have water standing on it, but it was not a serious matter.

Mr. Stow in reply remarked that he was a strong disciple of Mr. Dibdin, who he considered was better entitled to speak on the subject than any man living. It was on his (the speaker's) recommendation that the system at Uxbridge was made an absolutely separate system. They were told that a certain amount of water from back yards, etc., must go into the sewer, but at Uxbridge and Henley-on-Thames, and he believed at Hampton, it was dealt with separately, and when it was a question of pumping sewage two or three times it was most necessary for the sake of economy that such a scheme of sewage should be on the separate system. With regard to the subsoil at Uxbridge, Mr. Anstie, the engineer, understood that there was no water in the ground. It was soon found that there was, but the matter was not reported to the Council, with the result that stoneware pipes were used and now the leakage was very bad, and they were replacing the pipes with iron. As to upward filtration the filter was always full, and they had not only inorganic matter in the bottom of the filter, but they had organic matter which ought to go on the bed to do its part. There was a little misapprehension as to distributing channels in coarse beds. When he came upon the scene at Uxbridge a screen chamber was being constructed, and its design was absolutely wrong, and in order to save the beds for a time they put in those channels to distribute the sewage all over the beds and to catch a certain amount of sludge which they did not require now. There was no smell in connexion with the joint drainage scheme, and part of the farm had recently been offered as building sites and had fetched high prices. As to putting the effluent for the bacteria beds over land that the Local Government Board had to answer for, and he thought when the report of the Royal Commission was given the Board would see the error of their ways. The heavy cost of working was due to the pumping. As to Mr. Martin's views on distributing channels he himself thought they were most necessary in any scheme of bacteriological treatment. As to the depth of beds he did not see how superficial area could compensate for cubic capacity. He was strongly of opinion that clinker was the right thing for bacteria beds. As to the cost of the works the primary estimated cost for the joint scheme was 26,000*l.*, but it really cost 56,000*l.*, and he had spent 11,000*l.* on it. It was most important before any scheme of sewage disposal was carried out to spend money in the examination of the subsoil of every road.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Battersea Borough Council 9,514*l.* for electric lighting purposes; Finsbury Borough Council 3,691*l.* for paving works; Hammersmith Borough Council 8,455*l.* for similar works; Lambeth Borough Council 6,245*l.* for a similar purpose; Poplar Borough Council 2,040*l.* for pipe-sewer works, and Shoreditch Borough Council 8,290*l.* for street improvements and paving works. Sanction was also given to the following loans:—Islington Borough Council, 1,300*l.* for paving works, and Westminster City Council 19,298*l.* for paving works.

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Proposed Rebuilding of Lambeth Bridge.—Some discussion took place on the proposed rebuilding of Lambeth Bridge, arising out of the report of the Bridge's Committee. The Committee reported as follows:—

"In considering the kind of bridge which should be erected in place of the present structure we have had due regard to the position which Lambeth Bridge occupies upon the river, and have also borne in mind the resolution passed by the Council on 15th February, 1898, that the new Vauxhall Bridge should be built of masonry. The question of the gradients practically decides whether it is to be constructed of steel or masonry. At present the gradients are very steep, being from 1 in 19 to 1 in 22 on the north, and from 1 in 20 to 1 in 23 on the south. Under an agreement entered into in 1897 with Messrs. Doulton for the setting back of their premises, the Council cannot raise the level of the centre of the road at the junction of the bridge approach with Lambeth-road and the Albert Embankment more than 3 ft. 10 in. above the present level, and as a result that height fixes the level of the commencement of the road over the bridge. Our attention has also been drawn to the fact that, even if the restrictions placed upon the Council with regard to the headways and waterways of Vauxhall Bridge were considerably relaxed in the case of Lambeth Bridge, a masonry structure could not be built with a better gradient than 1 in 25, which is about the same as the northern approach to Southwark Bridge and which, on account of its steepness is little utilised for vehicular traffic going southwards. On the other hand with a steel bridge a gradient of 1 in 30 can be obtained and better facilities for navigation afforded during construction than has been the case at the new Vauxhall Bridge. As it was most desirable that a satisfactory understanding should be come to between the Council and the Thames Conservancy Board before Parliamentary powers were sought, we submitted to the Board a drawing showing generally the possible headways and waterways, both temporary and permanent, which could be provided under a granite or masonry bridge having a road gradient not steeper than 1 in 25. As the result of a conference between the Thames Conservancy Board and representatives of the river traffic interest, certain conditions have been imposed, one of which is as follows:—'that the headway of the openings of the temporary works in the two side arches adjacent to the centre arch should not be less than 15 ft. above Trinity high-water mark.' This condition, the engineer informs us, would preclude the construction of a granite or masonry bridge with reasonable gradients. Under the circumstances, it appeared to us that there was no alternative but to erect a steel bridge, and we accordingly submitted to the Thames Conservancy an alternative sketch which has been approved so far as it relates to the headways and waterways. With regard to the width of the proposed new bridge, we have come to the conclusion that 60 ft. will prove sufficient for present and future needs. This is more apparent when it is remembered that upon the east side there is Westminster Bridge, 84 ft. in width, and upon the west side, and within a very short distance there will be the new Vauxhall Bridge, 80 ft. wide, constructed so as to carry a double line of tramway across it. We have therefore had prepared estimates upon the basis of the bridge being 60 ft. wide. In the event of an 80 ft. structure being decided upon, it would be necessary to add 33 per cent. to the cost of the engineering works. The cost of acquiring property includes what is necessary to make the road approaches either 60 or 80 feet wide; but in the event of the smaller bridge being constructed, the amount of surplus land available for disposal would necessarily be more. The estimated expenditure is made up as follows:—

New bridge	£350,000
Embankment wall and paving on wharf area	30,000
Subway to hydraulic power company's works	5,000
Approaches	25,000
Design and supervision	10,000
Contingencies (10 per cent.)	42,000
	462,000
Acquisition of property (gross)	410,000
	£872,000

We would remind the Council that the temporary bridge between Lambeth and Vauxhall bridges, which now takes the traffic diverted from Vauxhall Bridge, will serve for Lambeth Bridge, and consequently it will have to remain where it is until the new bridge at Lambeth is finished. This temporary bridge is, without doubt, a serious obstruction to navigation, and its removal as soon as possible is to be desired. For this reason, in addition to those above referred to, we strongly urge the Council to seek powers for the rebuilding of Lambeth Bridge in the ensuing session of Parliament. The solicitor reports that the Council has power to make application for the purpose under section 144 of the Metropolis Management Act, 1855.

The reconstruction of this bridge was regarded as a necessity when evidence was given before a Committee of the House of Lords in the case of the London County Council (Improvements) Bill, 1900, dealing with the Westminster improvement scheme. Further, that in connexion with the Westminster improvement now in hand, the Improvements Committee have asked what levels should be fixed in respect of the work about to be carried out in Horseferry-road and Millbank-street, both of which thoroughfares form approaches to the proposed new bridge, and are dependent, therefore, for their levels upon the rebuilding of Lambeth Bridge. The design of the proposed new bridge has been prepared on the assumption that the altered level of the road at the junction of Grosvenor-road, Horseferry-road, and Millbank-street will be 9 ft. higher than the existing surface, and 6 ft. higher than the level to which the streets of the Westminster improvement can be constructed without further parliamentary powers. The Improvements Committee have informed us that the London Hydraulic Power Company and the Westminster Electric Supply Corporation have already called upon the Council to fix the levels of the new road with a view to the reinstatement of their premises. If, therefore, the new buildings in Millbank-street are allowed to be proceeded with at once at the lower level, it will be necessary to considerably interfere with them when Lambeth Bridge is rebuilt, involving, it is estimated, an additional expenditure of 100,000*l.* In addition, the value of the surplus land left over from the Westminster improvement will be seriously prejudiced, in fact, will either remain vacant until the levels can be fixed, or will be let at a considerably reduced ground rent, thus making recoupment dependent upon reconstruction of the bridge. This, we understand, will represent a considerable increase upon the 100,000*l.* above referred to, and the total capital loss to the Council may approach as much as 200,000*l.* . . ."

The Committee recommended:—

(*a*) That the standing orders of the Council, limiting the period for considering applications to Parliament, be suspended, so far as may be necessary, to enable the Council to consider the following recommendation of the Bridges Committee with reference to an application to Parliament in the session of 1904.

(*b*) That parliamentary powers be sought in the session of 1904 to enable the Council to rebuild Lambeth Bridge.

After debate, a division was taken, when 41 voted for the motion and 41 against. The Chairman explained that as it was a question of suspending the standing orders the motion could not be carried after that vote.

Rotherhithe Tunnel Construction.—The same Committee recommended:—

(*a*) That the estimate of 1,340,000*l.* submitted by the Finance Committee for the construction of Rotherhithe Tunnel, be approved, and that the Bridges Committee be authorised to incur expenditure up to that amount.

(*b*) That the Bridges Committee be authorised to prepare the specification and plans and to issue advertisements inviting tenders for the construction of Rotherhithe Tunnel.

They reported as follows on the scheme:—

"The total length of the tunnel and its approaches will be 6,883 ft., or about 1¼ miles; the external diameter will be 30 ft., or 3 ft. larger than the Blackwall Tunnel, thus allowing a carriageway of 16 ft., the same as at Blackwall, and two footways, each 4 ft. 8¼ in., as compared with 3 ft. 1½ in. at Blackwall Tunnel. The headways will be 18 ft. 6 in. at the centre of the carriageway, and 16 ft. at the channels, as compared with 17 ft. 6 in. and 14 ft. 7 in. respectively for the Blackwall Tunnel. It will be seen from these figures that the accommodation for traffic in the Rotherhithe Tunnel will be decidedly superior to that in the Blackwall Tunnel. The open approach will commence on the south side of the river at the junction of Union-road with Lower-road, direct access to the open approach being provided not only from the main thoroughfare, but also from Neptune-street, Albion-street, and Adam-street. It will be constructed along the south side of Adam-street, and will cross over the East London Railway by a bridge at Rotherhithe station. The cut-and-cover portion will extend from the railway to a point near Clarence-street, where the first shaft will be situate, and the actual tunnel construction will commence and continue to the second shaft, near the Surrey lock entrance of the Surrey Commercial Docks. From here the tunnel will pass under the river to the third shaft, which it is proposed to sink on the site of the New Star wharves, near Shadwell fish market, the fourth shaft being placed on the north side of Broad-street, just to the east of Collingwood-street. At this shaft the cut-and-cover construction will re-commence and be continued parallel to Broad-street as far as Butcher-row, at which point the open approach will re-commence and be continued by a curve to join Horseferry Branch-road. In connexion with the construction of the tunnel, a part of Horseferry Branch-road and the span of the bridge carrying the London and Blackwall Railway over that road will be widened from 40 ft. to 60 ft (in lieu of 70 ft. as originally proposed, with the result that a considerable saving will be effected); Broad-street, Medland-street, Butcher-row, and portions of Collingwood-street and Rose-lane will be widened to 40 ft. Upon the south side, Adam-street will be widened and extended to Brunel-road, and a portion of this work is now being executed by the Works Department. It is also proposed to construct underground conveniences at the entrances to the open approach on both the north and south sides. These impovements, incidental to the scheme, will undoubtedly prove of great benefit to the districts of Stepney and Bermondsey.

The drawings, specification, etc., for the work are now so far advanced as to admit of tenders being invited, but before this can be done it is necessary to obtain the authority of the Council to incur additional expenditure. In October, 1901, a preliminary vote of 4,500*l* was obtained, and in May, 1903, 4,685*l.*, in connexion with the formation of the new street, referred to above, from Swan-lane to Brunel-road, was authorised to be incurred. A further sum of 1,340,000*l.* for the construction of the tunnel is required, and this will include the cost of the shafts and iron tunnels, the brick and concrete covered ways to be constructed on the cut-and-cover system, the open approaches, the bridge over the East London Railway, all the street widenings, with the exception of that now being carried out by the Works Department, and all the works complete with the exception of the entrance houses, electric light station, and the bridge and paving works under the London and Blackwall Railway.

It is estimated that the works will not be fully completed for about five and a-half years, and that during this period the expenditure incurred each year, which is based upon experience gained at Blackwall Tunnel, will be as follows:—1904-5, 150,000*l.*; 1905-6, 250,000*l.*; 1906-7, 330,000*l.*; 1907-8, 220,000*l.*; 1908-9, 220,000*l.*; 1909-10, 160,000*l.*; 1910-11, 10,000*l.*"

After considerable discussion and the defeat of an amendment to refer the matter back, the recommendations were agreed to.

Fire Stations, Holloway and Eltham.—The Fire Brigade Committee recommended, and it was agreed

That the estimate of 2,050*l.* submitted by the Finance Committee in respect of the acquisition of No. 1A, Hertslet-road, Holloway, be approved; that the freehold of those premises be acquired for 2,000*l.*; that the solicitor do complete the matter; and that the seal of the Council be affixed to any necessary documents in connexion with the purchase.

That the estimate of 10,100*l.* submitted by the Finance Committee in respect of the erection of a new fire station at Holloway on the site of Nos. 80 ,82, and 84, Mayton-streeet, No. 1A, Hertslet-road, and the yard of the Holloway station be approved; and that the Fire rigade Committee be authorised to make the necessary preliminary arrangements for the erection of the building.

That an expenditure of 7,006*l.* for the work of erecting the Eltham sub-station be authorised; that the work be executed by the Council without the intervention of a contractor; and that the drawings, specification, quantities, and estimate be referred to the Works Committee for that purpose.

Tube Railways.—Mr. Evan Spicer asked the Chairman of the Highways Committee, in view of the recent underground railway disaster in Paris, what were the powers of the Council in regard to the supervision of the construction and working of tube railways and stations from the point of view of the public safety.

Mr. Benn, in reply, said the Council had no powers with reference to tube railways, so far as affected the safety of the public, except with regard to the approval of plans from the Building Act and Street Improvement point of view. The Board of Trade was responsible for the Tube Railways.

Main Drainage Extension: Southern Outfall.—On the recommendation of the Main Drainage Committee it was agreed that the expenditure of 1,495*l.* be sanctioned in respect of work incidental to the connexion of the new sewers with the existing outfall sewer at the Crossness outfall; and that the acceptance of the offer of Messrs. J. B. Squire and Co. to undertake the work for that amount as an extra upon their contract with the Council be confirmed.

By-Laws.—The Public Health Committee

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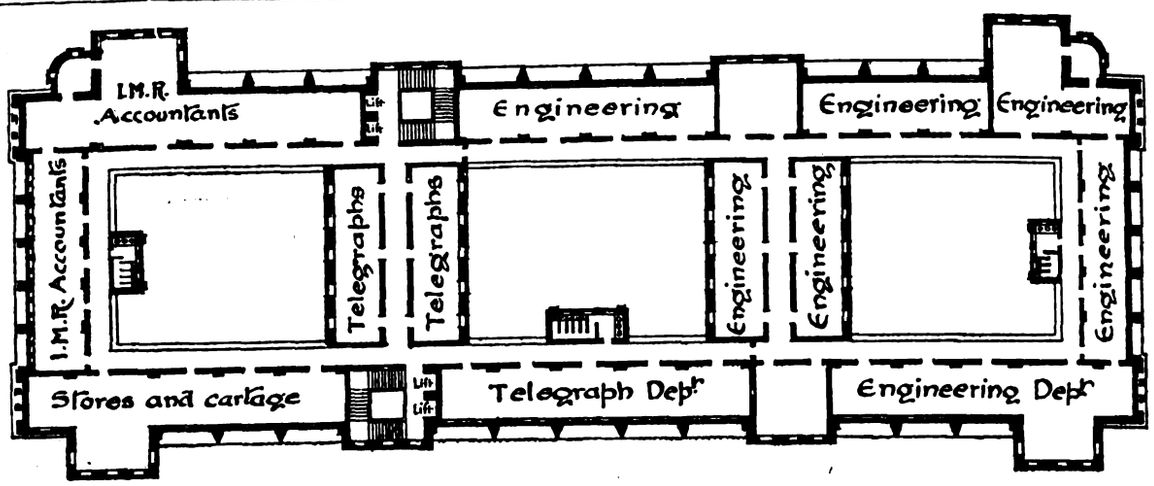
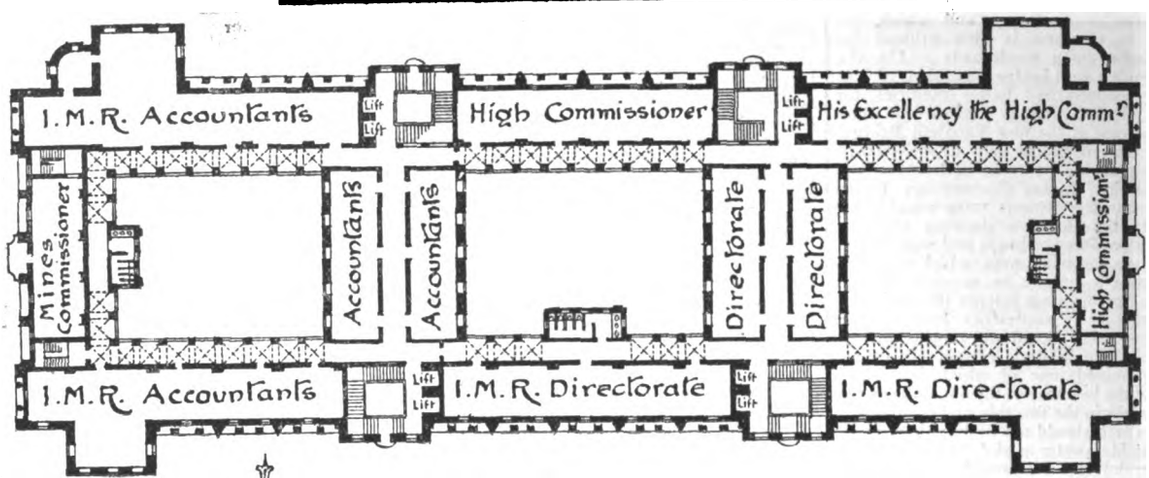
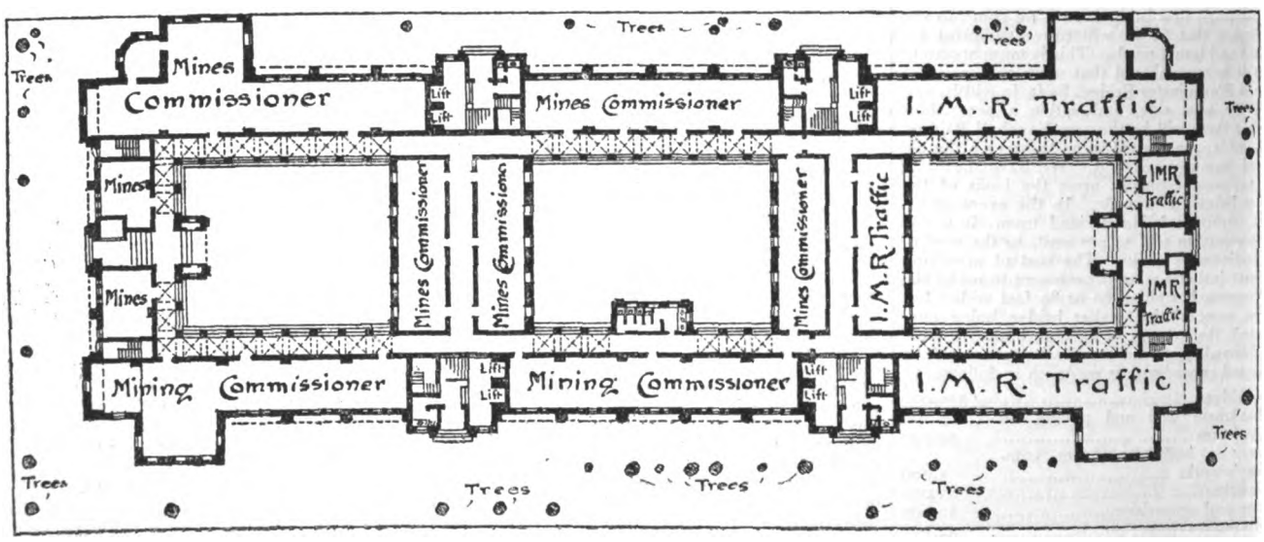


SECOND FLOOR PLAN



FIRST FLOOR PLAN



GROUND PLAN

Government Offices, Johannesburg. Plans. [*See opposite page.*

reported that the following by-laws were now in force: By-laws as to plans of drains and by-laws respecting common lodging-houses.

Flood Prevention.—Mr. Cleland moved that, having regard to the serious danger to health and damage to property by the frequent floodings in the vicinity of Loampit-vale, it be an instruction to the Main Drainage Committee to consider and report as to what steps could be taken to obviate the recurrence of such floodings pending the construction of the new sewer from Catford to Crossness.

Mr. Goodman, Chairman of the Main Drainage Committee, said that his Committee were doing everything in their power to obviate these floods. They were at present engaged in a great scheme, calculated to cost 3,000,000*l.*, for an extension of the main drainage system of London. They were spending the money as fast as the engineer could get out the plans. He hardly thought in view of these facts that the Council would sanction any large expenditure in temporary measures in any particular locality.

The motion was adopted.

The Council having transacted other business adjourned.

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Illustrations.

"THE TEMPLE," OLD PARIS.

BY THE LATE H. W. BREWER.

THIS is one of the last two drawings which Mr. H. W. Brewer made for us. It is a restoration of the ancient fortress or prison of the Temple, which formerly stood on a site between the Boulevard du Temple and the Rue du Temple. In the tower, which was not destroyed till early in the nineteenth century (the precise date seems uncertain), Louis XVI and Marie Antoinette were confined.

The site of the buildings shown in the drawing is that now occupied by the Marché du Temple and the Square du Temple. In the rear of the large church is seen the old circular Temple Church.

Owing to Mr. Brewer's lamented death, we have not his usual historical account of the site and buildings shown, which was always of interest and often contained curious and out-of-the-way information.

The water shown in the foreground no doubt represents an undrained portion of the marshes, the former existence of which gave to this part of Paris the name it still retains—"Quartier du Marais."

NEW GOVERNMENT OFFICES AT JOHANNESBURG.

THE plans illustrated are in the nature of preliminary sketch plans from instructions given to me in 1901. Owing to its high level above the sea, Johannesburg, though nearer to the equator than Cairo, enjoys a much more moderate climate. Under a nearly vertical sun, its days are hot, but the nights are cool and brisk. Accordingly, the usual features of tropical architecture are neither desired nor employed. Light in these latitudes is more brilliant and more penetrating than what we are accustomed to here in England, consequently rooms can be made deeper from back to front and with less amount of window glass. In other respects, life, so far as architecture is concerned, is much the same in the Transvaal as in the old country.

The site chosen for the offices was a public square, known as the Telephone Tower Park, and consists of rather more than 2 acres, nearly in the centre of the city. The plans provide for the different departments being housed within one building, though each department is isolated from the others and self-contained. Private entrances (four in number) on the ground floor give independent access to their quarters to the chief of the principal departments, whilst the public is accommodated by staircases and lifts from the large entrances. A third floor plan is provided for the inevitable expansion that takes place in the conduct of public offices.

The rooms are shown undivided—any division that may be required to be made subsequently; but the principle is that of large unobstructed rooms, rather than a series of individual and secluded cells.

The design is for a stone building with a slate roof, and care was taken to interfere as little as possible with the trees already growing

HALSEY RICARDO.

COMPETITION DESIGN FOR QUEEN VICTORIA MEMORIAL, ALLAHABAD.

THIS is a design which was submited in competition by Mr. A. T. Bolton.

We understand that the promoters of the competition were responsible for the combination of two such distinct ideas as a clock-tower and a statue; the design shows Mr. Bolton's conception for combining the two.

The following quotations from the Report sent in with the design explain the author's intention:—

"The design consists of a clock tower 16 ft. square and 85 ft. high to the centre of the clock face from the ground level, encircled below by an arcaded pavilion or open loggia, the base of the tower forming an inner shrine or canopy immediately above the statue. The tower supports are four massive columns of polished granite, which take the dead weight, while the four piers, 7 ft. square and spaced 28 ft. apart, which form the corners of the pavilion, buttress the angles of the tower both by diagonal arches below and by flying buttresses above, neutralising all the thrusts in accordance with the principles of Gothic construction. These corner piers are carried up and terminate in pierced open work crowns of masonry in harmony and in grouping with the central feature to which they are subordinated.

The inner shrine or canopy over the statue is cross vaulted in brick or tile work covered with gold mosaic, while the surrounding loggie are ceiled in wood ornamented at points with colouring in Indian enamel work and gilding.

A special feature was to be made of the pavement design. On the outer platform abutting upon the steps red and white sandstone in squares is used, while the treatment would become richer in proximity to the statue. Each of the four main divisions of the memorial pavilion was to be allotted to one of the four hemispheres, or main groups of the British Empire, as is indicated by the lettering on the pavement, the statue being placed in a central shrine symbolising the United Kingdom in its four constituent parts, England, Scotland, Ireland, and Wales, the characteristic badges of each occupying the angles of the paving.

Each of the four saloons or open halls (see plan) is 28 ft. long by 18 ft. wide, and contains two niches, one at each end, placed in the main piers, and intended for the reception of statues. The exterior canopied niches were for statuettes of the great viceroys and generals who have created British India. The decoration of each saloon was to be treated with special reference to the country represented, introducing coats of arms and characteristic emblems.

It was calculated that the marvellous facility of native workmanship would render the design sympathetic to Indian interpretation and to native feeling, while the avoidance of mixed detail would make the architecture satisfactory to the cultivated Englishman, by its reminiscence of mediæval art at home.

Indian material was proposed to be used exclusively, such as the white and red sandstone referred to, in the ashlar masonry and paving, and teak for the woodwork.

In the construction an endeavour was made to avoid all unnecessary material, obtaining mass only where absolutely necessary for support, the intervening spaces being covered with as light a construction as is possible, carrying out the idea of an open-air pavilion having a central statue in a permanent place of honour, with round about it four saloons for the free circulation of the public visiting the memorial and studying the statue."

COMPETITIONS.

TOWNHALL, TORQUAY.—A discussion took place at the meeting of Torquay Town Council on the 6th inst. concerning the amended recommendation of the Finance Committee in regard to the proposed new municipal buildings and public library. It was proposed that the total inclusive cost of the whole building should not exceed 20,000*l.*, being the 7,500*l.* given by Mr. Carnegie for the library and 12,500*l.* for municipal buildings. A premium of 50 guineas was to be offered to competing architects for the design placed first in merit and 30 guineas for the design placed second. The portion of the St. Marychurch-road adjoining the site at Phillips's corner was to be widened to not exceeding 60 ft.—The Mayor moved, and Mr. Kerswill seconded, the adoption of the recommendation.—Alderman Winter moved as an amendment that the matter be again referred back to the committee. There was no instruction to the architects as to the form which the free library should take, and what sort of building it should be. The town hall and library should correspond with one another, and it should be considered whether a building for secondary education purposes should not form a portion of the same block. If they were going to have a new town hall, for goodness sake let them have a decent one.—Alderman Beavis, seconding, regarded the scheme as premature, and objected to it chiefly on financial grounds.—Alderman Bovey regarded the premiums offered as totally inadequate to induce first-class architects to compete for designs.—The amendment to refer the matter back to the committee was carried.

OLD BLUE-COAT SCHOOL, LIVERPOOL.—Mr. Honan, in whose name we published the illustrations of the above building last week, writes to say that the name of Mr. Stanley Hewitt should also have been given, the measured drawings having been their joint production.

SCHOOLS, BARRY.—At a special meeting of the Barry Education Committee recently, the architect (Mr. G. A. Birkenhead) was directed to prepare a sketch plan of the proposed alterations to St. Paul's School, for the accommodation of girls and infants; also, as soon as a site had been secured, to prepare plans of a new school at Barry for the accommodation of 350 or 400 boys.

ENGINEERING SOCIETIES.

THE INSTITUTION OF CIVIL ENGINEERS.—The Council of the Institution of Civil Engineers have, in addition to the medals and prizes given for communications discussed at the meetings of the Institution in the last session, made the following awards in respect of other papers dealt with in 1902-3:—A Telford Gold Medal to George Deuchars (London); Crampton Prizes to A. B. Brady (Brisbane) and G. Maxwell Lawford (London); Telford Premiums to J. Johnston Bourne (Tientsin), K. H. Rhind (London), H. T. Hincks (Marikuppam), G. A. Hobler (Cairns), A. J. Goldsmith (Brisbane), F. H. Frere (Derby), R. Appleyard (London), P. Hamilton, B.Sc. (London). For students' papers the awards are:—The "James Forrest" Medal and a Miller Prize to Waude Thompson (Burton-on-Trent); the "James Prescott Joule" Medal and a Miller Prize to I. V. Robinson (West Hartlepool); Miller Prizes to H. A. Bartlett (London), J. D. Morgan (Glasgow), H. S. Watson (London), J. V. Thomas (Gloucester), O. B. Rattenbury (Doncaster), and C. M. Skinner (Newcastle-on-Tyne).

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Hampstead.—A one-story bay window, with a wooden cornice, and a brick and wood portico, in front of a proposed house on the north-east side of Finchley-road, Hampstead, westward of Frognal-lane (Messrs. C. Saunders and Son for Dr. Burnett-Smith).—Consent.

Hampstead.—A wood and glass addition over the portico at No. 2, Merton-road, Hampstead (Mr. E. S. Barr for Mrs. Beningfield).—Consent.

Islington, North.—A porch, with a three-story bay window over, in front of the office of the Royal London Friendly Society, adjoining No. 34, Junction-road, Islington (Messrs. Holman and Goodrham for the Society).—Consent.

Westminster.—A projecting doorway at a new entrance to a building on the north side of Great Peter-street, Westminster, eastward of St. Ann's-street (Mr. W. Flockhart for Messrs. Burroughes and Watts, Ltd.).—Consent.

Westminster.—One-story shops in front of Nos. 129 and 131, Victoria-street, Westminster (Mr. J. Eden for the Aërated Bread Company, Ltd.).—Consent.

Width of Way.

Woolwich.—That the application of Mr. F. Mitchell for an extension of the periods within which the erection of a two-story addition at the rear of Nos. 87 and 88, Beresford-street, Woolwich, was required to be commenced and completed, be granted.—Agreed.

Woolwich.—Four buildings on the west side of Pound-place, Eltham, to abut also upon Back-lane (Messrs. Whistler and Worge).—Refused.

Newington, West.—Three dwelling-houses on the north side of Hurlbutt-place, Newington, south-eastward of the "Ship" public-house, Newington-butts (Mr. J. Farrer for Mr. E. A. Cox).—Refused.

Width of Way, Lines of Frontage, and Projection.

Marylebone, West.—That the application of Messrs. J. Kelly and Son on behalf of Mr. J. Smith, for an extension of the periods within which the re-erection, with a projecting oriel window in Duke-street, of the "Lord Clive" public-house, No. 22, Duke-street, Manchester-square, St. Marylebone, abutting upon Edward's-mews, was required to be commenced and completed, be granted.—Agreed.

Strand.—A porch to the entrance to Nos. 104 and 105, Jermyn-street, Westminster (Mr. F. W. Roper for the Trustees of the Royal Society for the Prevention of Cruelty to Animals).—Refused.

Westminster.—A church, with towers and porch, upon the site of Nos. 18, 19, and 20, Montpelier-place, and Nos. 1, 2, and 3, Alfred-place, Westminster (Messrs. Rees and Boehmer for Baron Sir John H. W. Shröder).—Refused.

Space at Rear.

Mile-end.—Modification of the provisions of section 41, with regard to open spaces about buildings, so far as relates to the proposed erection of the "Black Boy" inn, and a shop adjoining, with stabling at the rear, on a site on the north side of Mile-end-road, westward of Globe-road (Mr. W. Husband for Mrs. E. A. Coake).—Consent.

Wandsworth.—That the Council do make no order on the application of Mr. E. Cannell on

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behalf of Mr. W. McMahon for consent to the erection of a dwelling-house on land at the rear of houses on the south side of Quill-lane, Putney.—Agreed.

Wandsworth.—That the Council do make no order on the application of Messrs. Bartlett and Ross on behalf of Mr. W. McMahon for consent to the erection of a dwelling-house on land at the rear of houses on the south side of Quill-lane, Putney.—Agreed.

Lines of Frontage and Space at Rear.

Hampstead.—Five blocks of flats upon a site abutting upon the south side of Dennington Park-road and west side of Kingdon-road, Hampstead, with projecting bay windows and turret, and with irregular open spaces at the rear (Mr. C. H. B. Quennell for Mr. A. Bretzfelder).—Refused.

Width of Way, Line of Frontage, and Construction.

Rotherhithe.—An iron bridge to connect premises on the north and south sides of Shad Thames, Rotherhithe, eastward of Curlew-street (Messrs. Gelder and Son for Messrs. A. and P. Keen).—Refused.

Line of Frontage and Cubical Extent.

Southwark, West.—The erection on the site of Nos. 15 and 17, Burrell-street and No. 2, Chancel-street, of an addition to Nos. 19 to 23, Burrell-street, Southwark, the building, with additions, to exceed in extent 250,000 but not 450,000 cubic feet, and to be used for the purposes of lithography and colour printing (Messrs. C. Bell, Withers, and Meredith for Messrs. N. Lloyd and Co.).—Refused.

Southwark.—Projecting wooden shutter casings to Nos. 19 to 23, Burrell-street, and a proposed building on the site of Nos. 15 and 17, Burrell-street and No. 2, Chancel-street, Southwark (Messrs. C. Bell, Withers, and Meredith for Messrs. N. Lloyd and Co.).—Consent.

Formation of Streets.

Hackney, South.—A deviation from the plan approved for the formation of two new streets for carriage traffic to lead from Ashenden-road to Marsh-hill, Homerton, so far as relates to an alteration in the gradient of the easternmost street (Messrs. A. and A. and A. E. Simpson).—Consent.

Wandsworth.—A deviation from the plan approved for the formation of a street, to be named Pirbright-road, to lead from Wimbledon Park-road to Replingham-road, Wandsworth (Mr. J. M. Jones for the Lands Development Syndicate).—Refused.

Means of Escape at the Top of High Buildings.

Kensington, South.—Means of escape in case of fire, proposed to be provided on the fifth and sixth floors of blocks Nos. 4 and 5, Oakwood-court, Addison-road, Kensington, for the persons dwelling or employed therein (Messrs. Rolfe and Matthews for Messrs. Jones Bros.).—Consent.

St. George, Hanover-square.—Means of escape in case of fire, proposed to be provided on the sixth and seventh stories of No. 15, Hanover-square, St. George, Hanover-square, for the persons dwelling or employed therein (Mr. P. Hoffmann for Mr. H. O'Brien).—Consent.

Strand.—Means of escape in case of fire proposed to be provided on the fifth, sixth, and seventh stories of the new Gaiety Restaurant, Strand, for the persons dwelling or employed therein (Messrs. E. Runtz and Ford for the New Gaiety Restaurant and Hotel Company, Ltd.).—Consent.

Buildings for the Supply of Electricity.

Greenwich.—Two cooling towers at the Stowage, Deptford (Mr. G. A. Lansdown for the London Electric Supply Corporation, Ltd.).—Consent.

City of London.—A deviation from the plans approved for the construction of five-story office building on the site of Nos. 82, 83, and 84, Fenchurch-street, City, so far as relates to the addition of a gable (Mr. W. E. Clifton for the Charing Cross and Strand Electricity Supply Corporation, Ltd.).—Consent.

Dwelling-houses on Low-lying Land.

Rotherhithe.—Four dwelling-houses on low-lying land, situated at the rear of Nos. 18, 19, and 20, Rebecca-terrace, Gomm-road, Rotherhithe (Messrs. Stock, Page, and Stock for Mr. W. G. Wells).—Consent.

Lambeth, North.—A dwelling-house on low-lying land situated at No. 16, New Cut, Lambeth (Messrs. Flood and King for Messrs. Grogan and Ruscoe).—Consent.

TRADE CATALOGUES.

Messrs. Peirson and Co., of London, send us a catalogue describing their patent "Joly" system of steel construction, which is suitable for employment in staircases, verandahs, roofs, light bridges, columns, and other details. The greater part of the present catalogue is devoted to illustrations of various types of staircases, and in applying the system to such construction the solid stringers usually employed are replaced by stringers formed of wrought iron flat bars forged to shape and, together with cast-iron "ferrules," or struts as they really are, built up into a lattice pattern. Every part subject to tensile strain is of forged wrought iron. Besides being applicable to situations in which the erection of an ordinary staircase would be difficult or impossible, the system appears to possess considerable merit, from a constructional as well as from an artistic point of view. It is suggested that "decorative appearance" may be obtained to any extent by building into stair stringers foliated metal work as shown by designs in the catalogue. As might be expected, most of these "decorative designs" simply spoil the elegance naturally possessed by this mode of construction, and our readers will do well to judge for themselves as to the most suitable architectural treatment for individual cases.

The St. Pancras Ironwork Co., of London, send us a copy of the new edition of their catalogue, descriptive of fire escape staircases and general ironwork. Among new features in this book we may mention again their form of non-slipping stair tread, consisting of a steel plate embedded in concrete, in the wearing surface of which a series of leaden rings is inserted. The steel plate imparts great strength, and even if the concrete were fractured, the tread could not give way as a whole. The slabs are adapted for use on wood or stone steps, and can be utilised for the renovation of worn-out or slippery staircases at moderate cost.

The Associated Portland Cement Manufacturers send us an illustrated pamphlet relative to various standard brands of Portland cement manufactured at the works of the association. This corporation at present owns some thirty cement works, of which twenty-eight are situated on the Thames and Medway, and an idea of the gigantic nature of the operations conducted may be gathered from the statement that the production of the association exceeds 1,250,000 tons of cement per annum. The book now issued is largely devoted to the enumeration of engineers and authorities to whom cement has been supplied, and it contains a number of excellent photographic views representing such undertakings as the Forth Bridge, the Nile Dams, the Birmingham Corporation Waterworks, and others, where the company's cement has been employed.

Messrs. A. Ransome and Co., of Newark-on-Trent, send us their general catalogue (1903), a volume that now includes 256 quarto pages, and constitutes a most complete epitomé of wood-working machinery and auxiliary plant. We have referred on previous occasions to the details of some machines described in former editions, and it would be impossible within the space available to give an adequate idea of the extensive range of appliances covered by this catalogue, which, as usual, is well-printed and contains one or more illustrations on practically every page.

Messrs. John Harper and Co., Willenhall, send us their illustrated price list of compressed steel brackets, hat pegs, etc. Most of the brackets are simple and suitable in design, strength and fitness being evidently sought for rather than the unsuitable so-called "ornamental" work which we too often see. As far as one can judge from illustrations, we can recommend these articles. In the separate catalogue of what are called "artistic" hat pegs there is a little too much of the attempt to be artistic by twisting things into unexpected shapes. Simplicity is the best art in objects of this kind, and Nos. 1,724 and 1,772 are better than the more eccentric shapes.

We have received from Messrs. Johnson and Phillips, of Old Charlton, Kent, a price list of flexible wire for use in electric wiring. It is of the greatest importance in wiring buildings only to use the very best quality flexible for electroliers and fittings, and so we are glad to notice that Messrs. Johnson and Phillips are manufacturing 2,500 megolim grade wire for this purpose. We can recommend this price list to all engaged in electric installation work.

Messrs. Johnson and Phillips have sent us also their catalogue of junction boxes for all kinds of electric cables. An inspection of this catalogue will show the great improvements that have recently been made in this kind of apparatus. We were specially struck with the type of mains fuse-box supplied to the Ipswich Corporation. An ingenious application is made of the same principle that is used in the diving-bell. The fuse is always kept perfectly dry, but at the same time a free escape is provided for the gases in the event of a fuse "blowing." The junction boxes for three-phase and triple concentric mains are very simple and effective in their design, and should popularise the use of such cables, as the making of junctions by their means is very easy.

Correspondence.

THE LATE MR. BREWER.

Sir,—As an old subscriber to the *Builder*, permit me to accord to yourself, and to his many admirers, my sincere sympathy in the loss we have sustained by Mr. H. W. Brewer's death. I, for one, always looked forward with keen interest (to what always turned out to be keener delight) when any coming drawing of his was announced, and not a few of my journeys abroad have been influenced for good by them; notably, by the sketch of Rothenburg and its curious old bridge, which catches the whole spirit of the place. One would, indeed, be ungrateful to forget all the pleasures received from his work for so many years. His delineation of the picturesque quaintness of old German architecture will always remain with us as a precious inheritance, and the list you propose to give us of his works will strengthen that sense of obligation we all owe to his memory. "Old Oxford," "Old Paris," and, specially, the beautiful composition called "Deserted," are works that will abide, and we are all the poorer that never again shall we have the pleasure of anticipating such charming efforts of his genius and his wonderful powers, both of observation and delineation.

Producers of pretty pictures are common enough. Mr. Brewer produced drawings full of archæological and historical research—possessing anatomy, muscle, and a beautiful skin over all that explained the architecture as he saw it, and obscured only that which was well to be left alone. His power with the brush was also very great, but his black-and-white work in his own groove may be equalled, but will hardly, if ever, be surpassed.

E. Swinfen Harris.

"CONSTRUCTION OF DRAINS."

Sir,—With reference to Mr. Armstrong's letter in last week's *Builder*, I consider the decision of the Sheffield stipendiary referred to is entirely wrong. I have frequently adopted the system of collecting several rain and waste pipes to one common gulley-trap by continuing the pipes underground, and I hope to treat a good many more in this way.

If Mr. Armstrong will refer to pages 64 and 65 of the "Annotated By-laws as to House Drainage," published by the Sanitary Publishing Co., 5, Fetter-lane, E.C., he will find the point in question fully dealt with.

Robert Wood, Mem. San. Inst.

WANTED—A BOX-SHAPED WHEELBARROW.

Sir,—Can any of your readers give particulars of a box-shaped wheelbarrow, to hold one-fifth or one-sixth of a cubic yard of broken road stone; to tip sideways from a plank laid from the wharf, across the hold of a barge lying alongside?

A more exact method of measuring the material loaded than can be got by using the common navvy barrow is what is desired.

W. H. Bensted.

The Student's Column.

CONCRETE-STEEL.—XVI.

TYPICAL FORMS OF BEAM DESIGN.

DETAILED discussion of the principal types of the almost endless variations that could be made in the design of concrete-steel beams is scarcely necessary. If we have succeeded in the endeavour to make clear the fundamental principles underlying the theory of concrete-steel, and some of the rules suitable for use in general practice, the reader should have no difficulty in dealing with any type of concrete-steel beam hitherto mentioned, or in designing beams of the same material in other types that are fully discussed in text-books on constructional steelwork.

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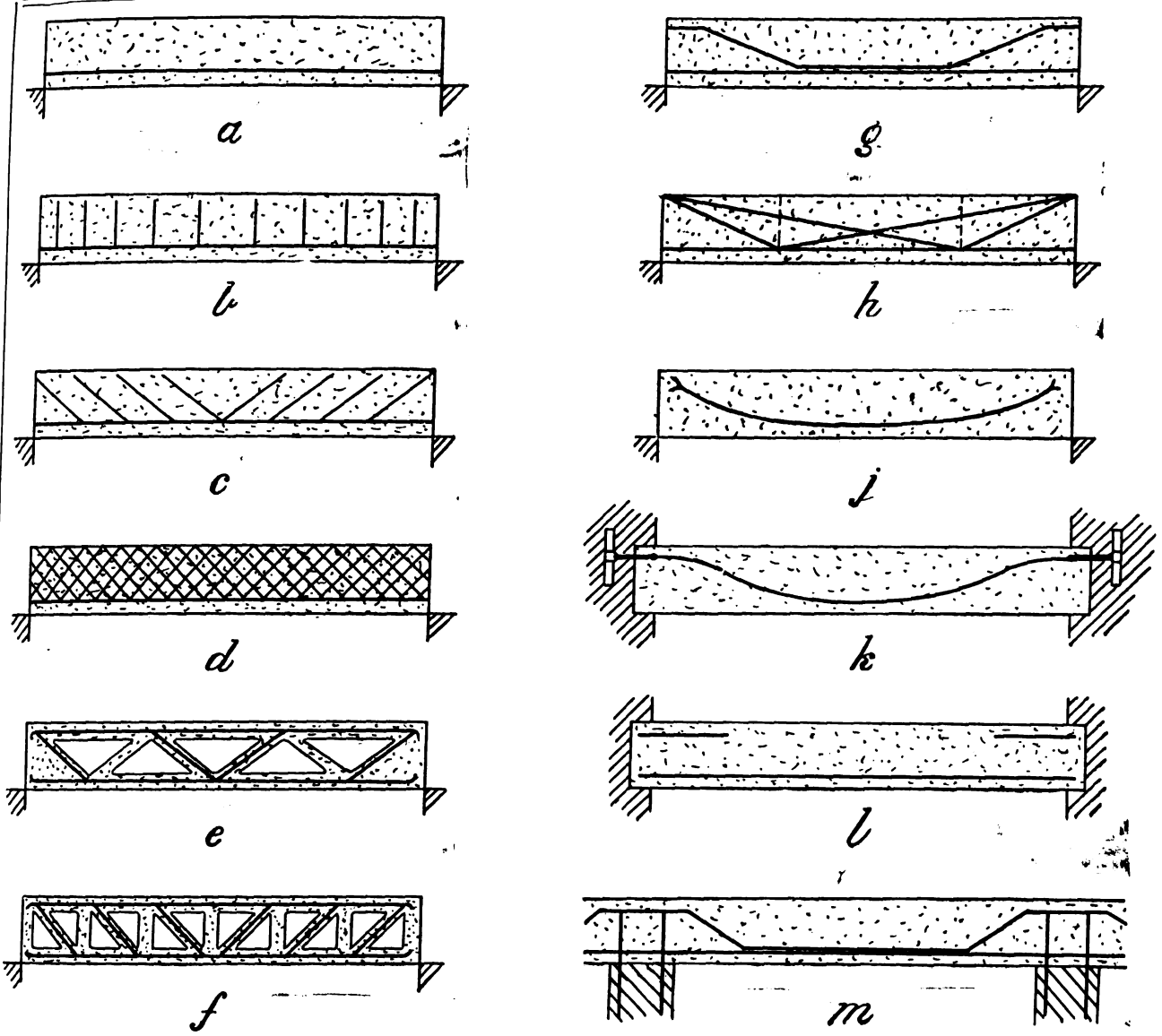

Fig. 31.

Illustrations to Student's Column.

Before leaving the present part of our subject, however, it will be useful to add a few notes relative to different primary forms of design suitable for general adoption, and without reference to the distinctive systems advocated by various patentees and manufacturers.

For the purpose of making these notes more intelligible, we give in Fig. 31, a series of diagrams representing different methods of applying reinforcement. Some of these methods have already been discussed, and others have not yet been mentioned. In addition to illustrating the present article, the diagrams embody a summary which will probably be found useful for reference, although, of course, it does not cover all possible types of construction.

In *a* we have the simplest possible form for a supported concrete-steel beam, with horizontal reinforcement, consisting of one or more bars placed near the bottom of the beam, for resisting tensile stress. Compressive and shearing stresses are taken by the concrete without assistance.

In *b* a similar beam is represented, but shearing stress is here resisted wholly or in part by vertical ties or stirrups. This auxiliary reinforcement can be formed of round rods, or of flat strips of steel, as may be preferred.

In *c* the main reinforcement is the same as *b*, but the auxiliary reinforcement is placed diagonally, for reasons that have been fully discussed, and its function is to withstand tension resulting from shearing stress on diagonal planes in the concrete, while compression similarly resulting from shearing stress is resisted by the concrete alone.

In *d* we have a suggested method of applying expanded metal for taking stresses arising from shear. The metal can be applied in the form of separate sheets, the lower edges wrapped round the outer rod of the reinforcement on each side of the beam; or in the form of a trough, the bottom of which would lie under the longitudinal reinforcing rods. In the latter arrangement part of the tension due to bending moment would be carried by the expanded metal. The main reinforcement is disposed similarly to that in previous examples.

In *e* the beam is designed on the principle of the "Warren" girder. Both the top and the bottom flanges are reinforced, the latter with more metal than the former; the diagonal web members in tension are reinforced; but the diagonals in compression rely upon the concrete for the necessary resistance. This beam is a framed structure, consisting of clearly defined flanges and diagonals as shown in the drawing. If made solid it would be practically similar to the beam represented in *c*.

In *f* is shown another type of framed beam, designed on the principle of the Linville truss, and it should be noted that the spacing of the tension members of the web is one-half that of similar members in the "Warren" type. If this beam were made solid, it would, like *e*, become equivalent to the beam illustrated in *c*.

In *g* is a type of design not yet considered. Here we have longitudinal horizontal reinforcement, consisting of one or more bars near the bottom of the beam, and additional reinforcement consisting of one or more bars bent in an upward direction near the supports. The horizontal part of the latter reinforcement is shown above the first mentioned bars for the sake of clearness, but it may be situated in the same horizontal plane if desired. The concrete, acting in conjunction with the steel bars, practically forms a trapezoidal, or queen-post, truss. This is a very strong type of construction, and the stress in the bent bar or bars can be ascertained by adapting rules contained in ordinary text-books.

It may be sufficient in many cases to rely upon the concrete to take the place of the usual struts, and to bind together the different elements of such a beam, but more satisfactory results will be obtained by the use of vertical reinforcement for this purpose. The diagonal ends of the upper bars here take a portion of the tension due to shearing stress, and if vertical or diagonal ties be used, it will probably be safe to calculate that one-half of the tension is already carried by the bent ends of the second series of longitudinal bars.

In *h* we have a development of the simple triangular truss, sometimes described as the "Bollman" truss. This form of braced girder is less suitable for concrete-steel than some other types, because the ties are necessarily of unequal length, the only exception being in one pair of ties in a similar girder having two ties meeting at the centre. Consequently, any extension of the metal, whether resulting from strain on the bars or from temperature changes, must be of unequal degree, the longer bars being extended more than the shorter ones. This naturally tends to induce secondary stresses of prejudicial character. The example is given chiefly for the purpose of showing the discrimination that must be exercised in applying types of steel-girder construction to concrete-steel design.

There are many other varieties of the braced girder in which similar defects do not exist, and some of them are quite worth consideration for special examples of concrete-steel construction. As a rule, however, the more simple methods of applying reinforcement are those which should be adopted in general practice.

In *j* we approach another method of reinforcing concrete beams, in which the reinforcement is shown bent into a curve similar to that forming one boundary of the bending moment diagram of a supported beam under a uniformly distributed load. Although theoretically correct, so far as bending moment is

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concerned, this arrangement does not lend itself conveniently to the application of ties for resisting shearing stress, and in practice it will be found to involve more expense and trouble than the use of other forms of reinforcement.

In *k* the last-mentioned system is shown in connexion with a beam having its ends firmly fixed in the walls of a building. In such a case, if the condition of fixity be fully satisfied, the maximum bending moment occurs at the ends of the beam, and has the value $M = Wl \div 12$, and the bending moment at the middle of the beam is $M = Wl \div 24$. At the distance of about one-fourth of the length (l) from each end of the beam, or, to be exact, $l \times 0{\cdot}211$, there is a point of contrary flexure where the bending moment becomes zero. Such a beam may be regarded as consisting of three parts—two cantilevers, and a supported beam between the points of contrary flexure. It must further be remembered that between the supports and the points of contrary flexure the upper fibres of the beam are in tension, while the same condition is evidenced in the lower fibres of the central portion. Hence the reinforcement must be of the curved form shown in the figure, and to secure the maximum advantage it should be secured at each end by anchors, as indicated in the diagram. As the maximum bending moment in the middle part of the beam is only one-third the value of that in a beam merely supported at the ends, the depth may be proportionately reduced, and as the maximum bending moment at the ends is only two-thirds the value of that developed in a similar beam supported at the ends, the depth of concrete may be proportionately less. The most economical profile is consequently that of a beam with parallel top and bottom faces between the points of contrary flexure and arched haunches at the ends. Such a profile has the further advantage of providing a considerable thickness of concrete in cross sections where shearing stress approaches its maximum intensity.

In *l* is shown another system of reinforcement, providing in a very simple manner for the incidence of tensile stress in a beam fixed at the ends, and although this mode of treatment does not conform so closely with theoretical requirements as the method described above, it can be applied easily and cheaply.

In *m* we have part of a continuous beam, where the conditions generally resemble those in a beam with fixed ends, and in this diagram we have shown vertical reinforcement in the supports, connected to the bent ends of the bars, serving to resist tension up to the points of contrary flexure and afterwards in the central portion of the beam.

The foregoing examples are sufficient to suggest the principal features embodied in concrete-steel beams, and, as each type illustrated is susceptible of further modification and development, it will be seen that an almost infinite variety of design is available for the architect or structural engineer.

A further modification of design is suggested by the application of the tubular system to beam construction. In this way the usefulness of a specified quantity of concrete can be increased, or for a specified duty the quantity of concrete can be reduced. Fig. 32 shows diagrammatically the

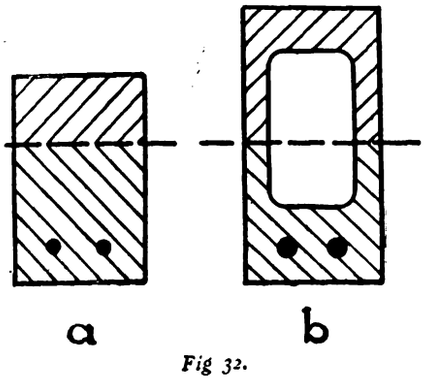

Fig 32.

manner in which a given area of concrete, in a vertical cross-section of a beam, may be advantageously employed for the purpose of gaining increased strength. As a matter of fact, as may be found by measurement, the solid section represented at *a* has a somewhat greater area of concrete than the hollow section shown at *b*, while, owing to the greater distance of the axis of compression from the neutral axis, the resistance of the second section is considerably greater than that of the first section. The area of concrete removed, below the neutral axis, would have been of comparatively little value for resisting tension, and if, as usual, the tensile strength of concrete is not taken into account, the theoretical loss is nothing. Similarly, the omission of concrete above the neutral axis does not materially affect the strength of the compression area. The general result, so far, is an increase of resistance to compressive stress and a small diminution of resistance to tensile stress. The balance of strength between the two areas must be adjusted by using more metal in the reinforcement of the section *b* than in the section *a*. The hollow section will then possess much greater resistance to the effects of bending moment than the solid section, and the only sources of extra cost are to be found in the necessary moulds for forming the central cavity, and in the weight of additional steel reinforcement.

So far as concerns shearing stress, it is quite certain that the resistance of a tubular beam must be proportionately less than that of a solid beam, but this feature can very easily be met by the employment of rods or strips of steel placed diagonally, or, better still, by using sheets of expanded metal in the manner already proposed. A very simple and effective way of finishing the upper edges of the expanded metal would be to turn them over two thin steel rods in the compression area, thus conducing to the thorough connexion of the whole construction.

The tubular system is more especially suitable for large beams, and, if worked out in accordance with the principles governing all beam design, it may very frequently be of much convenience and advantage to the architect.

With regard to the form of steel section used for reinforcement, the first essential is to avoid the concentration of metal, and always to use thin rods in preference to heavy bars. We have previously referred to the advantages possessed by some of the patented bars intended to add mechanical adhesion to the adhesion existing between the concrete and the steel, and in works where vibrations and shocks are likely to be severe, the employment of special forms of reinforcing bars may be thought necessary. As, however, recent investigation has shown that plain round bars afford satisfactory results, they may be used with confidence for ordinary building construction. A very great advantage is that such bars can always be purchased from stock without the delay that would probably attend the delivery of patented or other special sections. The merits of expanded metal have already been shown in connexion with resistance to shearing stresses; but it may now be added that this material will also be found of great value when used horizontally, either alone or in conjunction with longitudinal bars, as it will then serve to strengthen the beam laterally, and to bind together the longitudinal bars.

In every case the reinforcement must be securely anchored by bending or splitting the ends of bars and by bending the edges of sheets. Where, owing to the length of a beam or to other causes, a joint has to be made between two bars, the ends should be bent or hooked, or a slip socket, formed of iron tubing, may be used. Cement mortar can then be applied to complete the joint. Sheets of expanded metal can be joined by laying them to overlap, and the concrete will bind them securely together.

Whatever form of section be selected, the great thing is to dispose the metal in those places where an analysis of stresses shows it to be most required. If proper study be made of the principles governing concrete-steel construction, there is not the slightest reason why architects should not be able to design structures in this material as readily and as successfully as they already do in stone, timber, and brick.

Among the different systems of construction advertised in the present day, there is scarcely one that has not good features; but our advice to the designer is that he should not feel bound to confine himself to any particular system. It is far better to reserve complete liberty of action, and, after carefully studying the requirements of any given constructional work, to apply such forms of design as will most adequately fulfil the conditions that are known to be essential.

GENERAL BUILDING NEWS.

Wesleyan Chapel, Staveley.—The foundation-stones have just been laid of a new Wesleyan chapel at Staveley, Derbyshire. The new building will occupy a central site on the main road to Chesterfield. The cost is estimated at 5,500*l*. Messrs. Gordon and Gunton, London, are the architects, and Messrs. Lee and Kirk, Alfreton and Chesterfield, the builders. The church is to accommodate 506 worshippers, and a Sunday school is to be added in the future. The church will be erected in the Gothic style, of pressed bricks and Bath stone dressings.

Reading-room, Low Moor, Lancashire.—A reading-room was opened at Low Moor, Clitheroe, recently. The building, which has been erected from designs by Mr. H. R. Price, Manchester, is in St. Paul's-road, at the corner of New-row. On the ground floor accommodation is provided for smoking, reading, and committee rooms. The billiard-room is upon the upper floor. The building also includes rooms for hot and cold water baths for men and women, those for the women being on the ground floor, and they have a separate entrance in New-row. The exterior has been faced with Accrington bricks, the window sills and string jambs being constructed of red Ruabon terra-cotta. The contractors were:—Brickwork and masons' work, Messrs. J. Blezard and Sons, Clitheroe; slating and plastering, Mr. J. Robinson, Clitheroe; plumbing, glazing, painting, and heating, Messrs. J. Watson and Sons, Clitheroe; carpentry and joinery, Mr. T. Jackson, Low Moor.

Additions to Harrow School Chapel.—On the 8th inst., the additions made to the school chapel in memory of those Harrovians, 55 in number, who lost their lives in the late war in South Africa, were dedicated. With the sum raised by subscription, transepts have been added to the chapel on either side of the chancel, the foundation-stones of which were laid by Lord Roberts in July of last year. Porches have been built at the two main entrances, the big western door having been moved to the south side of the chapel, exactly opposite to the main north entrance. The architects were Mr. Aston Webb, R.A., and Mr. Ingress Bell. In each transept a sculptured memorial has been placed, showing the names of those in whose memory the fund has been raised, the figures of St. George, St. Michael, St. Andrew, and St. Patrick, which are to be placed round the tablets, being sculptured by Mr. Drury, A.R.A.

Church, Bromley Common.—It is proposed to erect a new Primitive Methodist church, to seat 500, together with two vestries and six class-rooms, at the corner of Bloomfield-road, Bromley Common. The design selected is by Messrs. Moulds and Porritt, of London.

United Free Church, Cambusnethan, N.B.—A new church, hall, and retiring-rooms have been erected by the Deacons' Court of Cambusnethan United Free Church, Wishaw, at a cost of 4,000*l*. The church is seated to accommodate 520, and the hall can accommodate 200. The work has been carried out under the supervision of, and to the plans prepared by Messrs. J. and J. Steel, architects, Wishaw.

Crematorium, Birmingham.—The Birmingham crematorium was declared open on the 7th inst. by Sir Henry Thompson, Bart., president of the company. It is situated at Sheldon Coppice, near Rockey-lane, three and a half miles from the centre of the city on the main road to Walsall, and is a brick and stone building with tiled roofs. It stands in the centre of grounds laid out with trees, turf, and shrubs. The size of the chapel itself is 50 ft. long by 25 ft. wide, and about 40 ft. high to the ridge, with an open timbered roof, the total length of the building being about 107 ft. On one side there is a vestry and registry office with a separate entrance, and on the other side a small mortuary chamber. The chapel is lighted by clearstory windows, and underneath these on both sides are recesses for the reception of cinerary urns. The catafalque is against the end wall opposite the entrance, and stands on a stone platform approached by two stone steps, and immediately beyond the catafalque are the iron doors leading to the antechamber between it and the furnace, the level of which is the same as the catafalque. The total cost of the crematorium, including land, chapel, furnaces, and lodge, has been about 6,000*l*. Mr. Frank Osborn was the architect and Mr. J. E. Wilcox the engineer.

Cottage Homes, Ecclesall, Yorkshire.—The Ecclesall Board of Guardians have decided to erect, at Bole Hill, a small colony of cottage homes for the children placed in their charge, and the foundation-stone has just been laid. The site is about 22 acres in extent. Accommodation will be provided, to commence with, for 78 children, six boys and six girls being in each house. The houses are arranged in two lines, with a wide space laid out as gardens between them. Each semi-detached house, of which there are six, contains a living-room, or kitchen, 18 ft. 6 in. by 15 ft., scullery, 13 ft. by 11 ft., bathroom and lavatory, grocery larder,

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and clothes stores, and hall, on the ground floor; and on the first floor are two dormitories, one for boys and one for girls, each containing six single beds, and a mother's bedroom. An isolation, or spare, bedroom is provided in each house. The cottages will have self-contained out-buildings and offices. There is aiso a single or isolation block, in case of any serious illness. The master's or superintendent's house is near the main entrance from Bole Hill-lane, and contains the committee or board-room, where the business in connexion with the homes will be transacted. On the right and left of the master's house are two buildings, 42 ft. by 17 ft., the ground floor of which will be used for stores. The upper floor will be for tailor's and shoemakers shops for the boys, and for sewing and knitting-rooms for the girls. Stables are also provided, and a water tower to supply the homes from the Sheffield water supply. The site has been laid out and the plans designed by Messrs. Holmes and Watson, architects, Sheffield, and the contract for the buildings has been let to Messrs. Wilkinson and Sons, Heeley.

CHURCH EXTENSION, GATESHEAD. — The foundation-stone has just been laid of a mission hall just beyond the railway bridge on Lobley Hill-road. The total cost of site, parish hall, and classrooms will be about 2,500*l.* A parish hall, to be called after St. Hilda, will first be erected, and it will serve as a temporary church and Sunday school. The architects are Messrs. Hicks and Charlewood, Newcastle; and the contractors Messrs. John Ross and Son, Gateshead.

CO-OPERATIVE STORES, WALBOTTLE, NORTHUMBERLAND.—New branch stores have been erected at Walbottle by the Throckley District Co-operative Society, Ltd. The work was carried out by Mr. John Jackson, contractor, Newcastle. Messrs. Liddle and Browne, also of Newcastle, were the architects.

HACKNEY TECHNICAL INSTITUTE.—The buildings which were opened on Thursday last week form the first two blocks of this Institute, which, when completed, will occupy a large frontage to Dalston-lane. There is also yet to be built a large Public Hall, which will occupy the corner of the site, with frontages both to Dalston-lane and Amhurst-road. The whole scheme will form one of the largest Polytechnic Institutes in London. The buildings recently finished occupy the rear portions of the site and provide large mechanical, physical, and electrical laboratories on the ground floor, drawing offices, and classrooms on the first, and the chemical and biological laboratories and lecture theatre on the second floor. The third floor, when completed, will provide accommodation for the art school, which for the present will occupy the large engineering laboratories on the ground floor. The buildings are quite plain and simple in treatment, as they are situated at the rear of the site without frontages to a public thoroughfare. They are faced with red bricks, with brick quoins at the angles, while the white frames of the windows are brought to the face of the wall. Internally the corridors are faced with a dado of salt glazed bricks, which, together with all the sanitary fittings, were supplied by Messrs. Oates and Green, of Halifax. The wrought-iron grilles and balustrading to the staircase has been executed by Messrs. Keeling, Teal, and Co. The general building contractors were Messrs. Chessman and Sons, of Bow, and Mr. W. Tidey was the clerk of the works. The other contractors were Messrs. G. E. Taylor and Co. for the electric lighting, Messrs. Kinnell for the heating, and Messrs. B. Ward and Co. and Messrs. Diespecker for the wood block floors and mosaic pavings. The buildings, exclusive of equipment, have cost about 1,500*l.* Mr. Arthur W. Cooksey is the architect.

THE BUILDING TRADE OF YORK.—The Buildings Inspectors of the city have presented their annual reports to the York Streets and Building Committee, on the work carried out during the year ended last December. The report dealing with the West side of the city says:—"The building trade in 1902 has not been so brisk, and there is a considerable decrease in the number of houses completed and in progress. This decrease has been somewhat balanced by the number of extensive additions to existing buildings. . . . The greater number of houses erected are in the South Bank and Nunthorpe Estates and Poppleton-road. On the East side of the city 219 dwelling-houses, mostly of the small and middle class, have been built on the Hull-road, Lawrence-street, Church Park, Huntington-road, Burton-lane, Bootham, Clifton, and Fulford-road estates. Extensive new public buildings and additions and alterations to existing premises are in progress, amongst which are the Nurses' Home; York County Hospital; St. Peter's School; Union Bank Premises, Parliament-street; New School, Haxby-road; and Messrs. Harding and Brown's premises, High Ousegate. Additions to the Blue Coat School, Aldwark; a new wing at the Training College, Lord Mayor's Walk; new classrooms at the Lendal Congregational Chapel; and a Mission-room in Speculation-street, have been completed."

SCHOOL, BELFAST.—The third and last of the new schools erected under the Hugh Henry Boyd endowment scheme was opened on the 1st inst. The principal entrance is from Rodenstreet through a porch which has a cloakroom off it. The main schoolroom is 40 ft. by 24 ft., with the ceiling open to the ridge. A classroom 17 ft. by 16 ft. is entered from a passage and cloakroom, and is fitted up with a gallery. Over the classroom is a storeroom for the school requisites. The work has been carried out by Messrs. MacIvor Bros. from plans and under the superintendence of the architects, Messrs. Young and Mackenzie.

BOARD SCHOOLS, CANTERBURY.—The new Board Schools at Canterbury were opened recently in St. John's-lane. The buildings are in two separate blocks, the larger one, of two stories, being for the boys and girls, and the smaller block, on the ground floor only, for the infants. The schools are built of red bricks, with stone dressings, and are tiled. Electric light is installed throughout. Mr. Jennings was the architect, and Messrs. Gann and Co., of Whitstable, the builders. The amount of the contract was 16,645*l.*

THEATRE EXTENSION, GLASGOW.—An extension has been made to the Grand Theatre, Glasgow, at a cost of 10,000*l.* A block of buildings abutting the south side of the theatre was acquired at a cost of 4,000*l.*, and this has been converted into refreshment rooms, smoking lounges, and ladies' retiring rooms, each section of the theatre being supplied with a similar suite. The alterations have been made from plans by Bailie Davidson, architect, Coatbridge. The theatre has also been redecorated. All the painting work is by Messrs. M'Culloch and Co., Glasgow.

BUILDING IN LEICESTER.—The latest report of the Highway and Sewerage Committee shows that in the last quarter the plans for but 214 houses were passed, as contrasted with 273 in the corresponding three months of the previous year. During the second quarter of the year the aggregate had been 262, while in a corresponding period three years before there had been as many as 423. The combined total of all classes of plans for the past three months had been 417. This was a decline of as much as 114 on the same period of last year, and a fall of 137 on the second quarter of the present one.

MEMORIAL HALL, CASTLETOWN, NEAR SUNDERLAND.—The foundation-stone of the hall which is to be erected at Castletown, near Sunderland, in memory of the late Colonel C. J. Briggs, was laid recently. The hall will be used for mission work in connexion with St. Margaret's Church. It wil be 60 ft. long and 27 ft. broad, with ante-rooms and the usual conveniences. Seating accommodation is provided for 500. The cost is put at 1,200*l.* Messrs. Henderson and Hall are the architects.

SCHOOL, LOUGHBOROUGH.—The new school in Rendell Street, Loughborough, commenced under the late School Board, and completed under the new Education Authority for the borough, was opened recently. Messrs. Barrowcliff and Allcock were the architects of the school, Mr. A. Faulks the contractor, and Mr. G. H. Bradley the contractor's foreman.

TECHNICAL SCHOOL, KIRKCALDY.—The new technical school which is to be erected by Kirkcaldy School Board is to occupy a site immediately to the west of the present High School, and entering from St. Brycedale-avenue. The school has been designed to harmonise with the High School, with which it is connected by a corridor. The building consists of semi-basement, ground, and first floor. In the basement are the carpentry and mechanical workshops, cookery and laundry rooms. On the ground floor are the laboratory, dark-room, workshops, machine and building construction and drawing class-rooms. The first floor is occupied by the chemical laboratory, art rooms, modelling, and design rooms. Competition plans were invited for the building, and those of Mr. N. Williamson, architect, Kirkcaldy, were selected. The school is expected to cost about 15,000*l.*

ST. CHAD'S CHURCH, GATESHEAD.—The new parish Church of St. Chad, Gateshead, has just been consecrated. Plans were prepared by the late Mr. W. S. Hicks, of the firm of Hicks and Charlewood, and the foundation-stone was laid by Bishop Westcott on November 3, 1900. The principal entrance is by a Decorated porch on the north side of the church. Above the door of the porch are three niches holding statues. The font is of Derbyshire alabaster, and is surrounded by eight statuettes, representing Faith, Hope, Charity, St. Michael, and four angels holding shields with emblems symbolic of Holy Baptism, the Dove, the Ark, the Fish, and the Holy Trinity. Behind the font, and above it, is a window, placed there in memory of the architect, Mr. Hicks. The three southern lights illustrate the idea of the building of the material fabric, the three northern lights the building of the spiritual fabric. All the carving in the church has been executed by Mr. Ralph Hedley. The pulpit is in carved oak.

CHURCH, NEWTOWN, MALVERN.—The Church of the Ascension, erected in Albert Park-road, Newtown, was opened recently. The church consists of a nave and choir, the dimensions of the former being 65 ft. long, 27 ft. wide, and 35 ft. high; the latter 37 ft. long, 18 ft. wide, and the same height. There is accommodation for about 300. There are no aisles, and the vestries are below the choir. At the west end is the baptistry, and above that the organ is placed. The nave consists of four bays, formed by stone transverse arches, between which is a plaster barrel vault. The choir has three bays in its length, vaulted with stone transverse and diagonal ribs, with plaster haunches. An arcaded triforium runs the entire length of the church. Coupled lancet windows light the nave, the choir having single lancets. At the entrance to the choir is placed a wrought-iron hammered screen, and above this, at the springing of the choir arch, is the rood of oak, stained and gilded. At the east end of the choir is a tripled lancet window, containing the subject of the Ascension. Below is a painted triptych in red and gold, the centre panel of which contains a picture of the Virgin and Child, with attendant Saints in the surrounding panels. The font is of Irish grey marble, eight-sided, with detached shafts. A metal cover hangs from the vaulted ceiling, of copper. Over the baptistry arch stands the figure of St. Michael. At the western face of the tower, externally, is a carved representation of the Ascension. The choir stalls, pulpit, lectern, and other fittings are of oak. The floors of the choir and baptistry are of black and white marble. Adjacent to the church at its eastern end is the parish room. It is estimated that the cost of the building will be 10,000*l.* The architect was Mr. W. J. Tapper, of London, and the builders Messrs. Stephens, Bastow, and Co., of Bristol; the clerk of the works, Mr. J. D. Organ, and the carving on the pulpit, choir stalls, and other parts was carried out by Mr. Wilmut, of Bristol. The Malvern Hill stone used in the walls was supplied by Mr. A. E. Lewis, North Malvern.

HOSPITAL, ASHBOURNE.—A new cottage hospital has been erected at Ashbourne, as a memorial to the late Queen Victoria. The new hospital has been built from designs prepared by Mr. A. E. Evill, Manchester, at a total cost, including the laying out of the grounds, of about 2,500*l.*

SCHOOL, MILL HILL, LANCASHIRE.—The new wing which has just been added to the school premises of the Mill Hill Congregational Church was opened recently. The structure has been erected at a cost of 2,765*l.* The whole of the premises are now estimated to seat some 1,020 scholars. In the new building, which has been constructed at the rear of the old premises, is included an infants' room on the ground floor, and an assembly hall above. Mr. A. R. Gradwell was the architect.

ST. AIDAN'S, CREW'S HOLE, BRISTOL.—The foundation-stone of the new Church of St. Aidan's, Crew's Hole, has just been laid by the Dowager Duchess of Beaufort. It has been decided to build at once the chancel, two bays of the nave, with the south aisle and morning chapel and vestries. Contracts have been signed by Messrs. Cowlin and Son for this work at the price of 4,873*l.*, and the work will be carried out under the charge of Mr. George Dixon, foreman. Mr. G. F. Bodley, R.A., is the architect. The material used wil be local pennant stone. The dressings are to be of Bath stone. The roof will be covered with red Broseley tiles. The extreme length of the church, when completed, will be 116½ ft., the chancel being 39½ ft. and the nave 77 ft.; the width of the chancel will be 25 ft., the nave alone 40 ft., and the nave and aisle 51½ ft. The height from the floor of the nave to the roof plate will be 26 ft. The external height of the west front from the ground level to the apex of the cross will be 64 ft. On the north side the church will be lighted by four windows of five lights. The arcading between the nave and aisle is to be composed of Bath stone piers, from which will spring flat connecting arches.

ST. PATRICK'S CHURCH, BALLYMACARRETT, NEAR BELFAST.—The first section of this church was built by Messrs. Campbell and Son, and was consecrated in March, 1893, being dedicated to St. Patrick. In 1901 Messrs. Thornbury Brothers were selected to finish the church and build the tower, and this work has been carried to a finish. The plan of the church comprises arcaded nave and clearstory, aisles, transepts, choir, organ chamber, vestry, tower, porches. The nave is 100 ft. long by 28 ft. wide, having north and south aisles. The width across the transepts is 98 ft. The chancel is 30 ft. long by 24 ft. wide, a portion of which is devoted to the choir, and beyond—eastward—steps rise to the Communion rails and the Holy Table. An effort has been made, although adhering generally to ecclesiastical arrangements, to make the church suitable for large congregations; and, with this

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in view, galleries have been introduced into the transepts. The internal woodwork is of pitch pine, except the choir stalls, which are of oak. The church is heated by hot water. The additions to the church, which have been in progress two years, and have now reached the final stage, consist of a continuation of the nave or main body of the church, and a tower which, now completed, stands 144 ft. high. The outside work is rock-faced, with cut-stone quoins and dressings. The seating accommodation of the church has been enlarged, being now equal to 1,500, with a possible accommodation of 2,000. Mr. Close, A.R.H.A., was the architect. There are two memorial windows in the church; the east window and the south transept window, and both are by Messrs. Mayer and Co.

Welsh Church, Port Talbot.—The Margam Chapel-of-Ease, which had been renovated, and a new organ placed in it, at a cost of over 800*l.*, was re-opened recently. A screen has been placed in the chancel, the handicraft of Mr. Clarke, of Llandaff. The contractors were Messrs. Couzens, of Cardiff, the organ builders were Messrs. Hill and Sons, and the architect was Mr. Halliday, diocesan architect.

Police Station, Manchester.—A new police station, which has been erected in Mill-street, Bradford, Manchester, was opened on the 1st inst. The station has cost 25,000*l.*, and will take the place of the old headquarters of the C Division in Fairfield-street, as well as of several sub-stations. The building contains separate departments for police and firemen, together with housing accommodation for several men of both forces. In the police department there are thirteen cells, and these, like the rest of the building, are lighted by electricity. The City Architect is Mr. H. Price, under whose directions the work has been carried out.

Church, Ballyhaunis, Ireland. — The foundation-stone has just been laid of the new Church of St. Patrick, Ballyhaunis. The new church will be in the Gothic style, and the building will comprise aisles, side chapels, two sacristies, and porches. The length of nave, clear of the pillars, is 30 ft. The aisles are each 110 ft., the sanctuary, 30 ft. by 30 ft. The tower is on the side next the town. The nave will be divided from the aisles and side chapels by moulded arches, springing from pillars of polished granite. The arch between the sanctuary and nave will be of stone springing from columns of polished granite. The principal entrance doors will be in front of the nave. The sanctuary will be lighted by lancet windows with internal and external shafts of polished granite. The roofs have groined and moulded principals resting on shafts of polished granite, supported on Bath stone. The ceilings of nave and aisles are of pine, divided into panels. The height of the nave walls will be 60 ft.; the height to cross will be 170 ft. The church will be built of local stone, faced with hammered stone of the same material. The dressing of the windows and doors will be limestone. The design will be carried out by Messrs. W. H. Byrne and Son.

College Buildings, Llandovery, Carmarthen.—The extension buildings in connexion with Llandovery College, which have been in progress for about two years, are now practically complete. A special feature of the new buildings is the dining-hall. It is nearly 72 ft. long by about 28 ft. wide. Mr. Mercer, of Llanelly, was the contractor, whilst the architects were Messrs. Austin and Paley, Lancaster.

The Reconstruction of Ayr Theatre.—At Ayr Dean of Guild Court recently, plans for the renovation and reconstruction of Ayr New Gaiety Theatre, recently partially destroyed by fire, were passed. At a previous sitting of the Court plans had been passed for the reconstruction of the stage. The further plans now submitted provide practically for the entire reconstruction of the interior, only the main walls of the former building being left. The plans have been prepared by Mr. Alex. Cullen, architect, Hamilton. The total seating accommodation of the theatre will now be 1,230, and the whole building, instead of being lighted with gas as formerly, will be fitted throughout with electric light.

Post-office, Barry.—Plans for the new post-office about to be erected at Barry are nearly completed. Mr. W. T. Oldrieve, of the Office of Works, is the architect. The interior of the building will have a frontage of about 130 ft. in Thompson-street. The public office will have a floor space of 30 ft. by 22 ft., and on the same floor there will be a sorting office 59 ft. by 27 ft., besides several other rooms necessary for conducting the business. Chief upon the upper floor will be the telegraph instruments room, 23 ft. by 21 ft.; a telephone room, 22 ft. by 18ft., and other offices and rooms. The estimated cost of the building is 7,800*l.*, and the contract has been let to Mr. Watkin Williams, of Cardiff and Barry. Ruabon red pressed brick will be used in the front elevation, with Portland stone dressing.

STAINED GLASS AND DECORATION.

Memorial Window, Lancaster.—It is proposed to erect a memorial window to the late Sir Thomas Storey in the Parish Church, Lancaster. The new window will cost about 750*l.*, and will be erected from the designs of Messrs. Shrigley and Hunt.

Sculpture, St. Chad's Church, Bensham.—Three carved stone figures of SS. Chad, Aidan, and Theodore, with their respective emblems were fixed recently in the new Church of St. Chad, Bensham, Gateshead-on-Tyne, for Messrs. Hicks and Charlewood, architects, of Newcastle-on-Tyne. The figures are the work of Mr. G. W. Milburn, sculptor, York.

Window, Westminster Abbey.—A new window has just been dedicated in Westminster Abbey. The window, which is placed in Poets' Corner, bears the title of "Translation of King Edward the Confessor," and represents incidents in the life of that Monarch. At the head of the window is a cinque-foil containing a shield bearing emblems of the Trinity, surrounded by angels holding a scroll. The lights contain two full-size figures under canopies, with six picture subjects beneath them, both lights being framed with wide architectural borders, having niches holding twenty-eight statuettes. In the left-hand light is the figure of King Edward the Confessor, the founder of the Abbey; in the right-hand light is that of St. John the Evangelist. The glass is the work of Messrs. Burlison and Grylls, acting under the superintendence of Mr. G. F. Bodley, R.A.

Memorial Window, Standish, Glos.—A stained glass memorial window has been erected in Standish Church, near Stonehouse, Glos. It is the work of Messrs. Joseph Bell and Son, of Bristol.

FOREIGN.

France.—M. Nénot, who is architect to the Panthéon as well as to the new Sorbonne, is placing in the Panthéon a series of statues of celebrated personages of the Revolution. In the apse of the choir is also to be placed the monument to Victor Hugo which M. Rodin is now completing. In regard to the painted decorations, M. Detaille is now at work on a large picture symbolising the Chant du Départ.——In the Garde-Meuble National there have been found forty-one carved panels which had been commissioned by Louis XIV. from the best artists of his day. These wood carvings, showing trophies of lyres, armorial bearings, etc., are to be collected in one of the rooms at Versailles.——A competition has been organised, in which foreign as well as French architects have been invited to compete, for transforming the Cour d'honneur of the hotel on the Boulevard des Capucines into a winter garden.——The Government has commissioned from the Gobelins manufactory two tapestries; one to reproduce the "Printemps" of Botticelli, from a cartoon prepared by M. Lavalley; the other to be a copy from a picture specially painted by M. Olivier Merson, representing two figures holding up the device of the Gobelins—

——"Divinâ Palladis arte
Picturam superavit acus."

——A new hospital is to be built at Tréport, from the plans of M. Ratier.——A competition has been opened for the designs for a picture gallery for Orleans.——An ancient feudal dungeon near Montlucon, called the "Donjon d'Huriel," and which is classed among the "Monuments Historiques" is in process of being "restored." It dates from the eleventh century, and is one of the best specimens of mediæval military architecture in France.——A concrete-steel bridge is shortly to be constructed at Chalons-sur-Marne.——M. Paul Guadet, architect to the Legation of France at Tangiers, has been commissioned to build a new Hotel de la Legation. ——Important works are shortly to be undertaken in Algeria for the improvement of the different ports, especially those of Algiers and Philippeville. To these works, which are estimated to cost nearly seventeen million francs, is also to be added a scheme for the creation of a military port at Mers-el-Kebir, at a cost of twenty million francs, and a trading port at Rachgoun at a cost of twenty-three million francs.——M. Roujon is spoken of as a probable candidate for the Secretaryship of the Académie des Beaux-Arts, in place of the late M. Larroumet.——M. Guillaume, the sculptor, has just completed the bust of Hittorf, the late eminent archæological architect. It is intended for the Palais Mazarin.——A statue of Vercingetorix was inaugurated on Sunday last at Clermont-Ferrand; the work of M. Bartholdi.

War Memorial, Ballarat.—We understand that the citizens of Ballarat, Australia, have decided to erect a statue to the memory of the troops who fought in the South African War. The statue is to be equestrian, in bronze, and the cost will not exceed 1,300*l.* delivered in Melbourne. The pedestal is to be constructed locally. Designs are being received by the Agent-General for Victoria, for transmission to the Committee.

A Colosseum in America.—Mr. McKim has made plans and designs for the construction of a vast stadium, after the classic model, upon the Soldiers' Field, the playground of Harvard College, on the bank of the Charles River. The building will enclose an arena 450 ft. in length, and its extreme dimension, as seen from the road that crosses Harvard Bridge, is nearly 600 ft. The framework of the structure consists of iron girders, with a facing of concrete blocks; whilst a mask of yellow white is to conceal the iron-work from within. The tiers of seats, rising to a total height of 100 ft., will give sitting room for 24,000 spectators, whose numbers might, on occasion, be increased to nearly 40,000. Light columns sustain a roofed gallery behind and above the highest tier, affording a covered walk or balcony, whilst the severe elevation of the design, as viewed from the exterior, will be somewhat relieved by a simple cornice above a colonnade of three rows of galleries.

Natal.—A new port will shortly be formed at the mouth of the Umhlatuzi river, in Zululand, to connect it with the main line from Durban to the Rand. The lagoons have been surveyed and reported upon by Mr. C. W. Methuen, M.Inst.C.E., and the total cost of construction will be 800,000*l.*

India.—The Municipality of Mussoorie have adopted a scheme for the supply of water from the Kemptee Falls. The electric plant erected on the spot provides for lighting the whole of the district. It is contemplated that the water will be pumped by electric power to three main reservoirs and thence distributed over the station.

MISCELLANEOUS.

Professional and Business Announcements.—The B. and S. Folding Gate Company have parted with their interest in electric and hydraulic passenger and goods lifts, which has been taken over by Messrs. W. A. Gibson, Ltd., 28, Fleet-street; and their interest in the Quimby screw pumps has been taken over by the Quimby Screw Co., Ltd., at the same address; the Folding Gate Co. intending to give their whole attention to their regular work in folding gates, steel rolling shutters, grilles, lift enclosures, etc.

Theatre Royal, Birmingham.—The scheme for the rebuilding of the old play-house embodies a row of shops in the front in New-street. Messrs. E. Runtz and Co. have, we understand, been appointed the architects. The old theatre, recently demolished, had a capacity for an audience of 2,000 persons. It was first built in 1774, at a cost of nearly 6,000*l.*; six years afterwards was added an Ionic portico with a balcony. Having been burned by the act of incendiaries in August, 1792, the house was rebuilt in 1793-5, and re-opened by the elder Macready. It was again consumed by fire in 1820, and was re-built in that same year. In 1810 W. C. Macready made his first appearance there in the character of "Romeo."

Appointment of Sanitary Officers.—The Local Government Board has sanctioned the appointment of the undermentioned sanitary inspectors:—Mr. H. J. Gentry, in Fulham, at a salary of 120*l.* per annum; Mr. J. Sweeney, in Southwark, at a salary of 120*l.* per annum; Mr. G. J. Bridel, in Greenwich (further period of six months), at a salary of 130*l.* per annum.

The Ten Temples of Abydos.—At Owens College, Manchester, on the 5th inst., Professor W. M. Flinders Petrie gave a lecture on the recent discoveries at Abydos. Abydos (he said) was the first capital of Egypt, and always remained one of its main religious centres, the Canterbury of the land. Its great temple, therefore, was restored and rebuilt in each age from 5,000 to 500 B.C. When Mariette dug there about forty years ago he concluded that nothing remained; even the very foundations had been removed, and it was hopeless to seek for the tomb of Osiris, which he thought was the great centre of worship. On that very ground we last winter found the remains of ten successive temples, one over the other, and instead of finding the tomb of Osiris we found that god was a later importation, and that a different god of the dead was originally worshipped, called "the Opener of Ways." These ten successive temples filled a depth of fifteen to twenty feet of earth and ruins. Of some, of mud brick, there were walls yet standing, but the stone temples had been almost entirely taken away for stone, and only the foundation deposits remained to show what had stood there. From the age of the first temple a group of about two hundred objects had been found which gave surprising light on the civilisation of the first dynasty. A part of a large glazed pottery vase of Mena, the first king of the first dynasty, about 4700 B.C., showed that even then they were making glaze on a considerable scale, and also inlaying it with a second colour. Other glazed vases were copied from the architectural lotus capital, showing that form to have been already used. The ivory carving was astonishingly fine, a figure of a king showing a subtlety and power of expression

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as good as any work of later ages. Other figures of lions, baboons, etc., are of the same school. In artistic work and in glazing technical completion was already reached at the first dynasty. Some pottery of this age had been imported from Crete, and also two figures of cast copper, showing that commercial intercourse across the Mediterranean was already going on. It is striking how Egypt tells the same tale of civilisation as Peru; there recent work has proved five successive ages of culture, and the earliest of all is in most respects the finest in its work. Coming down to well-known times, at about 4000 B.C., an ivory statuette of Cheops, the builder of the Great Pyramid, was found, the only portrait known of him. Although the face is no larger than the tip of a little finger, yet the work is so able that it has all the air of a colossus; when magnified on a screen no one would suppose that it was less than life size. It gives a strong idea of the driving power and indomitable will of the man who was the greatest builder of any age, who established the Egyptian monarchy on lines which lasted for thousands of years, and who confiscated to the State all the religious endowments of the country. Of this last policy, recorded by Herodotus, the actual remains were found in the hundreds of little clay substitutes for sacrifices. Later than this were found two large decrees on stone, the charters of the temple, giving the privileges of its staff; many alabaster vases of the kings, foundation deposits of several different periods, inscriptions of two new kings, and some statues. A group of terra-cotta figures in a burial of about 1400 B.C. shows how a Greek potter had settled in Egypt and was making things for the Egyptian market, mainly Greek in style. For the first time we have disclosed the continuous history of a great site, age before age, throughout the whole of the long course of Egyptian history—from the first dynasty down to the Greek period. —*Manchester Guardian.*

PROPOSED EXHIBITION AT DUSSELDORF.—The Board of Education have received a communication from the Foreign Office intimating that an International Fine Art and Horticultural Exhibition is to be opened at Düsseldorf on May 1, 1904. A hope is expressed that England will contribute largely to this exhibition.

UNDERGROUND ROOMS IN ST. PANCRAS.—The Public Health Committee of the London County Council reported as follows at Tuesday's meeting of the Council:—We reported on July 14 last that we had been in correspondence with the St. Pancras Borough Council on the subject of the large number of underground rooms illegally occupied in that borough. The Council, on our recommendation, decided to inform the Borough Council that the London County Council considers it of great importance that steps should be taken to enforce the provisions of section 96 of the Public Health (London) Act, 1891, with regard to underground rooms in the borough, and to ask what action is being taken upon the report of the borough Medical Officer of Health on this subject. The result of the enquiry which had been made by the Council's medical officer was that over 400 tenements in the borough, affording accommodation for more than 1,000 persons, were found to be occupied separately, although they contravened the provisions of the law relating to underground rooms beginning to be occupied after 1855. Ten of these tenements, accommodating 29 persons, did not even conform to the standard prescribed for underground rooms let antecedent to 1855. When this report was communicated to the Borough Council that body caused an inspection to be made of the underground rooms in the borough, and the borough medical officer reported that there were 640 rooms in which the conditions were practically irremediable, and suggested that the rooms should be dealt with consecutively and at intervals, "so as to avoid the serious effects of suddenly displacing a large population." The Borough Council has now intimated that notices have been served requiring the owners of 49 of these rooms, to discontinue, within three months, to suffer the rooms to be let or occupied as dwellings contrary to statute, and that the remaining cases are being dealt with. We propose to report again to the Council on the subject in a month's time.

WAR MEMORIAL, TYNEMOUTH.—On the 13th inst. a war memorial in the form of a monument was unveiled at Tynemouth. It was designed by Mr. Arthur B. Plummer, architect, Newcastle, and the sculptor was Mr. Robert Beall, also of Newcastle. The memorial is of red sandstone, and stands about 12 ft. in height.

THE SIMPLON TUNNEL.—According to the latest information received at the British Foreign Office the piercing of the Simplon Tunnel had, on August 1, reached a distance of 7,400 yards on the south side (Iselle), and a total, together with that on the north side (Brigue) of 18,138 yards. The average progress of mechanical boring on the south side was 18 ft. 7 in. per working day, and the flow of water from the tunnel was 253 gallons per second, whereas on the north side the average progress of mechanical boring was 24 ft. 8 in. per working day, and the flow of water from the tunnel 9½ gallons per second. An exhibition will be held in Milan in 1905 during the months of April to October to celebrate the opening of the tunnel. International sections will be:—(1) means of transport by land and aerial navigation; (2) means of transport by sea; (3) prévoyance .i.e., legislation on behalf of workmen, employees, etc., workmen's friendly and provident societies, etc.); (4) decorative art; (5) labour pavilion for industrial art. There will be a Fine Arts section for national exhibits only. The exhibition is under the patronage of the King of Italy.

LEGAL.

EMPLOYERS' LIABILITY ACT:

MASTERS' SUPERVISION AND MEN'S CONTRIBUTORY NEGLIGENCE.

AT the Marylebone County Court (London) on the 9th inst., before Judge Stonor and a jury, Thomas Patrick Hill, Saltram-crescent, Paddington, W., brought an action, under the Employers' Liability Act, against Mr. John McKenzie, builder and contractor, Keslake-road, Kensal Rise, N.W., claiming 150*l.* damages in respect of personal injuries, said to have been sustained owing to negligence on the part of the defendant or his servant or servants.

Mr. Chester Jones, counsel, appeared for the plaintiff, and Mr. W. Shakespeare, counsel, for the defendant.

Plaintiff's counsel stated that on April 10 last his client was in the employ of the defendant, and assisting in work being carried out at the Zoological Gardens, Regent's Park. The plaintiff and a man named Barrett had been working upon a thirty-round ladder, in order to reach the eaves at the gable ends of the parrot house. Afterwards they found this ladder to be too long, and went to the foreman for a shorter one. The foreman told them to get one from the monkey house; but there the men found only a ladder the same length as the one they had been using, and another which was much too short for their work. The men explained to the foreman that they could not find a suitable ladder, and he said, "Well, do the best you can." In order to reach their work the men put two long 9in. planks upon trestles, and upon these planks they placed a pair of ordinary builder's steps, the top leaning against the wall of the house. The plaintiff was working from the top of the steps, Barrett standing on the planks and holding the foot of the steps, when the weight of the plaintiff caused the extemporised "scaffold" to "bulge out" away from the wall and collapse. Both men fell to the ground, the plaintiff sustaining a broken thigh.

The plaintiff bore out his counsel's opening statement.

In cross-examination, plaintiff said that it was customary in the trade for the men to erect their own scaffolds, when small, such as the scaffold necessary for doing the work in question. While he was working from the steps the defendant and the foreman were within view, conversing for about a quarter of an hour.

James Barrett, the man who was working with the plaintiff at the time of the accident, corroborated as to the foreman saying "Do the best you can," and as to both the defendant and the foreman being within about ten yards of them while plaintiff was working from the steps.

Cross-examined: It was the usual thing in the trade for the men themselves to erect such small scaffolding; he was as much accustomed to the putting up of such scaffolds as the foreman, and witness did not at the time think that the scaffold was dangerous.

Medical evidence having been given regarding the plaintiff's injuries,

Mr. Robert T. Brown, architect and surveyor, said that the scaffold described would be distinctly unsafe.

Counsel for the defence submitted that, it being the duty of the men—as was admitted—to erect their own small scaffold, and as they knew as much about such work as the foreman, yet did not consider the scaffold in question to be dangerous, it could not be held that there was negligence on the part of the defendant or his foreman which caused the accident.

The Judge: But the men might be ignorant, and it is the duty of the foreman to see that they do not do their work in a dangerous way.

For the defence, William Thomas Gammon, the defendant's foreman on the job in question, was first called. Witness denied that either plaintiff or Barrett asked him for a shorter ladder. He did not see the men working on the steps, standing upon the trestles and planks.

The defendant said that, although he was on the job on the morning in question, he did not see the men working upon what was termed the "scaffold." There were twenty-round ladders on the job which they might have used.

The defendant's son; also a painter, and one of the Garden officials stated that there was a shorter ladder close to the men which they might have used for their work.

An important point in the address of defendant's counsel to the jury was to the effect that, if it were held that a master must be constantly on the look-out to see that men whom he employed as efficient workmen, and paid accordingly, did not do their work in an ignorant or negligent manner, it would be impossible for large works, such as that in question, to be carried on.

Counsel for plaintiff dwelt more on the probabilities of the case, urging that, as the foreman was on the job practically the whole of the time, he must have seen the men working on the "scaffold," having previously told them to do the best they could.

The Judge put to the jury questions as follows: Did the defendant or his foreman see the plaintiff working in a dangerous manner? Was the defendant or his foreman guilty of negligence, under all the circumstances, in not carefully supervising the manner in which these men did their work? Was the danger in working on this scaffold so evident that the plaintiff must have known it, and have therefore been guilty of contributory negligence in doing the work?

Counsel for the plaintiff formally submitted that there was no evidence of contributory negligence.

Counsel for the defence respectfully submitted that the question relating to contributory negligence required alteration; and suggested that it should run: Did the plaintiff exercise the care which an ordinarily careful man would exercise?

The Judge intimated that he would note counsel's objection.

The jury found: That the foreman must have seen the plaintiff working in a dangerous manner; that the foreman was guilty of negligence, under all the circumstances, in not carefully supervising the manner in which the men did their work; that the danger in working on this scaffold was so evident that the plaintiff must have known of it, and was guilty of contributory negligence in working there of his own free will.

This was a verdict for defendant, in whose favour his Honour gave judgment, with costs.

Counsel for plaintiff intimated that there was a possibility of his client appealing.

A solicitor representing the other man, Barrett, who was injured by the same accident, explained that his client also was bringing an action against the defendant for damages in respect of personal injuries; and solicitor asked that this case might be adjourned until after the appeal—if there was an appeal—had been disposed of.

His Honour consented.

THE STRAND ANCIENT LIGHTS DISPUTE.

IN the Vacation Court on Wednesday, Mr. Justice Bucknill had before him again the case of the Hotel Cecil, Ltd., *v.* the Savoy Hotel, Ltd., on a motion of the plaintiffs for an *interim* injunction to restrain the defendants, until the trial or further order from building so as to obstruct the plaintiffs' ancient lights.

Mr. Bramwell Davis, K.C., for the plaintiffs, said that the motion came before his lordship the previous Wednesday, and stood over until to-day on the defendants giving an undertaking in the meantime not to build beyond a certain height. The plaintiffs had had a large number of affidavits filed by the defendants put into their hands that day, and they desired time to answer them. He suggested that the defendants should continue the undertaking until the matter could be properly dealt with by Mr. Justice Farwell on the second motion day next sittings.

His Lordship: Do the affidavits delivered to you this morning raise fresh matter?

Mr. McCall, K.C., for the defendants, said they did, and conclusively showed that there were no lights in the plaintiffs' building which retained the rights of the ancient lights in the former building, and in these circumstances he submitted that the application was entirely misconceived. He agreed that the plaintiffs had not had time to answer their affidavits, but when defendants were brought into court the previous Wednesday they had not had time to answer the plaintiffs' evidence.

Mr. Bramwell Davis: I said at the time that I was prepared to move ex parte.

His Lordship: The plaintiffs' affidavits show that certain rooms in their hotel are already too dark, and any diminution of the light they have already got will be very serious. You are both rich people.

Mr. McCall: The defendants certainly are.

His Lordship: Well, let me suggest that this motion should stand over until Mr. Justice Farwell can dispose of it next term, on the defendants giving the same undertaking.

Mr. McCall: I decline to give any undertaking, and I have reason for doing so on the evidence before me. The only real substantial question in this case is whether the building, on the Beaufort House site, will interfere with one window, or two windows, in the plaintiffs' house.

Mr. Bramwell Davis: I do not agree with that.

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Mr. McCall: The rest of the case is with regard to the east wing, which is 130 ft. away from the plaintiffs' building.

Mr. Bramwell Davis: No, no.

Mr. McCall: With regard to the Beaufort House site, there will be no addition to that building until the trial of the action. I therefore decline to give an undertaking which will be a sort of admission that the defendants are wrong.

Mr. Bramwell Davis: Then I must ask your Lordship to grant an injunction until the second motion day next sittings.

His Lordship: How can I do that without going into the case?

Mr. Bramwell Davis said it would be necessary for his Lordship to go through the affidavits. It was not as though the defendants were stopping the works. They were now going on building higher, and if at the trial they were held to be wrong they would no doubt put forward the plea in excuse of being compelled to pull down, that the buildings had cost them a great amount of money.

Mr. McCall said that defendants had not increased the pace of their building operations because of this action. He was quite content that the action should be tried on the first available day next sittings, and that his Lordship should hear the case or Mr. Justice Farwell. Defendants were willing to accept short notice of trial, and to go to trial without pleadings.

Mr. Bramwell Davis said that the plaintiffs would agree to that, but the defendants must not build any higher in the meantime.

Mr. McCall said he would give no undertaking.

Mr. Bramwell Davis said that the defendants would be amply protected by the plaintiffs' undertaking in damages, for any expense they might be put to by not being able to build beyond the old height in the meantime.

Mr. McCall said he would not give any undertaking.

Mr. Bramwell Davis replied that in those circumstances he pressed for an *interim* injunction.

His Lordship said he would hear the case later in the day.

Later in the day it was arranged that Mr. Justice Bucknill should write to Mr. Justice Farwell, and ask him to try the action on October 27. If Mr. Justice Farwell could not try the case then, Mr. Justice Bucknill would try it. The defendants gave an undertaking not to build the wall complained of on the Beaufort House site higher than another 14 ft. in the meantime, the plaintiffs giving defendants an undertaking in damages.

ANCIENT LIGHT DISPUTE SETTLED.

THE case of the London Joint Stock Bank, Ltd., *v.* the Westminster Trust, Ltd., and J. Lyons and Co., Ltd., came before Mr. Justice Bucknill, sitting as Vacation Judge on Wednesday.

On the case being called on, counsel for the plaintiffs said that the motion was for an *interim* injunction to restrain the defendants till the trial building so as to interfere with the plaintiffs' ancient lights. Both defendants had consented to a perpetual injunction, and to treat the motion as the trial of the action, and to pay costs.

His Lordship assented to this arrangement.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

22,688 of 1902.—T. SHERWOOD: *Joint for Connecting Lead Pipes to Earthenware Closet Pans.*

This relates to a construction of joint for connecting the lead branch of a soil pipe to the earthenware spigot of a water-closet pan, the object being to make a more secure and liquid-tight joint, and also to economise the amount of solder required. A brass thimble or socket is employed of an improved form. The larger end of the socket is made cylindrical and of a sufficient diameter to receive the end of the earthenware spigot or pipe, leaving sufficient room between the two surfaces for the usual packing of spun yarn and Portland cement, the other end of the socket being reduced in diameter inside so as to form a shoulder to receive the packing, the inner pipe of the thimble projecting about an inch beyond the shoulder above mentioned, and being provided outside at about three-quarters of an inch from the end with a cup-like projection or flange all round.

24,556 of 1902.—G. F. NEWMAN: *Swing Door Hinges.*

In "dead" hinges for use in connexion with double-action swing doors, the employment of gapped caps or equivalent locking devices connected to and moving with the oppositely swinging hinge flaps; in combination with lugs, studs, or projections also carried by the said flaps, the gaps or clearances of the locking devices being so disposed with respect to the projections that normally, or when the door is closed, the projections and gaps will coincide as the door is swung one way or the other; the projection on the one flap will move outwards through the gap of the locking device on the other flap, whilst the projection on the last named flap will be simultaneously engaged by the locking device of the first named flap and temporarily held fast.

25,416 of 1902.—J. GREEN and W. GREEN AND CO., LTD.: *Cooking Ranges, Stoves, Grates, Fireplaces, and similar Apparatus.*

In a cooking range or the like, the combination with a pivoted bottom grate having means for securing its front edge at different positions of sliding front bars, having lugs engaging guides in the side frames, and lugs or the like to connect it with the bottom grate, with or without one or more catches at the upper ends of the guides in the side frames.

16,117 of 1903.—W. J. NOBLE: *Folding Tables.*

A folding table, comprising top sections, hinges connecting them, a cleat provided with a recess having an inclined bottom rigidly fastened to one section and a tongue rigidly fastened to the other section, and having a projecting portion arranged to engage the cleat when the sections are extended, said projecting portion being provided with an inclined face to co-operate with the inclined bottom of the recess in the cleat.

17,205 of 1903.—A. J. BOULT (L. Giraud); *Flushing Apparatus.*

A flushing apparatus for lavatories and other purposes, comprising twin tanks or a divided tank with a common cock adapted to alternately establish communication between one of the tanks and the water supply pipe, and the other tank and the flushing pipe, in such a manner that on operating the said cock one of the tanks will be filled while the other is being emptied, said tanks being provided with float valves.

17,443 of 1903.—G. C. MARKS (La Société E. Roy et Cie.): *Hinges and Methods and Apparatus for Fixing same.*

A hinge, the parts of which to be fixed on the wood work are each formed by one or several fingers parallel to each other and perpendicular to the socket, provided with or without strengthening ribs and carrying holes for fixing nails or provided with perforated lugs forming a suitable angle with the fingers.

26,230 of 1902.—A. B. JACKSON, E. R. LUDBROOK, and G. C. JACKSON: *Dust and Draught Excluder for Doors.*

This invention relates to a device to exclude dust and draught from entering a room by bad fitting doors, and consists of a strip of wood or metal which may have an indiarubber bead, which is sunk in a suitable recess in the threshold of the door to lie flush with the step. On each end of the strip are journal ends for it to turn on. Near one end of the strip is a projection for the door to meet on closing, which then turns the strip on its journal ends, causing one edge to rise and be retained against the edge of the door. On the door being opened the strip sinks into its recess. The device can be applied in the same way to the top and sides, as well as the bottom of the door.

22,735 of 1902.—H. K. G. BAMBER: *Manufacture of Portland Cement.*

The process of conditioning and regulating the setting time of cement, consisting in bringing steam in contact with the cement during grinding.

13,550 of 1903.—J. PARKER: *Jointing of Drain Pipes or Conduits.*

The application to the spigot end of a drain pipe or conduit of a ring or collar having a channel within it for receiving the liquid cement and rounded at its extreme end so as to permit easy entry into the socket, and to compress the mastic or plastic substance lying within the angle of same.

17,812 of 1903.—L. KLEFISCH (J. Klefisch): *Manufacture of Bricks from Slate Waste and Lime.*

A process for the manufacture of building bricks more particularly from slate and lime, in which waste slate and lime are broken up, ground, and sifted in a suitable mixture, moistened with a small quantity of water, and pressed into moulds; the treatment of the bricks produced by this process, in which the moulded bricks are subjected, when they have set, to the action of heated air, which must remain at a temperature slightly below 100 deg. C., so that in consequence of the evaporation of water a hard surface-layer of silicate of lime, or calcium hydro-silicate, is formed on the moulded material.

17,556 of 1903.—J. KAHN: *Composite Structural Members for Use in the Construction of Buildings, Bridges, and the like.*

In a composite structural member, the combination with an integral cementitious body material of a main longitudinally disposed metallic strengthening member, of a plurality of arms struck upward from the main member obliquely in opposite directions from the middle line of said member to form a part-truss, the remainder of said truss being completed by the cementitious body material.

17,680 of 1903.—S. SANDERS: *Ventilator.*

This invention is a ventilator intended to be placed in a sash window-frame. It consists of a board fitted into the window-frame and provided with holes which are covered with fine wire gauze, which allows the room to be ventilated but prevents the ingress of dust.

23,665 of 1902.—W. INGHAM, B. LANGTON, and L. INGHAM: *Improved Continuous Kiln.*

This relates to kilns of the continuous type, for burning bricks, tiles, earthenware, and the like. According to the invention, the kiln is made of the usual materials, and is preferably oblong or square in plan. It is divided into a number of chambers, separated by walls. These chambers are arranged side by side to ensure uniform distribution of heat, each chamber is provided with two combustion flues, one at each end. Their top sides are on the same level as the floor of the chamber, and are perforated or formed of bars. These flues, which are controlled by dampers, convey air from the outside of the kiln to support combustion. Race holes or passages are provided in the division walls between a flue in one chamber and that in the adjacent chamber. Nearer the top of the walls are similar race holes, each provided with a damper which is actuated from the feed chamber in the upper part of the kiln, and by this means communication can be made between each chamber and the adjoining one. When the outside wall of the kiln forms one side of the chamber, these holes communicate with one another and also with the adjoining chamber by means of a transverse passage, which is regulated by dampers. Under each chamber and parallel to the combustion flues is a cross flue having its top side perforated or formed of bars: this cross flue communicating with the main flue.

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

MEETINGS.

MONDAY, OCTOBER 19.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. W. C. Tyndale on "Calculations, Measurements and Plans and Sections." 7 p.m.

Liverpool Architectural Society.—Mr. Peter Cowell, City Librarian, on "Venice," illustrated by limelight views (to be held at public library, William Brown-street).

TUESDAY, OCTOBER 20.

Institute of Sanitary Engineers (Lectures in Practical Sanitary Science).—Mr. N. W. Hoskins on "Hydraulics and Hydrostatics." 7 p.m.

WEDNESDAY, OCTOBER 21.

Builders' Foremen and Clerks of Works Institution.—Quarterly meeting of the members. 8 p.m.

Architectural Association (Discussion Section).—Mr. J. W. Benwell on "Siena." 7.30 p.m.

THURSDAY, OCTOBER 22.

Sanitary Institute (Lectures for Sanitary Officers).—Professor R. Elsey Smith on "Building Materials." 7 p.m.

Carpenters' Hall (Lectures on Sanitary Building Construction).—Mr. H. Phillips Fletcher on "Properties and Qualities of Building Materials and how to use them: Timber decay and preservation." 7.30 p.m.

FRIDAY, OCTOBER 23.

Sanitary Institute (Lectures for Sanitary Officers).—Professor R. Elsey Smith on "Sanitary Building Construction and Planning: Soil and Local Physical Conditions." 7 p.m.

Glasgow Technical College Architectural Craftsmen's Society.—Messrs. A. H. Morton and G. H. Gibson on "Reinforced Concrete." 8 p.m.

Junior Institution of Engineers.—Annual General Meeting at the Westminster Palace Hotel. 8 p.m.

SATURDAY, OCTOBER 24.

Sanitary Institute (Demonstration for Sanitary Officers).—Inspection at Charing Cross Hospital new buildings. 3 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

October 1.—By GRIMLEY & SON (at Birmingham).

Yardley, Worcester.—The Grove Estate, 24 a. 2 r. 32 p., f.	£6,300

By HAMPTON & SONS (at Bristol).

Churchill, Somerset.—Two enclosures of land, 0 a. 3 r. 9 p., f.	100
Ubley, Somerset.—Ubley Warren Farm, 181 a. 2 r. 36 p., f.	825
Enclosure of land, 7 a. 0 r. 26 p., f.	100
Compton Martin, Somerset.—Freehold house and 16 a. 3 r. 22 p.	145

October 2.—By WILLSON & PHILLIPS (at Burnham-on-Crouch).

Creeksea, Essex.—The White House Estate, with 19 oyster plts, 49 a. 1 r. 20 p., f.	4,600

October 3.—By SPELMANS (at Norwich).

Wroxham, Norfolk.—Lanbeevar and 1 a. 2 r. 21 p., f., p.	1,000

By CHURTON, ELPHICK, & CO. (at Chester).

Hargrave, Cheshire.—The Church Farm, 102 a. 0 r. 30 p., f.	4,500
Two cottages and 2 a. 3 r. 33 p., f.	475
Two pieces of land, 5 a. 3 r. 25 p., f.	335

October 5.—By PROTHEROE & MORRIS.

Chingford.—Chingford-rd., a freehold building plot	100
Bulpham, Essex.—Pye Corner Field, 3 a. 2 r. 14 p., f.	150
Orsett, Essex.—London-rd., &c., 42 plots of freehold building land (in one block)	980

October 6.—By C. W. DAVIES & SON.

Holloway.—58, Marlborough-rd., u.t. 64 yrs., g.r. 7l. 7s., y.r. 38l.	350
Barnsbury.—2, Matilda-st., u.t. 40 yrs., g.r. 1l. 3s., q.r. 34l.	370

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46, 48, and 50, Wellington-rd., u.t. 8 yrs., g.r. 11*l.*, y.r. 88*l.* £200

By Edwin Evans.

Wandsworth.—60, Fullerton-rd., f., w.r. 37*l.* 14*s.* ... 400

Battersea.—115, Harbut-rd., u.t. 75 yrs., g.r. 6*l.* 10*s.*, w.r. 39*l.* 290

102, Falcon-rd., u.t. 24½ yrs., g.r. 6*l.*, y.r. 55*l.*; also f.g.r. 10*l.*, reversion in 24½ yrs. 855

By Rutley, Son, & Vine.

Regent's Park.—20, Albert-st., u.t. 38 yrs., g.r. 5*l.* 10*s.*, p. 755

Stockwell.—186, Stockwell-rd., u.t. 74 yrs., g.r. 10*l.* 10*s.*, p. 560

Holloway.—17, Denmark-ter., u.t. 58 yrs., g.r. 5*l.*, w.r. 40*l.* 6*s.* 315

Highgate.—5, Churchill-rd., u.t. 61 yrs., g.r. 5*l.*, y.r. 38*l.* 370

St. Pancras.—92 and 94, Drummond-st., u.t. 16 yrs., g.r. 3*l.*, w.r. 123*l.* 10*s.* 400

King's Cross.—Albion-st., &c., l.g.r. 13*l.*, u.t. 40 yrs., g.r. 6*l.* 110

22, Albion-st., u.t. 51 yrs., g.r. 6*l.* 6*s.*, q.r. 35*l.* ... 390

By E. Simpson.

Old Kent-rd.—28 to 36 (even), Trafalgar-rd., u.t. 28 yrs., g.r. 17*l.* 15*s.* 6*d.*, y.r. 168*l.* 1,040

By E. H. Stodart & Co.

New Kent-rd.—17 to 25 (odd), Ripley-st., f., w.r. 93*l.* 12*s.* 315

October 7.—By Francis Dod & Co.

Stoke Newington.—119, Evering-rd., u.t. 72 yrs., g.r. 9*l.*, p. 370

Edmonton.—1 to 4, Myrtle-cottages, f., w.r. 88*l.* 8*s.* 400

By Foster & Cranfield.

Hackney.—8 and 9, London-pl., with workshops in rear, u.t. 61½ yrs., g.r. 18*l.*, e.r. 99*l.* 700

By A. Harris & Co.

Soho.—31, Wardour-st. (S.), beneficial lease for 16 yrs., r. 100*l.* 1,000

Bayswater.—9, Talbot-rd., u.t. 46 yrs., g.r. 9*l.*, y.r. 65*l.* 550

West Ham.—17, Bolton-rd., u.t. 85½ yrs., g.r. 2*l.* 16*s.*, w.r. 32*l.* 10*s.* 300

By Higgs & Parsons.

Finchley.—29, Park Hall-rd., u.t. 78½ yrs., g.r. 6*l.*, y.r. 32*l.* 290

High Barnet, Herts.—17, The Avenue, f., e.r. 50*l.* 750

By F. Jolly & Co.

Hackney.—5, Terrace-rd. (S.), u.t. 41¼ yrs., g.r. 7*l.*, y.r. 40*l.* 360

By J. S. Richardson.

Dulwich.—58, 68, 70, 72, and 74, Park-rd., u.t. 69 yrs., g.r. 42*l.* 10*s.*, y.r. 232*l.* 10*s.* 2,320

113, 115, 117, and 123, South Croxted-rd., u.t. 69 yrs., g.r. 32*l.*, y.r. 152*l.* 1,330

By Boyton, Sons, & Buckmaster (at Fulham).

Fulham.—1a, 1 to 27 (odd), Racton-rd., u.t. 96 yrs., g.r. 97*l.* 10*s.*, w.r. 819*l.* 6,035

39 and 40, Crondace-rd., u.t. 76 yrs., g.r. 14*l.*, y.r. 85*l.* 875

By Hards & Bradly (at Hove).

Hove, Sussex.—28, Tamworth-rd., f., w.r. 29*l.* 18*s.* 335

By Balch & Balch (at Camden Town).

Camden Town.—15, St. Augustine's-rd., u.t. 43 yrs., g.r. 8*l.* 10*s.*, p. 575

Kentish Town.—129, Malden-rd., u.t. 42 yrs., g.r. 8*l.*, y.r. 40*l.* 420

33, Grafton-rd., u.t. 17½ yrs., g.r. 5*l.*, w.r. 57*l.* 4*s.* 230

October 8.—By C. C. & T. Moore.

Leytonstone.—506, High-rd., f., p. 1,600

By Norris, Sons, & Hadley.

Portman-sq.—11, Old Quebec-st., u.t. 7 yrs., g.r. 80*l.*, p. 250

St. John's Wood.—33, 34, and 38, New-st., and 5, Barrow Hill-rd., u.t. 14 yrs., g.r. 20*l.* 10*s.*, w.r. 253*l.* 1,105

By Walter Simmonds.

Camberwell.—90 to 98 (even), Kenbury-st., f., w.r. 179*l.* 8*s.* 2,125

Norwood.—7, Casewick-rd., f., y.r. 40*l.* 600

By Skilton & Goulden.

Lewisham.—8, Gilmore-rd., u.t. 54 yrs., g.r. 6*l.*, y.r. 33*l.* 340

By Wm. Stevens.

Kingsland.—22, Enfield-rd., u.t. 20 yrs., g.r. 4*l.*, y.r. 38*l.* 150

Clapton.—178, Millfields-rd., f., w.r. 52*l.* 500

De Beauvoir Town.—11 to 23 (odd), Bentley-rd., and 8, Tottenham-rd., with warehouse, &c., u.t. 12½ yrs., g.r. 61*l.* 10*s.*, y.r. 172*l.* 14*s.* 270

50, Englefield-rd., u.t. 20 yrs., g.r. 7*l.*, e.r. 42*l.* ... 310

By Stimson & Sons.

Islington.—20, Upper-st. (S.), f., y.r. 65*l.* 1,820

Norwood.—51, Belvedere-rd., f., y.r. 45*l.* 465

Haggerston.—48 to 58 (even), 74, 76, and 78, Whiston-st. (with workshops), f., w.r. 358*l.* 16*s.* 3,485

By Wriford, Dixon, & Winder.

Brixton.—Kildoran-rd., l.g.r. 26*l.*, reversion in 91 yrs. 650

By Willson & Phillips (at Leigh).

Leigh, Essex.—8 to 11, New-rd., f., w.r. 52*l.* 800

By Hards & Bradly (at Greenwich).

Greenwich.—17, 19, and 21, Tuskar-st., u.t. 72 yrs., g.r. 10*l.* 13*s.*, w.r. 98*l.* 16*s.* 600

104 and 106, Greenwich-rd., u.t. 29 yrs., g.r. 24*l.*, y.r. 76*l.* 435

2 to 12 (even), Armitage-rd., u.t. 53 yrs., g.r. 27*l.*, w.r. 157*l.* 6*s.* 1,245

1, 3, and 5, Collerston-rd., u.t. 53 yrs., g.r. 13*l.* 10*s.*, w.r. 93*l.* 12*s.* 660

47 to 53 (odd), Glenister-rd., u.t. 53 yrs., g.r. 18*l.*, w.r. 110*l.* 10*s.* 730

By J. Hood & Son (at Stratford).

Leyton.—41 and 45, Colville-road, u.t. 85 yrs., g.r. 8*l.*, y.r. 50*l.* 441

October 9.—Dennant & Co.

New Cross.—245 and 247, New Cross-rd., u.t. 42 yrs., g.r. 12*l.*, y.r. 90*l.* 775

By A. Robertson.

Battersea.—20, Leathwaite-rd., u.t. 78 yrs., g.r. 8*l.*, y.r. 40*l.* 415

Bermondsey.—20 and 22, Anchor-st., u.t. 32 yrs., g.r. 6*l.*, w.r. 54*l.* 12*s.* 410

23, Ambrose-st., u.t. 34 yrs., g.r. 3*l.*, w.r. 26*l.* ... 235

21, Alexis-st., u.t. 30 yrs., g.r. 3*l.* 4*s.*, w.r. 26*l.* ... 205

Hammersmith.—1 to 7, Guillard's-court, f. and c., w.r. 97*l.* 10*s.* 640

Deptford.—5 and 7, Douglas-ter., u.t. 30 yrs., g.r. 6*l.*, w.r. 67*l.* 12*s.* 450

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 0	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 13 0	" " "
Facing Stocks....	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 10 0	" at railway depôt
Red Wire Cuts ..	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
Glazed Bricks.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	20 6	" "

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	12s. 0d. per yard, delivered.
Stourbridge Fire-clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
Bath Stone—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "
Portland Stone (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2 2½	" "
Ancaster in blocks	1 11	per ft. cube, deld rly. depôt
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "
York Stone—*Robin Hood Quality.*		
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1¼ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.).....	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	deld. rly. depôt. per ft. super. deld. rly. depôt
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor..	13 2 6	per 1000 or 1200 at ry.dep.
20×12 " " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "

PRICES CURRENT (*Continued*).

SLATES.

in. in.	£ s. d.	
20×10 best blue Portmadoc doc	12 12 6	per 1000 or 1200 at ry.dep.
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green....	15 2 6	" "
20×12 best Eureka unfading green....	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" "
Hip and valley tiles....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles.....	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)..	3 5 0	3 15 0

Joiners' Wood.

White Sea: First yellow deals,	At per standard. £ s. d.	£ s. d.
3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " " 3 in. by 9 in.	12 10 0	13 10 0
" " " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ..	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Danzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do. ...	0 0 6½	. . .
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—		
Per ft. cube	0 4 0	. .

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch white matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

[*See also page 397.*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Shops and Houses, Fore-street	Kilmarnock (N.B.) Corporation	15*l.* 15s., 10*l.* 10s., 5*l.* 5s.	Nov. 9
Public Library, Skewer, Neath	Coedtrane Parish Council	10*l.* 10s.	do.
*Public Library, Herne Hill	Lambeth Borough Council	Not stated	No date.
*New Cotton Exchange	Liverpool Cotton Association, Ltd.	Not stated	do.

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Baths, Wakefield-road	Bradford Corporation	F. E. P. Edwards, Architect, Brewery-street, Bradford	Oct. 19
Minister's House, Wern, Minera, Wrexham	.....	D. Roberts, Wern Cottage, Minera	do.
Street Works, Sun & Thorn Sts., nr. Ashby-de-la-Zouch	R.D.C.	G. Farmer, Council Offices, Ashby-de-la-Zouch	Oct. 20
Additions to Police Station, Slough	Bucks County Council	R. J. Thomas, Civil Engineer, County Hall, Aylesbury	do.
Retaining Walls, Carlinghow-lane	Batley Town Council	Borough Surveyor, Branch-road, Batley	do.
Road Works, St. Leonard's Estate, Esholt, Yorks	.....	Empsall & Clarkson, Architects, 7, Exchange, Bradford	do.
Roof over Wharf, Royal Victoria Dock, E.	G.W.R. Co.	G. K. Mills, Paddington Station	do.
Water Supply Plant, Workhouse, Stratton, Wilts	Swindon and Highworth Guardians	J. P. Kirby, Union Offices, Swindon	do.
Road Works, Corsey, Edge and Park Lanes	Sefton (near Liverpool) R.D.C.	Jas. Roscoe, Surveyor, Kirkby	do.
Sewage and Water Supply Works, Waltham Abbey	Waltham Holy Cross U.D.C.	W. T. Streather, Surveyor, Waltham Abbey	do.
Reservoir, &c.	Street (Somerset) U.D.C.	A. P. T. Cotterell, Civil Engineer, 28, Baldwin-street, Bristol	do.
Cast-Iron Pipes and Castings (1,850 tons)	Grangeworth (N.B.) Town Council	Warren & Stuart, Civil Engineer, 94, Hope-street, Glasgow	do.
Road Works	Bootle (Lancs.) Corporation	Borough Engineer, Town Hall, Bootle, Lancs.	do.
Asphalt Works, &c. at Schools	Worsborough School Board	W. Haigh, Schoolhouse, Worsborough Common	do.
Sewering, &c., Sun-st. & Thorn-rd., Ashby-de-la-Zouch	Hartshorne and Seals R.D.C.	G. Farmer, Council Offices, Ashby-de-la-Zouch	do.
Sewage Disposal Works	Thurstonland (Yorks) U.D.C.	Haller & Machell, Engineers, Corporation Chambers, Dewsbury	Oct. 21
Sewerage Works, &c., Canton	Cardiff Corporation	W. Harper, Civil Engineer, Town Hall, Cardiff	do.
Additions to Bakehouse	Ashington Indus. Co-Op. Soc. Ltd.	J. Magin, Society's Offices, Ashington, Northumberland	do.
Additions to Corn Exchange, Northgate	Rochester Corporation	W. Banks, Civil Engineer, Guildhall, Rochester	do.
Road Works, &c., at Isolation Hospital	Llantrisant & Llantwit Fardre RDC	G. S. Morgan, Surveyor, School-street, Pontyclun	do.
Two Houses, Bankhouse-lane, Pudsey, Yorks	.....	C. S. Nelson, Architect, 15, Park-row, Leeds	do.
Cast-Iron Pipes	Salford Corporation	Borough Engineer, Town Hall, Salford	do.
Street Works, &c., Rokeby-street, also other streets	Hartlepool Corporation	H. C. Crummack, Civil Engineer, Borough-buildings, Hartlepool	do.
Club Premises, Camborne, Cornwall	Committee of Mining Schools	James Negus, Secretary, Camborne, Cornwall	do.
Chimney, &c., Globe Works, Colne-road, Huddersfield	.....	J. Kirk & Sons, Architects, Huddersfield	Oct. 22
Schools, Air Balloon-street, St. George	Bristol School Board	La Trobe & Weston, Architects, Bristol	do.
Seventeen Cottages, Dashwood-road, Prestwich	Industrial Society, Ltd.	Secretary, Society's Offices, Warwick-street, Prestwich	do.
Street Works	Southend Corporation	E. J. Elford, Civil Engineer, Town Hall, Southend	do.
Flints and Gravel Road Metal	Deal Corporation	T. C. Golder, Borough Surveyor, 23, Queen-street, Deal	do.
Road Works, Loveday-road	Ealing T.C.	C. Jones, Civil Engineer, Town Hall, Ealing	do.
*Terra Cotta for Chief Fire Station and Police Station	Manchester Corporation	City Treasurer, Town Hall, Manchester	Oct. 23
Shops and Houses, Gibraltar-street, Sheffield	.....	Hemsoll & Chapman, Architects, 18, Norfolk-row, Sheffield	do.
Villa Residence, Stotfield, N.B.	.....	J. Wittel, Architect, Elgin	do.
Car Sheds, Offices, &c.	Leicester Corporation	E. G. Mawbey, Civil Engineer, Town Hall, Leicester	do.
Road Works, Cricklade-road	Swindon Corporation	H. J. Hamp, Borough Surveyor, Town Hall	do.
*Sundry Works to Infirmary	St. George-in-the-East Guardians	Guardians' Offices, Raine-street, Old Gravel-lane, E.	do.
*Coast Guard Detachment, St. Govan's Head, Pembroke	Admiralty	Civil Engineer, H.M. Dockyard, Pembroke Dock	do.
*Laying-out 3½ Acres of Land for Tennis Courts	.....	C. M. Cobb, Architect, Old Vestry Offices, Enfield	Oct. 24
Coronation Clock Tower, &c., West Parade	Bexhill (Sussex) Corporation	G. Ball, Civil Engineer, Town Hall, Bexhill	do.
Alterations to Church, Antrim	The Presbyterians	W. D. R. Taggart, Architect, 11, Bridge-street, Belfast	do.
Wrot-Iron Railing and Gates, Victoria Park	Waterloo (Lancs) U.D.C.	F. S. Yates, Civil Engineer, Town Hall, Waterloo	do.
Road Works, Back Turnpike-row	Wallsend (Northumberland) Corp.	G. Hollings, Borough Surveyor, High-street, Wallsend	do.
*Road and Sewer Works, Brampton Park-road	Hornsey U.D.C.	Council's Engineer, 99, Southwood-lane, Highgate, N.	Oct. 26
*Highgate Outfall Sewer	do.	do.	do.
Paving Works at Cemetery, Westham, Weymouth	Melcombe Regis Burial Board	S. Jackson, Surveyor, Bridge Chambers, Weymouth	do.
Schools, Llainshen-street, the Heath	Cardiff School Board	Veall & Sant, Architects, High-street, Cardiff	do.
Pump Room, &c., Valley Gardens	Harrogate Corporation	T. Bagshaw, Borough Surveyor, Municipal Offices, Harrogate	do.
Bridge Works, Meesden Bridge	Hertfordshire County Council	N. A. Smith, County Surveyor, Hatfield	do.
Sinking Borehole, &c.	Wolverhampton Corporation	E. A. B. Woodward, Civil Engineer, Town Hall, Wolverhampton	do.
Sewerage and Sewage Disposal Works, &c.	Woodford (Essex) U.D.C.	W. Farrington, C.E., Council Offices, Woodford Green, Essex	do.
Sewerage Works, &c. (Contracts 1 and 2)	do.	do.	do.
Nine Houses, Darfield, Yorks	Mr. T. Wilkinson	A. B. Linford, Architect, Carlton Villas, Wombwell, Yorks	do.
Hospital Pavilion, Horton-lane	Bradford Guardians	F. Holland, Engineer, 11, Parkinson Chambers, Bradford	do.
Taking Down and Re-erecting Shop, 10, Water-street	Bury (Lancs) Corporation	A. W. Bradley, Borough Engineer, Bank-street, Bury	Oct. 27
Sewers, &c., Caergaw	Mountain Ash U.D.C.	H. P. Linton, Town Hall, Mountain Ash, Wales	do.
Sewage Tank, &c., Sturry-road	Canterbury Corporation	City Engineer, Guildhall-street, Canterbury	do.
Septic Tanks and Works at Sewage Farm, Sturry-rd.	do.	do.	do.
Sewer, &c., Stephen's and Broad Oak-roads	do.	do.	do.
Borehole, &c., in connection with Water Supply Works	Glemsford (Suffolk) U.D.C.	J. T. Eayrs, Civil Engineer, 39, Corporation-street, Birmingham	do.
*Dwellings for Working Class, Hackney	London County Council	Architect's Department, 19, Charing Cross-road, W.C.	do.
*Additions to Police Station, Portland	Dorset Standing Joint Committee	County Surveyor, Shire Hall, Dorchester	do.
Aqueduct	Derwent Valley Water Board	E. Sandeman, Engineer, Bamford, near Sheffield	Oct. 28
Additions to Institute, Pontygwaith	.....	The Secretary, Institute, Pontygwaith	do.
*Reconstruction of Slipper Baths, &c., at Marshall-street	City of Westminster	Works Department, Westminster City Hall, Charing Cross-rd., W.C.	do.
*Chimney Shaft for Destructor Works	Holyhead U.D.C.	P. F. White, Electricity Works, Bangor, N. Wales	Oct. 30
*New Postal Stores at Islington	H.M. Office of Works	H.M. Office of Works, Storey's Gate, Westminster, S.W.	do.
Mortuary Chapel, &c., Effingham-street	Sheffield United Gaslight Co.	J. W. Morrison, Engineer, Commercial-street, Sheffield	Oct. 31
Granite Kerb, &c.	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall, Hastings	Nov. 2
*Pumping Station, Gas Engines and Pumps, &c.	Portsmouth Borough Council	Borough Engineer, Town Hall, Portsmouth	Nov. 3
*Relief Sewer, &c.	do.	do.	do.
*Three Underground Conveniences	Tottenham U.D.C.	Council's Engineer, Coombes Croft House, 712, High-rd., Tottenham	do.
*Ward Block at Infirmary, Acton-lane	Willesden Guardians	A. Saxon Snell, Architect, 22, Southampton Buildings, W.C.	Nov. 4
*Completion of Boundary Wall, Tooting-grove	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
*Double Hung Sashes at Leavesden Asylum, Watford	do.	do.	do.
*Laundry and Mortuary Buildings, Ewell	L.C.C. Asylums Committee	Asylums Engineer, 6, Waterloo-place, S.W.	Nov. 6
*Branch Library, Lower Sydenham	Lewisham Public Libraries Comtee.	J. R. Vining, 89, Chancery-lane, W.C.	Nov. 10
Reservoir, Llanwrtyd Wells, Wales	Builth R.D.C.	R. L. Bamford, Surveyor, Wildemarsh-street, Hereford	Nov. 16
Sewage Outfall Works, &c.	Belper U.D.C.	C. J. Lomax, Civil Engineer, 37, Cross-street, Manchester	Nov. 21
*Carriageway and Tunnel under Thames, Rotherhithe	London County Council	Engineers' Department, County Hall, Spring Gardens, S.W.	Jan. 19, '04
Schools, &c.	Oldham School Board	J. Rennie, School Board Offices, Oldham	No date.
Alterations to Methodist Chapel, Newhaven, Sussex	.....	F. J. Rayner, Architect, Fort-road, Newhaven	do.
Post Office, Newhaven, Sussex	do.	do.	do.
Fifty Houses, Ellesmere-road, Sheffield	M.R. Co.	Gibbs & Flockton, Architects, 15, St. James'-row, Sheffield	do.
Two Semi-detached Houses, Avenue Estate, Knaresboro'	.....	Wm. Driffield, Architect, Boroughbridge-road, Knaresborough	do.
Additions to House, West-street, Gateshead	Messrs. Mather Bros.	W. R. Story, Architect, 2, St. Nicholas Buildings, Newcastle	do.
Additions to the "Claremont" Hotel, Harrogate	.....	Butler & Co., Architects, 12, East Parade, Leeds	do.
Workshop, Stanningley, Yorks	.....	P. Fox, Architect, 14, Manchester-road, Bradford	do.
Additions, &c., to the "New Inn," Skipton-rd., Harrog'te	.....	H. E. & A. Bown, Architects, James-street, Harrogate	do.
House, Stabling, &c., Canal-road, Bradford	.....	Aird & Calder Navigation Offices, Dock-street, Leeds	do.
Re-building Premises, Castle-street, Cardigan	Mr. W. George	Griffith Davies, 7, Castle-street, Cardigan	do.

[See also next page.

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Quantity Surveyor	Fulham Guardians	1½ per cent.	Oct. 19
*Surveyor	Romford U.D.C.	4l. per week	Oct. 20
*Clerk of Works	Barry U.D.C.	3l. per week	Oct. 26
*District Building Surveyor	Birmingham Corporation	3l. per week	Oct. 28
*Engineering Assistant	London County Council	500l.	Nov. 2
*Clerk of Works	Durham College of Science	Not stated	No date.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xix.

PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Fitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	- - -
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 5 0	9 10 0
" " galvanised	17 0 0	- - -
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	- - -
" " to 24 g.	10 15 0	- - -
" " to 26 g.	12 5 0	- - -
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 5 0	- - -
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	16 0 0	- - -
" " 22 g. and 24 g.	16 10 0	- - -
" " 26 g.	18 0 0	- - -
Galvanised Corrugated Sheets :—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	- - -
" " 22 g. and 24 g.	13 5 0	- - -
" " 26 g.	14 0 0	- - -
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	- - -
" " 22 g. and 24 g.	12 15 0	- - -
" " 26 g.	14 0 0	- - -
Cut nails, 3d. to 6 in. (Under 7 in. usual trade extras.)	9 5 0	9 15 0

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	13 17 6	- - -
Pipe in coils	14 7 6	- - -
Soil pipe	16 17 6	- - -
Compo Pipe	16 17 6	- - -
ZINC—Sheet—		
Vieille Montagne ton	26 0 0	- - -
Silesian	25 15 0	- - -
COPPER—		
Strong Sheet per lb.	0 0 10½	- - -
Thin "	0 0 11½	- - -
Copper nails "	0 0 11	- - -
BRASS—		
Strong Sheet per lb.	0 0 10	- - -
Thin "	0 0 11	- - -
TIN—English Ingots "	0 1 4	- - -
SOLDER—Plumbers' "	0 0 6	- - -
Tinmen's "	0 0 5	- - -
Blowpipe "	0 0 9	- - -

ENGLISH SHEET GLASS IN CRATES.

	s. d. per ft. delivered.
15 oz. thirds	2½d. per ft. delivered.
" fourths	1¾d. " "
21 oz. thirds	3½d. " "
" fourths	2¾d. " "
26 oz. thirds	3¾d. " "
" fourths	3¼d. " "
32 oz. thirds	4¼d. " "
" fourths	4¼d. " "
Fluted sheet, 15 oz.	2¾d. " "
" 21 oz.	3½d. " "
Hartley's Rolled Plate	1¾d. " "
½ " " "	2d. " "
½ " " "	2¼d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 9
" " " in drums	"	0 2 1
Boiled " in pipes or barrels	"	0 2 0
" " " in drums	"	0 2 4
Turpentine, in barrels	"	0 3 8
" in drums	"	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	"	19 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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TO CORRESPONDENTS.

J. F. W. (Amounts should have been stated).—G. W. T. (Below our limit).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ANNFIELD PLAIN (Durham).—The construction of settling tanks, &c., Kyo, for the Urban District Council. Mr. T. J. Trowsdale, surveyor, Council Offices, Annfield Plain :—

R. T. Johnson	£535 8 3
Wm. G. Fawsett, Annfield Plain*	437 10 0

[Surveyor's estimate, £454 15s. 4d.]

ARDMEDDEN (N.B.).—The erection of farm buildings. Mr. W. Clark, architect, Methlick :—

Masonry.—Paterson & Marshall, Pitmeddan, Udny	£321 17 0
Carpentry.—Francis Fraser, Hillbrae, Methlick	
Slating.—Callander Smith, Craigdam Towers, by Old Meldrum	

ASTON (Birmingham).—Conversion of schools into an Infirmary Block for Aston Union Workhouse. Messrs. C. Whitwell & Son, architects, Birmingham :—

J. E. Williams	£6,100	Elvins & Sons	£4,970
Lee & Son	5,199	T. Johnson	4,927
Dallow & Sons	5,080	A. Colin Hughes, Stratford Bdg., Birmingham*	4,835
W. S. Seamark	5,060		

BISHOP AUCKLAND.—For the execution of water-supply works, Crape Scar, Lynesack, for the Rural District Council. Mr. C. Johnston, surveyor, Cradock-street, Bishop Auckland :—

Bell's Asbestos Co., Ltd.	£310 8 6	G. Hetherington	£255 19 0
Rutter & Sons	263 3 9	Matthew Turnbull, High Grange, Howden-le-Wear*	225 15 0
Wm. Elliott	231 2 0		
Peter Frater	229 19 9		

CANNOCK (Staffs.).—For additions, &c., to workhouse laundry and rebuilding washhouses, for the Guardians. Mr. Ashton Veall, architect, 84, Darlington-street, Wolverhampton :—

E. Whittingham	£1,058	J. Bagnall	£885
J. Reynolds	985	H. Gough	865
F. Lindsey Jones	959	C. Griffiths	850
Thos. Tildesley	950	L. & R. Barton	834
Oakley & Coulson	939	T. Mason	829
F. Sprenger	935	J. M. Tildesley, Portobello, Wolverhpton*	797
T. & S. Ham	934		

COLCHESTER. — For the erection of a pair of cottages, Mersea-road. Mr. J. W. Start, architect, Cups Chambers, Colchester. Quantities by the architect :—

Potter & Son	£670	R. Beaumont	£578
R. J. Moore	650	Palmer	568
Dupont & Co.	650	Runnacles	497
W. C. Theobald	590	Chambers, Colchester*	469

DRINGHOUSES (York). — For the execution of sewerage works for the Bishopsthorpe Rural District Council. Messrs. Fairbank & Son, C.E., Lendal Chambers, York :—

Jones Bros.	£3,434 17 6
Balmforth, V.	2,275 5 6
Parker & Sharp	1,964 14 3
Edmundson & Wyatt	1,952 3 0
Keswick & Sons	1,934 0 0
Morley & Sons	1,845 0 9
Thos. Bell	1,791 9 9
W. Binns	1,790 0 0
Parkin & Co.	1,749 0 8
A. Palframan	1,723 8 6
Graham & Sons	1,714 12 3
Birkill Cyrus	1,709 9 0
A. & C. Harris	1,645 2 9
A. Dickinson	1,634 2 7
F. U. Simpson, Burton Leonard, Leeds*	1,554 12 7½

GUILDFORD.—For the supply of 600 tons of granite, for the Town Council. Mr. C. G. Mason, C.E., Town Hall, Tuns Gate, Guildford :—

	per ton.		per ton.
Fry Bros.	15 7	G. Le Maitre	14 5
Griffiths & Co.	15 6	L. Summerfeld, 2, Fowkes Bdgs., E.C.*	13 11
J. Hall	15 5	J. H. Dickson (Trusham granite)	13 6
Mowlem & Co.	15 3	G. A. Watson (Leicester granite)	11 11
E. & H. Beevers	15 1		
N. & F. Manuelle	14 11		
C. G. German	14 9		

LANCASTER.—For pavilion for the Lancaster Cricket and Bowling Club. Mr. J. Parkinson, architect. Quantities by the architect :—
W. Huntington & Sons, Lancaster*, £750.

LAVENHAM (Suffolk).—For kerbing Water-street and High-street for the Cosford Rural District Council. Mr. E. W. Veale, C.E., Bildeston, Lavenham :—
Edward J. Edwards, Norwich 2s. 6d. per yard (lineal).

LONDON.—For exterior painting at the Turin-street school for the School Board for London :—

Willmott & Son	£525	Woollaston Bros.	£450
Belcher & Co., Ltd.	499	A. Porter	446
Shurmur & Sons, Ltd.	475	W. Chappell	375
Silk & Son	470	Wales Bros.*	327

MANCHESTER.—For the erection of a new warehouse for Messrs. Jas. Spicer & Sons, in Whitworth-street, West. Quantities by the architect, Mr. J. Harold France, 7 Chapel Walks, Manchester :—

Brown & Sons	£13,853	Megarity & Co.	£13,264
Young, Tinker, & Young	13,627	Wilson & Toft	13,256
Southern & Sons	13,320	Robt. Carlyle	12,896
		Neill & Son*	12,800

[All of Manchester.]

[*See also next page*

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LONDON.—For New Stone Yard Buildings and Tenements, Hampstead. Mr. O. E. Winter, Borough Engineer, Town Hall, Haverstock Hill, N.W.

	Estimate No.				
	1	2	3	4	
	£	£	£	£	£
D. R. Paterson	1,269	3,276	8,759	10,185	23,490
Johnson & Son	1,108	2,948	8,572	9,270	21,900
C. R. Price	1,182	2,820	7,837	8,564	20,403
Sabey & Son	1,189	2,825	7,640	8,736	20,390
W. J. King	1,170	2,806	7,753	8,550	20,279
Wall & Co.	1,147	2,761	7,700	8,483	20,091
Kellett & Sons	1,048	2,592	7,495	8,734	19,869
G. Neal	1,158	2,627	7,358	8,386	19,529
Gough & Co.	1,160	2,640	7,420	8,264	19,484
Oldrey & Sons	1,151	2,660	7,360	8,126	19,297
H. L. Holloway	1,171	2,572	7,130	8,100	18,973
Patman & Fotheringham	1,083	2,585	7,140	7,945	18,753
Thomas & Edge	1,085	2,413	7,104	8,081	18,683
Leslie & Co.	1,125	2,458	7,046	7,706	18,336
Chessum & Sons	1,072	2,446	6,960	7,750	18,228
Dearing & Sons	1,015	2,488	6,978	7,722	18,203
J. Parsons	1,020	2,526	6,855	7,777	18,178
J. Appleby & Sons	1,000	2,416	6,882	7,868	18,166
*H. Knight & Son, Tottenham	1,017	2,391	6,699	7,622	17,729
J. Fergusson & Co.	543	2,455	6,960	7,649	17,607
S. E. Moss & Co.	1,300	2,312	6,298	7,176	17,086
Borough Engineer's Estimate	1,312	2,540	7,350	8,001	19,204

* Recommended for acceptance.

SALTBURN.—For the erection of Wesleyan church with tower and spire. Messrs. Garside & Pennington, architects, &c., Pontefract and Castleford. Quantities by the architect:—

T. E. Tuyden	£8,750	0	0
Stephen Coates	8,470	0	0
Watt Bros.	8,222	12	1
A. Moore	8,079	0	0
R. Harland	8,073	0	0
H. Harwood	8,057	0	0
W. S. Feaney	7,972	13	0
W. A. King	7,759	16	7
Allison Bros.	7,750	0	0
J. & R. Ridsdale	£7,727	14	4
Geo. M. Rudge	7,687	0	0
Allen & Son	7,447	0	0
Thos. Godfrey	7,400	0	0
Thos. Dickinson, & Son, West Hartlepool*	6,023	0	0

SEDBERGH.—For the erection of bank premises, for the Lancaster Banking Co., Ltd. Mr. J. Parkinson, architect, 67, Church-street, Lancaster. Quantities by the architect:—

Masonry, Slating and Plastering.

Brassington Bros. and Corney, Sedbergh*, £1,261.

Joinery.

John Dent, Sedbergh*, £471.

Plumbing, &c.

R. B. Abbott, Morcambe*, £167 18 4.

SEVENOAKS.—For the construction of sewerage works (2 miles). Kensing, for the Rural District Council. Mr. Thos. Hennell, engineer, 6, Delahay-street, Westminster:—

G. G. Rayner, Croydon, £1,239*.

[Twenty-four tenders were received.]

WORTHING (Norfolk).—For the erection of an iron bridge for the Mitford and Launditch Rural District Councils. Mr. E. J. Silcock, engineer, King-street, King's Lynn:—

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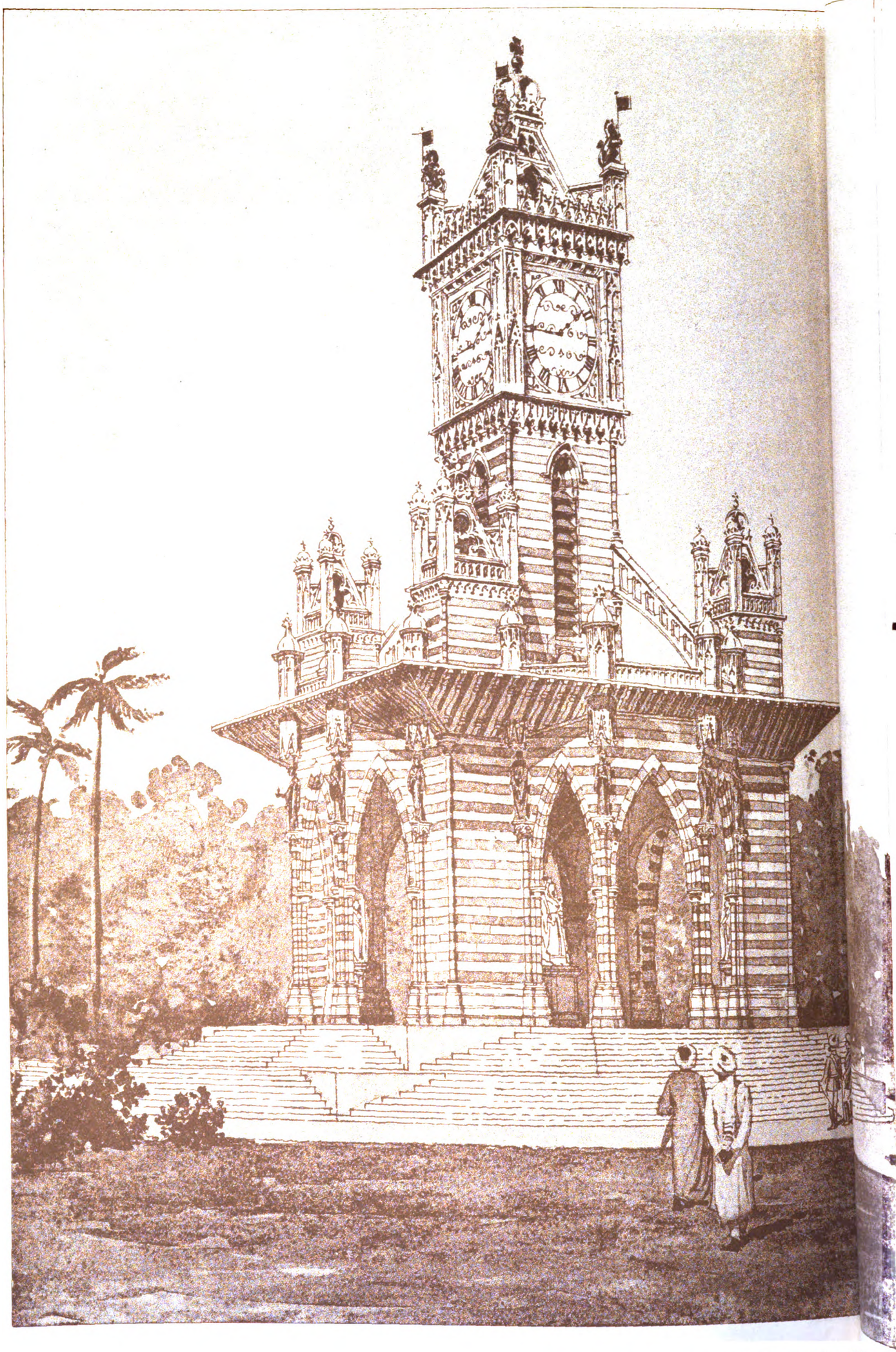

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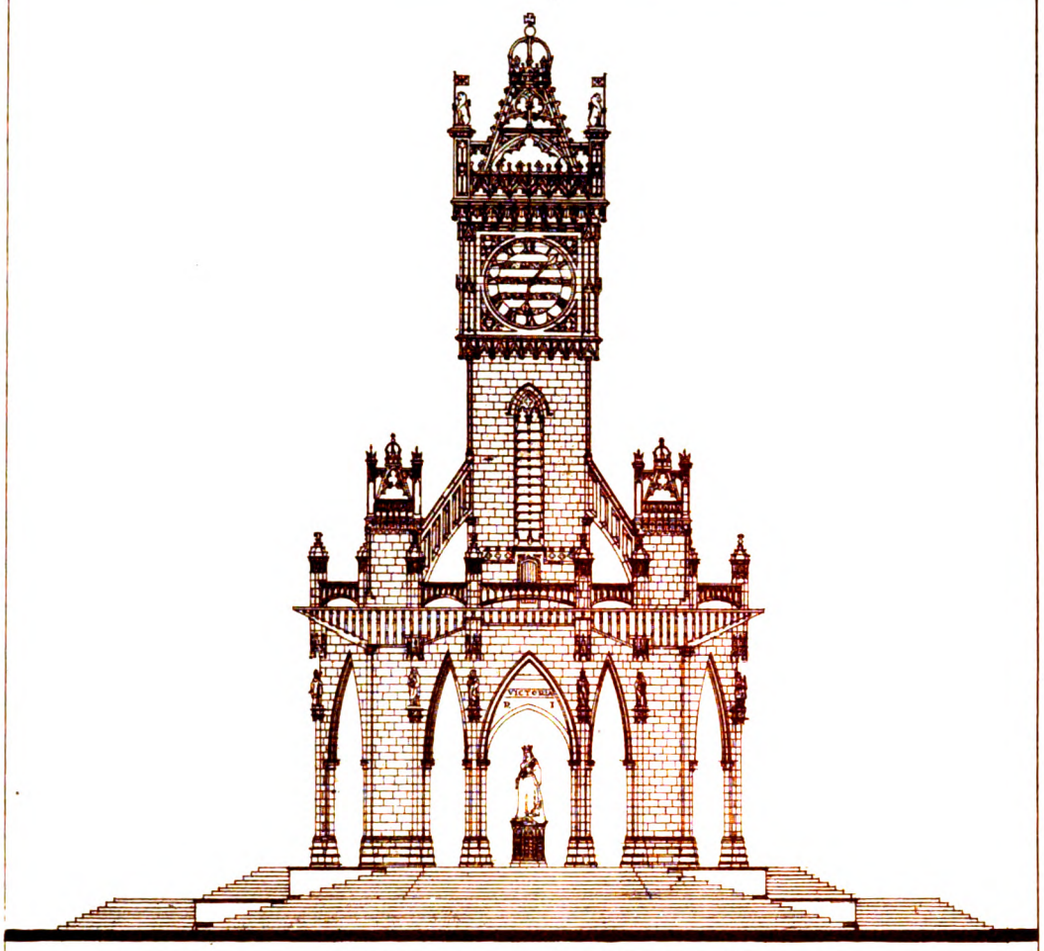

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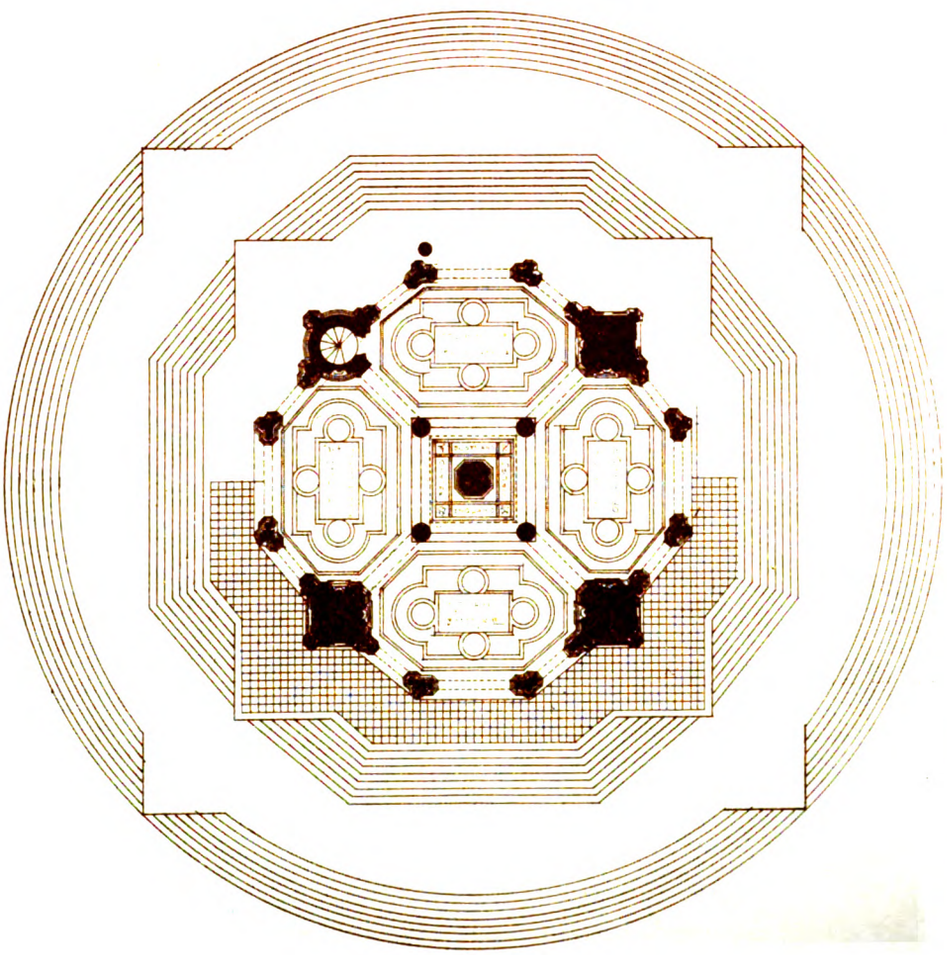

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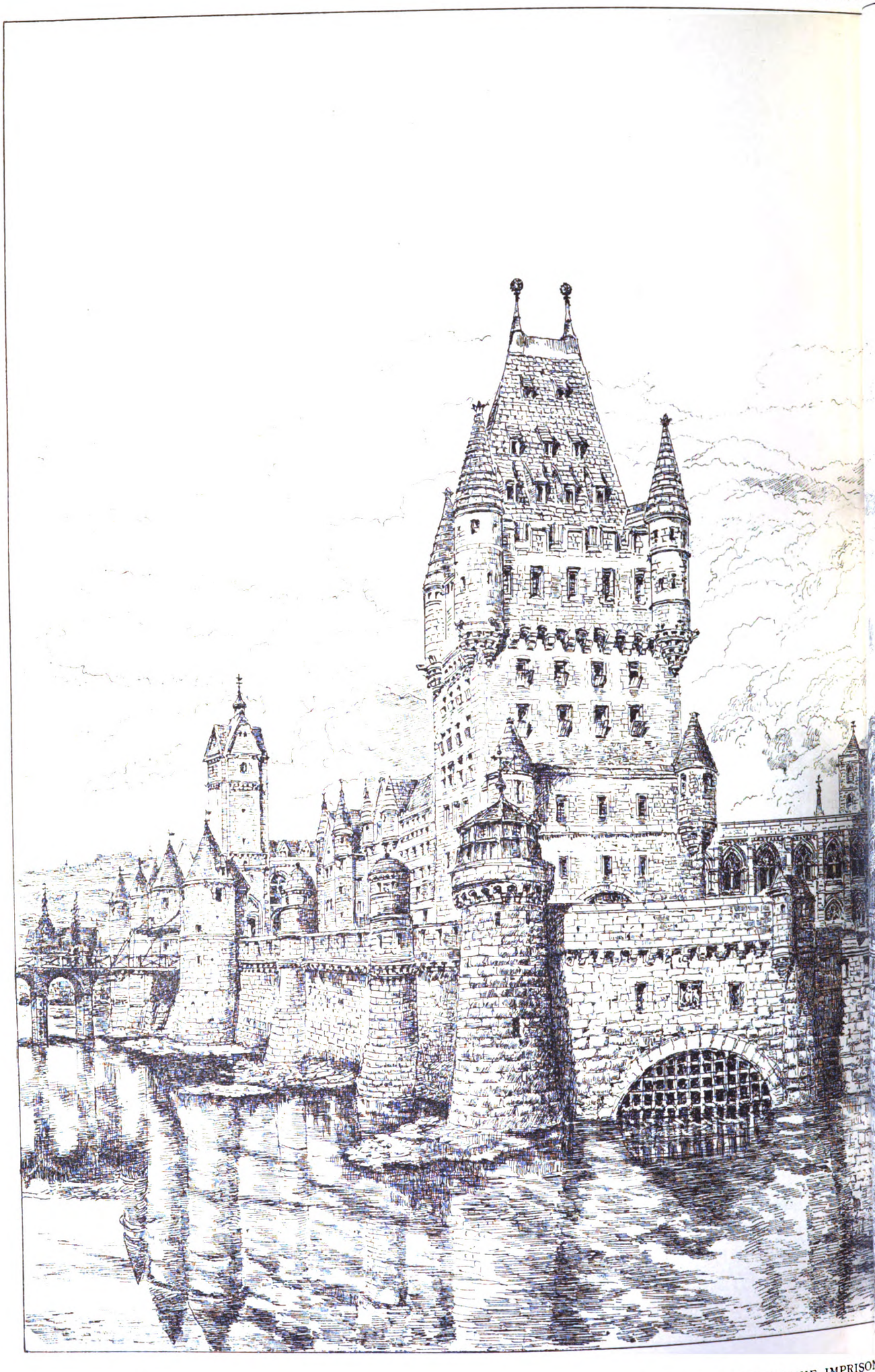

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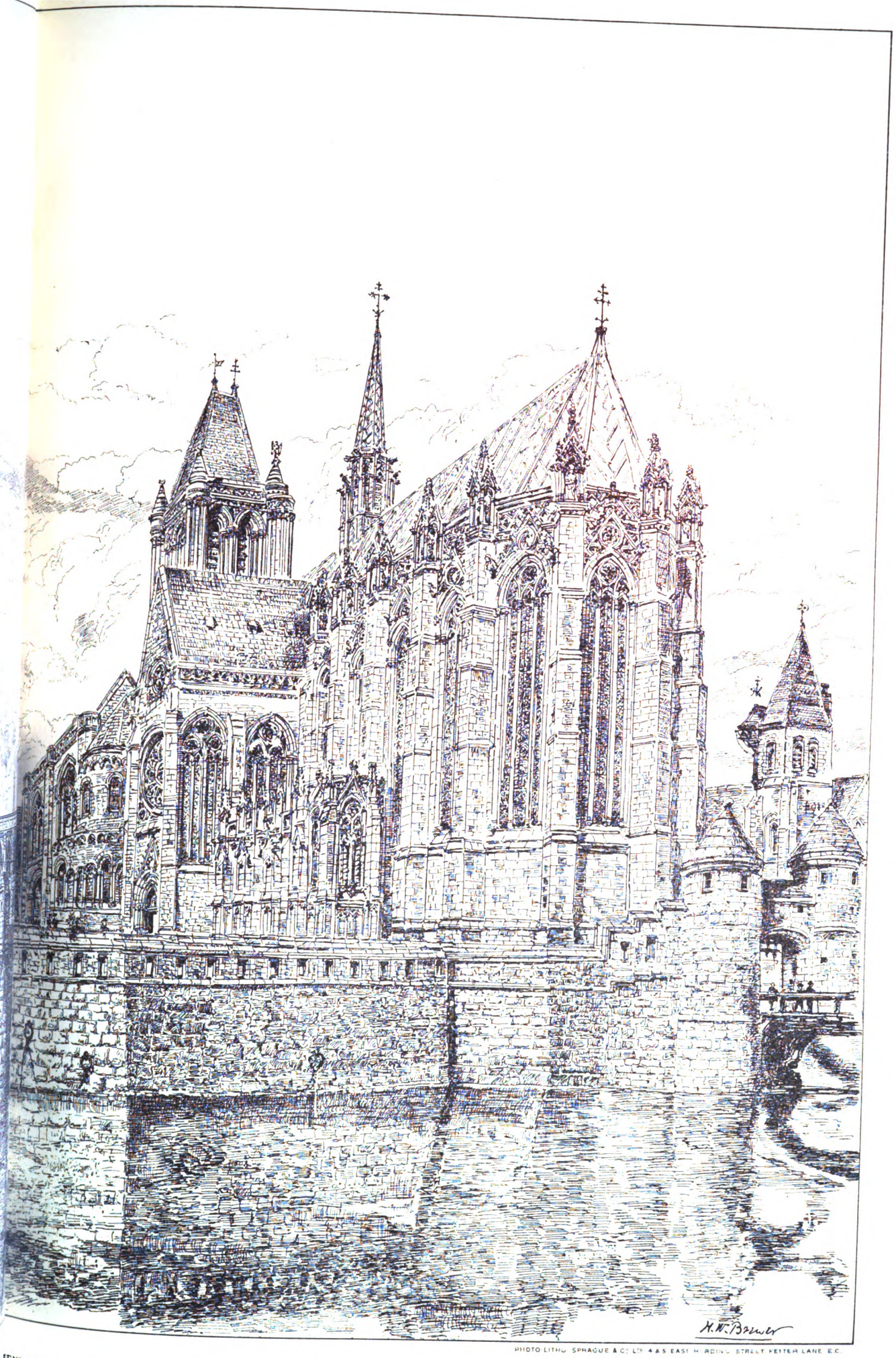

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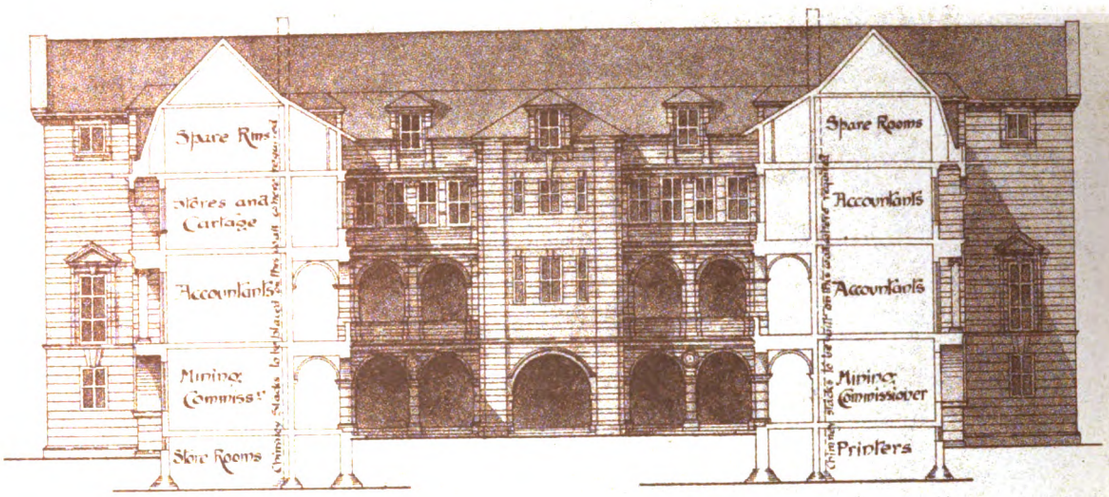

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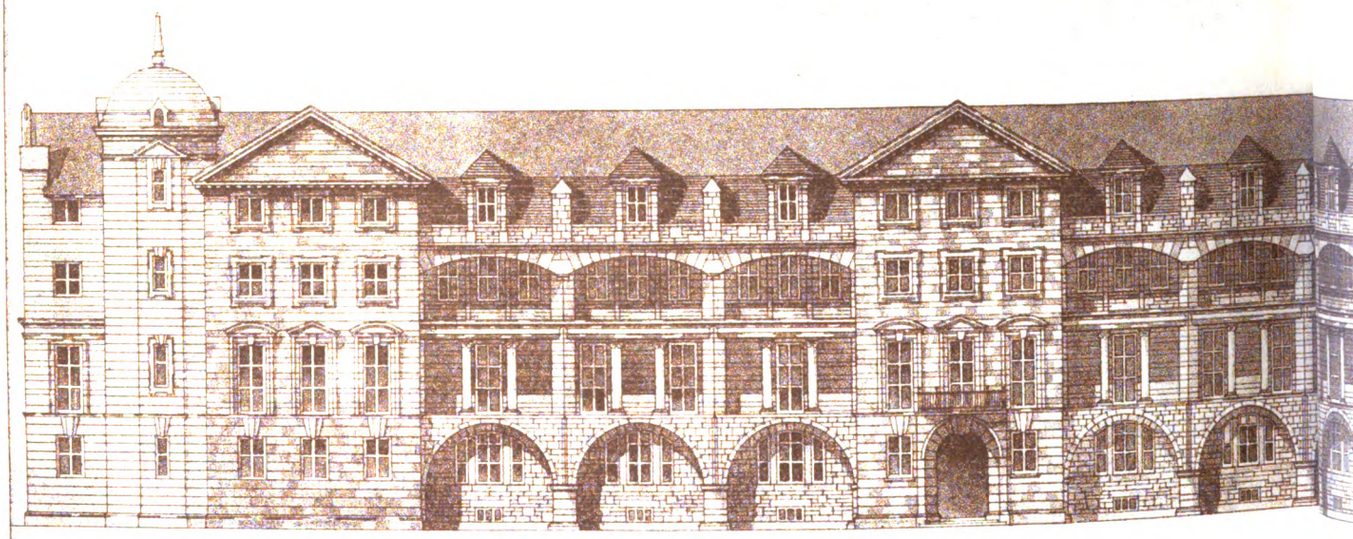

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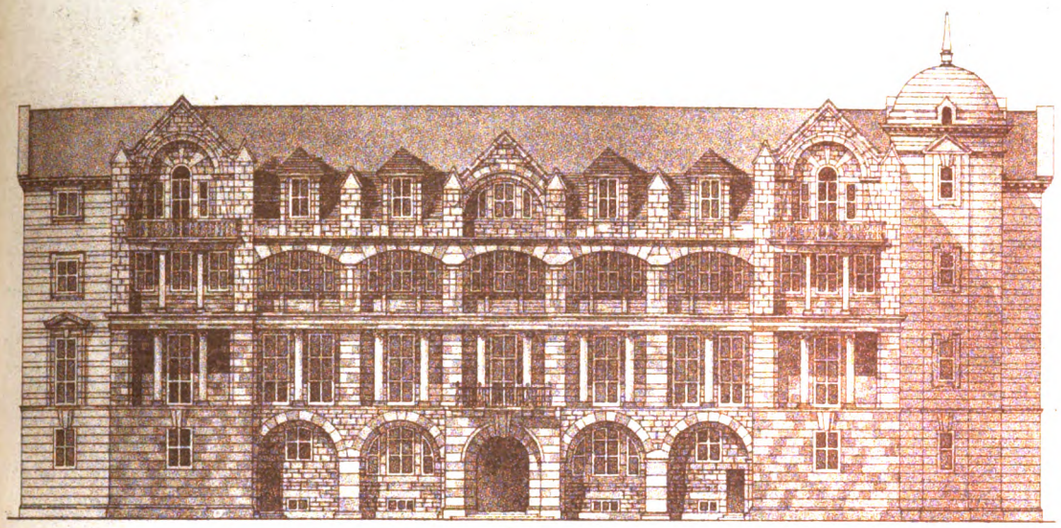

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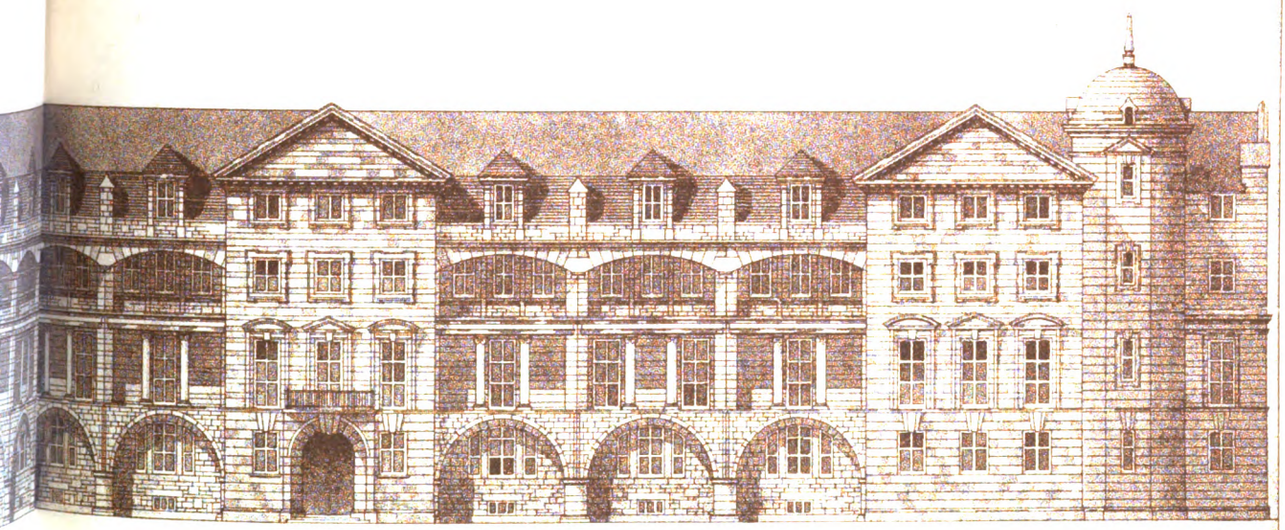

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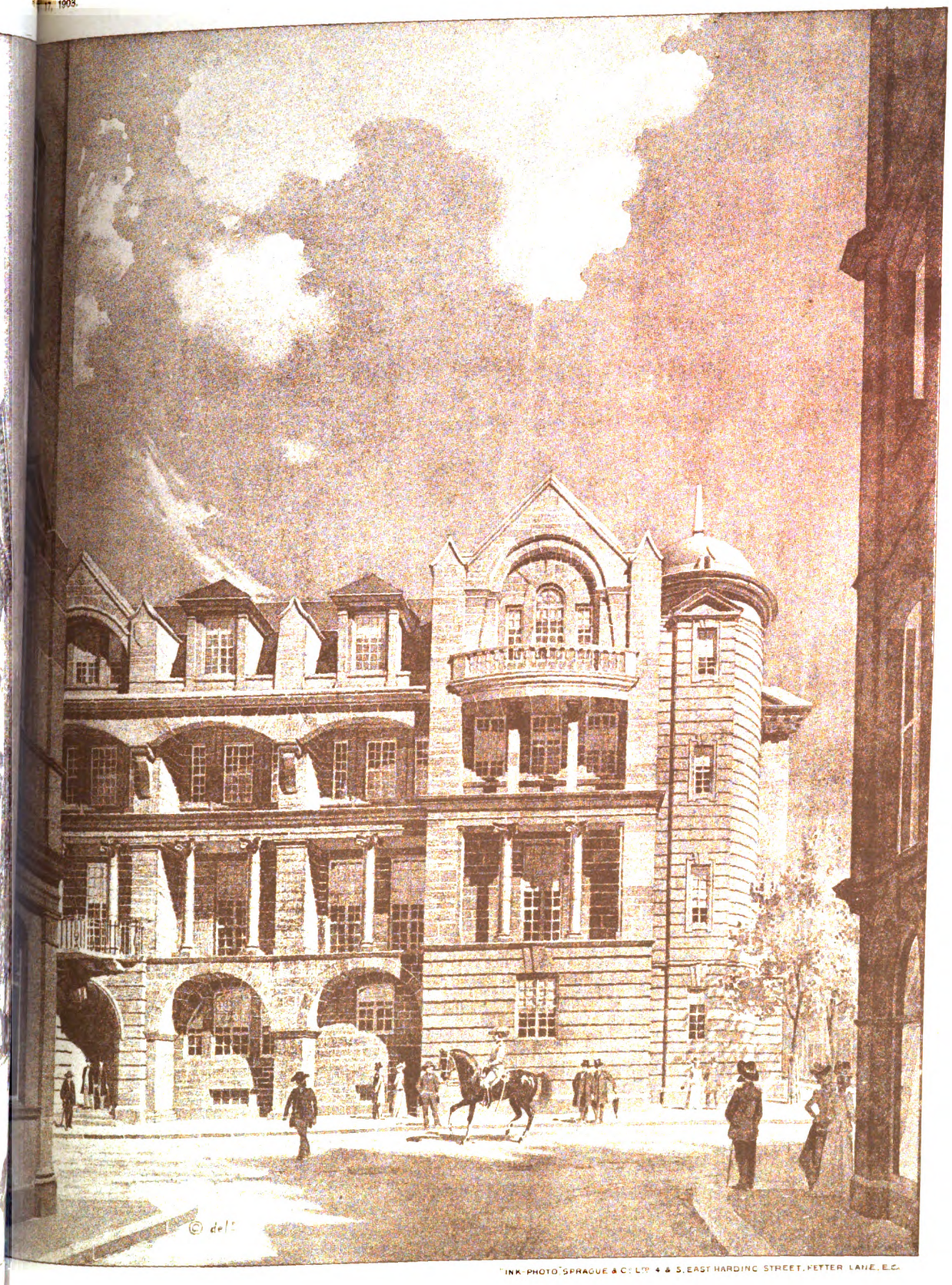

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The Builder.

VOL. LXXXV.—No. 3168. OCTOBER 24, 1903

ILLUSTRATIONS.

A Preliminary Idea for Liverpool Cathedral: Perspective ..... By Mr. A. H. Skipworth
Do. Do. Side Elevation ..... Do.
Do. Do. Interior ..... Do.
Rectory, Donhead St. Andrew, Wilts ..... Mr. C. E. Ponting, F.S.A., Architect.

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Highway Administration.

IN the Report of the Highway Committee appointed by the Local Government Board, will be found an intelligent survey of highway administration in England and Wales. The scope of the committee was to inquire into the general condition and sufficiency of the roads in the two countries, to suggest any desirable amendments of the law relating to these matters, and particularly to ascertain whether any change of the authorities or of their powers would be desirable, in view of the various purposes for which the roads now are, or shortly may be, used. From the Report recently issued it appears that many of the urban and rural district councils are responsible for very small mileages. Consequently it cannot be expected that such bodies should be able to maintain the roads under their charge so efficiently and economically as they might be maintained by authorities controlling large districts, in which the services of highly qualified officials are retained, where the most efficient road-making plant is almost invariably available, and where contracts for road material can be made on the advantageous terms always offered to large buyers. The committee very properly came to the conclusion that many of the smaller district councils should cease to act as highway authorities, and that their duties in this direction should be taken over by the county councils. It seems, however, that most of the district councils attach great importance to the retention of their control over local roads, and in deference to local sentiment the committee do not press the transference which they evidently feel to be desirable. From experience of such matters we strongly suspect that the local patriotism, to which reference is here made, has its origin chiefly in the objection entertained by surveyors and other officials, who usually dislike the removal of work from their offices. This is a most natural feeling, for which we have every sympathy, but the interests of the public must receive the first consideration. Again, we are not sure that the inhabitants of a small district are entitled to look upon any public highways as "local roads." Of course, all roads are local in one sense, but they are national in another, as everyone is free to travel upon them. There is evidence to show that inconvenience, and sometimes danger, is caused at points where the nature of the road material is abruptly changed, and, further, that deterioration of the surface resulting in excessive dust and mud, is in no small measure due to unsuitable material and inefficient maintenance. These defects are specially noticeable in what are sometimes termed local roads, which have been increasingly used by the general public, since the advent of motor vehicles. For these reasons we regret that the Report does not emphasize more strongly the necessity for transferring the administration of all country roads to the county authorities. Extravagance is always possible, and friction is certain under the existing system by which main roads are maintained in urban districts. These are characterised by the committee as serious matters, and the belief is expressed that friction would be removed, and greater uniformity, economy, and efficiency secured, "if it were possible to place the maintenance and improvement of all the principal roads in a county under the direct control of a County Highway Board, representative of all the authorities having at present rights and powers with regard to main roads." So far as it goes, this suggestion is excellent, and if all roads except those in county boroughs were included, instead of merely the "principal" roads, there would be no fault to find. It must not be forgotten, however, that if uniformity of maintenance is to be attained upon trunk roads, such portions of these thoroughfares as are situated within the county boroughs would necessarily have to be placed under the control of the suggested Highway Boards.

The scheme of administration now recommended, with the inclusion of all country roads, would secure uniformity of treatment of what the committee define as "county roads," but something more is required, for some highways are obviously of more than county importance, and, as suggested by the committee, their maintenance is a matter of national concern. Thoroughfares of this kind are described in the Report as "national roads," and for the maintenance of these it is proposed that the County Highway Boards should be responsible, subject to supervision by a central authority, which, it is suggested, might be a department of the Local Government Board.

Speaking generally, the recommendations made in the Report are worthy of approval, but it is clearly a mistake that the committee should view with equanimity the continued authority of admittedly incompetent bodies over some of the smaller roads in the various counties.

Turning to the question of the sufficiency or otherwise of existing roads, we observe that the evidence brought before the committee does not indicate any general insufficiency so far as the number and direction of roads are concerned. The congestion that undoubtedly occurs in the vicinity of large towns is attributed to one or more of the following causes: (1) Insufficient width of road; (2) want of alternative routes for traffic destined for places beyond the centre of the town; (3) the occupation of the road by tramway and light railway traffic; (4) the frequent and long-continued opening of the roads for the repair of pipes laid below them; and (5) want of power of the police authorities to regulate traffic, especially with regard to the position on the road of slow-moving traffic. The widening of roads on the outskirts of large towns is always an expensive matter, and the cost of such operations fairly belongs to the towns immediately concerned. We do not gather any definite expression of opinion on this point from the Report, but with regard to alternative routes, the committee consider "by-pass roads" are much required for through traffic in towns already crowded with local traffic, and we quite agree that the provision of such thoroughfares would certainly do much to relieve congestion. The committee believe that the principal obstruction to the free passage of ordinary vehicles in towns is to be found in the presence of tramcars upon roads of inadequate width, and they recommend that permission to lay tramway rails should only be given when the road is, or is to be,

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made, of sufficient width to enable loaded waggons to pass freely on each side of the tram lines. This is a most reasonable and necessary condition.

In view of the fact that the obstruction to traffic caused by the opening of roads for laying or repairing pipes and other conduits is already occupying the attention of the Royal Commission on London Traffic, the committee content themselves with the following suggestions :—(1) That notice of an intention to open should always be given to the highway authority. (2) That the restoration of the road should always be done by the highway authority, but that the cost, not only of such restoration on the site of the opening, but also of any additional repair of other parts of the road rendered necessary by the diversion of the traffic, should be recoverable from those who are responsible for the opening. (3) That penalties should be more easily recoverable against any company or authority obstructing the road by its operation for an unreasonable period. To these useful suggestions another should be added to the effect that penalties should be payable by companies or authorities desiring to open roads or streets at unreasonable times. A provision of this kind would tend to discourage those companies which now seem to take a fiendish delight in tearing up road surfaces that have been newly made or repaired.

Some exception may possibly be taken to the recommendation that highway authorities should be empowered to recover from the owners of locomotive engines and waggons, damages for any injury to roads caused by their passage in exceptional conditions of the weather. This has the appearance of prejudice against a comparatively new development of traction, and it is not perfectly clear why the owners of mechanically-propelled vehicles should be punished for the vagaries of the weather. Horse-drawn waggons probably do quite as much mischief in bad weather, and considerably more, taking the whole year round, while the incessant pounding of horses' hoofs does more damage than all vehicles put together. The weights and dimensions of road locomotives and waggons are strictly limited by laws and regulations, and so long as these are complied with, it seems unfair to penalise this particular form of traffic, while other forms go scot-free, save for the general rate levied upon the population at large.

The desirability of apportioning further national funds in aid of road expenditure has already been considered by the Royal Commission on Local Taxation. To the recommendations of that Commission the present committee add the suggestion that, in the event of an additional grant being made, a considerable part of it could be most usefully employed in the construction of by-pass roads in the vicinity of large towns, and in the widening of existing roads of importance, rather than upon works of ordinary maintenance and repair.

From the Report to which we refer, it may be gathered that the most important matter for attention is the amendment and consolidation of the laws relating to highway administration, and the satisfactory accomplishment of this task will be followed in due course by the various minor reforms and improvements discussed by the committee.

FROM AMERICA.

ALMOST at the same moment that we give, in another column, a brief notice of the scheme of the thirty-seventh annual Convention of the American Institute of Architects, held at Cleveland, there reaches us the handsome volume containing the complete report of the proceedings of the thirty-sixth Convention at Washington last year.* The issue of the Report seems rather late in the day, but it is always worth attention when it does come, and it contains, as usual, much interesting matter.

The meeting of the last Convention at Washington naturally led to a special consideration of the great scheme in hand for the improvement of Washington; and if this scheme is brought to a successful termination, it will result in an ornamental treatment of a city precinct on a larger and more pompous scale than anything now in existence. The principal feature in the Report is the treatment of this subject in the two papers read by Mr. F. L. Olmsted and Mr. Charles Moore, which are so fully illustrated by plans and views that it is easy to follow out the whole problem. It is remarkable, and it says much for the architectural genius of L'Enfant, who laid out the city at the beginning, that the scheme now proposed is in the main but an extension and elaboration of the lines of his plan; and that, as Mr. Olmsted said, "all that is encouraging and stimulating in Washington, except the individual architecture of a few good buildings, is the direct and necessary outgrowth of the original plan."

At the outset of Mr. Olmsted's paper he emphatically said that the only hope of a successful issue in a case of this kind lay in the adherence of the various designers to a consistent plan or ideal, and he usefully contrasted the modern condition of things with that of the mediæval city. In that consistency was secured "through the almost universal adherence of the people to a rather varied range of mutually harmonious ideals." In such a city as mediæval Chester, it would never have occurred to any of the builders to build anything that was out of conformity with the genius of Chester. It was the only ideal they knew. The modern ideal has a wider horizon, and we have to select one point of view for a particular site and keep to it. It is well to have this distinction insisted on: it is often forgotten.

The plan of Washington, with all its streets and squares, was blocked out by L'Enfant in 1791, under the direction of Washington and Jefferson, while the land was still wild forest. Mr. Olmsted refers to Wren's plan for London, not carried out, as a similar instance of planning a city on a regular system; the Wren plan is given as one of the illustrations. The leading feature in L'Enfant's plan was the position of the Congress House at the end of a long avenue or mall running east and west, and the position of the President's residence at one end of a cross avenue running north and south. This idea still forms the backbone of the scheme. Originally an equestrian statue of Washington was to have stood at the intersecting point of the axes of the two avenues. Considering what American sculpture was then, and what were the general ideas, in England as well as in the States, as to the style of public monuments of this kind, Mr. Olmsted was quite right in thinking that they had been fortunate in getting rid of it and in having a great obelisk erected instead. An obelisk, if somewhat unmeaning, at all events cannot present anything to offend the taste. Unfortunately, by this time the main intention of L'Enfant's scheme had been forgotten or overlooked, and instead of being placed axially with the centre of the Congress House and the Residence, it was placed "on the most convenient hillock of hard ground, some 370 feet out of line in one direction and 125 feet in the other." This mistake, which appears to have arisen from the absence at the time of any vista to direct attention to the importance of the Congress House, forms one of the difficulties in dealing with the scheme at the present moment. But much worse was behind; for the whole idea of the central avenue was forgotten; buildings were erected on part of the land intended for the avenue, and a railway allowed to be run across it at right angles, and subsequently, in consequence of difficulties in regard to gradient, a grant was even made to the Pennsylvania Railway Company for the erection of a large viaduct across the site, along with a train shed. There would evidently have been a difficulty in getting out of this; but the railway company acted in a patriotic spirit, came to the conclusion that they ought not to interfere with a scheme of national importance, and waived their right on condition of another site being found for their train-shed.

What is now proposed is gradually to remove the buildings which had been allowed to encroach on the avenue space, to clear out the avenue line and plant it on each side with four rows of American elms, with a broad greensward between them. The Capitol forming the termination of one end of the vista, the avenue is to be continued in the opposite direction, beyond the crossing, and to be closed at the other end by a memorial building which will either be, or will form an *encadrement* to, a monument to Lincoln—the only memorial considered to be suitable to rank with the Washington monument and the Capitol; an opinion in which most Englishmen, we think, will concur.

The difficulty in regard to the position of the Washington obelisk has been met in this way: the long arm of the avenue stretching to the Capitol is to be set out of the right angle with the building sufficiently to meet the obelisk exactly at the other end. The avenue will be so long that the discrepancy in angle will hardly be noticeable in execution, though it is visible on plan. In regard to the cross axis running up to the White House, nothing can be done with the obelisk, as it is too far out of line. No other important monument could be placed at the crossing which would not clash with the obelisk, so it has been decided to emphasise the crossing not by an object, but by a space, by making

* Proceedings of the Thirty-sixth Annual Convention of the American Institute of Architects, held at Washington, December 11, 12, and 13, 1902. Gibson Bros., Washington, U.S.A. 1903.

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it the site of a slightly sunk ornamental garden.

The whole scheme is a grand one, and though it may be years before it can be carried out, Mr. Olmsted said he hoped the design would at least, as he expressed it, be sketched out upon the ground without delay, and that "as it materialises, the American people will realise the truly magnificent ideas of the founders of the city," and will be ready to see money freely spent to make the Government buildings and their surroundings contribute to a great artistic whole.

An eloquent commentary on the scheme is furnished by a photograph of the Washington monument in its present surroundings, rising from behind groups of low and irregular trees with some small and mean-looking buildings interspersed, and with a foreground of marshy waste land. A plan of the "monument garden" as projected—the garden which will occupy the centre of the crossing—is given, showing the monument at one end of it, and a perspective view from a drawing showing the grouping as proposed.

Whenever this great scheme is completed, it will furnish something worth crossing the Atlantic to see.

Among various other papers contained in the volume, the short report of the Committee on Competitions is of some interest, as it deals with a subject which affects architects all over the world, without distinction of nationality. There appears to have been a Committee appointed to advise on competitions when appealed to, but not to interfere unless appealed to. In their general remarks the Committee observe that the most important condition in any competition, far more important than any question of payment to competitors, is the employment of professional service both for the programme and the award. "No competition may rightly be called improper if it is fairly stated and fairly judged," and they mention competitions into which first-rate men entered, though there were no premiums beyond the selection of one competitor for the work, because the conditions were such as inspired absolute confidence. That indeed is the crux of the whole matter. The Committee support the principle of limited and select competitions, where all competitors are paid, as against open competitions; but though we agree with this in regard to private works and works on a moderate scale, there are occasions of national interest in which an open (sketch) competition is to be preferred. The selection only of known men on such an occasion may deprive the nation of the services of a man of genius who only wants an opportunity to show his powers, and who may find this opportunity in an open competition, and in that way alone. The Report refers with approval to the system partly adopted in the Liverpool Cathedral Competition, of selecting competitors on the basis of illustrations of their previously executed work; and for a limited competition this is a very good plan; but then it should be carried out consistently and entirely. The mistake at Liverpool was that the competitors were allowed the option of either sending illustrations of executed work or designs prepared for the site. There was thus no true basis for comparison.

NOTES.

Position of the Organ in Churches.

At the Church Congress Sir Walter Parratt read a piquant and in some respects rather reactionary paper on church music and the relation between choir and congregation. Into the purely musical aspect of the subject we cannot go here, beyond saying that while admitting the justice and point of some of Sir Walter Parratt's remarks (as reported), we cannot agree with them all, an dwe thought his ideas as to the possibilities of church music, and the part which the congregation might take in it, represented by no means a counsel of perfection, and that much more might be done in enabling and encouraging congregations to take an intelligent part in the musical portion of the service than he seemed to contemplate as possible. But we are glad to see that he made some excellent and most sound remarks as to the position of the organ and the choir in churches. Congregational singing, he said, would be facilitated if the choir were near enough to afford support, but in too many cases they were placed in a narrow chancel whence the sound emerged very imperfectly. Then the organ was often very badly placed in a hole on the north side of the chancel (we do not know why he said the "north," as organ-chambers are often found on the south side also). The old west-end position was unquestionably the best for the organ, and the choir should be ranged halfway up the nave. We are entirely in agreement with these suggestions, which we may remind our readers are similar to those made by the joint committee of the Institute of Architects and the College of Organists, which considered and reported on the subject a good many years ago, but (so far) without much practical result.

Blackwell's Island Bridge, New York.

Twenty years have elapsed since the proposal was first made to construct a bridge across the East River at Blackwell's Island, but it was not until last month that the scheme took a finally definite shape in the plans and specifications for the superstructure, issued by the Commissioner of Bridges. This structure will be the fourth bridge connecting New York with the Brooklyn side of the river, and it is to be of the cantilever type. Permission to build a bridge on the site was granted to a private individual in the year 1884, but the plans were not submitted before 1898 for approval by the authorities. Work was started on the piers in 1901, but progressed so slowly that in 1902 the value of completed work was not more than 8,500*l*. The plans as now revised embody the following features: a shore span of 469 ft. 6 in. on the Manhattan side; a river span of 1,182 ft.; a centre span of 630 ft. across the island; a river span of 984 ft. over the east channel; and a shore span of 459 ft. on Long Island. Practically, therefore, there will be two cantilever bridges in series. A system of lifts and stairways is to be introduced, giving access to Blackwell's Island. The bridge will be double-decked throughout, affording space on the upper floor for two elevated railway tracks and two footwalks each 11 ft. wide, and on the lower floor for four railway tracks, two for overhead trolley cars, and two for the "underground" cars. In addition, the lower floor will have a 36-ft. roadway for horsed vehicles. The steel towers are to consist of massive legs of box section, spaced 93 ft. centre to centre, connected with deep latticed trusses, and other bracing. Nickel steel eye-bars, forming the main tension members, constitute a noteworthy feature of the bridge, the tests demanding an ultimate strength of 90,000 lb. per square inch. In addition to its own dead load, the bridge is designed to carry live loads of 6,300 lb. per linear foot, as ordinary traffic; and 12,600 lb., as congested traffic. The total length of the structure will be 7,636 ft., including the approaches.

The Connel Ferry Bridge.

This structure, which has recently been inspected by Colonel Yorke, is one of the largest cantilever bridges in Europe, being in fact, second only to the Forth Bridge. It consists of two steel cantilevers, supported on granite piers, with an intermediate span, forming with the two cantilever arms a clear span of 500 ft. over an arm of the sea. The clear headway above high-water level is 52 ft., and the balance arms of the cantilevers are 105 ft. long. The tops of the cantilevers are 120 ft. above high-water level, and the bridge is approached at each end by a granite viaduct. Nine Caledonian railway engines and four 30-ton waggons were formed into a train for the purpose of the official test, the total load being about 1,000 tons. The new bridge, which has been erected under the superintendence of Mr. E. Cruttwell, as consulting engineer, is on the Ballachulish extension of the Callander and Oban Railway. No doubt the new structure will be found most useful for the purpose intended, but it will never be beautiful. It is said that the necessity for maintaining a navigable waterway, the depth of water, and the strength of the tide suggested the type of construction adopted. We feel sure, however, that it would be quite possible to suggest a more pleasing example of the type in question.

Asphalt Block Paving.

A somewhat novel form of asphalt paving, laid in one of the streets of Magdeburg two years ago, appears to be giving satisfactory results. The foundation consists of concrete blocks about 10 in. square by 6 in. thick, the joints being filled with sand. On the surface of this foundation a thin layer of sand and a ¾-in. coating of mortar were spread, to form a bedding for the surface course of asphalt. The latter course was applied in the form of blocks, about 10 in. square by 2½ in. thick, about ¾ in. of each block at the lower part being of cement mortar, and the remainder of asphalt mastic. After being bedded in the layer of mortar covering the foundation, the blocks were jointed with neat cement grout. It appears that the concrete-block foundation was adopted because it was thought the formation of a continuous foundation would interfere with traffic for too long a time. One advantageous feature of the system is that the street can be opened very readily for giving access to pipes and other conduits. Most of the blocks taken up can be used again, and

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after restoration the surface shows little or no sign that it has been disturbed. The municipal authorities propose to extend the system to other narrow streets in the city, being now practically satisfied as to its general suitability for such thoroughfares.

Architecture in Novels.

In Mr. Quiller-Couch's spirited story, "The Adventures of Harry Revel," one of the earliest incidents in the hero's life is that, when a small boy, he escaped from the gallery in a church during service, went up the tower stairs, and climbed up an angle of the spire by the stone crocketts, but found he could not climb down again that way. His *modus operandi* was to hang on by the base of the finial, between the angles, and with his feet to kick a hole though the slates until he got the rafters laid bare; then to slip down and hang on to the woodwork and kick more slates through below, and so on till he made his way down to the base of the spire. It is hardly surprising, in any case, that the churchwarden should have remarked, after hearing of the operation, that he always suspected the contractor had treated them unfairly in the matter of slates. But if Mr. Quiller-Couch had had a little more acquaintance with modern architectural history and with building construction, he would have known that the circumstances were impossible in any case. The church is specially referred to as one "recently built." The time is in the first years of the XIXth century, somewhere about 1805, as the hero was, some few years afterwards, at the assault of Ciudad Rodrigo. It would puzzle the author, we should think, to find an example of a church built at that date with an octagonal crocketted spire. It would puzzle him still more to find a spire built with stone crocketted courses up the angles and filled in between with timber and light slating. A little general knowledge on these matters is advisable before authors work architectural structure into their stories.

Society of Oil Painters.

We fear it cannot be said that the present Exhibition of the Society of Oil Painters, at the Gallery in Piccadilly, is of very high interest as a whole. It contains, of course, some good pictures, but the proportion of mediocre and uninteresting work is very large. The President, Mr. Frank Walton, contributes three landscapes, of which the most important, "Townhurst Woods" (148) is a fine example of delicate and conscientious landscape-painting, by an artist who has a style and feeling quite his own. Of his two small landscapes, 251 and 253, with quotations for titles, the latter is noticeable for the charming manner in which the fore ground, with its spots of colour from the field flowers, is touched in. Mr. Melton Fisher's three exhibits are little more than sketches; and Mr. Lavery's "Summer" (198), a view over a sunlit sea with two figures in the foreground, has also the characteristics of a landscape sketch on a large scale, somewhat crude in effect. Sir J. D. Linton gives us for once a large figure-picture of the kind which he used frequently to paint—"The Casket Scene from the 'Merchant of Venice'" (66) at the moment when Bassanio is making his choice; it is fine in colour but rather devoid of character, though the figure of Portia is interesting and dignified. Mr. Leslie Thomson's "Summer" (34) is a kind of decorative panel of sea and sky, divided across by a horizontal bar of yellow sand and nude bathing figures on a small scale; a good piece of colour and decorative suggestion. Miss Fortescue Brickdale's picture, (16), with a quotation from Browning's "Rabbi ben Ezra" as title, is fine in execution but does not seem to rise to the spirit of the quotation; it is more like a cynical comment on the poet's words. Mr. Montague Smythe's "On the Norfolk Dunes" (118) is a melancholy seaside idyll rather in the feeling of Israels, but with a different and more delicate manner. Mr. Wetherbee illustrates "Dawn at the Gate" (123) by a figure of a fair farm-girl at the gate of the yard; a better work, and more in his own manner, is "The Golden Horn" (175), a pastoral with a rising moon. Mr. Davidson's "Corporal Trim Reading the Sermon" (186) hardly realises Stern's characters. Mr. Frank Dadd's "The Morning After" (168), a duel scene on the sands in the last century, is chiefly valuable for the dramatic contrast in the personality of the two antagonists; it is rather dead in colour. Mr. T. Graham's life-size study of a blonde rustic girl certainly answers to the title "My Father's a Farmer" (284), and is in that characteristic sense a success. Among other works in which figures are combined with landscape, one of the best is Mr. Charles Sims's "Sunshine and Wind"; we may mention also Mr. Coutts Michie's "Home from Pasture" (153) and Mr. Jacomb-Hood's "The Little Swineherd" (314). Mr. Kennington's "Flora" (75) is a brilliant study of half-length of a girl in tulle and backed by a mass of flowers, but the face is uninteresting. Among the landscapes is a large and fine view of "Durham" (98) from the railway, by Sir George Reid; an important and carefully finished painting by Mr. Fulleylove of "Jerusalem" (239) supposed to be taken from the traditional spot on the Mount of Olives where Christ wept over Jerusalem"; "A Norman Castle" (11) by Mr. D. Y. Cameron, a good composition in a conventional brown tone; Mr. Orrock's "Normanton-on-Soar" (72), a fine sky but very conventional trees (Mr. Orrock is more in his element in water-colour); and a brilliant little impressionist sketch by Mr. Moffat Lindner, "The Estuary" (95). We have mentioned a good many good works, after all, and there are some others; but the proportion to the whole number is small The extent of the wall-space is the difficulty of the Society; there is more than it can adequately fill.

The Late Mr. Brewer's Drawings.

We may remind our readers of what was mentioned in our last issue, that the drawings made by Mr. H. W. Brewer during many years back for this journal will be on view at the *Builder* Office from October 26 to November 6 (the intermediate Saturday excepted), between 12 and 3, on presentation of the visitor's address card. It was necessary to restrict somewhat the hours of exhibition, in order to avoid interfering too much with the usual business of the office.

THE ARCHITECTURAL ASSOCIATION.

The second meeting of the Architectural Association for the present session was held on Friday evening last week in the Meeting Room of the Royal Institute of British Architects, No. 9, Conduit-street, Regent-street, W., Mr. H. T. Hare, President, in the chair.

The minutes of last meeting having been read by Mr. H. Tanner, junr., hon. secretary, and confirmed, the following gentlemen were elected members:—Messrs. A. Hordern, C. H. Simpson, E. S. Charlton, H. C. Benson, J. F. Munnings, L. W. Edmonds, Leslie W. Green, J. A. Rogers, E. C. Burrows, B. Oliver, A. E. Hunt, L. S. Sullivan, P. K. Kipps, H. R. Smale, E. F. Duncanson, J. S. Turner, F. Nash, H. B. Newbold, R. I. Jones, C. S. Kimpton, F. H. D. Brockman, C. R. Davy, L. Kesteven, T. A. D'Arcy Braddell, D. G. White, J. M. Kellett, H. M. Gundry, C. E. Hanscomb, W. E. Woodin, F. J. Park, T. Braddock, C. R. Shield, J. B. Healing, E. S. Whitney, F. T. Bush, G. R. Griffith, S. H. Collins, J. P. Scriven, J. T. Sugden, L. T. W. Simkins, C. A. Covernton, K. H. Milne, W. H. Ludlow, D. W. Clark, Percy May, J. H. Chandler, R. W. Pickering, G. D. Burgess, F. E. Mennie, W. Harvey, L. H. Read, and L. A. D. Shiner.

Appointment of Honorary Secretary.

The President said that owing to the appointment of Mr. H. P. G. Maule as headmaster of the Day School, it was necessary to appoint a new honorary secretary in his place. The Committee had nominated Mr. Louis Ambler to fill the vacancy, and unless there were any other nominations he would declare Mr. Ambler to be elected.

As there were no other nominations Mr. Ambler was declared elected, and he took his place at the table.

This election caused a vacancy on the Committee, and Mr. G. B. Carvill was elected.

The Late H. W. Brewer.

Mr. Maurice B. Adams said he thought it would be a graceful act on the part of the Association if they recorded in some way their appreciation of the work of their friend the late Mr. Brewer. Mr. Brewer was not a member of the Association, nor was he an architect, but he had contributed by his beautiful drawings much to the pleasure and advantage of architects in general, and all who knew his work must appreciate his skill and his beautiful draughtsmanship. He (the speaker) suggested that a vote of condolence be sent to Mr. Brewer's sons, one of whom had made a name for himself as a decorative artist, expressing to them in some appropriate way the sincere appreciation of the Association of Mr. Brewer's work. Mr. Brewer's drawings were principally of a pictorial character, but they always displayed an appreciation of architecture from a technical point of view that was often wanting in pictorial work of this kind. Mr. Brewer's illustrations in the *Builder* had always been to him (the speaker) a great source of satisfaction and pleasure, and he thought it would be appropriate to send the letter he suggested.

Mr. W. A. Forsyth seconded the motion.

The President said he thought it was a very appropriate course to take. Mr. Brewer was quite alone in this particular line of work, and all architects must have appreciated his drawings which had appeared from time to time in the *Builder*.

Mr. Adams' motion was then agreed to.

New Premises Fund.

The Chairman said he had a very pleasing announcement to make, and that was that the Royal Institute of British Architects had promised a contribution of 500*l.* towards the New Premises Fund. This was a donation which he was sure they would all appreciate, not only because of the actual monetary value of the contribution, which was considerable, but more particularly because it showed the sympathy which the Institute had for the work of the Association and the way in which it regarded them. He had much pleasure in proposing a hearty vote of thanks to the Royal Institute of British Architects for their handsome donation towards the New Premises Fund.

The motion was heartily agreed to, and the Chairman further announced the following additional donations, *i.e.*, Messrs. Alexander Graham, 20*l.*; J. S. Gibson, 10*l.* 10*s.*; W. G. B. Lewis (second donation), 2*l.* 2*s.*; P. W. Lovell,

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2l 2s.; and J. H. Squire (second donation), 2l. 2s.

A vote of thanks having been accorded to the donors,

It was announced that the Modelling Class would commence on November 5, the instructor being, as before, Mr. F. W. Pomeroy.

A vote of thanks was accorded, on the motion of the Chairman, to the British Fire Prevention Committee for arranging for a party of members to visit the International Fire Exhibition on October 7. The visit was much appreciated by those who were present.

The Day School.

The Chairman then called on Mr. A. T. Bolton, late Headmaster of the Day School, to read the following paper on "Day School Teaching in Relation to Architectural Pupilage":—

Mr. President, Ladies, and Gentlemen,—It is my pleasant duty this evening to appear before you to render an account of my stewardship as organiser of the Architectural Association Day School during the past two years, and it is particularly gratifying to me that my friend and successor, Mr. Hugh P. G. Maule, has allowed his name to be associated with our subject to-night. You will not, I am sure, expect from him upon his entrance on his new task, the more definite views that he will be better able to give you later on when his turn comes to attend this audit; nor will you naturally assume that in every respect he endorses such conclusions and suggestions that I may feel bound to bring before you as the outcome of my own experiences.

The idea of establishing a Day School had for a number of years been contemplated by the Architectural Association, and the chief hindrance was, I think, the idea that such a school would destroy the long-established and well-tried system of architectural pupilage. Fortunately, it has been proved that this particular danger had been exaggerated, and it has been found possible, thanks to the loyal concurrence of the profession, to work the school as a preparation, rather than as a substitute.

The architectural profession has been fortunate in retaining the old traditional system of pupilage, during a period of changes and reforms, until the reaction has set in, so that it is now possible for us to develop rather than to destroy a method of training which, rightly understood and carried out, is still best adapted to a profession like our own.

It is generally agreed that a boy from school entering an office direct is seriously handicapped, and runs a great risk of losing the years of his articles owing to his inability to pick up work of so unfamiliar a character to his previous training.

The Day School is not only the pupils' charter, but is also an immense relief to the mind of the conscientious architect. The number of pupils sent to us at the Architectural Association Day School by the profession is conclusive on this point.

Now, what shall we say about the raw material as we receive it from the public school? Everyone knows the truth on this matter, the correspondence in the Press, is on a par with that directed from time to time against the great railways, and the attitude of the head masters would seem to approximate to that of the railway magnates. I do not propose on the strength of my own experiences to join in the chorus, but if I had a confidential five minutes with one of them, I should ask what is this vicious circle in which you are revolving? Your case appears to be that the public schools are waiting for the Universities, while the latter allege that they cannot move on your particular account.

Is not this all very much beside the mark? What are the statistics of public school boys who go to the University? and what are the responsibilities of the schools to those whom they launch into life ill prepared for their future work? For years the public schools have been drawing on their great asset, the right instinct that determines the parent to send his son to one of these great schools, for the sake of the development of that standard of character which will mean so much hereafter in his life. Those present saw, doubtless, Lord Cromer's striking message to the public on this point.

But, giving such considerations due value, are the schools right in supposing that they can for ever defy the competition of the best Continental training, and of new institutions growing up on similar lines? Imagine the usual reply, "look at my modern side," but ask a public school boy why he did effect a transfer. It is as if you wanted to know why he did not forthwith become a pariah. In pre-Colenso days we might have had a reference to "my Army class." Now I am afraid we are coming to "my preliminary Royal Institute of British Architects' Examination Class." This last is a frightful outcome of our pet mania, we are classing ourselves with China as the two examining nations.

It has occurred to some to wonder when it will be common knowledge that our primary schools work no longer under examination but through inspection, to the immense relief of the teacher, and the great benefit of the scholar.

It is apparently a crime like that of Oliver in asking for more, to suggest that a certain architectural school might recruit itself by a similar method.

The cause of public school deficiencies lies fairly deep. The remedy is known, but it is the will to apply it that is lacking. We have had our lesson, but Africa is a long way off, and the real strain has perhaps not yet come sufficiently home to our own shores.

To justify such views it will be necessary to consider in brief outline the ideal of education which we have in our minds, and to try and arrive at certain deductions from experience and observation which may guide us in a problem of such complexity as education.

In the first place, let us start with the principle that education is not the acquisition of certain definite information, but the training of the mind to meet contingencies that can never be accurately foreseen.

In the clear meaning of the term it is the leading out or development of the powers of the mind, combined to some extent with a correcting and supplementing of native qualities.

I am afraid this last limitation may not satisfy some enthusiastic teacher engaged in the most thankless of educational enterprises, that of instilling refinement in a mind of an incurably base type. May the teacher gain by the effort!

What, now, is the ultimate object of education? I should start by saying that man, of himself, in relation to his surroundings, is deprived of power, in other words, ignorant, if you will, over and in all the great eventful facts of his existence. This common fate is made more tolerable to us by its recurrence and universality, and the important part played by education in life, mentally considered, is that of giving us the support of the great minds that, thinking on these things, have endowed us with the accumulated wisdom of the race.

I take this to be the essential justification of classical, using the word in the widest sense, training, and an adequate defence of the study of the great literature of the past.

Unfortunately, this view of the essentially practical character of such studies is constantly obscured by the pedantry of that scholarship which concerns itself, not with the wider bearing of the subject studied, but with the minute facts of the workmanship of the casket in which the jewel lies hid.

No one for certain, pursuing a study that rises to the level of an art, would for a moment depreciate points of form, or understate the power of verbal felicity of expression, but it is idle to deny that, under an over-zealous pursuit of scholastic and grammatical points, the wider bearings of the subject are too commonly wholly lost, and never reaches the mind of the student, so as to influence his thoughts.

The study of the classics under such unfortunate auspices is made, not only repulsive, but also so unpractical that even people of some education will be found to condemn it as wholly useless.

From this arises the curious distinction, drawn by so many people, between theoretical and practical learning, whereas, in reality, no such distinction can exist in true education.

The ideal of education is simply the development of mental power. The true educated man is not necessarily a product of University training, nor even as a matter of course a student of wide reading in books.

This is a perpetual stumbling-block to many worthy people who confound the means with the end, and fail to realise by how many paths the goal of a well-developed and rightly-ordered mind may be reached. "Small Latin hadst thou, and less Greek," is the astonished exclamation of the scholar poet to the master he hailed as one grounded in Nature's own school.

There is a striking passage in a great French writer, in which he points to discussions in the tents of the Bedouin as originating Oriental philosophy, and as the equivalents of our Universities. You are doubtless aware that the Greek philosophers educated by means of conversational discussion. An acquaintance with their methods is an aid in grasping the characteristics of Greek art.

The bearing of these remarks lies in this, that the accumulation of facts is of itself of no value whatever unless it is accompanied by a simultaneous development of the reasoning powers, nor is the study of grammatical niceties essential to a comprehension of a great literature or art.

We must not, in fact, reverse the natural order of the acquisition of knowledge. Observe the process of a child's mental development. It is in essence a perfect specimen of the Socratic dialogue. The child's interest is first aroused, then comes the question, and following swiftly on the reply his more or less logical deduction, ending possibly in a perfect dilemma for the unfortunate parent, who is often driven to resort to the common form of nursery closure in order to end the discussion.

It is a mystery to me that so many teachers ignore this natural method. Students are drawn up blank against some concentrated essence, mainly grammatical, of a subject, and expected to develop an interest in the dry and often useless facts of which they utterly fail to grasp the bearing.

The customary excuse is that of the importance of accuracy, which, however, is to be taught of itself, and probably can be far better inculcated through the verifications of experimental science than by literary and grammatical means.

Let us now apply these principles to architectural education. In the first place it will follow that neither Gothic nor Classic art of themselves are wholly necessary to salvation, and that the mere Examination Facts, as I will call them, are not of themselves of any value whatever.

What we shall need will be to give our beginner a good general survey of the historical development of architecture treated in relation to the character and conditions of the people and countries where it originated, utilising for this purpose the method of the contrast of opposites and its contrary of imitative resemblance.

This survey should lead to the apprehension of certain central facts, the unity of all architectural expression in spite of its diversity, the possession of common qualities, and the permanence of artistic expression.

When a student reaches the point that he can, as it were, make a summary division into two styles, the plain and the ornamental, has learnt that there is no monopoly in beauty, and realises that proportion, grace, character, and fitness are all parts of one whole, then he has begun to justify his education, and has entered upon a path presenting possibilities of progressive growth.

A stumbling-block for the young student is that presented in the right relation of Art to Nature, more especially in architecture. When told "to study Nature" in the common phrase, the impression most probably produced on his mind is either one of mere bewilderment, or else a confusion of the imitation of concrete form with the outcome of deductions from an observation of natural facts, directed towards the apprehension of abstract qualities, capable of illustration in architecture.

Take the commonest fancy of the amateur, that the nave of a Gothic cathedral is a copy of a grove of trees, and compare with this Darwin's suggestion that the awe which we feel on entering a grand building finds its origin in the effect produced on early man by the caverns and forests in Nature. The fallacy of the grove of trees strikes you at once as too gross for discussion, but the underlying idea is always cropping up in changing forms. Its plausibility depends on the fact of a certain coincidence of result in the works of man, reached through a long series of logical developments, with the seemingly irresponsible work of Nature. An instance given in Garbett's "Principles of Design" is the relation between the elephant's foot, the human hand when raised to uphold a weight, and the highly-developed Doric column. Similarly in Gothic architecture, in certain phases of its fullest expression, an analogy may be felt between the intricate clustering of relief and open work, and the tree tracery of the woods in winter.

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In Renaissance work quite recently an attempt was made to base a theory on forms coincident with Nature's spirals as seen in shells.

The student once having found admittance to Nature's school is provided with a field of unending study. This observation and reflection on Nature is in many cases purely instinctive, and, I believe, not seldom possessed without any capacity of expression, as it will be found welling up among dwellers in the country in unexpected forms. Every Shakespeare lover knows the poet's marvellous instinct and extraordinary wealth of illustration obtained from this source. I should go so far as to fancy that the instant impression of supreme artistic creation, on all classes, derives a large part of its effect from the revelation agreeing with past subconscious observations on the part of the spectator.

Much is said of the refinement of Turner's landscape, but to the artist himself, full of the sense of Nature obtained from life in the open, his work was doubtless but a coarse transcript of infinite subtilties.

No student must rest content with a mere feeling after Nature's charm. Emotion must be translated into work, however imperfect, and the effort maintained through cloud as well as sunshine. Nature's process is infinitely slow, and artistic stature cannot be increased by taking thought any more than physical.

The student's greatest enemy is his own self-conceit. There is always a place for the patient worker; but the flashy student incapable of independent and sustained effort will always remain a burden to his teacher.

Every student is a problem in himself, and needs individual care, and the wisest teacher will be the least dogmatic in his judgment of capabilities, and the least ready to shut the door.

In this hasty and imperfect sketch, fellow students, I have tried to indicate to you the underlying spirit in which your education may be pursued. You came here, perhaps, expecting to hear about the details of the method employed in the Day School. We can all differ in that respect, and a student's own experiences will colour his personal prepossessions.

I do not propose to justify the particular means employed—I might find myself launched into biographical particulars—but the foundation requires to be sure, and the basis must be a close touch with the actualities of our own day, and a solid continuity of effort on the part of the student not afraid of hard work.

We are not entitled to set our students on a path which will make it harder than it need be for them to earn money within a reasonable period. The Day School has been run on semi-office lines, with an effort after a thorough grounding in the drawing methods in common use. We may agree that skill in draftsmanship is by no means the essential quality of an architect, but it is certainly a necessary qualification for an assistant requiring a place in an office, and we must look forward to the anxious period when, at the expiration of his articles, our Day School student has to give work-a-day proof of his powers.

While giving prominence to draftmanship, I never could myself agree to its pursuit to the detriment of the study of design, nor could I see the reason for postponing that important subject to quite a late stage in the student's career.

In the second year course of the Day School we have started the student in that important branch of his future work on very conservative lines, utilising the interest of the student in creating something, to deepen his studies of the first year, and guiding him in his first essays by the sure aid of the past examples of his art.

If you will look at the drawings in the second year, I think they will show you how interesting and practical the study of historical architecture may be made, and you will realise that for the preparation of these designs something more than a surface knowledge of the particular phases illustrated must have been acquired.

I have a particular wish to secure your support for my successor in his important task of developing the equipment of the Day School. The liberal assistance from the Committee and the general body should be forthcoming in this matter.

I am sure all the staff of the Architectural Association will hail with especial thankfulness the solution of the premises problem, which has lain across the path of the natural development of the Architectural Association for so many years.

Hurry up and pay off this debt, so that the Committee may devote themselves to the reorganising and equipment of the Schools, which should do so much for the coming generation of architects.

The Day School has doubtless been a useful piece of underpinning, but there has always seemed to me to be a top story wanting in our educational structure. A pretty good believer myself in Architectural Association methods, and fairly diligent in the classes, there came, all the same, a time when something more consecutive and thorough seemed to me to be essential. In my view, it need not have been necessary to go outside the Architectural Association for such further study.

Are our young students quite satisfied to-day, after, say, a year or two in the School of Design? And if they are now, will those who pass up from the Day School continue to find this school admirable as it is within its limits, sufficient for the completion of their training?

It is probably much better that the Architectural Association should finish its own students, affording them, on the slightest indication of the demand, the most advanced education that can be given.

Whatever the future development may be, let us hope the Architectural Association will know how to preserve its old characteristic of mutual instruction, free from the isolating effect of systems of education that separate the teachers and the taught into separate castes.

In the Day School I have seen a smile on the faces of the class when I have touched on this point, but, for myself, I sincerely state that I have learnt much from my two years' experiences, and I earnestly recommend some of our brilliant students to seriously consider whether they ought not to take their turn in our educational work.

You all know of the zeal of the late Arthur Cates, whose loss the Architectural Association has so much reason to regret. In the last conversation I had with him this was one of the points he insisted upon, urging the value of the effort to teach others to the teacher himself.

The Architectural Association ought to maintain a very large and able staff, as the numbers of students passing through the schools offers a very considerable field of selection. To those who dread captivity, we can reply that they are not asked to undergo a life sentence, and as to what they will get out of it, say all those things which are not learnt from books.

Where it is an honour to serve, understaffing need never exist, and the strain of teaching can be immensely lightened by a liberal policy in this respect.

Intercommunication and common action on the part of the teaching staff will naturally develop with reorganisation in our new home, to the great benefit of the students and the avoidance of overlapping.

In labouring on behalf of our young students, architects can find a practical solution of many divergencies. Pardon me this parting word of advice, "retain your own opinions, but do not make them an excuse for holding back from the work."

Mr. H. P. G. Maule, the new headmaster, then read the following paper on the same subject:—

Mr. President, Ladies, and Gentlemen,—It is with very great diffidence that I find myself in the position of having to say anything to you to-night on the subject of Day School Training, for the very limited experience I have had does not of itself entitle me to advance any views or opinions which I may have formed on the subject. I must ask you, therefore, to believe that it is only at the special wish of our friend, Mr. A. T. Bolton, that I venture to supplement what he has said, by emphasising a few of the points which appear to me salient features in architectural day school training. With the general outline of what he has said I most cordially agree, and I feel I do not even do him justice when I tell you that I know the difficulty of my task in carrying on the work to be light compared to his, in starting it, and that in handing it over to me every detail, every paper, was in perfect method and order.

With reference to the Architectural Association scheme it is necessary to bear two facts in mind—first, that the first year's course consists in reality of only nine months' actual work in the school, as three months are allowed for independent out-of-door study, which forms an important part of the student's training.

Secondly, that almost the most important part of the training is the second year, when the student is, in all probability, four days a week in an office and only two days a week in the school, during which time his study takes the form of directed exercises in design. This obviates the charge of mere academic teaching, as the student is brought into contact with the actual professional work of the day.

Now, the primary object of the Day School is to enable the student to acquire, during the first year, such a knowledge of architectural drawing, of history, and of construction, that, when he goes into an office as pupil, he can begin at once to take advantage of what he will there see and learn, and thus dispense with that awkward period, which most of us have experienced, of being plunged into an office with none but the vaguest idea of what to learn, or how to learn it.

There is another important feature, and that is that the organisation and method of the school training should enable a student to carry on his own education subsequently (supplemented, of course, by lectures and classes) with more directed method and application than is possible from an initial start in an office.

Now, the amount of "in-school" time available in the first year's course—namely, actually only nine months—seems to me to make it imperative that the training during that period should be on the broadest and simplest lines possible; that the training should, in fact, be mainly directed to teaching the student a method of learning. In other words, to teach him to begin to learn to draw; to begin to learn to observe; to begin to learn to think; and, above all, to endeavour to naturally fire and regulate his enthusiasm, and lead him to love his work for its own sake.

Without this latter as a resultant of the training, it is but labour lost so far as architectural training is concerned, though no doubt much useful knowledge would be gained which would always be an advantage in any work afterwards taken up.

The training, or rather the evolving, of an architect from the raw product of the public school, is a long and complicated process, and, when the shortness of the initial period, and amount of technical and constructive knowledge that is ultimately required, is taken into consideration, it seems to me self-evident that this early period should be made broad and general, and, above all, not too technical.

It must not be forgotten that, no matter what brains a student may have, nor how highly trained he may be so far as general education goes, of the special subjects of an architect's calling, whether history, construction, or elementary design, he is in almost all cases entirely ignorant.

His mind, therefore, no matter how receptive or retentive, cannot assimilate more than a certain amount of new matter, and it is assimilation and thought, and not an ill-digested assortment of facts, that really constitutes a good education.

Drawing.

The construction subject as inaugurated by Mr. Bolton seems to me the best of all methods for ensuring a simple and thorough grounding in elementary construction and materials, so long as the complete and direct relationship between materials, construction, and design is clearly kept before the student. A connexion which there is every reason to believe is sadly neglected in much of the work which now passes for architectural education.

I also attach great importance to the early, careful, and systematic drawing of simple full-size details in connexion with the construction subject, for an abbreviation, such as a set of $\frac{1}{8}$ scale drawings, cannot be properly understood—or drawn—unless the component parts, such as door and window openings, which they abbreviate, are clearly understood in detail.

In all the work done in the school, great care should be taken to ensure accuracy and clearness, and special attention should be directed to printing, and the value of clear and legible notes on working drawings and tracings.

Observation and Thought.

To an assembly of architects it is quite unnecessary to emphasise the importance of observation or the necessity for thought.

The eye sees what it is trained to see, and the eye is the greatest of all educators; the mind also develops its thinking faculty by knowing what to think about.

Unfortunately, the cultivation of observation does not apparently form part of an English

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school curriculum, and though most little children are very observant, the habit is generally crushed out of them long before they have arrived at an age when observation, and correct deduction from that observation, complement one another.

To reawaken the lost habit, if, unfortunately, lost it is, should be one of the great aims of the training, and this awakening of observation, directed as it is, will surely bring with it the development of thought.

Organised, logical thought, the thought that will eventually enable a man to design with beauty and build with truth, because he sees clearly and without confusion, can only come with years, but the germ can surely be planted and tended during the first year in the school.

Last, but not least,

Enthusiasm.

A famous writer once said that nothing was so catching as enthusiasm, and certainly no life work should be so capable of generating enthusiasm as the study and practice of architecture, but, if the early years of training are overburdened with dry technicalities, or with work too far in advance of fairly easy comprehension, there is grave fear of the failure to awaken this divine spark, without which the whole structure of architectural education falls to the ground.

One word more, and I will not try your patience further. It seems to me that to English students nothing but good can come through laying more emphasis upon the beauty and seemliness of our indigenous architecture of all periods.

Probably no country in the world is at the present time so full of simple, strong, and vigorous living work, impregnated with the character of its people, climate, and materials.

The individuality of each designer will be a process of evolution, as is he himself, and though this individuality must not be forgotten from the very first, it can scarcely be much developed at an early stage; but the gradual evolution of architectural forms, instinct with the character of the country and the people who produced them, can be insisted upon, and surely we in England are fortunate, not only in the examples which the past has bequeathed to us so abundantly, but also in much that the present is even now giving us in many directions.

It seems to me, therefore, that elementary English architectural education such as this should be directed with this object in view, and that observation, thought, and enthusiasm can be best cultivated at the early stage by special direction towards English work, character and materials, for surely the interest of each student is more likely to be awakened, quickened, and developed by more detailed knowledge of those things which are already dimly familiar to him than by those which, for the present at least, are probably beyond his reach.

In conclusion, I can only say I hope I have not dogmatised, or lost sight of the fact that my very limited experience hardly even entitles me to put before you what I personally conceive to be some of the essential features of that primary architectural education which I believe all members of our Association have so earnestly at heart.

Mr. Maurice B. Adams, in proposing a vote of thanks, said he was not sure that it would not be better if no one said anything at all, because they had already had put before them so much that was admirable, and if they could but digest what they had heard it would effect more than any casual remarks which might follow. He was delighted with what Mr. Bolton had told them of the system carried on in the Day School—the very careful and well-thought-out scheme which had been carried on in this, the initial, stage of what they had put their hand to, *i.e.*, a definite and more systematic way of bringing young men into the architectural profession. The scheme seemed to be, so far, thoroughly complete and eminently practical, and when he looked back to the days of his pupilage, and realised what students at that time had to do, he recognised what an immense stride education had made. Now, there were architects on every hand who were not only qualified themselves to take pupils, but in taking them they realised and did their duty towards them. Moreover, students were constantly having it dinned in their ears what the Association was doing to bring about a better state of things. The new departure which appeared to him to be made by the Association was that before a young man was articled he could go to the Day School and ascertain in a tentative way if architecture was the kind of work which would be congenial to him. Now, that was a great step in advance, for a boy's father or guardian need not commit himself or the boy until he found out whether architecture was the best pursuit for that lad, and whether he had the necessary capabilities to enable him to carry it on with credit to himself and satisfaction to others. That was a great advantage, for there were still some wretched advertisements touting for pupils, even in remote parts of the country where there could be no proper means of educating boys in architecture, and people fell into these traps and sent their lads to such places, and goodness only knew what became of them in the future. That the Association was teaching students in an efficient way would gradually become known, and the public would gradually get to know that there was a better way now of teaching architectural students than used to prevail. He was extremely gratified that this very practical step had been taken to enable a student to realise whether he was fit for the work before him. He had had intending pupils brought to him, but he had never taken a pupil, because he felt the responsibility of doing so was too serious. What usually induced a parent to put his son to architecture was the taste the boy possibly might show for drawing; but the drawings that such youths did were usually prepared in some art school, and showed that the lad had little notion of the things he drew. Such a boy was often put into an office for a month or so to see if he liked the work, but beyond becoming acquainted with the other fellows there, the opportunity thus afforded was not sufficient to enable him to ascertain whether he liked architectural work or not. At the Day School of the Association a student worked for a year, and probably he would get to feel some enthusiasm for his work—an enthusiasm which would probably never have been acquired in an office, for there, too often, he was made to copy letters, make tracings, or copy drawings, and even to run errands. In the Association School the student's time was profitably occupied. Architects could not be manufactured, but no better way, he thought, could be devised for producing them than that practised in the Day School. He was entirely in agreement with the idea of not departing from the old system, which he remembered so well, *i.e.*, that of mutual instruction. It was a grand idea to get young men to teach young men. Old teachers, as "heavy fathers," were apt to crush the enthusiasm of aspiring students, and young men who had not long been engaged in practice, and who were nearer the ages of the students, were generally the men best able to produce the best results. Mr. Bolton spoke in rather a disparaging way of the manner in which young people were not taught to observe in ordinary schools. He thought that the lecturer hardly did justice to the high-school system, and particularly the system which started with kindergarten work. There the child was taught to observe and handle things and ask questions, and the system thus begun was an admirable one. In his student days boys had to learn a lot of hard facts and dry points, and their education was more or less a system of cram. Now it was quite different, for the student was taught to observe and enquire, so that he rather thought Mr. Bolton had done a slight injustice to the better system of teaching young people to realise and think. In the future of the Day School there would be an extraordinary development, of which we had but little conception at the present time. If they went on in the manner they had commenced, and under the enthusiastic auspices of so many old friends of the Association, he was sure they would be proceeding in the right direction, and produce results which would even surpass their present expectations.

Mr. A. M. Watson, in seconding the vote of thanks, said he had expected some of the older men to be present to defend the system of office pupilage as against the school system which had been inaugurated by the Association. When one compared the work done by the Day School students in the first year with work which a pupil did in the same time in an office, one saw that the office system was not in it. A man who had had any experience of office work would hardly think it possible for pupils to be producing this kind of work unless the master had next to no practice. If he had any practice the student was generally engaged in helping him in his office work, and there was no opportunity of preparing such studies as one saw round the walls that evening. He had had the privilege in the Evening School of the Association of coming into contact with some of the Day School students in their second year, and he had observed that they were in a very healthy state of curiosity, and that was a great thing, because a man could not have curiosity about a subject unless he was interested in it. If a man were not interested in a subject he would not be curious about it, and so he came to the conclusion that the Day School was carrying on the traditions of the founders of the Architectural Association classes, and that was that the line between teachers and taught, if marked at all, was very indistinctly marked. All were engaged in research and exploration, and the best teacher was himself learning and the best student was teaching; and if there was any difference between teacher and student it was this, *i.e.*, the teacher was exploring just a little bit further ahead than the best student in his class, and perhaps a good deal further ahead than the youngest and dullest student; but because he was far ahead of the dullest and youngest student, he must not deprive that student of the pleasure of thinking out things for himself, and he should take the student deliberately through the country he himself had already explored—should put the student in the way of satisfying his own curiosity, so that the student should have the satisfaction of finding out for himself the solution of the problem his mind was at work on. Mr. Bolton had alluded to the possible lacking of a top story in the scheme of the Association, and he (the speaker) took him to mean a story in which the budding architectural genius, the future Sir Christopher Wren, should be provided for. It seemed to him that that provision was at hand if members of the profession would only co-operate with teachers. Wren himself, when he was past thirty years of age, attended an architectural day school; and he called it, in a letter about it, "a school of architecture, the best probably at this day in Europe." Those words were written in the year 1665, and that school was the scaffolding which surrounded the buildings of the Louvre in Paris, where Wren said that he spent days and weeks "prying into trades and arts." It seemed to him (the speaker) that we have the making of such a school in London. Some of the members of the Association were carrying out large buildings, and those buildings were often fine places for students to go to in the day time and see how men worked and how buildings were put together and constructed. Of course, the Association did something of the kind now, but they had only been able to visit buildings on Saturday afternoons, when workmen were not carrying on work, and it would be a good thing if architects would put in an additional clause in their contracts to the effect that notice of the work should be given not only to the District Surveyor and the local authorities, but also to the staff of the Architectural Association, so that the students in the school should be able to study the building on certain days in the week. He did not think that students would be found to be in the way, and if members of the Association who were directing building operations in London would co-operate in this way, it would result in the Day School becoming unique, for no other school in London could then compare with it.

Mr. G. H. Jenkins said they must all be grateful to Messrs. Bolton and Maule for their explanation, but he might ask whether they were satisfied with the educational scheme now started. Was it really the best that could be obtained? They knew that in Germany there was a four-years' course in a technical school which was much larger than any school we had in England. That school took the student from the finish of his general education to the time when he could enter upon a practice of his own. That was only possible after a scholar had had a perfectly sound secondary education, and it appeared to him that one point in which the Association Day School curriculum was lacking was the fact that there was no test at the commencement as to whether the student was grounded in such items of secondary education as all ought to possess who wanted to become architects. Would it not be well if there were an examination held to discover if the student had a general knowledge of geometry and the other subjects which it was necessary that he should

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know before he started to set out the "Orders," and to take up other subjects which the Day School taught? No doubt the system was a good one, but when we saw that the student was taken in one year through the whole history of architecture, through the whole of building construction, and in the second year devoted himself principally to design, one wondered whether the knowledge acquired by the student was sufficient to justify the course which had been pursued. Was not the student attempting too much? He knew a Day School pupil, and he was sorry to say that he did not find that student's knowledge was of the depth and profundity which one might have expected. The student did not seem to be acquainted with that general knowledge with which he ought to be possessed. It seemed necessary to have a course which would be longer and more sustained, so that the students would have some opportunity of acquiring a general knowledge of his profession. One hoped that the Association would in time be able to add another year to the course of training, so that the student at the commencement would spend more time on the elementary subjects. He did not see how the student could expect to learn freehand, elementary perspective, drawing from models and casts, elementary construction, history of architecture and other subjects in one year, and he hoped they did not look upon the Day School as the best that could be done, especially seeing what was being carried out in Germany and America. He hoped they looked upon it as an initial idea, which would be developed as years went on in a more thorough school of architecture than was possessed at present.

Mr. Max Clarke said he spent nearly all his pupilage time in sticking photographs into a large volume. In reference to what the last speaker had said, it did not seem to make much difference whether a boy started by learning geometry, or how to draw out the orders, if he had made up his mind to become an architect and had a sufficient amount of brains. Of course, without that initial determination, a young man might just as well never begin at all, for preparation for the work was a fearful labour at any time, and the ability to draw was but a trifle compared to what a student had to learn. The chief assistant in the office in which he was as a pupil, told him that one had to pay for all the information one got, but in those days there were not many ways of getting knowledge even by paying for it; a student had to find things out for himself. Now, of course, students were far better off in that respect. He did not think it was instilled into a student sufficiently that in addition to being an architect it was most desirable that he should be a gentleman. They had heard something about architectural traps. Such a thing should not be possible, and an architect should never be guilty of setting an architectural trap for either clients, opponents, or pupils, and that was a point he wished to emphasise. If a man were not a gentleman he would never be a good architect; he might be able to draw, but he would never be able to conduct the multifarious duties which an architect had to deal with unless he was absolutely upright and straightforward; and that should be inculcated at the school as much as the importance of such matters as learning to draw. Recently he met a young man who had been drawing a door, at an institution where young men were taught building construction, etc., and when he questioned that student about what he had been drawing, the young man showed a complete ignorance about the subject. Again, at some baths recently, he saw from his room, through the panels of the door, the people walking along the passage. He then found that the panels in places had not been rebated into the stiles and rails, and were about ¾ in. short of them, and were fixed on to the mouldings, and the mouldings on to the stiles and rails. He could only conclude that the work had been carried out in the office employing the above-mentioned student. Mr. Bolton and Mr. Maule were doing their best to educate present-day students, and if the system was not the best, time would soon produce something better. In any case, it was only fair to give it a trial. If students chose to work, they now had advantages which had never before been offered them in this country.

The President said he was sure they would all agree that the papers which Messrs. Bolton and Maule had given them were of the very greatest interest. Mr. Bolton's review or explanation of the course through which the students were taken was extremely interesting, and confirmed one's previous admiration of the way in which Mr. Bolton initiated the course. He had very little hesitation in saying that no other member of the Association could have started the Day School on such an excellent basis as had Mr. Bolton, and no student who had gone through the course described could fail to have gained a very great amount of knowledge unless he were hopelessly stupid. Now, as Mr. Jenkins said, it might be a very superficial knowledge, but he could not help thinking that that was so because it was given in a more or less superficial way, and he took it that the idea, at all events, in the present stage of the scheme, was not to make an architect at all; it was simply to give a lad a general knowledge which would enable him to educate himself afterwards and to take advantage of such education as was to be found in the office. It would be ridiculous to think that they could educate an architect in a year's course; it could not be done. It was only the means of giving a start on the right lines. There was no doubt that three-quarters of what the student heard in lectures would be forgotten, but the part which remained would be of the greatest use to him. In listening to Mr. Bolton's description of the course, he was very much interested in the method of teaching construction, which seemed to him to be a great improvement on the methods which had previously been in vogue. At the present time there were amongst them a great number of architects, and so-called authorities on education, in whose minds there was a tendency rather to magnify the study of construction out of its proper proportion. Twenty years ago, or perhaps a little more, it was rather the fashion amongst the more advanced architects of those days to minimise the value of construction altogether, and to say the study of design and the art side of architecture was the most important, and that construction was a matter for the surveyor and builder, and not for the architect. Now the pendulum seemed to have swung in the other direction, and he had heard it freely expressed that the only thing to study was construction, and that the other things could take care of themselves. Both ideas seemed to be wrong. The only proper course was the middle course—that the study of design and history and construction should go together, and in this way the student would be able to study the relative value and meaning of each side of his art. Mr. Watson made a suggestion about visits to buildings in progress. Well, of course, that was done in the Day School now to some extent, although probably not to the extent that Mr. Watson meant. He did not think there was the least difficulty in arranging visits to almost all the buildings in progress in London. The Day School was in its infancy, and was not at all fully fledged, but he looked forward to the time when the course might be—and he had little doubt in his mind that it would be—extended to three or five years. He believed the Day School was the beginning of a national school of architecture, and that it would develop into something very much larger than many people imagined. With regard to the system of pupilage, as at present instituted the Day School did not interfere seriously with the old-time system of pupilage. We were a conservative people, and were not ready to get rid of established ideas; but he could not say that there was any necessity for the retention of the pupilage system at all, and it was quite possible the day would come when there would not be such a thing, and when the education of architects would be on the lines carried out in Germany, where the student could go to the school and study for five or six years, going through a complete course and coming out to practise as a fully qualified architect, ready to undertake the work of the architect. That was looking forward far ahead, and they would have to proceed slowly; but he thought they had initiated a course of study which in future years would lead to something which would be of the greatest importance in the education of architects.

The vote of thanks was then very heartily agreed to.

Mr. A. T. Bolton, in reply, said he was rather glad that Mr. Jenkins had made the remarks he did, because that represented the point of view against which the paper was, to a large extent, directed. Mr. Jenkins had, he feared, entirely failed to understand what the object aimed at in the papers was, and their intention. The suggestion that there should be an examination of students when they entered the Day School was out of the question, for such an examination as he proposed was precisely what they wanted to avoid. In English secondary education, of course there were many things which, as his paper indicated, the public schools ought to teach but did not, and at the Day School they knew from experience the knowledge with which the students came to them, and what it was desirable they should be taught. The difficulty was to get the public schools to teach subjects which the students should know before they came to the Day School at all. Mr. Jenkins had not, apparently, understood that the object in the first year's course of this Day School was not that the student should be made well acquainted with all the elementary facts connected with architecture, but that he should be taught to get hold of the main idea of the historical development of architecture, and at the same time be given a sound training in geometrical drawing. If any architectural office in London would send round a young man who in his first year had been able to prepare such drawings as those shown that evening, and was able to answer a cross-fire of questions from the Day School men on his drawings, they would forthwith present him with a putty medal. His idea was that no office in London could produce a student who in a year was able to show such a quality and amount of work as some of the Day School students had done. A speaker had referred to the attention a pupil received in an office. How was it possible for any principal to give to his pupils the attention young men received at the Day School of the Association? In the Day School there had been three rooms, and in each room there was one assistant, with, at the most, nine or ten students. No student was checked in asking questions, and many hours were spent over each of them. As master he used to make it a point to go round and ask students questions to see whether they understood what they were drawing, a point which could easily be seen from the work itself. They did not pretend that a student was, after the course, more than prepared to profit by his articles and by the work which would be open to him in the Evening School. Mr. Jenkins, who assisted in the Evening School, apparently found that he had his duties to perform. A student from the Day School might very likely not know certain things which he ought to have known, and it was certainly Mr. Jenkins' business to teach that student those things if the student were a night-school student. Mr. Jenkins had, however, no right to complain of the Day School because of the shortcomings of the public or private schools. Possibly, if the student referred to by Mr. Jenkins came back from the Evening School to the Day School they would have no difficulty in finding cause for complaining to Mr. Jenkins.

Mr. Jenkins: The student is not in the Evening School.

Well, that did not seem to help Mr. Jenkins' case very much. Fortunately no complaints had ever before reached them; on the contrary, architects they all knew by name had expressed their satisfaction with the pupils sent to them. Architects receiving pupils might help them by seeing that their pupils attended the second year course, and by taking an interest in their doing so. It was unsatisfactory for the school where students omitted this second year work. He was acquainted with Continental methods, and he did not think that the Ecole system—which was finer than the German system—was adapted to the requirements of this country, and there were many reasons why that was so. Those of them who had read the article by a Frenchman in the *Architectural Review* would, he felt sure (and especially if they read between the lines to understand it in an everyday light), see how unsuitable the system would be for this country. His idea was that the best results were obtained by the old system of pupilage, and he found that the most satisfactory results were obtained by students in the second year who were in architects' offices. Students got in an office where work was carried on and paid for, an incentive to work and persevere, for they found that they must prove their value. A man who came from a school where a purely academic training was given, and where this incentive was absent, would, generally speaking, not do as well. The Association Day School system, with the Evening School and the office open to a student, gave

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the best results, he thought. Of course, the student must work hard, and three-parts of the work of preparation for his career must be done by himself. Good as a teacher might be, the result did not rest with him so much as with the student. He was much obliged to his friend, Mr. Watson, who was one of the lecturers in the Evening School, which carried on the teaching commenced in the Day School. Mr. Watson's subject was English mediæval architecture, and he went over the ground in about three months—a length of time which they could not give to it in the Day School. He thought, however, that Mr. Watson would rather have Day School students to lecture to than students who had not had such an advantage. The students' time might, of course, be devoted in the Day School to a mere study of the four orders, and they might then know off-hand that the Parthenon had 16 or 20 flutes to a column (whichever it might be; he never remembered himself), but if at the end of his year the student went into an office where mediæval work was being done, he would be unable to appreciate the various points connected with it, whereas by the Day School method the student got sufficient general knowledge to enable him to understand the general principles of the leading phases and styles. They got, so to speak, and architectural coach-ride, and this gave them an interest in their office work. The Day School did not pretend to teach students all they should know, but they were taught enough to enable them to follow up their studies in the office and on their own account. One student did not take the same interest in Classic as he did in Gothic, but in the Day School they insisted on the study of both, and it was hoped in that way to keep a man in the future free from stupid prejudices on the subject. Twenty years ago this following of one style and deriding all but one sacred period still lingered, and was often combined with a good deal of conceited ignorance. The future Gothic man was made to realise that there was such a thing as the Doric order, and that it was not the same whether Roman or Greek. He would have liked to have had Mr. Max Clarke's young man in the Day School. That sort of thing was the result of the method of teaching generally in vogue. When students drew a door in the Day School it was not any door, but the particular door which belonged to a particular house, and the student was found to take a proportionate interest in it. They could go and see the door, they had the full sizes of it, and there were models of parts of door framing as well. That was the same with windows and other parts of a building. It was lamentable that the public schools sent out men whose intelligence was not awake, and in the Day School they had had to awaken it. If the public schools after seven years sent out young men who knew nothing about geometry, the Day School could not help it, and they could not teach physics, mechanics, and chemistry, the elements of a knowledge of which a student ought to have acquired at the public schools. If the student were deficient in these matters the admirable lectures in the Evening School were open to him, and he must make up his deficiencies there. He was interested in Mr. Watson's remarks about Sir Christopher Wren, and remembered the correspondence referred to. The Louvre, however, was very different from an ordinary building, and it was the fashion in those days, when a Royal person undertook to erect a big building, to summon the most eminent artists from different countries to prepare plans and consult on this matter. Thus Wren was greatly interested in meeting Bernini at the Louvre, where he tried to get him to show his plan, but he complains that he was too jealous. In those more leisurely days things were done on the buildings which were now done in workshops, and the Louvre presented doubtless an extraordinary scene of artistic activity. He thought that work on buildings should come to students rather late, when they were more developed, but he entirely agreed that every architect before he practised should have some experience as a clerk of works. That was most essential. Visits to a building were not the same thing as constant residence on the site. What architects required was a system similar to that which engineers had—a system of resident engineers on the works. A man who was on a building from beginning to end got to know about building work in a way that no visiting or even workshop practice would teach him. He hoped that the Day School boys before they went into practice would spend six months at least on some building, and regard it as part of their education. This, however, was not the "top story," as Mr. Watson had surmised.

Mr. H. P. G. Maule also replied. Mr. Adams had referred to high-school training, but Mr. Bolton and he (the speaker) had referred to public-school training, which was a very different thing, unfortunately. Then Mr. Watson referred to visits to buildings in course of erection. The previous day the day-school students went to a building being erected, instead of discussing the dry details of such matters as footings and damp courses. It was one of Mr. Bolton's own buildings, and the following morning the students had to answer a number of questions which he (the speaker) had prepared arising out of the visit of the previous day. The students were asked to state what they had seen and to illustrate their replies by sketches. He thought that answered Mr. Watson's question. Mr. Bolton inaugurated that system, and a definite course of visits had been arranged to museums and buildings in course of erection. Mr. Jenkins referred to the German course. He (the speaker) recently had the advantage of meeting a lot of young American architects, and was told about the training they received, which was similar to that given in Germany, where they had a regular academic course of four or five years, and students finally passed out of the school ready to take positions as architectural assistants or to start as architects on their own account. He had had the advantage of speaking to one student who was twenty-five years of age. He had been working for five years in the Boston School of Technology, and he was now going to take a position as architect in an office of his own. That student had had no experience whatever of any practical sort, and he (the speaker) thought that the system that had been inaugurated in connexion with the Architectural Association was preferable, and he thought that they would agree with him when they saw, as they had that evening, some of the work which had been carried out by students who had only been with them a short time. He thought that example ought to make them pause before they thought of embarking on a truly academic course. With regard to what Mr. Max Clark said about the drawing of a door by a student, the point was interesting to him because a student in the day class was set to draw out a door with a model before him, and so there was no excuse for any student not to know how the panels were put together. He did not think the boy referred to by Mr. Max Clark could be a Day School boy, for with the method practised there was no excuse for a student not understanding such matters. Then, as to what Mr. Jenkins had said about students being examined when they first entered the Day School. An examination was not wanted at all; but there was a sort of examination, for when the student came, or his parents brought him, the practice was to find out what kind of a training he had had. If it was discovered that the student had had a classical training, and was deficient in knowledge of such matters as geometry or Euclid, it was impossible to send him back. So what was to be done in the circumstances? But sometimes a boy was sent back. He had a boy of sixteen brought to him recently who was particularly well grounded in many ways, but he seemed to be too young to enter the school, and it appeared to be preferable to give him the advantage of another year of general training before he entered the Day School, and so he was sent back, although he had a much better general knowledge than many ordinary students who had left public schools. It was impossible in some cases to do as they had done in this case, although the student might be deficient in some of the points which were essential in the training of an architect.

The Chairman said that the conversazione would be held at the Gallery of the Royal Institute of Painters in Water Colours on Wednesday, the 28th inst; tickets, 3s. 6d. single and 5s. 6d. double. He also announced that the next ordinary meeting would be held on November 6, when a paper would be read by Mr. C. A. Nicholson on "Modern Churches."

The meeting then terminated.

MEMORIAL WINDOW, UBLEY, BRISTOL.—A stained-glass memorial window was recently dedicated at Ubley Church, Bristol. The work has been carried out by Messrs. Joseph Bell and Son, of Bristol.

HOLBORN TO STRAND IMPROVEMENT.

THE Improvements Committee of the London County Council brought up the following Report at the meeting of the Council on Tuesday:—

". . . As stated in our former report, the Holborn to the Strand improvement now being carried out by the Council received the sanction of Parliament by the London County Council (Improvements) Act, 1899, and it will be within the recollection of the Council that before the scheme as submitted to Parliament was approved by the Council, we consulted the Royal Institute of British Architects, with the result that the scheme which was finally adopted by the Council was one which embraced the suggestions made by the Royal Institute after we had slightly modified the Institute's plan in order to make the crescent road (Aldwych), connecting the new main street with the Strand, more symmetrical. By this scheme a minimum width of 100 ft. was to be provided for the thoroughfare of the Strand, as well as for the streets leading to Holborn, and now named Aldwych and Kingsway. The width of the Strand immediately to the east of its junction with Aldwych at Wellington-street was proposed to be 100 ft., and a similar width was provided for the Strand immediately to the west of its junction with Aldwych at St. Clement Danes Church. This width gradually increased to about 160 ft. to the east and also to the west of St. Mary-le-Strand Church, in order to provide a minimum width of 50 ft. for the traffic on each side of the church. In the large open space between the eastern end of the crescent site and the western side of St. Clement Danes Church, the Council agreed, on March 13, 1900, to allot to the Gladstone Memorial Committee a site for the purpose of the monument proposed to be erected by the Memorial Committee. Nearly all the houses situated between the Strand and Aldwych have been acquired and demolished; some of the land has been staked out and the Council has invited offers for building leases.

We have had before us, however, a letter, dated May 21, 1903, from the Royal Institute of British Architects, calling attention to a letter which appeared in the *Times* on May 4, 1903, from Mr. Hamo Thornycroft, R.A., suggesting a considerable amendment of the Council's line for the northern frontage of the Strand between the two churches, with a view (*a*) to bringing the church of St. Mary-le-Strand into alignment with the centre of the thoroughfare, (*b*) to making the direction of the thoroughfare aim at the front of the church of St. Clement Danes and not at one corner of it, and (*c*) to securing for the future a good view of the Courts of Justice to all approaching that building from the Strand on the west. The Royal Institute has stated that, although in entire artistic sympathy with Mr. Thornycroft's scheme, it is fully alive to the difficulties, financial and otherwise, in the way of its execution, and the Royal Institute has therefore suggested a modification which it thinks could be carried out with a comparatively small sacrifice of pecuniary interest, and would practically secure the advantages of Mr. Thornycroft's scheme. By Mr. Thornycroft's proposal, the portion of the Strand between the eastern end of St. Mary-le-Strand Church and Aldwych would be widened to an average width of 150 ft.; by the Royal Institute's plan the average width would be about 120 ft. The Royal Institute has contended that by carrying out its plan a better view would be afforded of both churches from either end, and also of the Law Courts, and the apparent narrowing of the Strand at the point in question would be obviated, and that, although the eastern end of the crescent site would not be entirely symmetrical with the western end, this would be observable only on paper, and would not be seen when the actual work was carried out. The Royal Institute has also pointed out that by further widening the Strand in the manner suggested the sharp corner at the eastern end of the crescent site, as contemplated by the Council's plan, would be avoided.

We have also had before us a letter from the Royal Academy of Arts suggesting that the fullest consideration should be given to Mr. Thornycroft's proposal, and a memorial from the Further Strand Improvement Committee, forwarding a plan showing an amended line suggested by that committee, the line being somewhat similar to the one originally proposed by Mr. Thornycroft, and providing an average width for the Strand of about 155 ft. In their memorial the Further Strand Improvement Committee contend that by their plan (*a*) the Strand would take its natural course direct to the Law Courts and Fleet-street; (*b*) the Church of St. Mary-le-Strand would be brought into alignment with the thoroughfare; (*c*) an island pavement would be provided where trees might be planted and seats placed in one of the busiest thoroughfares in London; (*d*) that while the building frontage would be reduced the value per foot of the remaining frontage would be increased by the widening of the thoroughfare;

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and (*c*) that the proposal has the support of several of the Metropolitan Borough Councils who have had before them the memorial in question.

Upon receiving the letter from the Royal Institute, we were impressed with the importance of the suggestions made, and we accordingly invited certain of its representatives and also Mr. Thornycroft to meet us on the site, in order that they might fully explain their proposals to us, and we have since had before us a plan submitted by the Royal Institute showing definitely the scheme which it now proposes.

For the information of the Council we have caused a cartoon plan to be prepared and to be hung in the Council chamber, showing, by black lines, the scheme as contemplated by the Council; by dotted blue lines the considerable modification originally suggested by Mr. Thornycroft in his letter to the *Times;* by yellow lines and dotted yellow lines the scheme put forward by the Further Strand Improvement Committee, which is somewhat similar to the one originally suggested by Mr. Thornycroft; by red lines the proposal now made by the Royal Institute of British Architects; and by green lines a suggestion laid before us by the Council's superintending architect, by which plan the aggregate width of the Strand would be 115 ft. It is right to state that Mr. Thornycroft at his interview with us has expressed himself as being generally in accord with the proposal now made by the Royal Institute.

If the modification originally suggested by Mr. Thornycroft, and shown by dotted blue lines on the cartoon plan, were carried out, it would necessitate the addition to the public way of the Strand and Aldwych of land which would otherwise be let for building purposes and is valued by the Council's valuer at 350,000*l.*, to which must be added the cost of altering the existing vaults, paving, etc., estimated at 10,000*l.*, making a total of 360,000*l.*; the loss of recoupment if the Council were to adopt the plan submitted by the Further Strand Improvement Committee, shown by yellow lines on the plan, would be 239,400*l.* for land and 10,000*l.* for works, making a total of 249,400*l.*; the loss of recoupment if the Council were to adopt the amendment suggested by the Royal Institute of British Architects, as shown by red lines upon the plan and now accepted by Mr. Thornycroft, is estimated at 70,000*l* for land surrendered and 4,000*l.* for alteration of vaults, paving, etc., making a total of 74,000*l*; while the loss to the Council, if the suggestion made by the Council's superintending architect, and shown by green lines on the cartoon plan, were adopted, is estimated at 59,000*l.* for land and 4,000*l.* for vaults, paving, etc., making a total of 63,000*l.* In order that these figures and also the loss in rates by the adoption of any one of the four schemes may be fully understood we give the following table:—

Suggested modified Line of Frontage.	Average width suggested for the Strand.	Value of land surrendered to public way.	Estimated cost of altering vaults, paving, &c.	Total cost of adopting suggested alteration of frontage.	Cost of erecting buildings on land given up.	Rental value per annum.	Loss in rates per annum. To Westminster at 6s. 3d. in the £.	Loss in rates per annum. To the Council at 1s. 4½d. in the £.	Total.
		£	£	£	£	£	£	£	£
(*a*) Mr. Thornycroft's first plan ...	150	350,000	10,000	360,000	85,000	16,750	4,414	1,169	5 583
(*b*) Further Strand Improvement Committee's scheme	155	239,400	10,000	249,400	82,800	12,690	3,344	886	4,230
(*c*) Royal Institute of British Architects' plan	120	70,000	4.000	74,000	16,475	3,295	868	229	1,097
(*d*) Council's Superintending Architect's plan	115	59,000	4,000	63,000	14,690	2,890	761	201	962

We may remind the Council that members have had an opportunity of studying the question on the site, because we arranged for the erection, before the summer recess, of poles and boards upon the vacant land on the northern side of the Strand between the two churches, the boards being painted in different colours to show the several modifications suggested.

After the most full and careful consideration of all the facts, and having carefully viewed on the site of the improvement the effect of the various proposals made, we have arrived at the conclusion that the width already provided by the Council for the widened Strand, namely, a minimum of 100 ft., is in every respect ample for the present and prospective traffic. It must not be forgotten that, when Aldwych and Kingsway are completed, much of the traffic passing to and from the new street and the southern, eastern, and western parts of London will not use the portion of the Strand between Wellington-street and the Law Courts; that part of the thoroughfare will accordingly be used almost entirely by the traffic passing from Fleet-street westwards and from the western portion of the Strand eastwards to Fleet-street. Fleet-street is being widened by the City Corporation to 60 ft., and the Council is contributing part of the cost. The portion of the Strand opposite the Hotel Cecil has been widened, at the cost of the Council, to 80 ft., and the same width has been adopted for the improvement at the portion of the Strand east of the Hotel Cecil and opposite Beaufort-buildings, now being undertaken by the Westminster City Council, with a contribution from the Council. It will be apparent, therefore, that, while the portion of the Strand between Wellington-street and the Law Courts will presently be relieved of a large amount of traffic which at present passes along it, the Council is providing a width of street far in excess of that which has been adopted for other portions of the same line of thoroughfare. Moreover, the width of 100 ft. is considerably in excess of that generally adopted for street improvements in the past. During the 33 years of the Metropolitan Board of Works the average width adopted for main thoroughfares was 60 ft., which in our opinion was in some cases not sufficient. Charing-cross-road and Shaftesbury-avenue should, we think, have been made more than 60 ft. wide; but there is a very considerable difference between the 60 ft. provided for those thoroughfares and the 100 ft. to which the Council has widened the Strand at that part which shortly will be relieved of some of the traffic. Very few streets constructed by the Board were as wide as 80 ft., and the only thoroughfares which exceeded that width (80 ft.) were Northumberland-avenue (90 ft.) and the Victoria-embankment (100 ft.). The Council when effecting county improvements has, whenever possible, adopted a width of 70 ft. and 80 ft. With these facts before us, it appears that any proposal for increasing the width of 100 ft. for the portion of the Strand between Wellington-street and the Law Courts cannot be made merely on the ground of meeting the needs of the traffic, but must partake almost entirely of the nature of an æsthetic proposal, the chief argument in support of the proposal being to secure better architectural effect by bringing into greater prominence the church of St. Mary-le-Strand and the Law Courts. We have not yet been convinced that by throwing open to view various portions of the Law Courts buildings the architectural effect in the Strand would be considerably enhanced; but, whether this would be so or not, we feel that the Council would not be justified in incurring so large an expenditure as would be involved in securing a doubtful enhancement of the architectural view in the Strand. Having regard to the great width already provided (100 ft.), it will be possible to secure under the Council's scheme an imposing effect for the buildings to be erected on the northern side of the Strand. In view of all the facts above stated, we have to submit the following recommendations to the Council:—

(*a*) That no alteration be made in the present northern line of frontage in the Strand between Wellington-street and the Law Courts, as in the opinion of the Council not one of the proposals made offers of sufficient advantage to justify the Council in incurring the great expense which would be involved in increasing the already adequate width (100 ft.) of the portion of the thoroughfare in question.

(*b*) That a copy of the foregoing report, and the Council's resolution thereon, be communicated to the Royal Institute of British Architects, to Mr. Hamo Thornycroft, and to the Further Strand Improvement Committee."

These recommendations were agreed to after discussion.

Birmingham Municipal School of Art.—Mr. Alfred J. Dunn, A.R.I.B.A., has, on account of pressure of work away from Birmingham, resigned his lectureship in Building Construction and Drawing (elementary, advanced, and honours). The committee have appointed as his successor Mr. Francis B. Andrews, A.R.I.B.A. Mr. Andrews is an experienced lecturer, and has received from the Royal Institute of British Architects one of the twelve "Certificates of Competency to act as Building Surveyor," issued by the Institute on the result of examinations held up to 1901.

THE STANDARD SIZE OF BRICKS.

We take the following from the last issue of the *Journal* of the Royal Institute of British Architects:—

"The following standard has been agreed upon between the Institute and the Brick Makers' Association, and has been drafted in consultation with these bodies and representatives of the Institution of Civil Engineers, and ordered to come into force on May 1, 1904.

The Council recommend that members should insert this standard in their specifications under the title of 'The R.I.B.A. Standard Size of Bricks.'

1. The length of the brick should be double the width, plus the thickness of one vertical joint.

2. Brickwork should measure four courses of bricks and four joints to a foot.

Joints should be ½ in. thick and an extra 1-16th, making 5-16ths for the bed joints to cover irregularities in the bricks. This gives a standard length of 9¼ in. centre to centre of joints.

The bricks, laid dry, to be measured in the following manner:—

(*a*) Eight stretchers laid square end and splay end in contact in a straight line to measure 72 in.

(*b*) Eight headers laid side to side, frog upwards, in a straight line to measure 35 in.

(*c*) Eight bricks, the first brick frog downwards and then alternately frog to frog and back to back, to measure 21½ in.

A margin of 1 in. less will be allowed as to *a*, and ½ in. less as to *b* and *c*.

This is to apply to all classes of walling bricks, both machine and hand-made."

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of this Council was held on Tuesday in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Battersea Borough Council 15,000*l.* in respect of cost of erecting working-class dwellings; Hampstead Borough Council 1,273*l.* for street lighting purposes, and 1,800*l.* for erection of wall at cemetery; St. Pancras Borough Council 23,060*l.* for electric light installation; and Woolwich Borough Council 16,000*l.* for erection of municipal buildings.

Tramways.—The Highways Committee recommended, and it was agreed, that expenditure on capital account of sums not exceeding 30,500*l.* in all be authorised, in respect of the construction, for the underground conduit system of electrical traction of the tramway, authorised by the London County Tramways Acts, 1900, along St. John-street and St. John-street-road, Islington.

Letting of the Council's Land.—Mr. Mullins, Chairman of the Corporate Property Committee, stated in answer to questions that only three lots of land had been sold at the recent sale—namely, in Southampton-row, 620*l.*; in Long-acre, 55*l.*; and in Mare-street, 40*l.* Since then, there had been another lot sold in Mare-street at 40*l.* He had been asked what it was that militated against the Council's success. He thought the difficulties had been greatly exaggerated, as the Council's conditions were not more stringent than those of many of the large London landowners. The conditions were framed with a desire to raise the standard of architecture in London, and it was desired to take every advantage they could of the sites they had. He did not believe that there would be any difficulty in the matter. Negotiations had already been begun with the auctioneers, and there was every reason to believe that they would bear fruit. There seemed to be distrust by the public of the Council's architect acting as arbitrator.

Mr. Piggott said that all the difficulty seemed to be due to Clause 13 in the conditions, according to which all questions of dispute were to be settled by the Architect to the Council. The public seemed to dislike that, not because of any distrust of the architect as architect, but because he was but one man. They had an excellent architect, but he (the speaker) would not trust one man if he wished to spend a large sum of money on a site. He believed that if Clause 13 were altered all the difficulty would cease.

Mr. Robinson, Deputy Chairman, agreed

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that Clause 13 was what was disliked in the conditions.

Mr. Emden said that the clause was usual in building agreements in London, and he did not think that that was the cause of the difficulty. The difficulty was that the clauses were more strictly enforced than was the case on other large estates. The Council was inviting people to lay out large sums of money, and the clauses ought to be read in a liberal spirit. It would be better for the Council to bring its conditions into accord with those relating to other London estates. Builders and others wanted to be able to put up such buildings as shops and offices that could easily be let—not palaces. He agreed that the Council should get a good architectural result, but it must not be to the detriment of the man who was going to build.

Mr. Howell J. Williams asked the Chairman of the Committee to bring up a Report on the whole subject of the conditions. What was objected to was the clause relating to the architect, *i.e.*, "His decision in all matters shall be final and binding." As large sums of money would be locked up during a dispute which the architect would have to decide, builders could very easily be ruined if this clause stood.

Mr. Burns said that the ratepayer had to be considered, too. If they departed from the principle of single arbitrament the street would be spoilt by a heterogeneous collection of red brick, terra-cotta, and other buildings. The difficulty in regard to letting the land was due to a lack of purchasing power.

Mr. Mullins said he would bring the matter before the Committee, and the matter should be brought before the Council again.

Street Improvement, Piccadilly.—The following recommendation of the Improvements Committee was agreed to:—

"That, with the view of assisting the Council's negotiations and endeavouring to save expense, application be made to Parliament in the Session of 1904 to enable the Council to acquire compulsorily the leasehold and other minor interests in the shops at Walsingham House needed in connexion with the widening of Piccadilly between Arlington-street and the Green Park, sanctioned by the Council on May 26, 1903."

The Hackney Fire Disaster.—In reply to questions, Mr. E. Smith, Chairman of the Fire Brigade Committee, said that in reference to the fatal fire in Hackney-road on Monday morning, it was a fact that the shop was a projecting one, similar to a shop close by where a fatal fire occurred a year ago. There was no doubt that if a fire occurred in shops similarly constructed in other parts of London it would be almost impossible to effect a rescue, and he hoped the Council would try to get power to regulate such buildings. The wall between the shop and the inner room was only of lath and plaster.

Improvement of the Strand.—The Improvements Committee recommended:—(*a*) That no alteration be made in the present Northern line of frontage in the Strand between Wellington-street and the Law Courts, as in the opinion of the Council not one of the proposals made offers sufficient advantage to justify the Council in incurring the great expense which would be involved in increasing the already adequate width (100 ft.) of the portion of the thoroughfare in question. (*b*) That a copy of the foregoing Report, and the Council's resolution thereon, be communicated to the Royal Institute of British Architects, to Mr. Hamo Thornycroft, and to the Further Strand Improvement Committee."

[The Report of the Committee is printed on another page.]

Mr. Beachcroft moved the insertion of the following words after "Architects":—"With an expression of regret that the Council, for financial reasons, is unable to make any alteration in the direction proposed."

Mr. Collins seconded, but the amendment was lost. The Committee's recommendations were then agreed to.

Long-grove Asylum Foundations.—The Asylums Committee reported as follows:—

"The Works Committee having declined to undertake the putting in of the foundations of this asylum at the amount of the quantity surveyor's estimate—viz., 47,750*l.*—we have to report that we invited by advertisement tenders for the carrying out of the work. Fourteen tenders were received, as follow:—

	£	s.	d.
Joseph Howe and Co., West Hartlepool	45,694	10	9
J. E. Johnson and Son, Leicester	47,600	0	0
Wm. King and Son, Westminster	47,648	0	0
Charles Wall, Chelsea	47,729	0	0
Wm. Moss and Co., Loughborough	48,486	9	10
McCormick and Son, Islington	48,870	11	0
H. Willcock and Co., Wolverhampton	49,725	9	8
Kerridge and Shaw, Cambridge	50,731	5	11
J. Parnell and Sons, Rugby	51,339	10	0
J. and M. Patrick, Wandsworth	52,809	0	0
Pethick Brothers, Westminster	55,120	15	0
Leslie and Co., Kensington	55,759	0	0
Pedrette and Co., Finsbury-park	59,827	2	11
Stephen Kavanagh and Co., Surbiton	60,993	11	8

After the fullest consideration, and in all the circumstances, we came to the conclusion that the interests of the Council would be best served by the acceptance of the tender of Mr. Charles Wall, amounting to 47,729*l.*, which, although not the lowest, was less than the quantity surveyor's estimate for the work. We have accordingly entered into a contract with Mr. Wall, and the same has received the approval of the Home Secretary."

Vauxhall Bridge—Superstructure.—The Bridges Committee reported that the following tenders had been received for the superstructure of Vauxhall Bridge:—

	£	s.	d.
Messrs. Pethick Brothers (Foreign steel)	132,073	0	0
Ditto (Foreign steel)	133,664	0	0
Ditto (British steel)	137,073	0	0
A. Fasey and Son	141,741	13	9
C. Wall	142,042	9	5
Patent Shaft and Axletree Co.	153,551	10	0
Heenan and Froude, Ltd.	154,584	0	0
A. Handyside and Co.	158,200	11	4
Cochrane and Sons	158,500	0	0
Perry and Co.	160,360	0	0
Baudet, Donon, and Co.	166,587	9	0
J. Westwood and Co., Ltd.	168,803	0	9
Vereinigte Maschinenfabrik Augsburg und Maschinenbaugesellschaft (Steelwork only)	110,771	2	6

We are advised that the steel proposed by Messrs. Pethick in their lowest tenders is of such a kind that the chief engineer would not recommend its acceptance, and we have therefore considered only their tender which provides for the use of British steel. Messrs. Pethick propose that they shall have the option of choosing, as sub-contractors for steelwork, either the Patent Shaft and Axletree Company, Messrs. Handyside and Co., or Sir W. Arrol and Co., Ltd. Of the other firms tendering, both the Patent Shaft and Axletree Company and Messrs. Handyside propose Messrs. Pethick as sub-contractors for masonry. Messrs. Fasey and Son have tendered for work for the Council, and Mr. Wall carried out the reconstruction of Highgate-archway, but in neither case were the works of such magnitude as that now in question. Messrs. Heenan and Froude propose to carry out the whole of the work themselves. We have carefully considered the tenders, and are of opinion that that of Messrs. Heenan and Froude should be accepted. . . . We recommend:—'That the tender of Messrs. Heenan and Froude, Ltd., to undertake the erection of the superstructure of Vauxhall Bridge for the sum of 154,584*l.*, be accepted; that the solicitor be instructed to prepare the necessary contract; and that the seal of the Council be affixed to the same (when ready).'"

Mr. E. White said that the tender recommended was 22,000*l.* above the lowest tender for foreign steel and 17,000*l.* above the lowest tender for British steel. They had a tender from Mr. C. Wall, of London, which was 12,000*l.* below the tender recommended. He would say nothing about London work for London men, but when by giving the work to a London man they would save 12,000*l.*, it did seem to him an astonishing thing that they should propose to give the work to a North Country firm. He moved that the tender of Mr. Wall be accepted.

Mr. Torrance seconded the amendment. He knew of nothing which would justify the exclusion of a reputable firm whose tender was so much lower.

Mr. H. Ward said he was inclined to support the amendment, but he thought it would be better to refer the matter back for further consideration. There were few contractors who could do all the work themselves, and it would doubtless be found that Mr. Wall would sublet the steel work.

Mr. Allen said that Mr. Wall had not expressed such an intention.

Mr. White said he had heard from Mr. Wall that he proposed to carry out all the work himself.

After further discussion the amendment was carried.

Office of District Surveyor, West Hackney.—The Building Act Committee recommended:—

(*a*) That so long as the premises, No. 360, Mare-street, Hackney, continue to be used as the office of the district surveyor for West Hackney, the boundaries of the districts of West Hackney and East Hackney (North) be so modified as to include in the former district one-half of the building known as No. 360, Mare-street, Hackney.

(*b*) That the Council do, under Section 141 of the London Building Act, 1894, approve of the office of the district surveyor for West Hackney being situated at No. 360, Mare-street, Hackney; and that, as required by that section, notice of the situation of such office be given to the local authority.

The recommendations were agreed to.

The London Building Act Amendment Bill.—Mr. MacDonald asked the Chairman of the Committee, in view of the fatal fire in Hackney-road, what was being done in the matter of the amendment of the Building Act.

Mr. Burns asked whether the Chairman was aware that the last fatal fire in that neighbourhood was in a shop similar to the one just referred to, and whether, seeing that nine lives had been lost in fires originating in forecourt shops, the Committee would take steps to prevent the recurrence of other fatalities.

Captain Hemphill, Chairman of the Committee, said the Committee were proceeding as rapidly as possible with the work of a general amendment of the Building Act. In June last they wrote to the City Corporation, the City of Westminster, the Borough Councils, the Institute of Architects, the District Surveyors' Association, the Chamber of Commerce, and other bodies, asking for suggestions for the amendment of the Act. The Committee had now a vast amount of material collected, and were proceeding with the necessary steps in order to hand over the material to the Parliamentary Committee for the purpose of drafting a Bill as soon as possible. Several valuable suggestions had been received from some of the Borough Councils, and the Committee hoped to receive suggestions from other quarters. The Bill which was brought forward last year dealt with these one-story forecourt shops, and it was proposed to make the roofs and partitions of these buildings fireproof. The Bill was not a perfect one, but it would have been a useful one on which an Act could have been framed, and it was regretted by the Committee that it had to be withdrawn. The Committee desired to impress on the Council the necessity for the amendment of the Act, both as regards protection of life from fire, and with regard to other matters, and they hoped that when the amendments were brought forward they would receive a large amount of public support and be carried into law. Many fires had occurred in these shops, and the Committee thought that this kind of building should be discouraged as much as possible.

Mr. Sankey said that the City Corporation was chiefly in opposition to the previous Bill. What was the position of the Corporation now?

Captain Hemphill said that the Corporation would not make any suggestions until they had a draft of the Bill before them. It would be much better to have their suggestions before, rather than after.

The matter then dropped.

London Squares.—Mr. Howell J. Williams said, in view of the advertised sale of Edward-square, Islington, he would like to know whether it was proposed to take any action in the matter—to save that square and other London squares from being built upon?

Captain Hemphill said the Committee had the matter before them. They were inclined to think it was a matter for the Parks Committee.

Mr. Stuart Sankey has the following motion on the paper:—

"That, in view of the growing tendency to offer for sale, for building purposes, squares and gardens in London which for many years have been retained as open spaces for the use of the frontagers, it be a further instruction to the Parks and Open Spaces Committee to consider and report whether Parliamentary powers should not be sought by the Council to secure that such squares and gardens should remain unbuilt upon, by payment, for the imposition of such restrictions, of fair and reasonable compensation to the freeholders and others having vested interests therein."

The Council adjourned soon after six o'clock.

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ARCHITECTURAL SOCIETIES.

Sheffield Society of Architects and Surveyors.—The ordinary monthly meeting of the Sheffield Society of Architects and Surveyors was held on the 15th inst. in the Society's rooms, Leopold-street, Mr. E. Holmes in the chair. The following gentlemen were elected associates:—Messrs. W. Langcock, F. H. Wrench, G. E. Marshall, and S. M. Gibson. The President (Mr. Thomas Winder) then gave his inaugural address. He mentioned at the outset of his address that the Council of the Royal Institute of British Architects was again giving consideration to the question of registration, and that of the Surveyors' Institution had adopted alterations to their rules which almost amounted to making surveying a closed profession. Sooner or later the question would have to be faced both by surveyors and architects in consequence of the action of members of another profession. No architect or surveyor of standing would dream of drawing up legal documents or of interfering with legal questions, and it was greatly to be regretted that members of the legal profession were abandoning professional traditions and encroaching seriously upon the duties of the surveyor, the valuer, and the land agent. Large numbers of plans are being drawn upon legal documents, often most incorrectly, by irresponsible junior clerks in solicitors' offices, and drawn with as little understanding of the meaning of the work as ability to make a correct plan. These plans were charged for, and this was unfair to clients, and would prove a fruitful source of litigation. Solicitors were also computing areas of plots, sub-dividing leaseholds, negotiating sales (including valuation), and wherever possible absorbing the duties and emoluments of surveyors and land agents. This was but another phase of the curious system by which one went to the draper for plumbing repairs, and to the chemist for stationery and literature, and it had been greatly stimulated by the publication of that most misleading publication, the 41 in. Ordnance Map, of which a complete set existed in the library of the Sheffield Law Society for the use of members. Perhaps the burning question of the day, continued the President, was the provision of so-called "artisans' dwellings." This question would very closely affect their professions were it not for opinion, which had even found voice in the City Council, that the introduction of what they were pleased to call professionalism into the question was undesirable. The City Council recently had an opportunity of getting the benefit of the experience and ability of the whole of the Sheffield architects, but was most careful so to frame its conditions as to prevent the majority of the members from competing. Their members could, and would, have given invaluable assistance in the solution of that most difficult problem—the provision of a sanitary and convenient cottage, at the minimum cost, with the maximum accommodation, which would comply with the Corporation by-laws (this was a *sine qua non* unless the City Council was building), and should also conform to the fads of the Local Government Board, one of which was that the smell of cooking must be confined to the kitchens. He had elsewhere expressed the opinion that the authorities were making a cruel and gigantic blunder in the way they were approaching this most difficult social problem. They condemned a large area of property and destroyed numbers of houses long before others were erected to take their place. This could only result in the poor creatures turned out herding in already overcrowded houses, with results such as he came across recently, where seven families were packed into one house, whilst the local authorities—not of Sheffield—were squabbling with the Local Government Board because the latter considered the workmen's dwellings were too large for people one-third of whose earning would be absorbed by the rent of the Corporation-provided houses, even should they be fortunate enough to secure them. What were wanted, and what the architects of Sheffield should be encouraged to design, were small, well-built, inexpensive houses of from one to five rooms, which unskilled workmen, widows, and others who earn a bare living wage could afford to rent. No one would grudge the erection of such houses, even if they were let at a loss, but to erect villa residences which ratepayers had to subsidise was unfair to ratepayers, to contractors, and to property owners, and to all but the fortunate, and generally far from needy, few who get possession of them. His idea was that if Corporations could be induced to adopt the system in vogue amongst railway and waterworks contractors, and to erect iron houses upon sites which at the present time were suitable, they might in twenty or thirty years remove them and erect others on sites which would then be more suitable, making a handsome profit out of the improved value of the old sites. The piling up of by-laws and Acts of Parliament for municipal or urban aggrandisement was a very grave menace to the city's future well-being. The fact that a person who inadvertently or otherwise broke a by-law was allowed in some cases to continue to do so on payment of an annual fine was proof that such by-law was unnecessary. This was further proved by the fact that Corporations repeatedly ignored their own by-laws. To fine a working man for "erecting" obsolete tramcars upon his garden patch because they were not incombustible, and because the walls were not 9 in. thick, and to oppose the erection of corrugated iron buildings because the walls did not come up to the thickness required by the by-laws, was incompatible with the fact that the Corporation allowed a second story of wood to be put upon an existing wooden erection on its own market premises, and that in dangerous proximity to its own Corn Exchange. Again, when architects sent in building plans they knew from painful experience they must not step over the building line, but this rule did not hold good when the Tramways Committee were erecting tram sheds or the Highway Department premises for themselves. The new by-laws would require rooms in dwelling houses to be 9 ft. high throughout, but if the houses were erected by the Corporation 7 ft. 9 in. high (for part of the rooms) became a sanitary height. The Council of the Society had given much time to the consideration of the education question, and had reason to hope that architectural education would enter into the curriculum of the new Sheffield University. The successful architect or surveyor of the future must be a very highly-educated man. The recent visit of the British Archæological Association to Sheffield had drawn attention to the rapidity with which ancient buildings were disappearing, and had shown how poor were the records which had been kept of them. Could not the Architects' Society do something to preserve them from utter oblivion, enrich their library, and increase its usefulness by adding to it photographs and measured drawings of the few remains which were worth recording. The committee of the High Hazels Museum would accept with gratitude any ancient object of local interest, and they might assist in making a valuable collection of old lead hoppers, mantels, plaster work, and especially examples of early cast-iron work, of which latter beautiful examples were turned out by the Green Lane Works in Godfrey Sykes' time, and at earlier dates.—Mr. Winder also gave a lecture on "Farm Buildings." He opened with a plea for the use of local materials, and gave a rapid sketch of the evolution of the English homestead, which he believed was a development of the Saxon one, in which the master, men, maids, and stock all dwelt under one roof. This was followed by remarks on the position of the homestead upon the holding, upon drainage and the water supply, in which he warned his hearers against the danger of infection to wells, etc., by the percolation of water through worm or mole holes, or through holes made by the roots of trees and vegetables. He said that it is usual for the farmer to bear the cost of the team work for new buildings—which is probably a survival of the old boon-team service—a feudal service which was not altogether obsolete when he entered the service of the Duke of Norfolk, thirty years since. The best arrangement of the various buildings with their respective positions on the homestead was then considered, together with the most suitable materials for their construction. The lecturer drew the attention of his audience to the anomaly of the use of the same by-laws as to air space and ventilation for cowhouses situate in the slums of a city and for those on our bleak Derbyshire and Yorkshire hills. He said the pigeon cote was not now obtaining the attention it deserved, and that where a large cote was found upon a seventeenth-century homestead, that homestead would probably prove to have been the Manor House, and gave as examples of this Kimberworth, The Grange, Hesley Hall, Handsworth, etc.—The lecture was illustrated by slides made by Mr. E. Claude Skill, and by others lent by Mr. J. R. Wigfull, which were shown by Mr. J. Atkinson.—On the motion of Mr. Gibbs, seconded by Mr. J. Smith, and supported by Messrs. E. Holmes, H. L. Paterson, and others, a hearty vote of thanks was accorded to the President for his address and lecture.

Illustrations.

A PRELIMINARY IDEA FOR LIVERPOOL CATHEDRAL.

THIS design was submitted in the preliminary qualifying competition.

Owing to the known predilection of the Committee in favour of the more stereotyped and orthodox Gothic, the uncertainty at the time this idea was thought out as to who the assessors would be, and the greater uncertainty as to the final result, the preliminary design was not worked out as thoroughly as it would have been under other and more favourable circumstances.

The governing idea was the seating of a very large congregation within both sight and hearing of the preacher. About 3,500 could be accommodated under the octagon, the galleries over the entrances to same, the transepts on the diagonals, etc. The distance from the pulpit to those comparatively few furthest away being about 150 ft.

The clear span of the nave and chancel is 62 ft., between the main walls of nave 92 ft., low aisles 13 ft. wide. The height of the columns 100 ft., and to the apex of groining 122 ft. The diameter of the octagon is 121 ft., and on the diagonals 123 ft.

A. H. Skipworth.

RECTORY, DONHEAD ST. ANDREWS', WILTS.

This house was built some years ago from the design of Mr. C. E. Ponting, of Marlborough.

The house is situated on a hill overlooking the valley in which lies the village, and has a good view of the Downs. It was designed for the walls to be entirely in stone, but exigencies of cost necessitated the use of red brick, with dressings of Bath stone. The roofs are covered with tiles.

A point in the plan is a spacious hall, to be used as a sitting-room, with doorway giving access to the garden terrace. The parish-room shown has not been erected.

The builders were Messrs. Estcourt and Son, of Gloucester.

ENGINEERING SOCIETIES.

The Junior Institution of Engineers.—There was a large attendance of the members on the 17th inst., when the Vauxhall New Bridge Works were opened to the visit of this Institution. Mr. W. C. Copperthwaite, M.Inst.C.E., Bridges Engineer, London County Council, who showed the party over, first went through the drawings, explaining all the important features of design and the methods adopted in executing the work so far as it had proceeded. The running of the cableway erected for removing the old bridge and for building operations on the new, was demonstrated, an excellent bird's-eye view of the works being obtained from the suspended cage in which the visitors were conveyed across the river. The new bridge will replace the old bridge opened in the year 1816, which was the first iron bridge built across the Thames. It consisted of nine cast-iron arches, each of 78 ft. span, with stone piers and abutments. With the increase of traffic the bridge, being only 30 ft. 6 in. wide, proved too narrow, and in 1895 the London County Council obtained an Act for its re-building. The new structure, when finished, will have five steel arches, built upon granite masonry piers and abutments. The centre span will be 149 ft. wide in the clear, the two intermediate spans 140 ft. 4 in., and the shore spans 130 ft. 6 in. respectively. The work at present executed consists of the masonry of the piers and abutments of the new bridge, built to a level of 9.75 ft. above O.D. The foundations are of concrete, carried down, in the case of the abutments, to about 18 ft. below O.D., and the piers about 30 ft. The masonry is of white Cornish granite, laid in courses of 2 ft. thick, and backed by 6 to 1 concrete. The method of construction, after the old bridge had been removed, was to build

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dams similar to the one now visible at the Westminster abutment, of 14 in. by 14 in. tongued and grooved piles. Around these dams protective dolphins were placed for the security of the river traffic. These dolphins are still in existence. The foundations of the pier are in clay. Considerable difficulty was experienced in the case of the Westminster abutment, and of the pier supporting the Westminster central arch on the Westminster side. In the latter case, when the excavation of the foundation was nearly completed the dam burst, and very serious difficulty was met with in its repair. It is proposed to finish the work in the following manner:—The abutments will be built of ornamental granite facing to the parapet level of the bridge, but the masonry of the piers will only be carried up to the springing of the arches. Above that level they will be finished in steel work, the ends of the piers being decorated with ornamental cast-iron panels. The steel ribs will be thirteen in number in each arch, and the superstructure is so arranged that the parapet of ornamental wrought-iron projects over the outside ribs by means of cantilevers.

COMPETITIONS.

Elementary School, Ealing.—The Education Committee of the Borough of Ealing have commenced their labours by having a competition for a new public elementary school among architects actually resident in Ealing. Six sets of plans have been submitted, and will probably be exhibited shortly. The assessor in the competition was Mr. Edward R. Robson, of Westminster.

Library, Heywood.—The drawings received by the Committee in connexion with this competition have been on view in the Lecture Hall of the Technical School. The first premiated design was by Messrs. North and Robin, of London; the second by Messrs. David Bird Manchester; and the third by Mr. R. J. McBeath, Sale, near Manchester.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

The London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Strand.—An iron and glass shelter to the new Gaiety Theatre, Strand (Messrs. E. J. Prest and Co. for Messrs. E. Runtz and Ford).—Consent.

Norwood.—Addition to the Corpus Christi Roman Catholic Church, Brixton-rise, to abut upon Trent-road and Horsford-road (Messrs. J. F. Bentley and Son).—Consent.

Westminster.—That the application of Messrs. Davis and Emanuel for an extension of the periods within which the erection of a building for the Charity Organisation Society, on the site of Nos. 284 to 298 (even numbers only) inclusive, Vauxhall Bridge-road, Westminster, was required to be commenced and completed, be granted.—Consent.

Brixton.—Blocks of buildings on a site on the north-west side of Coldharbour-lane, Brixton, abutting also upon Lilford-road and Kenbury-street (Mr. E. E. Bird for Messrs. L. Whitehead and Co., Ltd.).—Consent.

Lewisham.—Six houses on the west side of Bromley-road, Catford, southward of Aitken-road (Messrs. Norfolk and Prior for Mr. W. Bailey).—Refused.

Chelsea.†—Iron and glass shelter over the entrance to the restaurant at Harrod's Stores on the west side of Basil-street, Chelsea, at the corner of Hans-road (Mr. C. W. Stephens for Harrod's Stores, Ltd.).—Refused.

Deptford.—Permission to retain a wood and glass pediment above the shop front of Nos. 7 and 8, The Broadway, Deptford (Messrs. Jenrick and Crocker).—Refused.

Finsbury, Central.—Warehouses with one-story shops in front on the site of Nos. 1, 2, and 3, Clerkenwell-green, Finsbury (Mr. S. Adams for Mr. W. H. Adams).—Refused.

Finsbury, East.†—A porch at an entrance in South-street to a building in course of erection on the east side of South-street, and north side of South-place, Finsbury (Messrs. Davis and Emanuel for Mr. C. G. Hill).—Refused.

St. George's, Hanover-square.—A projecting sign in front of No. 16, Dering-street, Oxford-street, St. George's, Hanover-square (The Tayler Smith Electric Company for Mr. R. Franks).—Refused.

St. George's, Hanover-square.—An iron and glass shelter over the entrance to No. 17A, Allington-street, St. George's, Hanover-square (Messrs. G. Trollope and Son for Mr. J. Isaacs).—Refused.

Wandsworth.—One-story shops upon part of the forecourts of Nos. 6, 7, 8, and 9, Replingham-road, Southfields, Wandsworth (Mr. T. J. Lynes for Mr. C. G. Spagnolette).—Refused.

Width of Way.

Finsbury, East.—Buildings on the site of Nos. 35-39, Old-street, St. Luke's, with external walls at less than the prescribed distance from the centre of the roadway of Teanby's-buildings (Mr. W. E. Wallis for Messrs. H. Bates and Son).—Consent.

Southwark, West.—A water-closet building on the north side of Clink-street, Southwark, eastward of Bank End (Messrs. Deakin and Cameron for Mr. H. Baerselman).—Consent.

Woolwich.†—Retention of a clubroom at the rear of the "Park Tavern," Park-place, Eltham, with external walls and with a boundary fence at less than the prescribed distance from the centre of the roadway of Back-lane (Messrs. Gush, Phillips, Walters, and Williams for Messrs. T. H. and W. St. J. Fox).—Consent.

Brixton.†—A one-story shop upon the forecourt of Hebert House, Coldharbour-lane, Brixton, with external walls at less than the prescribed distance from the centre of the roadway of Milkwell-yard (Messrs. T. Laws and Son for Messrs. Hammond and Baker).—Refused.

Width of Way and Line of Fronts.

Wandsworth.†—Buildings on the north-west side of Greyhound-lane, Streatham, westward of Pathfield-road (Mr. W. Grellier for the Crooke-Ellison Estate).—Refused.

Hampstead.—One-story shops upon the forecourts of Nos. 3 and 5, Fairhazel-gardens, Hampstead, to abut also upon Coleridge-gardens (Mr. W. Daniell for Mr. J. Gibbs).—Refused.

Line of Frontage and Construction.

Bow and Bromley.—Retention of an iron and concrete timber drying stage at Tredegar Works on the south-west side of Ordell-road, Bow (Messrs. Perry and Co.).—Consent.

Strand.—An iron and terra-cotta front across the roadway leading from the Strand to the Savoy Hotel extension, Strand (Mr. T. E. Collcutt for the Savoy Hotel Company, Ltd.).—Consent.

Space at Rear.

Lewisham.—A modification of the provisions of Section 41 of the Act with regard to open spaces about buildings, so far as relates to the proposed erection of No. 39, Ermine-road, Lewisham, with an irregular open space at the rear (Messrs. S. J. Jerrard and Sons for the executors of the late S. J. Jerrard).—Consent.

St. George's, Hanover-square.—A modification of the provisions of Section 41 of the Act with regard to open spaces about buildings, so far as relates to the proposed erection of a bath-room and water-closet addition at the rear of No. 6, Eaton-terrace, St. George's, Hanover-square (Mr. W. J. Bassett for Mrs. M. Spencer-Ledyard).—Consent.

Deviation from Certified Plans.

Whitechapel.—A deviation from the plans approved on July 21, 1903, in respect of the erection of a stable building on a portion of the site of stables at No. 76, Hanbury-street, Whitechapel, so far as relates to a reduction in the height of such building and the substitution of a plain for an ornamental gable (Mr. P. E. Culverhouse).—Consent.

Width of Way and Widening of Street.

Hackney, South.—Houses on a site on the south side of Woodbine-cottages and abutting on the west side of a way leading out of the south side of Woodbine-cottages, Chatham-place, Hackney (Messrs. Hodson and Whitehead for Messrs. J. and T. G. Smith).—Consent.

Hackney.—That an order be issued to Messrs. Hodson and Whitehead sanctioning the adaptation as a street for carriage traffic of a portion of a way leading out of the south side of Woodbine-cottages, Chatham-place, Hackney (Messrs. J. and T. G. Smith).—Consent.

Means of Escape at Top of High Buildings.

Strand.—Means of escape in case of fire proposed to be provided on the fifth story of Nos. 62 to 65, Charing-cross, Strand (Mr. G. R. Julian for the Canadian Pacific Railway Co.).—Consent.

Buildings for the Supply of Electricity.

Holborn.—An addition to the sub-station situate in Tower-street, Seven Dials, Holborn, to abut upon West-street (Mr. J. S. Highfield for the Metropolitan Electric Supply Company, Ltd.).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

COURT OF COMMON COUNCIL.

The usual Court of Common Council was held in the Guildhall on Thursday last week.

Mr. Carl Hentschel asked if the work of relaying the wood blocks in Fleet-street could not be continued day and night.

The Chairman of the Streets Committee replied that the work should have been continued day and night, but that sometimes it was said that certain work could not be done during the night.

The Streets Committee submitted a report on the proposed by-laws for the regulation of the demolition of buildings in the City, and on the recommendation of the committee the by-laws were approved, and it was agreed to submit them to the Local Government Board for confirmation.

The same committee reported on a petition which had been received from certain occupiers of premises in London Wall, Circus-place, and Finsbury-circus, asking that wood be substituted for the asphalt and macadam roadways of those thoroughfares. The committee stated that the pavement of the circus was in good condition, and could not at present be disturbed, and that it was undesirable to substitute wood for asphalt in London Wall. They recommended, however, that the portion of Finsbury-circus between Circus-place and East-street be paved with creosoted deal at a cost of 1,300*l.*, and this was agreed to.

The Improvements and Finance Committee submitted the award of the arbitrator appointed in 1901, agreeably to section 6 of the City of London Sewers Act, 1807, certifying the amount to be paid out of the Consolidated Rate to the Mayor, Aldermen and Citizens, as trustees of the Bridge-House Estates, at 55,325*l.*, for the ground required for widening London Wall and Blomfield-street, between Albion-place and Finsbury House. The committee recommended that an arrangement should be agreed to, whereby the matter would be settled for the sum of 50,000*l.*, including costs.

Mr. Morton was of opinion that the London County Council should have contributed 25,000*l.* towards the cost.

The report was adopted after some discussion.

The same committee reported that an arrangement had been come to with the London County Council by which that body had agreed to contribute one-half the net cost of widening Mansell-street. The work would be done as opportunities occurred. The total cost is estimated at 105,500*l.*

METROPOLITAN ASYLUMS BOARD.

The usual fortnightly meeting was held on Saturday last week, Sir Robert Hensley in the chair.

A letter was received from the Local Government Board authorising the expenditure of an additional sum of 3,468*l.* in the erection of Millfield.

Joyce Green Hospital.—The Hospitals Committee reported that they had informed the Local Government Board that it was not proposed to proceed with the additions to this hospital during the coming winter.

Eastern Hospital.—The Works Committee submitted a plan of proposed alterations at the laundry of this hospital. The cost was estimated at 850*l.* The plans were approved.

South-Eastern Ambulance Station.—The same committee reported that Messrs. T. W. Aldwinckle and Son had prepared amended plans for the provision of additional accommodation for small-pox nurses at the South-Eastern Ambulance Station, and recommended that the plans be approved. This was agreed to. The amended scheme will cost only 1,600*l.*, as against 2,950*l.* for the original scheme.

BOOKS RECEIVED.

Official Report of the International Fire Prevention Congress, 1903. (British Fire Prevention Committee.)

The "Mechanical World" Pocket Diary, 1904. (Emmett and Co., Manchester.)

The Purification of Sewage and Water. By W. J. Dibdin, F.I.C., F.C.S. (The Sanitary Publishing Company. 21s.)

Wood Carving: Design and Workmanship. By George Jack. (John Hogg.)

Great Masters: 1200—1800. Reproductions in photogravure, with text by Sir Martin Conway. (W. Heinemann.)

A Centenary Memorandum.—Joseph Aloysius Hansom, architect, founder of the *Builder* and inventor of the Hansom cab, was born at York on October 26, 1803. He died June 29, 1882, at 399, Fulham-road. It is not often that the invention of a new vehicle proves such a complete and permanent success as the Hansom cab has been.

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Correspondence.

THE LATE MR. H. W. BREWER.

Sir,—In addition to the appreciative notices which have appeared as to this eminent artist, may I add that the views of London schools in my work on "School Architecture," published in 1874, were all drawn on the spot by him, and, in the majority of cases, were also transferred to the wood by him. His is a loss not easily replaced.

Edward Robert Robson.

A REMINISCENCE.

Sir,—As a subscriber to your journal since 1848, and having been acquainted with the late Mr. Brewer since 1853, when he resided in Hampstead, perhaps the following reminiscences of his association with Hampstead and its artists may be interesting to many of his admirers.

At that time an association was formed called the Hampstead Conversazione of Arts, and an exhibition was held twice a year at the Assembly Rooms, Holly Bush-hill (now the Constitutional Club), and with it were associated some of the leading lights who resided here, and who adorned the artistic and architectural world during the last half-century—notably the late Clarkson Stanfield, R.A., Mr. Herbert, R.A., Professor Cockerell, Mr. Wardell, and other eminent men who have joined the majority, the then active and most energetic members being the late Mr. Geo. Stanfield and the late Mr. H. W. Brewer.

The association and grounding with such men as these (with his unique mind for minutiæ and detail) produced in the late Mr. Brewer not only a genius that will be difficult to replace, but also a generous and genial friend to many.

Permit me, as an old contributor, to join issue with his many friends in sincere sympathy at his loss. R.I.P., but his works are left to speak.

W. H. Watts.

"HAIR BITUMEN."

Sir,—Specimens of the above sent to us by Messrs. Engert and Rolfe some weeks ago still retain an appreciable odour, so that we should be afraid to use the material as a sound deadener between rough and finished floors.

Certain so-called "inodorous" felt (not Messrs. Engert and Rolfe's) which we used some years ago for this purpose emits a distinct odour in certain states of the weather. So much do we distrust the inodorous qualities of this kind of material that we now use ordinary grey felt, such as is used under carpets, for a sound deadener between the rough and finished boarding of a floor. This we find very fairly effectual, and less expensive and messy than wet pugging.

Hopkins and Walker.

5, Staple Inn,
October 9.

The Student's Column.

CONCRETE-STEEL.—XVII.

FLOOR DESIGN.

No detail of modern building construction is more intelligible than the simple floor of concrete supported by steel girders and joists. However extensive such a floor may be, it is readily analysed into units, each of which has to carry a certain definite proportion of the total load, and the dimensions of each unit are calculated by the simple rules governing the design of beams.

Thus, in the case of a floor intended to carry a uniformly distributed load, the weight per square foot of the external load is first taken into account in settling the necessary thickness of each floor slab, and sufficient margin is allowed for the weight of concrete in the slab itself. The total dead load per panel so obtained serves as the basis of calculations by which the dimensions of the floor joists are determined, and the collective weight of slabs and floor joists, transmitted to the girders, represents the external load to be carried by the latter members. Their proportions are then calculated with due regard to the dead weight of the material, and the general design of the floor is finished, apart from practical considerations and details leading to complications of any kind.

It would be perfectly easy to adopt a similar process in connexion with the design of concrete-steel floors, but the inevitable result would be a very considerable excess of strength and consequent waste of material.

The ordinary steel and concrete floor is so constructed that the concrete is practically split up into a number of detached and non-continuous units, none of which can be treated more favourably than as a beam supported at each end, or as a slab more or less efficiently supported along each side. Similarly, the steel members have to be separately considered as individual details.

In a properly designed concrete-steel floor the conditions are quite different. Such a floor is really a homogeneous structure, and may be said to constitute a single unit, or one continuous slab—with stiffening ribs—extending throughout the whole area covered.

As a matter of fact, however, if the steel skeleton of an ordinary concrete floor is efficiently filled in and covered with concrete at the top and bottom, a noticeable increase of strength is secured. This effect was observed in the early days of concrete-steel construction, and a step towards the more economical design of floors was made by employing T-bars instead of I-bars for joists, and in placing these joists so that the two arms of each T-bar formed a tension flange, situated a few inches below the under surface of the intervening concrete. The projecting parts of the joists were, of course, completely covered with concrete during the construction of the floor, and the result was a continuous floor slab with a number of projecting beams. By adopting this type of construction it was found that a considerable saving of metal could be effected, and that the thickness of the concrete between the beams could be materially reduced. Subsequent experiments, and experience gained in practical work, ultimately led to the development of still better designed concrete-steel floors, whose successors flourish so abundantly in the present day.

Before looking into the distinctive features of any of the types of concrete-steel flooring at the disposal of the designer, we will briefly trace the evolution of a complete and self-contained floor from a collection of simple beam forms.

In the first place, let us consider a beam of simple concrete in which the neutral axis is midway between the top and bottom surfaces.

Then, in order to preserve a correct balance between the resistance of the compression and tension areas, the sectional area of concrete below the neutral axis must have ten times the sectional area of the concrete above the neutral axis, to compensate for the lower tensile strength of concrete as compared with its compressive strength.

Next, let us assume that instead of increasing the area of concrete in the tension portion of the beam, we add steel reinforcement near the bottom surface. By the employment of a suitable proportion of metal, the resistance of the compression and tension areas can be exactly adjusted, and the form of the cross-section will be a four-sided rectangle.

Proceeding a step further, we will assume that the amount of reinforcement added is greater than that necessary for balancing the tensile and compressive resistance of the two areas in the cross-section of the beam. In such a case the balance of strength can only be restored in one of two ways: (1) By placing reinforcement near the top of the beam; or (2) by increasing the area of concrete above the neutral axis. It is evident, however, that these two alternatives might be combined. Thus, let us take a beam in which the reinforcement in tension is such that, for the proper balancing of resistance, the concrete in compression must be extended in the form of a wide flange, giving a T shape to the cross-section of the beam. If we assume the further addition of reinforcement in the tension area it might be inconvenient or impracticable to increase the width of the compression flange, but a similar effect would be obtained by the application of reinforcing bars near the top of the beam. In the latter event we should have a combination of the two alternatives suggested above.

A little consideration will show that a very wide upper flange, whether of concrete alone, or of concrete with longitudinal rods, would be weak laterally, and might tend to crack or to break off from the main body of the beam. Hence, transverse reinforcement could be added with advantage.

The resulting beam would consequently be of T section with longitudinal reinforcement near the bottom and a network of rods near the top. It is evident, then, that the general proportions of the beam and the width of the compression flange can be varied at pleasure for a given load by corresponding adjustment of the reinforcement. The latitude so given is of considerable value in the design of flooring systems.

We will now consider the effect of employing beams designed in this manner as parts of a homogeneous floor structure.

Let us take one floor panel, in which the main girders are 8 ft. apart and the transverse girders, or joists, are 4 ft. apart.

We assume that by suitable adjustment of the reinforcement the compression flanges of the main girders have been made 4 ft. wide and, say, 4 in. thick. Then, between the centres of two consecutive girders, spaced 8 ft. apart, there will be an interval of only 4 ft., as each of the compression flanges projects 2 ft.

Similarly, it is assumed that the top flanges of the joists are made 2 ft. wide. Consequently the interval between successive joists will only be 2 ft., as the compression flanges account for the other 2 ft. of the distance.

The general result, so far, is that the floor panel considered is complete, with the exception of a series of rectangular spaces, each measuring 4 ft. by 2 ft., and the number of which depends upon the span of the panel. These spaces can be filled in with concrete, and the floor is thereby finished. It will be understood that in practice they would be closed concurrently with the formation of the top flanges of the girders and joists. Practically, therefore, the whole of the floor slab forms the compression flange of the connected system of beams.

Further, assuming the top flanges to be reinforced by longitudinal and transverse rods, it is a natural step to conclude that all these rods should be laid continuously from end to end of the span, and from side to side in the width of each panel. The additional cost of the metal would be quite inconsiderable, and the cost of labour would probably be reduced because the rods would not have to be cut, and the number of separate pieces would be smaller. These rods would then occur at pre-determined intervals in the flanges of the girders and joists, and would also continue across the concrete filling the parts of the floor not covered by the previously defined widths of the flanges. Here we have an additional feature of strength due to the reinforcement of the whole of the floor slab by steel rods running in two directions, and thus binding the construction still more firmly together.

It will also be seen that in a floor designed in the manner here outlined, each of the joists acts as a stiffener for the flanges of the adjoining girders, and that the entire structure is so interconnected that an exact calculation of its strength is practically impossible.

But we have a further element of strength, arising from the action of the various spans after the manner of continuous beams. To develop this action to its fullest extent, reinforcement should be applied as shown by diagram *m* in Fig. 31, and further strength may be added by the formation of concrete haunches on the girders and joists.

No one has yet developed a scientific theory of the strength of concrete-steel floors, and, as the distribution of stresses is so complicated, and the inter-relation of the various constituents is so involved, that it seems unlikely that anything more than approximate rules will ever be available for the guidance of the designer.

One result following the method of construction outlined above, is that floors so made are very much stiffer than steel girder floors with ordinary concrete filling. In this connexion, it may be interesting to give the results of two tests conducted by the engineering department of the Paris and Orleans Railway Company at the Austerlitz and the Quai d'Orsay stations in Paris.

The first test was conducted upon a concrete-steel floor of the Hennebique type, built in the electric sub-station at the Austerlitz railway station. It was calculated to carry a machinery load of 280 lb. per square foot, the clear span was 16 ft., and the floor was subjected for a width of 17 ft. to a uniformly distributed test-load of 420 lb. per square foot. The resulting deflection was then found to be only one-eighth of an inch, without any permanent set.

With the object of comparing the resistance of this floor to shocks with that of steel-girder floors, it was subjected to severe blows from falling weights, and similar tests were applied to a floor at the Quai d'Orsay railway station. The latter floor, built of steel girders and brick arches, was of the same span and had been calculated for the same load as the floor at the Austerlitz station.

A weight of 220 lb. falling upon the concrete-

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steel floor from a height of 13 ft. caused a maximum vibration of one-sixteenth of an inch, lasting five-sevenths of a second, whereas a weight of 110 lb. falling from a height of 6 ft. 6 in. upon the steel and brick floor produced vibrations measuring five-sixteenths of an inch and lasting two seconds.

Hence, although the weight falling upon the concrete-steel floor was of twice the value of that falling upon the brick floor, and fell from twice the height, the resulting deflection was only one-fifth of the amount recorded for the latter construction, and the vibrations lasted for only one-third of the time.

Considering these figures in connexion with the dead weights of the floors—62 lb. per square foot for concrete-steel and 100 lb. for steel and brick—it will be seen that a very great advantage is possessed by the former type of construction.

No specific mention has been made in this article of ties for withstanding shear, but our readers will, of course, understand that reinforcement of this kind is equally desirable for beams incorporated in floors as for simple beams of concrete-steel.

GENERAL BUILDING NEWS.

Police Building, Dukinfield.—A new police court and offices were opened at Dukinfield on the 13th inst. The court has been erected by the County Council at a cost of 7,000*l.* from designs of Mr. Beswick, County Architect.

Church, Newchurch, Lancashire.—The foundation-stone of a new church to replace the one at Newchurch, recently burned down, was laid on the 13th inst. The new building, which is to cost 13,000*l.*, has been designed by Messrs. Travers and Ramsden, Liverpool.

Board School, Springhead, Yorkshire.—Some months ago the site was chosen by the Springhead Board for the erection of a school at Shelderslow, near Springhead, and the contract was let to Mr. Squire Oldfield, with Mr. A. J. Howcroft as architect. The foundation-stone has just been laid.

Town Hall, Deptford.—The Mayor of Deptford laid the foundation-stone, on the 14th inst., of a new Town Hall for the borough, which is to be erected on a central site in the New Cross-road. The new building is to cost 30,000*l.* An illustration of the building appeared in our issue for November 1, 1902. The builder was Mr. H. L. Holloway, and the architects Messrs. Lanchester, Stewart, and Rickards.

Post-office, Torrington.—A new post-office is being erected at Torrington by Mr. H. Grant, from plans prepared by Mr. Medland, architect.

Church, Middlesbrough.—The corner-stone of the new Church of St. Michael and All Angels' at Middlesbrough has just been laid. The building is being erected immediately to the north of the Albert Park. The new building is in Waterloo-road. Mr. Wm. Duncan, of Middlesbrough, is the architect for the new building, the tender for the erection of which has been let to Messrs. Bastiman Bros., of Middlesbrough, for 5,430*l.*; but the fittings, etc., will bring up the total cost of the undertaking to fully 6,000*l.* The new church will provide seating accommodation for 500 worshippers.

New Gaiety Theatre, Strand.—This building has just been completed, and the following information will be of interest:—Owing to the disposition of the site, with its two frontages diverging from the circular corner, the position for the chief entrance is naturally at the junction of the Strand and Aldwych. The entrance opens, under the dome, into a circular crush-room, with retiring-rooms and box-office, from which staircases lead right and left up to the grand circle "back." Below the crush-room is the stalls saloon, and above it are the saloons to the grand circle, balcony, and gallery, all following the lines of the crush-room and circular or oval in plan. The entrances and exits to the parts other than the stalls and grand circle are alternately in the Strand and Aldwych. The open colonnade, or loggia, is approached by two staircases from the gallery level. The theatre is to seat, in the gallery, 400; upper circle, 260; dress circle, 172; stalls, 146; pit, 300; private boxes, 48; total, 1,326. Behind the proscenium is a stage, 40 ft. deep, and of an average width of 80 ft., with a mezzanine floor and cellar below. Right and left to the Strand and Aldwych are the stairs leading to the stage exit and entrance, and the dressing-rooms, numbering 29 in all. The flies are provided with a separate gallery for the convenience of the electrician managing the special lighting effects and limes. The "gridiron" is of more than usual working capacity; it is 70 ft. above the stage. The stage, ropes, blocks and drums have been supplied and fixed by Mr. I. N. Lyons. The whole of the façades are executed in Portland stone, with bands of verde antique marble. The internal dome will be constructed of steel and concrete, the external dome being in steel and wood, and covered with copper. The crowning figure is being executed by Mr. Hibbert Binney. The construction generally consists of cement, greystone, and blue lias lime, brickwork and steel, and concrete floors and roof. The floors are almost exclusively finished in cement, and the roofs (of auditorium) with a double layer of asphalt. The steps throughout are granolithic. Scagliola is employed in the columns of the crush-room and foyer, with modelled caps and bases in plaster. The constructional steelwork of the tiers, roofs, and dome has been executed by Messrs. Dennett and Ingle, engineers. The circles are constructed in steel and concrete throughout, and so designed as to carry from wall to wall of auditorium without intermediate supports. The total weight of the three circles when fully loaded is estimated at about 350 tons, and this weight is transmitted to the foundations partly by the brick walls and partly by cast-iron and steel stanchions embedded in the brickwork. The stepped surface of circles is formed in concrete upon steel bearers spaced from 2 ft. to 3 ft. apart, and the ceilings are constructed with metal lathing suspended below the girders and cantilevers, and at such a level as to permit of an unbroken soffit and a clear height of not less than 8 ft. from circle to ceiling. A complete system of high-pressure fire mains and hydrants is installed by Messrs. Merryweather and Sons, both in the auditorium and behind the scenes, and the proscenium is fitted with an improved double thickness asbestos fire-resisting curtain. The system of ventilation is by propulsion, and the ventilating and heating arrangements, by Messrs. James Stott and Co., are in combination. The air supply is all obtained at the roof line, one intake for the auditorium portion and another for the stage. Immediately after leaving each intake the air is passed through a patent revolving air screen, and then driven forward by means of a disc propeller, and passed through heating pipes into a short main duct over the ceiling of the auditorium, and finally enters the auditorium through interstices or openings arranged in the fibrous plaster decorations. For dealing with the gallery, a special fresh air trunk leads away in the roof from the fan-chamber. The stage portion is arranged on similar lines, fresh air coming down from above after being suitably warmed and purified. The heating batteries are furnished with sliding valves that permit the whole of the heat being shut off, or *vice versâ;* the whole of it may be warmed, or, on the other hand, half warm and half cold sent forward, or any intermediate mixture of each, by raising or lowering the dampers in question, without restricting the volume of air. The necessity of hot-water pipes is entirely dispensed with. In designing the electric light installation, the two-circuit system has been installed throughout the theatre, in the auditorium, passages, entrances, and exits, the lamps being installed alternately on two circuits, these being connected through the necessary switchboards and change-over switches to two independent sources of supply, so that the lamps at any moment can be fed either all from one supply or half on each as desired. As a further means of protection, a number of lamps throughout the theatre are being installed, for the purposes of identification, called "police lights," and connected to a third independent system of supply. In the event of the first two supplies failing, there will be sufficient illumination for the public to leave the building in safety. These "police lights" will be used during the daytime for cleaning purposes. The whole of the lamps in the auditorium, passages, etc., are controlled from two points only, the two large switch boards, having a total of about seventy switches, being fitted in chambers leading out of the stalls saloon, where they will be under the control of a responsible official. The wiring is arranged so that in the event of any portion of the light supply breaking down the whole of the lighting of that system can be changed over to another supply. The whole of this work is being carried out by Roger Dawson, Ltd., to the specification of the consulting engineer, Mr. Thomas J. Digby. The auditorium is flanked with twelve private boxes, with arched loggia over. The proscenium is decorated with winged figures and modelling by Mr. W. J. Neatby, and three decorative tympanum panels in oils by Mr. Charles Buchel. Upon either side of this arched opening and in the spandrels are two niches containing figure-subjects of "Music" and "Dancing" by Mr. Hibbert Binney. The mural decorations consist of a material by Rottmans, having a ground work of old rose, with a raised design in gold, cerulean blue, Hooker's green, and permanent red. The decorative plaster work throughout is by Messrs. George Jackson and Sons. The draperies are of pale green, the carpets and seats of similar colour, and specially designed. The retiring-rooms, in the rear of the boxes, are in contrast to the auditorium; the Royal rooms are in the Adam style, with modelled frieze, ceilings, and panelled walls. The crush-room is in the Georgian style, with marble columns, bronze caps and bases supporting a modelled entablature and frieze; the floor is of marble mosaic. The foyer is treated in hardwood, the panels being occupied by portraits of former Gaiety actresses—Nelly Farren, Kate Vaughan, Letty Lind, Sylvia Grey, and Ellaline Terriss. The frieze above is richly gilded, and the modelled ceiling entirely in ivory white. The whole of the decorations of the building have been carried out by Mr. Edward Bell, in accordance with the specification of the architects, who have specially designed and personally supervised all the details of upholstery and general furnishing. Messrs. James Shoolbred and Co. have been entrusted with the order for this section of the work, and have supplied a thick red carpet for the crush-room, the staircases and corridors being covered with a soft velvety Axminster carpet in shades of green. The seats have polished mahogany frames, inlaid with satin wood, into which is worked the number of the respective seats. The covering is of English-made silk brocade. Mr. George Ridout is responsible for the supervision of the whole of the furnishing. All the doors throughout the building are fitted with the Yale locks, supplied by the company of that name. The architects are Messrs. Ernest Runtz and George McLean Ford, and in addition to the general structure, the whole of the decorative work and upholstery is from their designs. The contractor is Mr. Henry Lovatt, of London and Wolverhampton. Mr. Lovatt's foreman on the job is Mr. Bassett. The clerk of works is Mr. D. Davies, who occupied a similar position at the Adelphi, Apollo, and Wyndham's theatres. It is understood that the exterior design of the building was sketched out by Mr. Norman Shaw.

Roman Catholic School, New Ferry.—The foundation-stone of the new St. John's elementary schools and school chapel being erected for the Roman Catholics of the New Ferry district was laid on the 18th inst. The new premises are being constructed on land in Bebington-road, and are intended to accommodate on the ground floor about 350 scholars, and on the upper story, which is to be equipped as a chapel, about 300 worshippers. The school chapel stands well back from the road, the space in front being reserved for the future erection of a church. The site cost 900*l.*, and the present buildings, which are of Ruabon brick, will cost 4,500*l.* The architect is Mr. John Barnes, of Bebington, and the builder Mr. Peter Rothwell, Birkenhead.

Church Buildings, Bethnal Green.—Lieut.-General Lord Methuen visited Bethnal Green recently for the purpose of unveiling the memorial-stone of the building erected in Hereford-street, which is to be utilised as a parish hall and meeting place for the clubs in connexion with the Church of St. Matthew. The building will be of plain brick. On the ground floor there will be two sets of clubrooms, one for boys and one for men. On the first floor will be provided a parish hall to accommodate 400 people, and will be available for a gymnasium, and for meetings, concerts, etc. The estimated cost of the building, which is being erected by Messrs. Perry Bros., under the superintendence of Mr. S. Clifford Tee, architect, is estimated to cost 3,000*l.*

Business Premises, Bristol.—A block of business premises is about to be erected in College-green, Bristol. Messrs. Wilkins and Son are the contractors, and Messrs. La Trobe and Weston the architects. The new buildings comprise new premises for Messrs. Hughes and Son, estate agents, and an extension of Mr. P. E. Gane's furnishing establishment.

City of London Crematorium, Little Ilford.—The foundation-stone of the crematorium at the City of London Cemetery, Little Ilford, Essex, was laid on the 14th inst. The crematorium will contain a hall for the mourners with a waiting-room attached. The catafalque upon which the coffins will rest will be in the centre of the hall, and there will be an ante-chamber for the attendants between the hall and the cremating chamber. The cremating chamber will be at the rear of the hall, and will be of sufficient size to admit of two cremating furnaces being erected. It is intended to erect only one furnace at the present time, the flue for which will be carried up in the centre of an ornamental tower about 80 ft. in height. A small auxiliary furnace will be placed at the base of the tower for the more perfect combustion of the gases arising from the cremating furnace. The furnace will be attended to from a basement under the cremating chamber. The hall for the mourners will have an open timbered roof, and the interior will be faced with red pressed brick, with an ornamental tiled dado, the floor being paved with ornamental tiles. The crematorium will cost about 7,000*l.*, and will be built from the designs of Mr. D. J. Ross, the Corporation Engineer.

Business Offices, Norwich.—New offices have been erected in Red Lion-street, Norwich.

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The premises have been designed in the style of the French Renaissance, freely treated, by Messrs. G. J. and F. Skipper, architects, of Norwich. The building contractor was Mr. J. S. Smith, of Norwich. The terra-cotta was supplied by Messrs. Doulton and Co., Lambeth; electric lighting by Messrs. Park and Son, Lambeth; decorations by Messrs. Trevor, Page, and Co., Norwich.

St. Cuthbert's Church, Kirkby-in-Furness.—The new work to the tower of this church was dedicated on the 16th inst. The present tower was built in 1829, the ancient one having collapsed many years before. It was substantially built, but presented no features of interest. Heavy square battlements were carried up the whole thickness of the walls, leaving no bearing for the roof, which was of very slight construction, and carried on wooden brackets. The belfry window openings were formed with rough pointed arches (a very unusual form in the district), and were filled with wooden frames of poor form, which were wrecked in a gale in the early part of the present year. The work now completed included the stripping of the crumbling roughcast, and repairing the walls; a new roof of substantial construction, and renewal of parapets and cornice; the insertion of tracery windows, provided with oak louvres, under the existing arches of the belfry openings. These are of Late Gothic form, but with sufficient differentiation in the mouldings to distinguish them from ancient work. Small slit windows have been formed to light the clock chamber, and the time is shown on a skeleton dial of copper gilt made to the architect's design by Messrs. W. Potts and Sons, of Leeds. The dressed stonework is from St. Bees (Sandwith) quarries; the walling of local slate rubble. The architect was Mr. J. Standen Adkins, of Kew. The contractors were Messrs. Ashburner, of Dalton-in-Furness.

Thornhill U.M.F. Church, Sunderland.—A new church has been erected in Burn Park-road, Sunderland, by the United Methodists. The new church, which will be known as Thornhill United Methodist Free Church, and the schoolroom and other buildings in connexion with it, occupy a site at the corner of Burn Park-road and Beechwood-street on the newly-opened Thornhill estate, and are in the Perpendicular style. At the corner a tower with a copper spire and vane rises 83 ft. There is a frontage of 130 ft. overlooking the Burn Park, and the whole of the main entrances are in this elevation. Three portals, over which is a five-light window, give admission to the church through an outer and inner porch, the staircase to the gallery being within the tower. The church itself consists of a nave, clearstory, aisles, transepts, and chancel, and an end gallery over the entrance porches. Its seating capacity is for 520 adults, which can be augmented to about 620 as occasion requires. The nave arcades, which are of moulded arches supported by columns with richly-moulded caps and bases, and the chancel arch, are worked in Denwick freestone. The pulpit base is in the same material, the upper part being of Austrian oak. The chancel is raised three steps above the nave level, and has a carved and moulded Austrian oak reredos screen. The choir seat ends and front screens are similarly treated in the same material. The roof is of pitch pine, open timbered. The seats, screens, and gallery front are also in pitch pine. A stained glass memorial window, with "The Ascension" as its subject, has been placed in the chancel, and one of the transept windows is also of stained glass. The windows have been executed by Messrs. Atkinson Brothers, Newcastle-on-Tyne. At the entrance to the church are separate cloakrooms for ladies and gentlemen. The school, which is recessed from the main road by two front classrooms, has accommodation for 300, and there are separate classes for senior and infant scholars. A rostrum is fixed at the end of the school. A corridor is placed at the side of the school, running its whole length, and is recessed for cloaks and hats. The buildings also contain a church parlour, a lecture-hall, and seven vestries. A kitchen vestry is provided. The heating throughout is by hot water carried in pipes and radiators. The whole is lighted by the electric light. The buildings, which have cost about 7,600*l.*, have been designed by, and the work carried out under the supervision of Mr. J. Ezra Miller, and Messrs. Wm. and T. R. Milburn, joint architects, the contractor being Mr. W. B. Cooper and the subcontractors Mr. Digby Nelson, slater; Messrs. Aitken and Austin, plumbers; Messrs. Reid, Ferens, and Co., electrical engineers; Messrs. Austin and Son, painters, etc.; Messrs. C. W. Wilson and Son, leaded glaziers; and the clerk of works, Mr. R. F. J. Carter.

Wesleyan Church, Beamish, Durham.—The foundation-stone of a new Wesleyan church at Beamish has just been laid. The new buildings have been designed by Messrs. Marshall and Tweedy, architects, Newcastle, and are being erected by Mr. William Hall, contractor, Gateshead. The church will accommodate 350 persons, and three vestries will be attached, the whole erection being of stone.

Church, Kilcar, Co. Donegal.—The foundation-stone of the new parish church of Kilcar, County Donegal, has just been laid. The church is Romanesque in style, freely treated. The general walling is of the local freestone from Bavin Quarries, and the nave arcade is of the same. The church affords seating accommodation for some 1,200 persons. It consists of nave, aisles, chancel, two side chapels, sacristies, narthex, and baptistry. The total length is 128 ft., and the width across nave and aisles, 54 ft. The nave is spanned by a barrel vault. The arcade consists of six bays of circular-headed arches carried on circular cut stone columns, with moulded bases, and capitals carved with Irish interlaced ornament. The windows will be fitted with lead lights in Gaelic patterns, made by Messrs. Ward, of Belfast. The roofs will be covered with small, thick, rough grey-green slates, from the Killoloe Quarries. A feature of the west front is the recessed entrance doorway, and the three-light window. The architects are Messrs. Doolin, Butler, and Donnelly, of Dublin, and the contractors are Messrs. Campbell and Son, of Belfast.

The "Frascati" Restaurant, Oxford-street, London.—This building has just been enlarged and improved. Several of the adjoining premises have been demolished to make room for new kitchens and other offices embraced in a scheme of service which includes the provision of a kitchen for the supply of each dining and banqueting-hall. The builders have been Messrs. Godson and Sons, working from the designs and under the direct supervision of the architect, Mr. Charles H. Worley, whilst hot plates and table plate, etc., has been supplied by Messrs. Mappin and Webb.

Restoration of Haxey Church, Lincolnshire.—This church has been reseated, and partially restored. Messrs. Prothero and Phillott, of Cheltenham, have been the architects, and Messrs. Halliday the contractors.

Harbour Trust Offices, Swansea.—Mr. Griff. Thomas, Chairman of the Swansea Harbour Trust and Mayor of Swansea, recently opened the new offices of the Harbour Trust, which have been erected at the corner of Adelaide-street and Somerset-place, Docks, Swansea. A square tower covered by a dome of copper, surmounted by a gilded vane representing a ship of antique design, rises near the angle. The upper part is decorated with sculptured figures representative of "Discovery," "Commerce," "Engineering," and "Navigation," and the pediments of the building are also embellished with seated female figures. The sculpture and carving have been carried out by Mr. Houghton, of Swansea, and Mr. T. Jones, of Cardiff. The contractors are Messrs. Lloyd Brothers, of Swansea, who have erected the buildings from the designs of Mr. Edwin Seward, architect, of Cardiff. The full design has just been completed by the addition of a wing containing further offices, together with new premises for the Capital and Counties Bank. The chief features of the interior are the ranges of offices for the general superintendent, engineer, solicitor, accountant, etc., with their staffs, and the shipping department. The approach lobbies and corridors are fitted with screens in polished teak. A room on the first floor is the board-room, with a waggon-headed roof containing some plaster decoration. Mr. William David has acted as clerk of works.

Public Library and Museum, Banff.—A new library and museum have been erected in High-street, Banff, and will be opened shortly. The new building is two stories in height, and has a frontage of 70 ft. It is built of Berrymuir bluestone with Covesea sandstone facings. The entrance hall has a tile flooring and linings of pitch pine. On the right, entering by the main entrance in High-street, is the library, and on the left the reading-room. A staircase from the entrance-hall leads to the upper story, where the museum specimens have been housed. All the woodwork is of pitch pine. The librarian's office is in the upper story, and the lavatories, cellars, etc, are in the basement. The architect was Mr. C. W. Cosser, Banff, and the contractors were as follows:—Mason, R. Mitchell, Huntly; carpenter, J. Christie, jun.; slaters, J. Hutchinson and Co.; plumber, A. Strachan; plasterer, J. Gibson; painter and glazier, F. Watt, all of Banff.

Public Library, Chatham.—The new Public Library and Reading Rooms, Chatham, erected at a cost of 5,000*l.*, in New-road, near the Luton Arch, were opened recently. The building is a two-story structure, with a basement. The basement contains two class-rooms, 27 ft. 6in. by 17 ft. 6 in. and 23 ft. 6 in. by 17 ft. 6 in. respectively; a lavatory, two unpacking rooms, heating chamber, and stores, etc. On the ground floor is the entrance hall, with the stairs in one corner. To the right and left of entrance hall are the newspaper rooms, 28 ft. 6 in. by 17 ft. 6 in., and 23 ft. 6 in. by 17 ft. 6 in. respectively. Opposite the main entrance is the lending library, 26 ft. by 20 ft. 6 in., and to the right and left of this is the librarian's room, and the ladies' room, the latter being 17 ft. by 14 ft. 6 in. On the first floor on either hand of the staircase are two museums, top lighted, 31 ft. by 24 ft. and 28 ft. 6 in. by 24 ft. The entrance halls are tiled, and the floors and stairs are all of concrete and iron, the concrete floors being paved with wood block paving, polished. The front is executed in red brick, with stone dressings. The works have been carried out under the supervision of Mr. George E. Bond, by Messrs. West Bros., at a total cost of about 5,000*l.*

Orphanage, Aldridge, Staffordshire.—The foundation-stone of a new orphanage to be erected in Aldridge, was laid recently. The new building will cost 1,900*l.*, exclusive of internal fittings, which will amount to 220*l.* It is to be built of brown brick, with red brick and terra-cotta dressings, from the designs of Mr. F. W. Mager, C.E., the work being carried out by Mr. Joseph Myring, contractor, Aldridge. It will provide accommodation for forty children (twenty girls and twenty boys).

MISCELLANEOUS.

American Institute of Architects.—The thirty-seventh annual convention of American architects was announced to be held in Cleveland, Ohio, on October 15, 16, and 17. Among the subjects to be specially considered are:—"The necessity for trained men in future artistic productions," by Mr. Theo. N. Ely; "The advantages of the School of Rome for the study of mural painting," by Mr. John La Farge; "A few words on academic training in sculpture," by Mr. Augustus St. Gaudens; "Rome as a place of schooling for a decorative painter," by Mr. E. H. Blashfield; and "The significance of Rome to the American architectural student," by Mr. Austin W. Lord. There was to be an exhibition of drawings of the group plan for public buildings in Cleveland, presented by the Cleveland Group Plan Commission, Mr. D. H. Burnham, Mr. John M. Carrère, Mr. Arnold W. Brunner.

Painting Public Buildings.—The Association of Master Plasterers and Painters of Manchester and Salford have issued a communication to the members of the local municipal bodies as to the direct employment of labour in the painting and decorating of public buildings. As large employers of labour, employing operative painters the whole year round, in slack times at considerable loss to themselves, the members of the Association feel that the withdrawal of public work and the employment of the men direct is a serious loss to them as a body, against which they have the right to protest. Further, they submit that this is not a monetary gain to the municipal authorities, but rather that the cost is materially increased by the method, and the work not as well done.

Dangerous Structures, Sheffield.—Mr. C. F. Wike, the Sheffield City Surveyor, in his annual report, refers to the large increase in the notices regarding dangerous structures:—The increase is partly due to the action of the police in dealing with persons who have done work to the exterior of buildings abutting upon streets without the provision of adequate protection for the public, but a further and more serious reason for the increase is the large number of dangerous structures which have been dealt with during the year. There have been 627 such cases, as compared with 140 dealt with during the previous year, an increase of nearly 348 per cent. This is, to a certain extent, attributable to insufficient methods of supporting old buildings during alterations, and the rain storms and high winds which have prevailed during the greater part of the past year have also helped. In some cases new machinery has been placed in old buildings not capable of bearing the strain, and in others the fault has been with owners or agents who have not given the necessary attention to repairs. In many cases there is great reluctance to carry out the requirements of the department in this branch of the work—one which involves considerable trouble to the inspectors.

London School Board's Ancient Lights.—At the meeting of the London School Board, on Thursday, the General Purposes Committee reported, with reference to the Board's ancient lights at the Rosebery-avenue School, Gray's Inn-road: "The solicitor brought an action against Messrs. Grover and Wallis, the owners, which action was heard on the 22nd July last, when the defendants, by their counsel, admitted that their new buildings did obstruct the Board's 'ancient lights,' and it was referred by the Judge to an arbitrator, to say what ought to be done by the defendants to give the Board such access of light as they previously enjoyed. The case came before the arbitrator, Mr. Blashill, on the 17th September, who has made his award as follows:—That the defendants do take down so much of their new building as is necessary, in order to comply with the following conditions, viz.: (1) The front wall of their said building next Laystall-street, for a distance of 46 ft. 6 in.

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horizontally from the outer face of the wall at the north-west end of the said building not to be of a greater height when completed than 27 ft. 8 in. above the curb or footway in the said street. (2) Except as hereinafter provided, no part of the said building within a distance of 46 ft. 6 in. from the said north-west wall to extend upwards above a plane or slope commencing from the top of the said front wall, and rising to the outer face of the back wall of the said premises at an angle of 30 degrees with the horizon. (3) The defendants to be at liberty to construct above the said slope or plane all necessary chimneys and two dormer windows, but only one of such windows to be nearer than 33 ft. to the outer face of the said north-west wall, which window shall not be nearer than 10 ft. to the frontage line of Laystall-street aforesaid. And neither of such windows to exceed 5 ft. in width, or project in any part more than 5 ft. above the surface of that portion of the roof on which it stands."

YORKSHIRE FEDERATION OF BUILDING TRADES.—Mr. John Dawson, of Huddersfield, President of this Federation, recently presided over a meeting at the Sheffield Building Trades Exchange, Cross Burgess-street. Delegates from the chief towns and centres of Yorkshire were present, amongst whom were Alderman Jessop, Messrs. J. Mallinson, R. Radcliffe, W. Hampshire, G. E. Wilson, J. E. Kaye, and J. C. Stoot, of Huddersfield; J. Pickard, Paul Rhod, G. N. Wilson, and W. T. Ledgard, of Leeds; Councillor Mansfield, of York; Messrs. A. Moulson and R. Raper, of Bradford; Mr. A. W. Sinclair, Scarbro'; Messrs. Marsden, T. Goates, C. Hebblewhite, and G. Stanley, of Hull; Henry Failas, and Councillor W. Judge, Wakefield; Messrs. A. Calverley and F. Jackson, Harrogate; N. Kitchen, Malton; W. R. Thompson, Dewsbury; G. Porter and J. Smith, Barnsley; A. J. Forsdike (president of the Sheffield Master Builders' Association), J. D. Cook and A. Mastin (vice-presidents), T. Roper, H. Hodkin, Councillor J. Longden, Messrs. J. Coward, G. E. Powell, P. Mollov, J. L. Taaffe (secretary), and many other Sheffield members. Various matters affecting the building and kindred trades were discussed, and at the conclusion of the business the party were driven to the works of Messrs. W. S. Laycock, Limited, where, by kind permission of the management, the working of the various up-to-date appliances and machines was fully explained by the secretary, Mr. T. Durman, and the engineer, Mr. Wild. A vote of thanks to the firm was passed on the motion of Mr. J. Dawson and Ald. Jessop. Leaving Messrs. Laycock's works the drive was continued to Dore Moor, thence back to the Building Trades Exchange, where tea was provided for a large company. A vote of thanks to the Sheffield Association for the day's arrangements concluded the gathering.

REREDOS AND ALTAR, CREWKERNE.—Carved oak stalls have been placed in Crewkerne Church and some polished Devonshire marble work in the sanctuary, from the designs and under the superintendence of Mr. Howard Gaye, architect, London. The works were carried out by Messrs. Henry Hems and Sons, of Exeter.

QUEEN VICTORIA STATUE AT CHESTER.—Earl Egerton of Tatton, Lord-lieutenant of Cheshire, recently unveiled a memorial statue of Queen Victoria, erected in the square at Chester Castle, in front of the Law Courts. The memorial takes the form of a bronze statue, executed by Mr. F. W. Pomeroy, of London. The cost has been 1,360*l.*, exclusive of the foundation. The statue represents the erect figure of the late Queen in her robes of State, and holding in her right hand the sceptre, and in her left the orb. On the four sides of the pedestal are the Royal arms (in the front), the county arms (facing the county), the city arms (facing the city), and the shamrock and thistle intertwined, and the rose supporting the crown.

CAPITAL AND LABOUR.

EMPLOYMENT IN SEPTEMBER IN THE BUILDING TRADES.—According to returns furnished by 82 employers' associations whose members are estimated to employ nearly 89,000 workpeople, and by trade unions with an aggregate membership of 199,000, employment in the building trade continues moderate generally, and is worse than a year ago. The returns from employers' associations show that employment was good with 7.7 per cent. of the workpeople reported on, fair or moderate with 48.9 per cent., and dull or bad with 43.4 per cent. Employment with bricklayers is reported as showing a slight improvement on the preceding month. It is better than a year ago. With masons it continues fair. With carpenters and joiners employment has declined somewhat, and is worse than a month and a year ago. The percentage of unemployed trade union carpenters and joiners at the end of September was 4.0, as compared with 2.0 at the end of August, and 3.3 a year ago. With painters employment is dull, and is worse than a month and a year ago. With plasterers employment continues dull. Employment with plumbers shows a slight improvement compared with a month ago. It is, however, rather worse than a year ago. The percentage of trade union plumbers unemployed at the end of September was 6.4, as compared with 7.1 unemployed at the end of August, and 5.9 a year ago. Slaters and tilers report employment as moderate, and worse than a month ago.—*Labour Gazette.*

LEGAL.

A CLAIM FOR LABOUR.

AT the Southwark County Court on Monday, before His Honour Judge Addison, K.C., Edward Elgood, a "fire-proof floor contractor," of Reaston-street, New Cross, sued John Shillitoe and Son, builders and contractors, of College-lane, Bury St. Edmunds, to recover 23*l.* 19s. 7d. for labour, for making fire-proof floors at 80, Borough-road, Southwark.

Mr. Addington Willis was counsel for the plaintiff, and Mr. Craies for the defendants.

The defendants counter-claimed for 2*l.* 13s. 9d.

Mr. Willis said that in November last the defendants were putting up a large building in the Borough-road, and the plaintiff offered to provide the labour for the fire-proof flooring (centreing, concreting, and striking) at 1s. 6d. per super yard. The defendants agreed to this price, and 1s. 7d. per super yard where any deal dove-tail joist strips occurred, and the work was carried out. The foreman then said that the clerk of the works wanted the work floated, and the plaintiff asked 3½d. a yard. This was suggested, and plaintiff suggested grouting. He did a small piece as a sample, but the foreman said it must be floated, and the defendants would do the work. On March 21 the plaintiff's job was finished, and the figures were agreed. He had been paid for the greater part of the work, and applied for the balance, but although he made four written applications he received no reply. Subsequently, however, when the plaintiff's solicitors threatened to issue a writ, the defendants' solicitors wrote that there had been some miscalculation in the measurements, but their client was having the quantities taken out, and if there was anything due to the plaintiff it should be paid.

The plaintiff's solicitors wrote stating that the measurements had been agreed, and the defendants' liability had never been disputed, and the case was proceeded with under Order 14. Then the defendants filed an affidavit in which they swore "The contract entered into between us was for the work described in the particulars endorsed upon the writ, but in accordance with the estimate and specification of which the plaintiff had notice, the work was to be finished with Portland cement floated face. In consequence of the plaintiff's inability to complete with Portland cement floated face, we did this part of the work for him, and the cost of the labour thereon was 26*l.* 13s. 4d., which we claim to deduct from the plaintiff's price of 219*l.* 19s. 7d. Therefore he is in debt to us to the extent of 2*l.* 13s. 9d."

The plaintiff bore out his counsel's statement, and in cross-examination said that had he included floating in his price of 1s. 6d. per super yard, he would have stated it in his written offer. Floating was plasterers' work.

Mr. W. J. Chant, an expert on fire-proof flooring, said the plaintiff's offer to do the centreing, striking, and concreting did not include floating. Custom and the price quoted were against that contention.

George Warby, the defendants' general foreman, said that when he complained that the plaintiff was not bringing up the surface fine enough, Elgood grouted a small piece, remarking that it would cost him (the plaintiff) more. The grouting did not suit, so witness agreed to do the floating, and he followed up the plaintiff's work. When the plaintiff gave his estimate he saw the specification, which set out that the floors were to be floated.

His Honour remarked that to anyone familiar with such work the case was entirely free from difficulty. The plaintiff had brought an expert to tell him that centreing, striking, and concreting did not include floating, but he arrived at that decision before the expert gave evidence. He gave judgment for the plaintiff on the claim and counter-claim, with costs.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

25,036 of 1902.—A. E. LAYTON: *Supports for Use when Laying Gas and Water Mains.*

This invention relates to means for supporting gas and water main pipes lineable whilst their joints are being made, consisting essentially of a screw jack having at the top of its screw and carried thereby a V-shaped part adapted to receive the pipe, said jack being so constructed that the screw and its V-shaped top can be raised or lowered whilst the pipe is carried thereby.

25,199 of 1902.—J. BARNES: *Cornice Pole Joints.*

A cornice pole joint consisting essentially of a coil spring having means for fixing the same to the ends of the two parts of the cornice pole so as to connect them together and permit of their being bent at any required angle with each other.

25,373 of 1902.—E. V. BAILEY: *Means for Attaching Door and other Knobs to their Spindles.*

This invention relates to means for attaching door and other knobs to their spindles, and consists in the employment, in conjunction with an adjustable knob having a socketted or recessed neck, of an annularly grooved adjusting pummel or nut screwing on the spindle and engaging in the socket of the knob, a swinging catch plate pivoted adjacent to a gap in the recessed neck and adapted to be passed through said gap so as to engage the groove or channel of the pummel, and a rose plate having a curved or semi-circular guard and bearing collar adapted to be brought over the catch and prevent the same from rising from its locking position.

3,954 of 1903.—A. J. BOULT (F. C. Hollins): *Window Attachments.*

A window attachment comprising a board removably secured to the stop bead on the window sill between the sides of the window frame, and means permanently secured partly to the board and partly to the lower rail for sliding the bottom rail up and down on the board.

12,510 of 1903.—J. M. BEECH: *Stoves and Fireplaces.*

A stove or fireplace having a fire box and an ash pit, and provided with a feed section having an opening extended continuously from its upper to its lower part, and having three hinged doors one above another for closing said opening, the upper part of the opening affording access to the fire box and the lower part thereof affording access to the ash pit.

16,962 of 1903.—A. F. W. LORIE: *Sash Fasteners.*

In a sash fastener, a handle to a screw perforated with a slanting hole and recessed on opposite sides, a locking pin working in said hole provided with a head having projecting side pieces and adapted to lie in one of said recesses, and a foot adapted to engage a reversible angle piece on the window, and when withdrawn to lie in the other of said recesses.

25,870 of 1902.—J. W. B. WRIGHT and H. DARWIN: *Gas Heating Stoves.*

Means for supporting one or more water receptacles in connexion with a gas heating stove, consisting of a bracket or brackets pivotally mounted thereupon, said bracket or brackets being arranged to carry a receptacle or receptacles for the water.

20,720 of 1902.—J. ADAMS: *Combined Cramp and Appliance for Cutting Mitres.*

This consists of a double cramp and spring mitreing machine, for use in picture framing, joinery work, and the like. Two vertical brackets are provided upon a flat metallic bed, which vertical brackets form a guide for the saw. Two pivoted arms are provided on the metallic bed, and are held in position by thumb screws, while two pivoted brackets are fixed to the bed with screws passed through them, so that by these means the work can be cramped to any angle.

24,865 of 1902.—W. W. PILKINGTON and W. R. ORMANDY: *Insulating Substances for Cables, Wires, and other Electrical Devices.*

The manufacture and use of insulating substances for cables, wires, and other electrical devices, whether as troughs or tubes, as filling material or as an insulating flexible coating for insulated wires and the like, formed of pitch and graded mineral matter, starting with an impalpable powder with or without sand, resins, tars, or oils.

25,405 of 1902.—J. HOLROYD and R. BOND: *Machine or Apparatus for Dressing, Abrading, or Brushing Glazed or other Bricks in the Clay State.*

A machine for dressing, abrading, or brushing glazed or other bricks in the clay state, consisting of a frame having a driving shaft carrying one or more face plates provided with roughened metallic working surfaces.

26,283 of 1902.—J. BULEY: *Automatic Apparatus for Regulating or Controlling the Temperature of Water Supplies for Baths and other purposes.*

An apparatus for regulating or controlling the temperature of water supplies for baths and other purposes, which consists of a regulating chamber through which the mixture of hot and cold water is led on its way to the bath or other place where it is to be utilised, a tube or other vessel contained within the said regulating chamber, a collapsible and expansible chamber communicating with the said tube or vessel, both tube and cham-

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

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ber being charged with air or gas, an equilibrium or other suitable regulating valve in the hot or cold water supply pipe, and means for transmitting motion from the chamber to the said valve.

17,252 of 1903.—G. Moore, jun., and A. D. McEwen: *Means for the Casting of Baths or other Similar Vessels of Aluminium or Alloys of a Similar Character.*

This invention relates to means for the casting of baths or other comparatively large vessels of aluminium or alloys of a similar character, and refers more particularly to the construction and arrangement of the cores for such purpose. It is well known that in aluminium castings the metal when cooling from the molten to the cold, solid state, shrinks very considerably more than in most, if not all, other metals, and also quickly, and consequently it is found that in castings for baths and the like vessels, unless the cores are specially constructed, so as to yield to the contracting pressure, the metal is apt to be torn under the shrinkage. It is also desirable for economy and simplicity of workmanship to make such cores of green sand; but when these are made in the ordinary manner they are too solid in their character to permit of the shrinkage of the aluminium without injury to it. In the present invention the cores are constructed by making a series of partition pattern plates, placed longitudinally or transversely or both, which are laid in the core box or its equivalent, which are afterwards removed so as to leave a number of spaces, by which the said core may readily collapse when under the shrinkage action of the metal.

25,339 of 1902.—D. Sinclair: *Radiators for Heating Buildings.*

This invention relates to an independent self-contained radiator, composed of top and bottom chambers, a row or series of hollow upright columns for connecting said chambers together, one or more gas burners, electric heaters, or the like placed underneath or with the upright columns, baffle plates and partitions so arranged in the upper and lower chambers respectively to ensure the fluid passing in opposite directions through the columns alternately, and finally returning it to be reheated through the bottom chamber of the base to a point in the column over the gas burner. Narrow communicating spaces are so arranged between the columns that while the bulk of the fluid follows a circuitous course, there is a certain movement of the heating medium through these spaces across the radiator which accelerates the speed at which the radiator is heated without interfering with the circulation of the bulk.

MEETINGS.

Friday, October 23.

Sanitary Institute (Lectures for Sanitary Officers).—Professor R. Elsey Smith on "Sanitary Building Construction and Planning; Soil and Local Physical Conditions." 7 p.m.

Glasgow Technical College Architectural Craftsmen's Society.—Messrs. A. H. Morton and G. H. Gibson on "Reinforced Concrete." 8 p.m.

Junior Institution of Engineers.—Annual General Meeting at the Westminster Palace Hotel. 8 p.m.

Saturday, October 24.

Sanitary Institute (Demonstration for Sanitary Officers).—Inspection at Charing Cross Hospital new buildings. 3 p.m.

Incorporated British Institute of Certified Carpenters.—Visit to the Crossness Outfall. 3.30 p.m. Nearest station, Abbey Wood, South-Eastern Railway.

Monday, October 26.

Sanitary Institute (Lectures for Sanitary Officers).—Professor R. Elsey Smith on "Ventilation, Warming, and Lighting." 7 p.m.

Tuesday, October 27.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Sanitary Science).—Mr. R. Horton on "Details of Plumbers' Work, House Drainage and Sanitary Appliances." 7 p.m.

Wednesday, October 28.

The Architectural Association.—Conversazione, to be held at the Royal Institute of Painters in Water Colours, Piccadilly, W. 8 p.m.

Auctioneers' Institute (Hamilton House, Victoria Embankment).—Inaugural address by the President, Mr. J. H. Townsend Green. 7.45 p.m.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—(1.) Inspection of Canal Boats, arranged by Dr. R. Dudfield. (2.) Mr. W. H. Maxwell on "Sanitary Appliances." 7 p.m.

Thursday, October 29.

Institute of Builders.—Dinner, the "Walnut Rooms," Grand Hotel, Charing Cross. 6.30 p.m.

Carpenters' Company, London Wall (Lectures on Sanitary Building Construction).—Mr. H. D. Searles-Wood on "Site, Foundations, and Sanitary Requirements of a Building." 7.30 p.m.

Friday, October 30.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. W. H. Maxwell on "House Drainage." 7 p.m.

Saturday, October 31.

Sanitary Institute (Demonstrations for Sanitary Officers)—Inspection of a House in Stoke Newington. 3 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

October 8.—By Walter Ludlow & Briscoe (at Birmingham).

Packwood, Warwick.—Various enclosures, 26 a. 3 r. 1 p., f.	£1,195
Lapworth, Warwick.—Lapworth Close, 6 a. 0 r. 38 p., f.	610
Birmingham, Warwick.—238, 242, 244, and 246, Belgrave-st., f., w.r. 129*l.* 7*s.*	1,260

October 9.—By A. Dowell (at Edinburgh).

Newtyle, &c., Forfar.—The estates of the late Earl of Wharncliffe, 2,544 a. (in one lot)	55,000

By Walker Barnard (at Stratford-on-Avon).

Tysoe, Warwick.—Harbury Leys Farm, 176 a. 0 r. 32 p., f.	6,000

October 10.—By Dowsett, Knight, & Co. (at Colchester).

West Mersea, Essex.—May Day's Farm, 132 a. 1 r. 39 p., c., y.r. 75*l.*	1,000

October 12.—By Leopold Farmer & Sons.

Maida Vale.—256 and 258, Portsdown-rd., u.t. 58 yrs., g.r. 19*l.* 10*s.*, e.r. 120*l.*	910
Brondesbury.—79, 91, and 96, Brondesbury Villas, u.t. 61½ yrs., g.r. 31*l.* 10*s.*, y.r. 160*l.*	1,510

By Grogan & Boyd.

Hyde Park.—6, Aldford-st., u.t. 82 yrs., g.r. 112*l.*, p.	18,000

By Long & Sons.

Chiswick.—Paxton-rd., &c., f.g.r. 55*l.*, reversion in 73 yrs.	1,490
26 to 30, Bennett-st., f., w.r. 68*l.* 18*s.*	480
8 to 12, Furze-st., f., w.r. 71*l.* 10*s.*	480
49, Paxton-rd., f., w.r. 26*l.* 13*s.*	390

By Fred Varley & Son.

Holloway.—98, Brecknock-rd., u.t. 45½ yrs., g.r. 7*l.*, e.r. 60*l.*	375
4, Hungerford-rd., u.t. 39 yrs., g.r. 8*l.* 8*s.*, e.r. 55*l.*	400
Harringay.—22, Lothair-rd. South, u.t. 72 yrs., g.r. 6*l.* 10*s.*, e.r. 38*l.*	365

By Weatherall & Green.

Chiswick.—21 to 29 (odd), Spencer-rd., f., y.r. 255*l.*	2,685
Spencer-rd., f.g.r. 20*l.*, reversion in 62 yrs.	505
Fernhurst, &c., Sussex.—Moses Hill Farm, 147 a. 1 r. 0 p., f.	13,000

October 13.—By Debenham, Tewson, & Co.

Mitcham Common, Surrey.—Croydon-rd., The Ravensbury Arms, b.-h., and six cottages adjoining, area 1½ a., f., y.r. 120*l.* 2*s.*	4,050
Hammersmith.—16 to 22 (even), Southerton-rd., u.t. 62½ yrs., g.r. 26*l.*, y.r. 188*l.* 10*s.*	1,370
Holloway.—40, Arthur-rd., u.t. 39 yrs., g.r. 6*l.* 6*s.*, y.r. 40*l.*	415
Stoke Newington.—27, Rectory-rd., u.t. 73½ yrs., g.r. 10*l.*, y.r. 45*l.*	380

By C. & H. White.

Stockwell.—56, Hargwynne-st., u.t. 61 yrs., g.r. 5*l.* 5*s.*, y.r. 36*l.* 8*s.*	250
South Lambeth.—44, Heyford-av., u.t. 84 yrs., g.r. 8*l.* 10*s.*, w.r. 57*l.* 4*s.*	390
Greenwich.—Diamond-ter., l.g. rents 45*l.* 5*s.*, u.t. 17½ yrs., g.r. 8*l.*	250

By Andrew Young.

Holborn.—Southampton-row, an island plot of land, area 2,545 ft., building lease for 80 yrs., let at per annum	620

By Nott, Cartwright, & Etches (at Slough).

Burnham, Bucks.—2 to 9, Alma-row, f., w.r. 72*l.* 16*s.*	725
2 to 10, Chapel-st., f., w.r. 81*l.* 10*s.*	1,020
Chapel-st., freehold building site, with farm-yard and buildings	200
High-st., freehold building site	155
High-st., The Alma, b.-h., f., y.r. 40*l.*	1,365

By G. B. Hilliard & Son (at Witham).

Witham, Essex.—Newland-st., nine freehold houses, shop, and cottage, y.r. 248*l.* 18*s.*	3,900
Newland-st., a freehold workshop, y.r. 10*l.*	135
Newland-st., The Constitutional Club, f., y.r. 20*l.*	300
Bridge-st., Croft House, f., y.r. 26*l.*	490
Bridge-st., &c., thirty-three freehold cottages, y.r. 233*l.* 2*s.* 1*d.*	3,025
Howbridge Hall-la., freehold garden ground, 1 a. 0 r. 2 p.	145
Brick Kiln Farm, 20 a. 0 r. 1 p., f.	500
Witham Mead, &c., 11 a. 1 r. 7 p., f.	570
Jackson's Farm, 7 a. 2 r. 27 p., f.	300
Hatfield Peverel, Essex.—Knowles Farm, 92 a. 3 r. 29 p., f., y.r. 75*l.*	1,400
Kelvedon, Essex.—Church-st., four freehold villas, f., y.r. 62*l.*	920

By J. C. Platt (at Hammersmith).

Hammersmith.—79 to 87 (odd), Banim-st., u.t. 72 yrs., g.r. 17*l.* 10*s.*, w.r. 11*7l.*	750
1 and 2, Banim-ter. (S.), u.t. 72 yrs., g.r. 9*l.* 10*s.*, y.r. 95*l.*	890
Banim-st., a piece of land, u.t. 72 yrs., g.r. nil	145
Shepherd's Bush.—277, Goldhawk-rd., u.t. 40½ yrs., g.r. 10*l.*, e.r. 85*l.*	860

October 14.—By H. Donaldson & Son.

Dalston.—50 and 56, Parkholme-rd., u.t. 33 yrs., g.r. 5*l.* 10*s.*, y.r. 68*l.*	615
1, 5, and 7, Wilton-rd., u.t. 33 yrs., g.r. 9*l.*, y.r. 103*l.*	1,020
Hackney.—3 and 5, Spurstowe-rd., u.t. 56 yrs., g.r. 11*l.* 10*s.*, y.r. 72*l.*	740
Islington.—8, Ockenden-rd., u.t. 38 yrs., g.r. 6*l.* 2*s.*, y.r. 42*l.*	465
City-rd.—8 and 11, Coomb's-st., u.t. 21 yrs., gr. 9*l.*, y.r. 66*l.*	450
49 and 51, City Garden-row, u.t. 25 yrs., g.r. 10*l.*, y.r. 60*l.*	400

By Hy. Holmes & Co.

City of London.—15, St. Bride-st., (S.), u.t. 49½ yrs., g.r. 170*l.*, e.r. 600*l.*	5,000

By Knight & Co.

South Kensington.—61, Onslow-gdns., u.t. 46½ yrs., g.r., &c., 43*l.*, p.	2,710

By Towers, Ellis & Co.

Paddington.—15, St. Mary's-ter., u.t. 42 yrs., g.r. 11*l.* 10*s.*, p.	570

By Douglas Young & Co.

Clacton-on-Sea, Essex.—Wellesley Villas, &c., f.g. rents, 11*l.*, reversion in 79½ and 80½ yrs.	237
Vista-rd., two blocks of freehold building land, including wells and conduit pipes	930
Pier-av., Public Hall Buildings (hall and 7 shops), f., y.r. 510*l.*	£10,250

By Lound & Douet (At Masons' Hall Tavern).

Turnham Green.—High-rd., "The Crown and Anchor," p.-h., c., y.r. 65*l.*, with goodwill	8,210

By Millar, Son & Co. (At Truro).

Perranzabuloe, Cornwall.—"Lambourne Castle Farm," 132½ a., f. (including mineral rights)	3,000

October 15.—By Bisley & Sons.

Bermondsey.—44 and 46, Ambrose-st., u.t. 31 yrs., g.r. 8*l.*, w.r. 80*l.* 12*s.*	460
Greenwich.—20 and 27, Kemsing-rd., u.t. 90 yrs., g.r. 8*l.*, w.r. 65*l.*	645
Deptford.—20, 22 and 24, Croft-st., u.t. 35 yrs., g.r. 9*l.* 12*s.*, w.r. 83*l.* 4*s.*	640
12, Hoopwick-st., u.t. 64½ yrs., g.r. 4*l.* 15*s.* w.r. 41*l.* 12*s.*	385
5 and 7, Trundley's-rd., u.t. 14½ yrs., g.r. 2*l.* 10*s.*, w.r. 41*l.* 4*s.*	170
Rotherhithe.—19 and 21, Bestwood-st., u.t. 14½ yrs., g.r. 2*l.* 12*s.* w.r. 44*l.* 4*s.*	170
13 and 15, Bestwood-st., u.t. 23 yrs., g.r. 4*l.* 10*s.*, w.r. 46*l.* 16*s.*	240
6 and 8, St. Helena-rd., u.t. 54 yrs., g.r. 6*l.*, w.r. 63*l.* 14*s.*	365
10 to 13, Manor-la., u.t. 47 yrs., g.r. 8*l.*, w.r. 71*l.* 10*s.*	450

By H. J. Bliss & Sons.

City of London.—Wood-st., f.g.r. 60*l.*, reversion in 36 yrs.	2,600
Hackney.—149, Clarence-rd. (S.), f., q.r. 30*l.*	420
8 to 14 (even), Casterton-st., u.t. 74 yrs., g.r. 22*l.*, w.r. 135*l.* 4*s.*	910

By Harman Bros.

Hoxton.—1 and 5, Fairbank-st. (S.), u.t. 44 yrs., g.r. 21*l.*, y.r. 110*l.*	1,000
Chiswick.—27 and 29, Elliott-rd., u.t. 71 yrs., g.r. 10*l.* 10*s.*, y.r. 58*l.*	670

C. C. & T. Moore.

Mile End.—8 and 17, Morgan-st., u.t. 36 yrs., g.r. 6*l.* 6*s.*, y.r. 88*l.*	695
Poplar.—71, Teviot-st., u.t. 62 yrs., g.r. 4*l.*, w.r. 33*l.* 16*s.*	300
7, Aberfeldy-st., u.t. 53 yrs., g.r. 4*l.*, w.r. 46*l.* 16*s.*	325
9 to 15 (odd), Aberfeldy-st., u.t. 44 yrs., g.r. 15*l.* 5*s.*, w.r. 133*l.* 18*s.*	940
118 to 130 (even), Abbott-rd., u.t. 70 yrs., g.r. 35*l.*, w.r. 258*l.* 14*s.*	2,015
Upton Park.—52, Raymond-rd., u.t. 83 yrs., g.r. 3*l.* 10*s.*, e.r. 28*l.*	235
Homerton.—8 and 9, Churchill-rd, f., w.r. 72*l.* 16*s.*	760
21 and 22, Warwick Villas, f., w.r. 41*l.* 12*s.*	400

By Alfred Squire.

Hampstead-rd.—39, Robert-st. (S.), u.t. 18 yrs., g.r. 18*l.*, w.r. 84*l.* 10*s.*	305
Holloway.—86, Hampden-rd., u.t. 60 yrs., g.r. 4*l.*, w.r. 38*l.* 14*s.*	225
60, Hampden-rd., u.t. 61 yrs., g.r. 4*l.* 10*s.*, w.r. 41*l.* 12*s.*	355

By Stimson & Sons.

Camberwell.—Albany-rd., f., stabling and yard, y.r. 30*l.*	300
21, Chiswell-st., f., w.r. 28*l.*	235
Battersea.—36, Savona-st. (and stabling), f., y.r. 25*l.*	310
Canonbury.—9, Grosvenor-rd., u.t. 46 yrs., g.r. 7*l.* 7*s.*, y.r. 46*l.*	450
Hackney.—Harrogate-rd., l.g.r. 168*l.* 4*s.*, u.t. 40 yrs., g.r. 23*l.* 10*s.*	2,015
Chalk Farm.—Chalk Farm-rd., l.g.r. 61*l.* 18*s.*, u.t. 27 yrs., g.r. 10*s.*	710
Hornsey.—Canon-rd., f.g.r. 10*l.*, reversion in 70 yrs.	215
Peckham.—Danby-st., f.g.r. 17*l.* 10*s.*, reversion in 72 yrs.	475
Avondale-rd., f.g.r. 31*l.* 10*s.*, reversion in 73 yrs.	830
Copleston-rd., f.g.r. 25*l.* 10*s.*, reversion in 74 yrs.	630
Stoke Newington.—Nevill-rd., l.g.r. 62*l.*, u.t. 58 yrs., g.r. 3*l.* 10*s.*	1,200
Battersea.—Meath-st., f.g.r. 39*l.* 10*s.*, u.t. 74 yrs., g.r. 10*l.*	630
Old Kent-road.—No. 549, f., e.r. 48*l.*	850
Peckham.—84 to 92 (even) Sumner-rd., u.t. 57 yrs., g.r. 5*l.*, y.r. 162*l.*	1,500

October 16.—By G. W. & H. G. Potter.

Hampstead.—Mount Vernon, "Abernethy House," f., y.r. 60*l.*	920
The Mount, "Bentham House," y.r. 55*l.*; Holly Mount, "Holly Bush House," y.r. 26*l.*, f.	1,160

By E. & S. Smith.

Holborn.—61, Red Lion-st. (S.), f., e.r. 90*l.*	1,900
Barnsbury.—76, Barnsbury-rd., u.t. 14 yrs., g.r. 5*l.*, y.r. 44*l.*	905
Kilburn.—3, Chichester-ter. (S.), u.t. 54 yrs., g.r. 6*l.*, y.r. 40*l.*	305

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£	s.	d.		
Hard Stocks	1	16	0	per 1,000 alongside, in river	
Rough Stocks and Grizzles	1	18	0	"	"
Facing Stocks	2	12	0	"	"
Shippers	2	5	0	"	"
Flettons	1	10	0	"	at railway depôt

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PRICES CURRENT (*continued*).

BRICKS, &c.

	£	s.	d.			
Red wire Cuts ...	1	13	0	per 1,000	at railway	depot.
Best Fareham Red	3	12	0	"	"	"
Best Red Pressed Ruabon Facing	5	0	0	"	"	"
Best Blue Pressed Staffordshire ...	4	5	0	"	"	"
Do. Bullnose	4	11	0	"	"	"
Best Stourbridge Fire Bricks.....	4	8	0	"	"	"
GLAZED BRICKS.						
Best White and Ivory Glazed Stretchers.....	13	0	0	"	"	"
Headers.....	12	0	0	"	"	"
Quoins, Bullnose, and Flats	17	0	0	"	"	"
Double Stretchers	19	0	0	"	"	"
Double Headers...	16	0	0	"	"	"
One Side and two Ends.....	19	0	0	"	"	"
Two Sides and one End	20	0	0	"	"	"
Splays,Chamfered, Squints.....	20	0	0	"	"	"
Best Dipped Salt Glazed Stretchers and Headers	12	0	0	"	"	"
Quoins, Bullnose, and Flats	14	0	0	"	"	"
Double Stretchers	15	0	0	"	"	"
Double Headers...	14	0	0	"	"	"
One Side and two Ends.....	15	0	0	"	"	"
Two Sides and one End	15	0	0	"	"	"
Splays,Chamfered, Squints.....	14	0	0	"	"	"
Second Quality WhiteandDipped Salt Glazed.....	2	0	0	"	less than best.	

	s.	d.	
Thames and Pit Sand	6	9	per yard, delivered.
Thames Ballast	6	0	" "
Best Portland Cement	30	0	per ton, delivered.
Best Ground Blue Lias Lime ...	20	6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12s. 0d. per yard, delivered.
Stourbridge Fire Clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s.	d.	
BATH STONE—delivered on road waggons, Paddington depôt	1	6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt.....	1	8½	" "
PORTLAND STONE (20 ft. average)—			
Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Whraf	2	1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2	2½	" "

	s.	d.	
Ancaster in blocks	1	11	per ft. cube, deld. rly. depôt
Beer in blocks	1	6	" "
Greenshill "	1	10	" "
Darley Dale in blocks ...	2	4	" "
Red Corsehill "	2	5	" "
Closeburn Red Freestone	2	0	" "
Red Mansfield "	2	4	" "

YORK STONE—*Robin Hood Quality.*

	s.	d.	
Scappled random blocks	2	10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2	3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto.....	2	6	" "
3 in. Sawn two sides slabs (random sizes) ..	0	11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes).....	0	7½	" "
1½ in. to 2 in. ditto, ditto	0	6	" "
Scappled random blocks	3	0	per ft. cube "
6 in. sawn two sides, landings to sizes(under 40 ft. sup.)	2	8	per ft. super. "
6 in Rubbed two sides Ditto	—		" "
3 in. sawn two sides slabs (random sizes)	1	2	" "
2 in, self-faced random flags	0	5	" "
Hopton Wood (Hard Bed) in blocks	2	3	per ft. cube.
" " " 6 in. sawn both sides landings	2	7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1	2½	" "

SLATES.

In. in.	£	s.	d.	
20×10 best blue Bangor	13	2	6	per 1000 or 1200 at rly.dep.
20×12 " "	13	17	6	" "
20×10 best seconds "	12	15	0	" "
20×12 " " "	13	10	0	" "
16× 8 best "	7	0	0	" "
20×10 best blue Portmadoc	12	12	6	" "
16×8 best blue Portmadoc	6	12	6	" "
20×10 best Eureka unfading green.....	15	2	6	" "
20×12 best Eureka unfading green.....	17	2	6	" "
18×10 " "	12	10	0	" "
16× 8 " "	10	5	0	" "
20×10 permanent green	11	10	0	" "
18×10 " "	9	10	0	" "
16× 8 " "	6	10	0	" "

PRICES CURRENT—(*continued*).

TILES.

	s.	d.		
Best plain red roofing tiles...42	0	per 1,000	at rly. depot.	
Hip and valley tiles 3	7	per doz.	" "	
Best Broseley tiles.....50	0	per 1,000	" "	
Do. Ornamental Tiles 52	6	"	" "	
Hip and Valley tiles..... 4	0	per doz.	" "	
Best Ruabon Red, brown or brindled Do. (Edwards) 57	6	per 1,000	" "	
Do. Ornamental Do. 60	0	"	" "	
Hip tiles 4	0	per doz.	" "	
Valley tiles..... 3	0	"	" "	
Best Red or Mottled Staffordshire Do. (Peakes) 51	9	per 1,000	" "	
Do. Ornamental Do. 54	6	"	" "	
Hip tiles 4	1	per doz.	" "	
Valley tiles 3	8	"	" "	
Best "Rosemary" brand plain tiles 48	0	per 1,000	" "	
Do. Ornamental Do 50	0	"	" "	
Hip tiles 4	0	per doz.	" "	
Valley tiles 3	8	"	" "	

WOOD.	At per standard. £	s.	d.	£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15	10	0	16	10	0
Deals: best 3 by 9	14	10	0	15	10	0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11	10	0	12	10	0
Battens: best 2½ by 6 and 3 by 6 ...	0	10	0	less than 7 in. and 8 in.		
Deals: seconds.....	1	0	0	less thn best		
Battens: seconds	0	10	0	" " "		
2 in. by 4 in. and 2 in. by 6 in.....	9	0	0	9	10	0
2 in. by 4½ in. and 2 in. by 5 in. ...	8	10	0	9	10	0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0	10	0	more than battens.		
¾ in.	1	0	0	"		
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4	10	0	5	0	0
Seconds	4	5	0	4	10	0
Small timber (8 in. to 10 in.)	3	12	6	3	15	0
Small timber (6 in. to 8 in.).....	3	0	0	3	10	0
Swedish balks	2	15	0	3	0	0
Pitch-pine timber (30 ft. average)...	3	5	0	3	15	0
JOINERS' WOOD.						
White Sea: First yellow deals, 3 in. by 11 in.	At per standard. 23	0	0	24	0	0
3 in. by 9 in.	21	0	0	22	10	0
Battens, 2½ in. and 3 in. by 7 in.	17	0	0	18	10	0
Second yellow deals, 3 in. by 11 in.	18	10	0	20	0	0
" " 3 in. by 9 in.	17	10	0	19	0	0
Battens, 2½ in. and 3 in. by 7 in.	13	10	0	14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	15	10	0	16	10	0
Battens, 2½ in. and 3 in. by 7 in.	11	10	0	12	10	0
Petersburg: first yellow deals, 3 in. by 11 in.	21	0	0	22	10	0
Do. 3 in. by 9 in.	18	0	0	19	10	0
Battens	13	10	0	15	0	0
Second yellow deals, 3 in. by 11 in.	16	0	0	17	0	0
Do. 3 in. by 9 in.	14	10	0	16	0	0
Battens.....	11	0	0	12	10	0
Third yellow deals, 3 in. by 11 in.	13	10	0	14	0	0
Do. 3 in. by 9 in.	13	0	0	14	0	0
Battens	10	0	0	11	0	0
White Sea and Petersburg:— First white deals, 3 in. by 11 in....	14	10	0	15	10	0
" " 3 in. by 9 in. ...	13	10	0	14	10	0
Battens	11	0	0	12	0	0
Second white deals, 3 in. by 11 in,	13	10	0	14	10	0
" " 3 in. by 9 in.	12	10	0	13	10	0
" " battens	9	10	0	10	10	0
Pitch-pine: deals	16	0	0	18	0	0
Under 2 in. thick extra	0	10	0	1	0	0
Yellow Pine—First, regular sizes ...	33	0	0	upwards.		
Oddments	22	0	0	24	0	0
Seconds, regular sizes	24	10	0	26	10	0
Yellow Pine Oddments...	20	0	0	22	0	0
Kauri Pine—Planks, per ft. cube ...	0	3	6	0	4	6
Danzig and Stettin Oak Logs— Large, per ft. cube	0	2	6	0	3	6
Small " "	0	2	3	0	2	6
Wainscot Oak Logs, per ft. cube ...	0	5	0	0	5	6
Dry Wainscot Oak, per ft. sup. as inch	0	0	7	0	0	8
¾ in. do. do.	0	0	6½	—		
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0	0	9	0	0	11
Selected, Figury, per ft. sup. as inch	0	1	6	0	2	0
Dry Walnut, American, per ft. sup. as inch.....	0	0	10	0	1	0
Teak, per load	17	0	0	21	0	0
American Whitewood Planks— per ft. cube.....	0	4	0	—		
Prepared Flooring—	Per square.					
1 in. cy 7 in. yellow, planed and shot	0	13	6	0	17	6
1 in. by 7 in. yellow, planed and matched	0	14	0	0	18	0
1¼ in. by 7 in. yellow, planed and matched	0	16	0	1	1	6
1 in. by 7 in. white, planed and shot	0	11	6	0	13	6
1 in. by 7 in. white, planed and matched	0	12	0	0	14	0
1¼ in. by 7 in. white, planed and matched	0	14	6	0	16	6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards ...	0	11	0	0	13	6
1 in. by 7 in. do. do. do.	0	14	0	0	18	0
¾ in. by 7 in. white do. do.	0	10	0	0	11	6
1 in. by 7 in. do. do. do.	0	11	6	0	13	6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £	s.	d.	£	s.	d.
Rolled Steel Joists, ordinary sections	6	5	0 ...	7	5	0
Compound Girders, " "	8	2	6 ...	9	5	0
Angles, Tees and Channels, ordinary sections	7	17	6 ...	8	17	6
Flitch Plates	8	5	0 ...	8	15	0
Cast Iron Columns and Stanchions, including ordinary patterns	7	2	6 ...	8	5	6

PRICES CURRENT (*Continued*).

METALS.

IRON—	Per ton, in London £	s.	d.	£	s.	d.
Common Bars	7	10	0 ...	8	0	0
Staffordshire Crown Bars, good merchant quality.....	8	0	0 ...	8	10	0
Staffordshire "Marked Bars".....	10	10	0 ...	—		
Mild Steel Bars	8	15	0 ...	9	5	0
Hoop Iron, basis price	9	5	0 ...	9	10	0
" " galvanised	17	10	0 ...	—		
("And upwards, according to size and gauge.)						
Sheet Iron (Black)—						
Ordinary sizes to 20 g.	9	15	0 ...	—		
" " 24 g.	10	15	0 ...	—		
" " 26 g.	12	5	0 ...	—		
Sheet Iron, Galvanised, flat, ordinary quality—						
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12	15	0 ...	—		
Ordinary sizes to 22 g. and 24 g.	13	5	0 ...	—		
26 g.....	14	5	0 ...	—		
Sheet Iron, Galvanised, flat, best quality—						
Ordinary sizes to 20 g.	16	0	0 ...	—		
" " 22 g. and 24 g.	16	10	0 ...	—		
" " 26 g.	18	0	0 ...	—		
Galvanised Corrugated Sheets—						
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12	15	0 ...	—		
" " 22 g. and 24 g....	13	5	0 ...	—		
" " 26 g.	14	0	0 ...	—		
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker.....	11	15	0 ...	—		
Best Soft Steel Sheets, 22 g. and 24 g.	12	15	0 ...	—		
" " 26 g.....	14	0	0 ...	—		
Cut nails, 3 in. to 6 in.	9	5	0 ...	9	15	0
(Under 3 in., usual trade extras.)						

LEAD, &c.

	Per ton, in London. £	s.	d.	£	s.	d.
LEAD—Sheet, English, 3 lbs. and up	13	17	6 ...	—		
Pipe in coils	14	7	6 ...	—		
Soil pipe	16	17	6 ...	—		
Compo Pipe	16	17	6 ...	—		
ZINC—Sheet—						
Vielle Montagne .....ton	26	0	0 ...	—		
Silesian	25	15	0 ...	—		
COPPER—						
Strong Sheet.....per lb.	0	0	10½...	—		
Thin..... "	0	0	11½...	—		
Copper nails ..... "	0	0	11 ...	—		
BRASS—						
Strong Sheet .....per lb.	0	0	10 ...	—		
Thin " ..... "	0	0	11 ...	—		
TIN—English Ingots..... "	0	1	4 ...	—		
SOLDER—Plumbers'..... "	0	0	6 ...	—		
Tinmen's ..... "	0	0	8 ...	—		
Blowpipe ..... "	0	0	9 ...	—		

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d.	per ft.	delivered.
" fourths.....	1½d.	"	"
21 oz. thirds	3½d.	"	"
" fourths.....	2½d.	"	"
26 oz. thirds	3½d.	"	"
" fourths.....	3½d.	"	"
32 oz. thirds	4½d.	"	"
" fourths.....	4½d.	"	"
Fluted sheet, 15 oz.....	2½d.	"	"
" 21 oz.	3½d.	"	"
⅛ Hartley's Rolled Plate.....	1½d.	"	"
1/8 " " "	2d.	"	"
¼ " " "	2½d.	"	"

OILS, &c.

	£	s.	d.
Raw Linseed Oil in pipes or barrels... per gallon	0	1	9
" " " in drums..... "	0	2	1
Boiled " " in pipes or barrels... "	0	2	0
" " " in drums..... "	0	2	4
Turpentine, in barrels ..... "	0	3	8
" in drums ..... "	0	3	10
Genuine Ground English White Lead per ton	19	0	0
Red Lead, Dry ..... "	19	0	0
Best Linseed Oil Putty..... per cwt.	0	8	0
Stockholm Tar ..... per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for seats of Churches	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal.....	0	18	0
Extra Pale French Oil	1	1	0
Eggshell Flatting Varnish.....	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
French and Brush Polish	0	10	0

TERMS OF SUBSCRIPTION.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Pavilion and Winter Gardens, Bray	Committee	30*l.*, 15*l.*, 10*l.*, and three of 5*l.* 5*s.*	Nov. 30
Cattle Market, Wakefield	Governors	50 guineas, 25 guineas	Dec. 1

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered.
Sewers, &c., St. Stephen's-road	Canterbury Corporation	City Engineer, Town Hall, Canterbury	Oct. 27
Sewers and Manholes, Broad Oak-road	do.	do.	do.
Excavators Works, &c., Withernsea, Yorks	Holderness Gas Co., Ltd.	J. Holliday, Civil Engineer, St. Mark's-street, Hull	do.
Road Metal, &c.	Margate Corporation	Borough Surveyor, Town Hall, Margate	do.
Road Metal, &c.	Romford R.D.C.	G. Lapwood, Highway Surveyor, Victoria Chambers, Romford	do.
Street Works, &c.	Salford Corporation	Borough Engineer, Town Hall, Salford	do.
Road Works, Belgrave and Clement-streets	Sowerby Bridge U.D.C.	R. W. Evans, Commercial Bank Chambers, Halifax	do.
Pier Widening Works	Portpatrick &c. Jnt. Railways Com.	J. Thomson, Citadel Station, Carlisle	do.
Road Works, St. Andrew's-road	Enfield U.D.C.	R. Collins, Surveyor, Public Offices, Enfield	Oct. 28
Fire Station, Hollings Mill-lane	Sowerby Bridge U.D.C.	R. W. Evans, Commercial Bank Chambers, Halifax	do.
Six Shops and Flats, High-street, Hounslow	do.	W. A. Davies, Civil Engineer, Town Hall Chambers, Hounslow	do.
Waterworks, &c.	Galway U.D.C.	Jas. Perry, Civil Engineer, Galway	do.
Broken Granite Road Metal	Ware (Herts) U.D.C.	G. H. Gisby, Council Offices, Ware	do.
Meter and Governor House	Cudworth (Yorks) U.D.C.	W. W. Hutchinson, Engineer, 10, Pontefact-road, Barnsley	do.
Sheds, &c., Halifax	do.	C. H. Petty, Architect, Waterhouse-street, Halifax	do.
Intercepting Sewer, Regent-road	Salford Corporation	L. C. Evans, Town Hall, Salford	do.
Sewerage Works, &c.	Rotherham U.D.C.	J. Platts, Borough Engineer, Town Hall, Rotherham	do.
Sewers, &c., Worting-road	Basingstoke Corporation	F. R. Phipps, Civil Engineer, Town Hall, Basingstoke	Oct. 29
Road Metal, &c. (1,050 tons)	Gravesend Town Council	C. E. Hatten, Court House, Gravesend	do.
Alterations to Bakery, Oakwood, Roundhay, nr. Leeds	do.	J. Charles & Son, 98, Albion-street, Leeds	do.
Street Works, &c., Greg-street	Stockport Corporation	J. Atkinson, Civil Engineer, Town Hall, Stockport	do.
Warehouse, 16 and 18, Bull Green, Halifax	Messrs. W. Conway & Sons, Ltd.	R. Horsfall & Son, Architects, 221, Commercial-street, Halifax	do.
Bandstand Foundation, Cast-iron rails, &c.	Portland U.D.C.	R. S. Henshaw, Engineer, Council Offices, New-road, Portland	do.
Boundary Walls, &c., Penydarren Schools	Merthyr Tydfil School Board	J. L. Smith, Architect, Aberdare	do.
Baths, Beverley-road	Hull Corporation	A. E. White, Civil Engineer, Town Hall, Hull	Oct. 31
Detached Cottage, Sutton Scotney	do.	C. W. Broadmore, 120, High-street, Winchester	do.
Alterations to Chapel, Brawdy, Pembrokeshire	do.	D. E. Thomas, Architect, Haverfordwest	do.
Two Houses, Hanbury-road, Bargoed, Wales	do.	P. V. Jones, Architect, Hengoed	do.
Five Cottages, North Back, Long Lanes, Bridlington	Mr. E. H. Rudd	A. T. Martindale, Architect, 66, Wellington-road, Bridlington	do.
Alterations to Chapel, Trefgarne Owen, Pembrokeshire	do.	D. E. Thomas, Architect, Haverfordwest	do.
Chimney Shaft at Electricity Works	Holyhead U.D.C.	P. F. White, Engineer, Bangor, North Wales	do.
Rebuilding the Castle Inn, Pantywyll	do.	C. M. Davies, Architect, 12, High-street, Merthyr	do.
*New Central Library	Bristol Libraries Committee	Bernard & Son, 4, St. Stephen's-chambers, Bristol	Oct. 31
Church and Manse, Clonmel, Ireland	Methodist Trustees	Rev. H. Kevin, Clonmel	do.
Purification Works, Asquith B. Dyeworks, Sowerby B.	do.	Spinks & Pilling, Engineers, 20, Park-row, Leeds	do.
Macadam Road Metal (4,000 tons)	Bexhill Corporation	G. Ball, Civil Engineer, Town Hall, Bexhill	do.
Wharf (300 ft. long)	Wick (N.B.) Harbour Trustees	J. Barron, Civil Engineer, Aberdeen	do.
Alterations to Boardroom at Workhouse	Christchurch (Hants) Guardians	A. Druitt, Boardroom, Workhouse, Christchurch, Hants	do.
Reservoir, &c., Bovey Tracy, Devon	Newton Abbot R.D.C.	Fox & Tatton, Civil Engineers, 5, Victoria-street, S.W.	Nov. 3
Refuse Destructor, Nechells	Birmingham Corporation	Superintendent, Montague-street Wharf, Birmingham	do.
Church, St. Columb Minor, Cornwall	Wesleyans	S. Hill, Architect, Green-lane, Redruth	do.
*Pumping Station, Gas Engines and Pumps, &c.	Portsmouth Borough Council	Borough Engineer, Town Hall, Portsmouth	do.
*Relief Sewer, &c.	do.	do.	do.
*Making-up Roads	Tottenham U.D.C.	Council's Engineer, 712, High-road, Tottenham	do.
Broken Granite (2,000 tons)	Watford U.D.C.	H. M. Turner, Surveyor, 14, High-street, Watford	Nov. 4
*Making-up Roads	Ealing Town Council	Borough Engineer, Town Hall, Ealing, W.	Nov. 5
Parade Extension Works	Bridlington Corporation	E. R. Matthews, Civil Engineer, Town Hall, Bridlington	Nov. 7
*New Hospital, adjg. St. Stephen's Ch., Haverstock Hill	Hampstead General Hospital Com	Young & Hall, 17, Southampton-street, Bloomsbury, W.C.	Nov. 9
*Branch Library, Lower Sydenham	Lewisham Public Libraries Com.	E. Wright, Town Hall, Lewisham	Nov. 10
do.	do.	J. R. Vining, 89, Chancery-lane, W.C.	do.
*Additions, Ordnance Survey Office, Southampton	Commissioners of H.M. Works	H.M. Office of Works, Storey's Gate, S.W.	do.
Government Offices, Leicester	do.	Registrar, County Court, Leicester	do.
Telephone Exchange, Engineer's Office, &c., Manchester	do.	The Secretary, H.M. Office of Works, Storey's Gate, S.W.	Nov. 11
Well Works at Schools, Ashford, Middlesex	Managers, W. London School Dist.	G. Midgley Taylor, 27, Great George-street, S.W.	Nov. 12
*New School, Manor-road, Liscard	Wallasey Education Authority	E. Kirby, Architect, 5, Cook-street, Liverpool	Nov. 14
Carriageway and Tunnel under Thames, Rotherhithe	London County Council	Engineers' Department, County Hall, Spring Gardens, S.W.	Jan. 19, '04
*Cleaning, Painting, &c., Assize Courts	Manchester Assize Courts Com'tee.	J. D. Harker, Architect, 78, King-street, Manchester	No date.
Chapel Works at Cemetery	Pinner Burial Board	Harrison & Ward, 66, Victoria-street, S.W.	do.
Extension of Water-Main at Asylum	Ipswich Corporation	E. Buckham, Borough Surveyor, Town Hall, Ipswich	do.
Sanitary Work to Premises, Steel-street, Ulverston	do.	J. W. Grundy & Son, Brogden-street, Ulverston	do.
Seventy Rods of Brickwork	do.	Barnett & Brotchie, 68, Salisbury-road, West Kilburn, N.W.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Application to be in
*Clerk of Works	Chiswick U.D.C.	3*l.* 10*s.* per week	Oct. 29
*Engineering Assistant	Finchley U.D.C.	42*s.* per week	Nov. 4

Those marked with an asterisk (*) are advertised in this Number. *Competition*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvii.

TO CORRESPONDENTS.

M. T. K. (Below our limit).—W. C. H.—J.S.M. (Amount should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ASCOT (Berks.).—For alterations to the Queen's Hall, for the County Council. Mr. Joseph Morris, County Surveyor, Broadway-buildings, Reading. Quantities by Surveyor:—

Burfoot & Son	£3,995 0	E. C. Hughes	£3,223 17
G. H. Tucker	3,787 0	W. Hawkins	3,178 0
F. Newberry	3,595 0	F. Pizzey	3,150 0
H. Charman	3,400 0	G. Brown	3,144 0
McCarthy Fitt	3,379 0	W. Watson, Ascot*	3,100 0
Cox & Sons	3,303 10	Bennett & Sons	2,800 0
I. B. Seward	3,247 0		

[County Surveyor's estimate, £3,121 4*s.* 11*d.*]

BARNSLEY (Yorks).—For the execution of road works, New-street, for the Dodworth Urban District Council. Mr. P. A. Hinchliffe, architect, 14, Regent-street, Barnsley:—

C. F. Lawton	£195 0 0	J. Hood	£179 0 0
P. Dalby	193 0 0	Higham & Sons	170 0 0
B. Roberts	192 0 0	H. Bower	169 14 2
G. Haigh	190 0 0	G. H. Burrows	166 8 4
E. R. Taylor	184 0 0	W. Schofield, Summer-lane, Barnsley*	156 0 0
C. W. Squire	182 0 0		
J. W. Hampson	181 0 0		
G. F. Brown	179 0 0		

BIDEFORD (North Devon).—For the erection of Municipal buildings and library, for the Corporation of the Borough of Bideford. Mr. Alfred J. Dunn, architect, 86, Colmore-row, Birmingham, and 31, St. Michael's-square, Gloucester:—

Forse & Sons	£9,195 0	Collins & Godfrey	£7,190 0
Woolaway & Sons	9,150 0	Westcott, Austin, & Co.	6,700 0
Long & Sons	7,999 0	Elies & Son	6,380 0
Hayward & Wooster	7,857 0	H. Glover, Bideford	6,215 10
Smith & Pitt	7,560 0		

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CHEADLE (Staffs).—For laying sewers, &c., Caverswall-lane, Blythe Bridge, for the Rural District Council. Mr. F.T. Inskip, surveyor, Cheadle :—

T. Peacock	£376 0 0	T. Tucker	£228 2 2
Langley Bros.	239 4 6	F. Barke	220 0 0
W. Williams	244 0 0	Bridgett & Hand	182 0 0
F. Woolton	235 0 0	Alcock, Cheadle*	175 0 0

DUBLIN.—For the construction of a pumping station, Pigeon House-road, for the Corporation. Mr. G. Chatterton, C.E., 6, The Sanctuary, Westminster :—

J. & W. Stewart, Ltd.	£34,650	H. & J. Martin, Ltd., Dublin and Belfast*	£29,466
J. & P. Good, Ltd.	32,500		

EBBW VALE (Mon).—For the execution of street works, Newchurch (Contracts 1, 2, and 3), for the Urban District Council. Mr. T. J. Thomas, Town Surveyor, Council Offices, Drillground, Ebbw Vale :—

Contract No. 1.—Drysiog-street Improvements.

W. Brown, Merthyr Tydfil £462 15 1

Contract No. 2.—Newchurch Drainage.

W. Mills, Ebbw Vale 106 9 0

Contract No. 3.—Painting Public Lamps, &c.

J. O. Leary, Ebbw Vale 20 8 0

FAREHAM (Hants.).—For the erection of an engine house, &c., at the County Asylum, Knowle, for the Hants County Council. Mr. W. J. Taylor, County Surveyor, The Castle, Winchester :—

J. Croad	£2,185 0	W. Wallis, Little-hampton*	£1,634 0
Knight Bros.	1,955 10		
Rashley & Son	1,887 0		

FEATHERSTONE (Yorks).—For the execution of sewerage works, Wakefield-road, for the Urban District Council. Mr. Fredk. B. Rothera, engineer, Council Offices, Featherstone. Quantities by engineer :—

Ives & Co.	£402 0 0	Jonas Totty	£289 17 6
James Benton	319 15 11	J. W. Broadhead	217 2 2
Alfred Gates	269 14 8	George Clements, Featherstone*	206 15 11
Cyrus Birkhill	221 0 6		

GREAT WRATTING (Suffolk).—For the erection of four cottages for the Hon. W. F. D. Smith, M.P. Mr. C. P. Ayres, architect, Watford :—

Wiles & Son	£1,066	W. G. Jarvis	£950
Dupont & Co.	997	Mason & Son, Haverhill*	880
Grimwood & Sons	957		

HALIFAX.—For the execution of road improvement works, Salterhebble-hill, for the Corporation. Mr. James Lord, C.E., Town Hall, Halifax :—

Bower Bros., Church-street, Halifax*... £553 1 1

HASTINGS.—For laying sewers, &c., London-road, St. Helens, for the Corporation. Mr. P. H. Palmer, C.E., Town Hall, Hastings :—

Mr. Joseph Harvey, 53, King's-road, St. Leonards*... £535

HESSLE.—For alterations and additions to the Granby Hotel, Hessle, for Mrs. M. Saunders. Messrs. Ansdell & Cox, architects, Hull :—

E. Neal	£946 10 0	W. Parkinson	£881 7 9
G. Houlton	975 0 0	T. Goates	865 0 0
C. Barron	940 0 0	Taylor & Son	860 12 0
F. Hall	900 0 0	T. R. Woods	828 0 0
W. Barton	889 0 0	J. H. Fenwick, Hull*	797 0 0

HOUGHTON-LE-SPRING.—For the execution of sewerage works, Fence Houses, for the Rural District Council. Mr. Wm. Morley, surveyor, 29, Edwin-street, Houghton-le-Spring :—

J.G. Kersley	£842 0 0	J. Watson	£660 0 0
J. W. White	784 0 0	J. Hollings	571 5 9
D. W. Richards	781 14 7	J. McLaren & Son, Gosforth*	553 16 0
J. B. Stott	718 5 7	Tough Bros.	540 19 3
Balmer Bros.	701 12 10		

LLANELLY.—For the erection of a mission church, Pwll, Pembrey, for members of the Established Church. Mr. Cyril A. Jones, A.M.Inst.C.E., Cilymaenllwyd, Llanelly, S. Wales :—

Masonry (Including all Mason's Work, Plastering, and Small Items).

Evans & Sons, Pwll, Llanelly* £338

Woodwork and Joinery.

J. Evans 287

Brown, Thomas & John, Llanelly* 198

LONDON.—For new steel cable for Streatham cable tramways, for the London County Council :—

Craddock & Co.	£1,093 15
F. W. Scott	885 0
Latch & Batchelor, Ltd.	870 0
Brown & Co. (Bankhall), Ltd.	800 0
Haggie Bros., Ltd., Gateshead-on-Tyne*	697 10

LONDON.—For new mahogany shop front and fittings marble work, and electric lighting at 5, Frognal-parade Hampstead, for J. Richards, Ltd. Mr. T. Wilson, architect, 34, New Bridge-street, E.C. :—

J. Pugh* £657

LONDON.—For alterations and additions at 138, Sydenham-road, Sydenham, for Mr. A. V. Zwanenberg. Mr. T. Wilson, architect, 34, New Bridge-street, E.C. :—

Wheeler	£765	Speechley & Smith	£678
Pugh	715	Pratt*	667

HARROGATE.—For Main Drainage Works. Contract No. 2. Mr. E. W. Dixon, Engineer, 14, Albert-street, Harrogate :—

	Section 1.	Section 2.	Section 3.	Section 4.	Total.
	£	£	£	£	£
John Moffatt	17,980	4,565	8,181	4,344	35,072
S. F. Davidson	17,160	4,434	7,387	3,927	32,909
Hardy & Atkinson	17,531	4,675	7,495	2,686	32,388
Hampton Matthews	11,124	3,476	5,215	3,014	22,861‡
Johnson & Langley	16,294	5,072	7,454	4,378	33,202
Wilson & Sons	16,121	8,213	9,105	5 891	39,262
B. Oxley	16 585	4,596	7,336	3 225	31,805
Hodson & Son	14,938	4,854	7,599	4,124	31,516
Arnold & Co.	15,475	4,886	7,640	4,063	31,200
Parker & Sharp	15 124	4,639	7,347	3.793	30.906
A. Braithwaite	15.192	4.854	7,315	4 144	31,506
Wm. Brigg	16,928	4,864	7,392	3 197	32,382
Rd. Annakin, Harrogate	14,870	3,821	7,606	3 113	29,413*
Bon Firth	15,613	4.490	7,777	4,530	32,412
Breber & Co.	15,323	4.606	7.018	4 213	31.221
T. C. Starkey	15 933	5,880	7,409	4 970	34,184
Kell Bros.	19,579	7,091	10 014	5,258	41.944
Bentley & Loch	15,866	4,771	8,180	4.189	33.507
George Bell	16 369	4,842	7,983	£4,035 £500	33,239
R. H. B. Neal	23.837	6,817	11,256	5,666	49,000
J. S. Dawson	17,093	5 148	8,581	4,179	35,002
Smith & Co.	15.053	5,068	7.571	4.467	32,161
Graham & Son	18,559	4.405	8,643	3,751	35,360
Etheridge & Clark	16 185	4,907	8.001	4.557	33,650
J. & T. Binns	22.170	8.643	11.773	6.367	47,954
George Parsons	16 297	6.029	9.251	4.584	36,161
Wm. & J. Lant	20,876	5.517	8,863	4.952	40,210
Egan & Sons	17,074	4,753	7,715	3,639	33,187

‡ Withdrawn.

LONDON.—For the supply and delivery of lime for the treatment of sewage at the Barking and Crossness outfall works, for the London County Council :—

		Delivered alongside jetty.		Delivered into store.	
		Barking.	Crossness.	Barking.	Crossness.
	Tons.	per ton. s. d.	per ton. s. d.	per ton. s. d.	per ton. s. d.
James J. Dixon	23,800	12 8	12 8	14 2	14 2
L. Sommerfeld	23,800	13 8	13 8	15 2	15 2
Wm. Fletcher*	9,000*	—	—	—	15 3½*
The Associated Portland Cement Manufacturers (1900), Limited*	14,800*	14 0*	—	15 6*	—
	23 800	14 4½	14 4½	15 10½	15 10½
	9,000	—	15 0	—	16 6
G. Albrecht	23,800	14 2	14 2	15 8	15 8
The New Lime Company, Limited	14,800	14 9	—	16 2	—
C. Christopherson & Co.	9,000	—	15 6‡	—	—
Mackay & Davies	9,000	—	20 7	—	—
Current contract prices		—	—	15 11	14 6

‡ Subject to no import duty being levied.

MARPLE.—For the erection of ten houses, for the Compstall Co-operative Industrial Society, Limited. Messrs. Garlick & Wyatt, architects, Stockport-road, Marple :—

J. T. Pott	£2,980 0 0
Yarwood	2,965 0 0
John Waine	2,829 0 0
Wilson & Roberts	2,775 0 0
Vessey, Openshaw & Vessey	2,750 0 0
Robinson & Sons	2,747 0 0
George Woodwiss, Marple*	2,713 0 0
Clayton Bros.	2 650 0 0
Sparrow	2,508 7 4

NAAS (Ireland).—For the erection of sixteen labourers' cottages, for the Rural District Council. Mr. Francis Bergin, B.E., Beechgrove, Kildare :—

J. Taylor, Bannoxtown, Kilnillen	£158 0 each for two cottages.
J. Slattery, Rathasker-road, Naas	153 10 " " "
J. Wyse, Bullockpark, Rathmore, Naas	158 0 for one cottage.

NANTYGLO.—For additions to Nantyglo School, for Aberystruth School Board. Mr. R. L. Roberts, architect, Abergarn, Monmouthshire :—

J. Newcombe	£1,095 0	J. Jenkins	£990 0
Smith Bros.	1,060 0	Morgan & Son, Nantyglo*	863 12
W. Jenkins	1,031 0		

NORMANTON (Yorks). For flagging, kerbing, &c., Forge-street, for the Urban District Council :—

Rodgers & Son, Castleford* £136 12 3

PORTSOY.—For new buildings in Portsoy. Mr. R. B. Pratt, architect, Elgin :—

Masonry.—Gray, Portsoy	£1,030
Carpentry.—Geddes & Son, Portessie	
Plumbing.—H. J. Watson, Banff	
Slating.—Strathdee, Portsoy	
Plastering.—J. Rae, Portsoy	
Painting.—G. Fairweather, Portsoy	

ROTHERHAM.—For the execution of sewers, &c., Whiston-road, Canklow, for the Rural District Council. Mr. B. Hey, surveyor, 29B, High-street, Rotherham :—

Green & Co., Wellgate, Rotherham* £186

RAVENSTHORPE (Yorks.).—For additions to schools, North-road, for the Ravensthorpe Congregational Church Trustees. Messrs. Marriott, Son, & Shaw, architects, Church-street, Chambers, Dewsbury. Quantities by architects :—

Masonry.—Whitehead & Sons, Ravensthorpe*	£783
Joinery.—J. W. Harrop, Gawthorpe Ossett*	
Ironwork.—Bagshaw & Sons, Batley	
Slating and Plastering.—Albert Shaw, Mirfield*	
Painting.—Brook Jackson, Dewsbury*	
Heating Apparatus.—Unity Wood and Iron Co., Padiham*	

RUNCORN.—For the execution of road works, &c., Dundonald-avenue and Kimberley Drive, for the Rural District Council. Mr John Swinton, surveyor, 19, Cliff View, Stockton Heath, near Warrington :—

	Dundonald-avenue.	Kimberley Drive.
Josiah Dale	£495	£208
Frank Hayes	465	206
Frank Warburton	444	297
F. W. Wright	381	246
F. Mitchell & Son	380	265
Garner Owen	378	242
Bennie & Thompson	376	249
Thos. Stringer, Warrington*	365	244

ST. BUDEAUX.—For the Crownhill and Honicknowle sewer works, for Plympton St. Mary Rural District Council. Mr. F. A. Clark, surveyor, 83, Old Town-st., Plymouth :—

H. Stanbury	£6,469 0 0	A. N. Coles	£4,849 12 4
T. Roberts	5,546 0 0	H. J. Allen	4,818 0 0
Davis, Ball & Co.	5,350 0 0	Smith & Son	4,829 15 0
Jn. Shaddock	5,339 0 0	M. Bridgeman	4,721 18 7½
J. & J. Binns	5,297 0 0	C. J. Payne	4,649 19 9
R. H. B. Neal	5,240 0 0	W. C. Shaddock	4,647 8 0
J. C. Ambrose	5,200 0 0	W. J. Stevenson	4,640 0 0
C. Duke	5,075 0 0	E. Pike	4,412 0 0
Pearce Bros.	5,073 0 0	Steel & Pearce, Plymouth*	4,032 18 3
T. Shaddock	4,977 0 0		

SHEFFIELD.—For the erection of eight dwelling houses, stabling, &c., in Coombe-road, Crookes, for Messrs. G. & J. W. Lister. Messrs. Hall & Fenton, architects and surveyors, 14, St. James'-row, Sheffield. Quantities by the architects :—

A. Bradbury	£3,344 0	R. Charlesworth	£2 363 0
H. Watkinson	3,048 10	W. Ainsley	2 353 0
H. White	3,037 0	G. Vaughan	2,350 0
Roper & Sons	2,900 0	M. Hancock, 71, Roebuck-road*	2,335 0
J. S. Teanby	2,850 0		
M. A. Earl	2,600 0		

[See also next page.

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SOUTHWOLD (Suffolk).—For the erection of business premises, High-street, for Mr. F. Esthaugh. Mr. Arthur Pells, surveyor, Beccles, Suffolk :—

		Included for Decorations.
Hurren	£2,085 0 0	£45 0 0
Gibbs	1,995 0 0	29 10 0
Scales & Robins	1,800 0 0	16 0 0
Thompson	1,796 1 2	28 0 0
Youngs	1,724 0 0	30 0 0
Gunton & Palmer	1,719 17 0	31 12 3
Boddy & Son	1,711 0 0	31 13 8
Fowler	1,700 0 0	35 18 9
Thurman	1,698 0 0	30 0 0
Grimwood & Son	1,693 0 0	30 6 11
West	1,690 0 0	31 0 0
Smith	1,680 0 0	27 12 11
Hawes	1,650 0 0	31 19 0
Allen & Son, Southwold*	1,580 0 0	40 0 0
Gaze	1,544 15 0	30 0 0

STOCKPORT.—For the execution of street works, Harvey and Apsley-streets, for the Corporation. Mr. John Atkinson, C.E., Stockport. Quantities by the engineer :—

Gosling & Stafford	£1,266 5 2
W. H. Eva	1,235 8 6
P. D. Hayes, Old-road, Stockport*	1,225 16 9

STOWMARKET (Suffolk).—For the execution of drainage works, &c., Lime Tree-place, for the Urban District Council. Mr. G. W. Lingwood, surveyor, Station road, Stowmarket :—

Bradshaw & Co	£165 0	Scales & Robins	£113 10
E. & S. Flummer	145 0	Murray & Sherwin	105 0
G. Burgoyne	119 3		

WALDERSHARE.—For alterations and additions to schools and alterations and additions to Minacre farmhouse, &c., for the Right Hon. the Earl of Guildford. Messrs Fry & Miller, architects, Cannon-street, Dover :—

J. E. Turner	£1,700 15	Hayward & Paramor	£1,232 0
Austen & Lewis	1,413 11	Lewis & Sons	1,182 11
Denne & Son	1,317 0	Warren & Son	1,163 0
T. T. Denne	1,254 0	W. Bromley, Dover*	1,157 0

WALSALL.—For the execution of road works, Borneo-street, for the Corporation :—

James Atkins, Walsall*	£305 14 6

WATFORD.—For additions to the receiving wards at the Watford Union Workhouse, for the Watford Board of Guardians. Mr. C. P. Ayres, architect, Watford :—

Jesse Mead	£689	H. Brown	£590
R. L. Tonge	687	H. B. Watkins	579
Tyler & White	629	Clark Bros.	579
G. & J. Waterman	607	Clifford & Gough	569
C. Brightman	597	W. King, Watford*	550

WATFORD.—For the erection of new farm buildings at Langleybury, for Mr. E. Henry Loyd. Mr. C. P. Ayres, architect, Watford :—

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H. Brown	2,895	A. Timberlake, Kings Langley*	2,725
Goodchild & Jeffery	2,866		
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J. Ferguson	8,162	J. Darville	7,695
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H. B. Watkins	7,968	C. Brightman	7,440
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Dupont	2,858	Webster & Cannon	2,595
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Martin	2,692	H. Brown	2,587
Goodchild & Jeffery	2,645	C. Brightman, Watford*	2,525
Waterman	2,629		

WIGTON.—For the execution of water supply works, Hesket-New-Market, for the Rural District Council. Mr. W. Brown, surveyor, Kildare, Wigton. Quantities by surveyor :—

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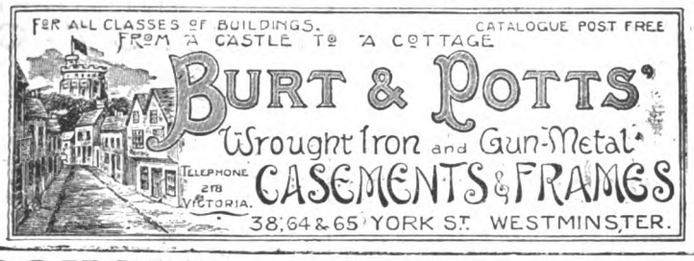

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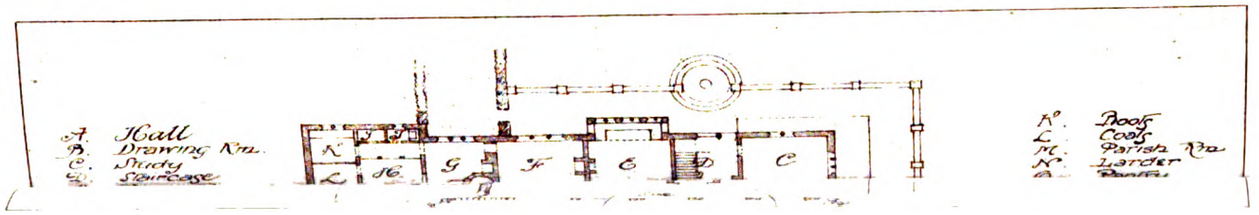

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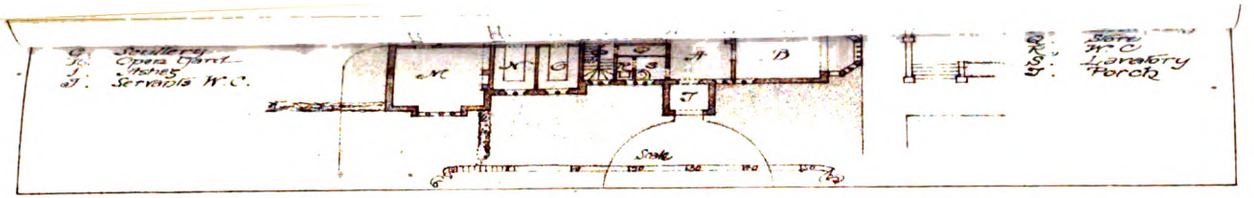

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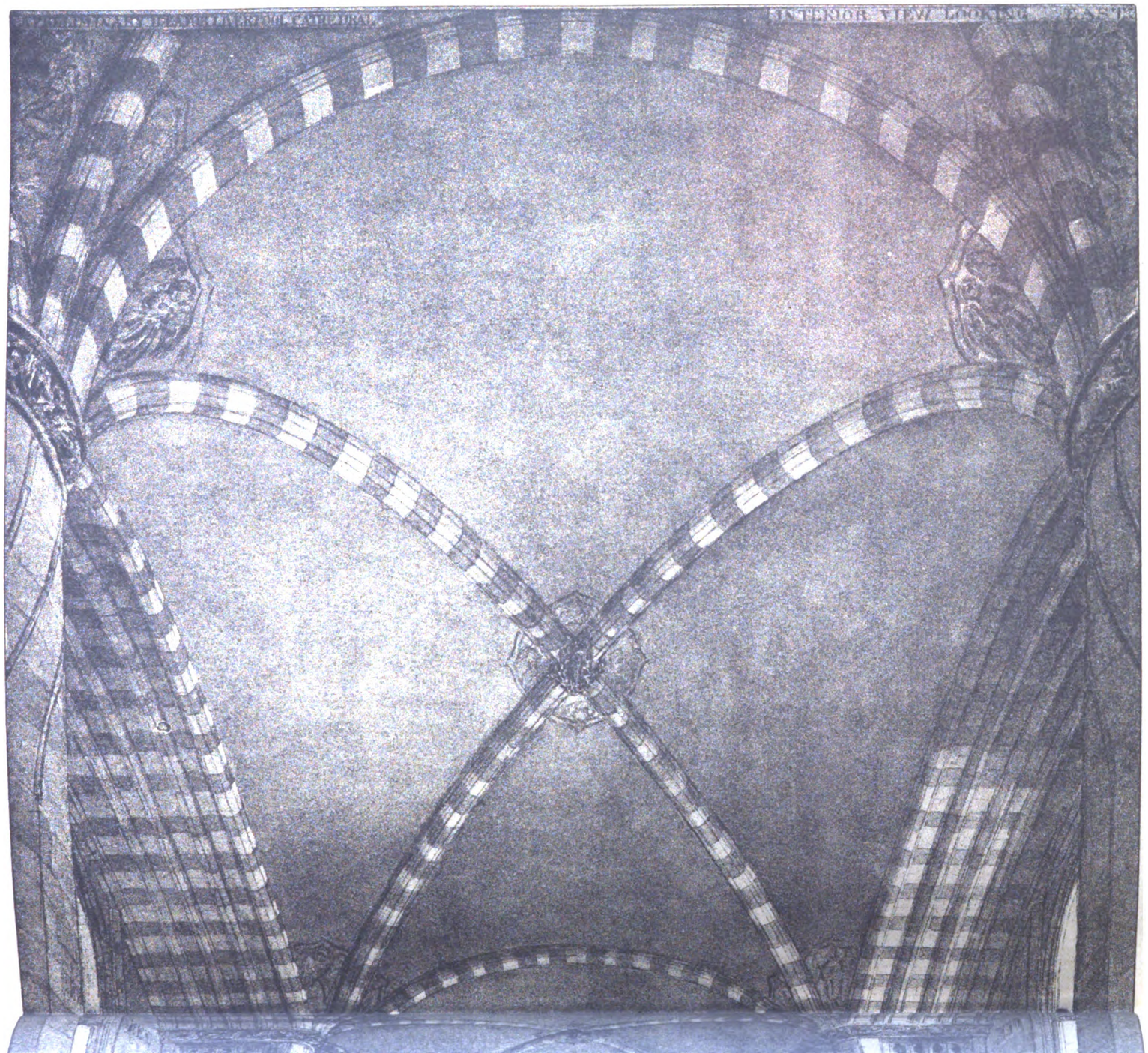

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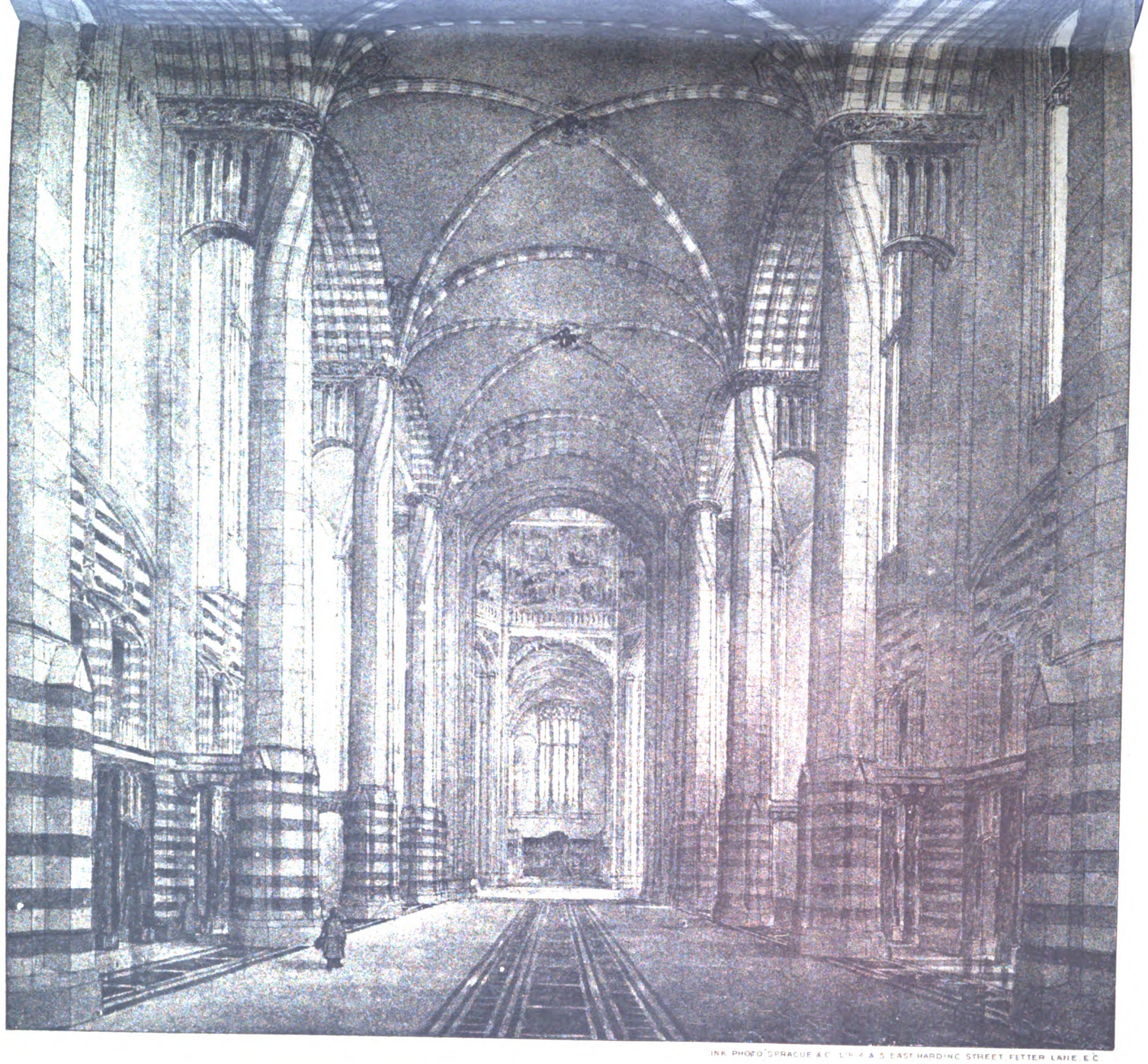

A PRELIMINARY IDEA FOR LIVERPOOL CATHEDRAL: INTERIOR.—Designed by Mr. A. H. Skipworth.

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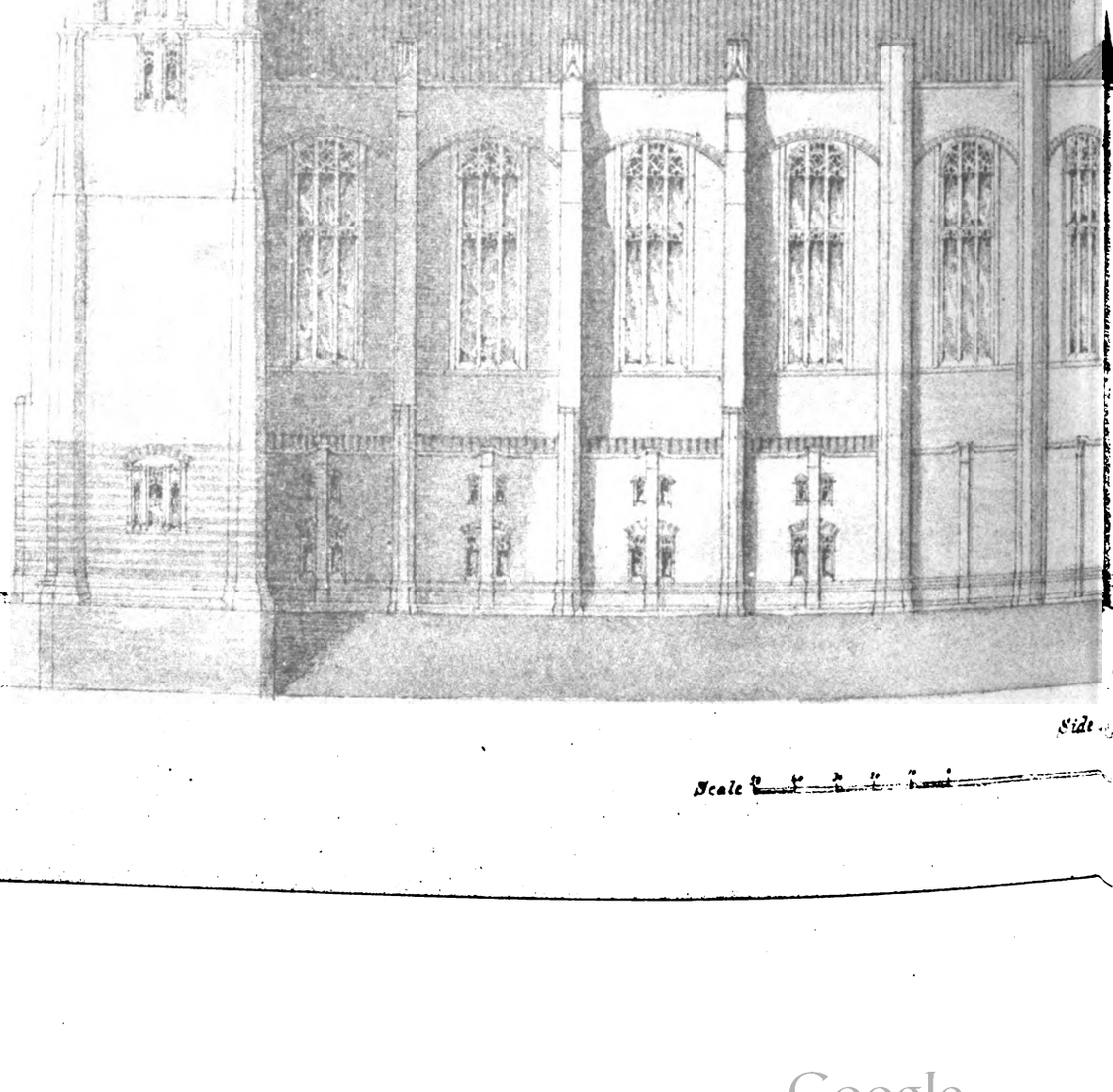

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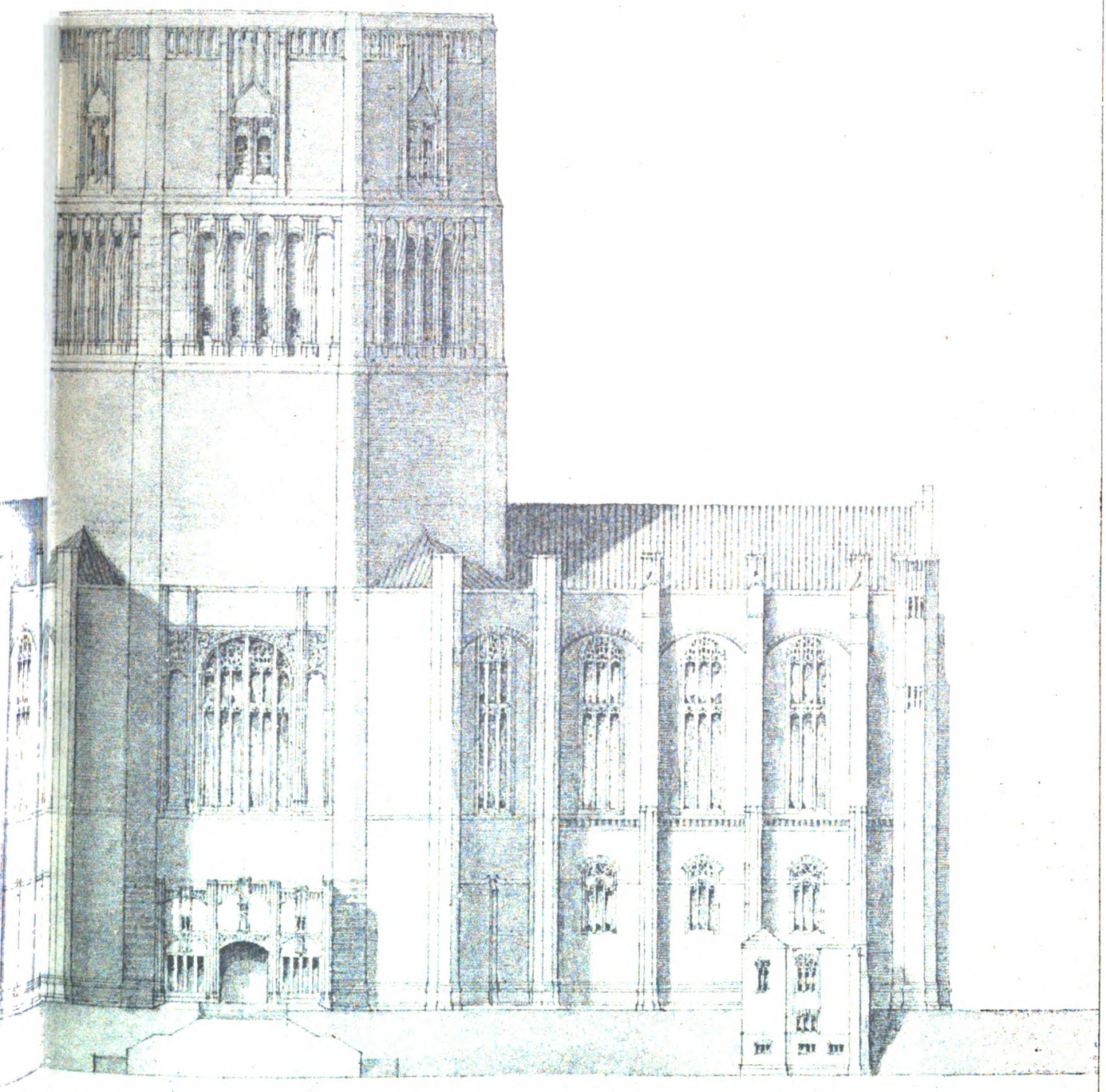

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A. H. Skipworth, Archt.
5 Staple Inn. London. Lith.

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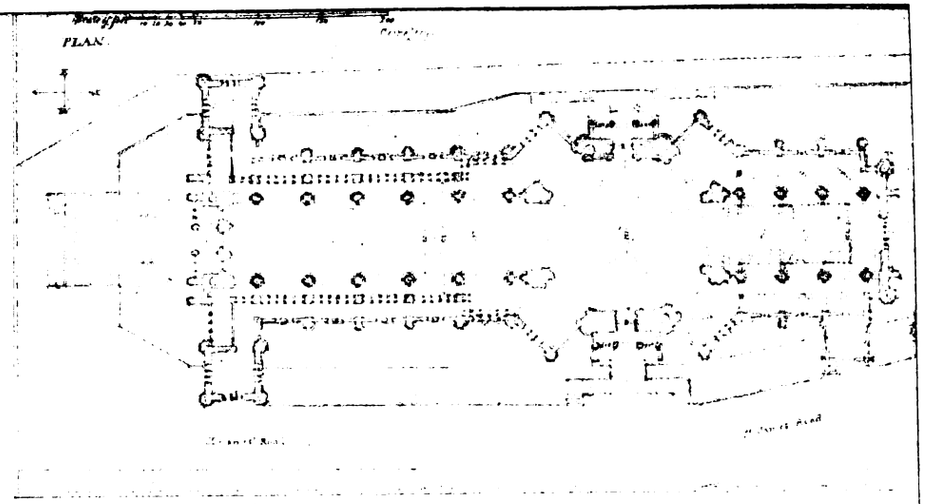

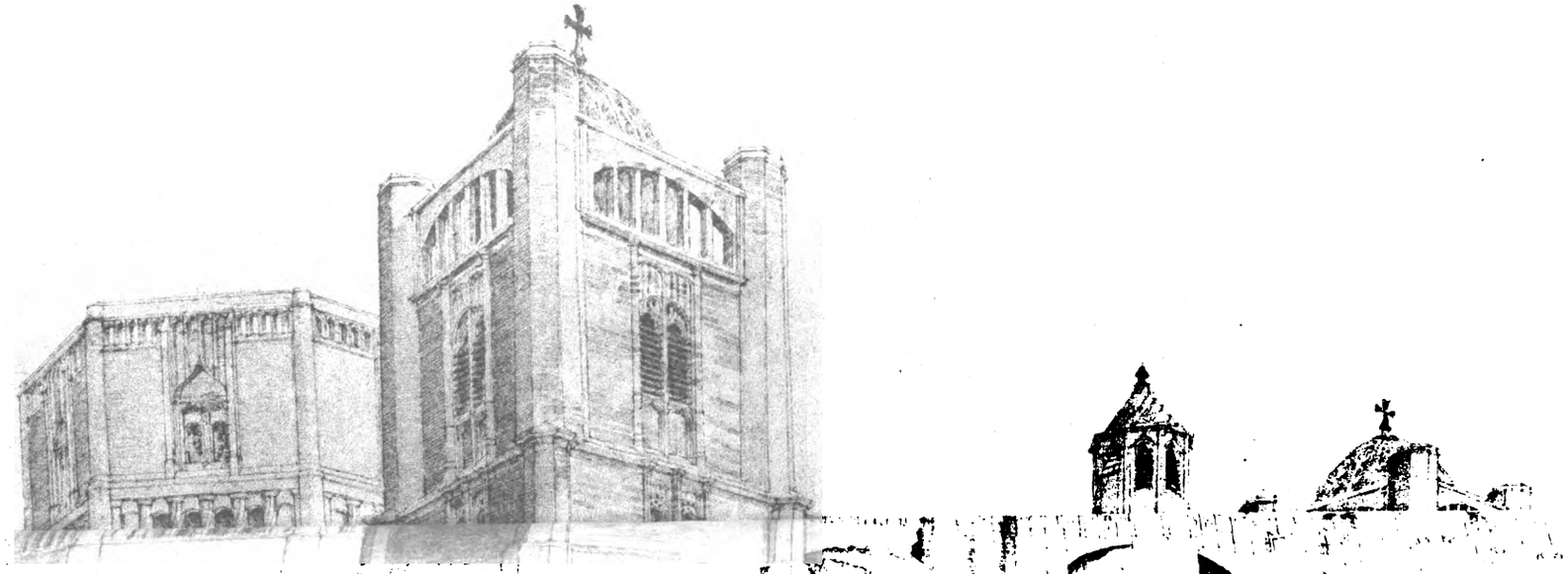

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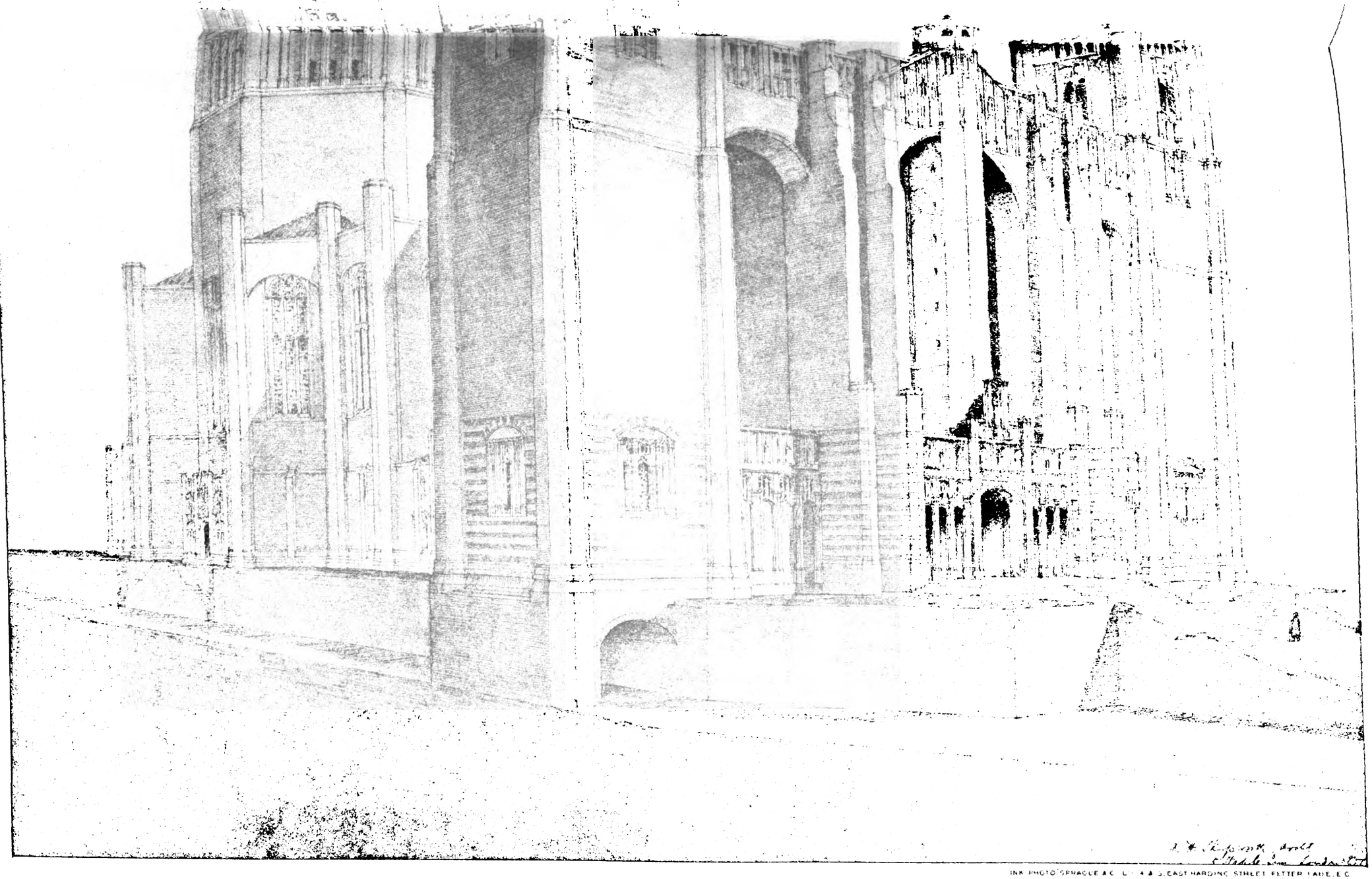

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The Builder.

VOL. LXXXV.—No. 3169. OCTOBER 31, 1903.

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Altar, Cathedral Church of St. Anne's, Leeds ..... Mr. J. H. Eastwood, A.R.I.B.A., Architect.
"The Forest," Balcombe, Sussex ..... Mr. Gerald C. Horsley, Architect.
Beechgrove United Free Church, Aberdeen ..... Messrs. Brown & Watt, Architects.
Design for a Classic Steeple (Tite Prize, R.I.B.A., 1892) ..... By Mr. T. Rogers Kitsell, A.R.I.B.A.

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The Church of St. Michael, Braintree.

HERE is much of interest pertaining to the fine church of St. Michael, Braintree, which may certainly be reckoned among the largest parish churches of Essex. The printed authorities as to the history of this church are (1) Newcourt's "Repertorium" (1710), (2) Morant's "History of Essex" (1768), and an admirable article by the present vicar, the Rev. J. W. Kenworthy, in the "Transactions of the Essex Archæological Society" (1893). As to MS. records, there is a certain amount to be found in the Chantry certificates, Church Goods Inventories, and a few other documents at the Public Record Office; a few further particulars, in addition to those given by Newcourt, in the Bishop of London's Registry; and there is also a valuable old book of Churchwardens' Accounts in lay keeping in the town. It is surprising that no one has as yet attempted a monograph on the adjacent old towns of Braintree and Barking.

The old church of the parish of Raine, or Braintree, founded before the Conquest, stood on Chapel-hill, about half a mile east from the present parish church. Morant, the eighteenth-century historian of Essex, deceived by the terms of a will, and unable to exact history from stone, stated that the present church was first begun to be built in the latter part of the reign of Edward III.; and he has been slavishly followed by the general run of guide-book makers for the county. Morant says that this is proved "from a clause in the will of John de Naylinghurst, of this town, dated April 2nd, 1349, whereby he bequeaths a black bullock to the work of the church." It has very rarely happened, we should think, that a statement as to the age of a church built on so flimsy a foundation has gained such general currency. All students of pre-Reformation wills know that gifts of cattle and sheep to the warden for the general repair fund or work of the church, and occasionally to the "stocks" of particular guilds, were of the commonest occurrence throughout England in the fourteenth, fifteenth, and sixteenth centuries. Moreover, the particular year 1349, with at least several years after that date, was an absolutely impossible time for any big scheme of church building, for it was the identical period of the terrible and paralysing visitation of the Black Death. Consequently, the oft-cited reference to the will of John Naylinghurst is absolutely valueless with regard to the architectural history of St. Michael's, Braintree.

The removal of the church from the site on Chapel-hill, where it stood in juxtaposition to the episcopal manor house, was doubtless brought about by the growth of the town in its present position. In 1190 William St. Mary, who was Bishop of London from 1198 to 1221, obtained a charter from King John for a market in the new town on the main road to London. The first building of the church took place soon after this date. The records in stone point undoubtedly to the erection of a fabric of some magnitude in the new English Pointed style during the first quarter of the thirteenth century. The ground plan of this church was a west tower, nave with north aisle (and possibly south), and chancel. The total interior length was 109 ft.; nave, 52 ft.; and chancel, 40 ft. The width of nave and chancel was 22 ft.

Of this early thirteenth-century work the highly interesting and uncommon tower is the chief remnant; it measures about 20 ft. at the base externally, without the buttresses, and is of three stages. The strong plain angle-buttresses, with two sets-off, reaching to the level of the top of the fine single lancet that lights the basement in the west wall, are obviously original, though the stops of the chamfered edges have been renewed during restoration. The wall material is an interesting amalgam of undressed flints, pebbles of various sizes, Roman bricks, and varied bits of stone, with good quoins of dressed stone, many of the original ones being from the famed Barnack quarries of Northamptonshire. Above the buttresses the angles of the tower are formed of alternate ashlar and small mediæval bricks. The second stage, or ringing chamber, is lighted by small lancets with circular arches within; while the top stage or bell-chamber has two tall lancets on each side, with a row of three circular sound-holes above them. These obtuse lancets have circular arches within, a by no means uncommon strengthening arrangement in Early English towers of even later date than this. The sound-holes, a most striking feature of the tower, have large semi-circular arches over them within and straight jambs without any splay. At the east end of the chancel are two buttresses, which, though much trimmed and renewed during restoration, are certainly in the main of the same date as the tower. Below the new east window is a short central buttress of the like style; but this does not appear in a lithograph view of the church, *circa* 1850, so we must conclude that this is an insertion of 1866. During that restoration considerable remains of a triple lancet window came to light in the east chancel wall. There is an arcade of three arches on each side of the nave, supported by two octagon pillars at the west and two circular pillars at the east. The pillars on the north side rise from squared bases 2 ft. 6 in. high that have belonged to an earlier arcade. The mouldings of the capitals and the arches themselves are undoubtedly fourteenth century, probably in the second quarter, when a considerable reconstruction of the church took place. The archway into the tower was altered at that date, and possibly the south aisle has no earlier origin. There was also a clear-story to the nave of the same style.

The north chapel, opening into the chancel, at the east end of the north aisle, was built between 1380 and 1404, as is known from three most beautiful heraldic bosses taken down from its roof at one of the unhappy restorations, and now carefully preserved at the vicarage (see illus-

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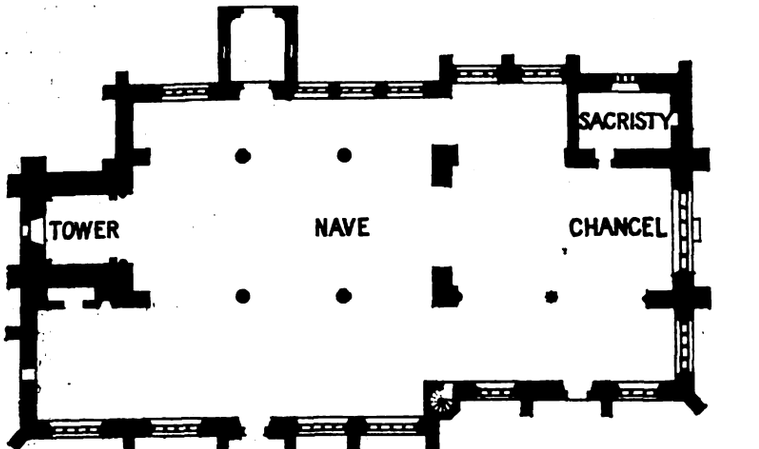
Braintree Church: View from South-east.



Plan of Braintree Church.

tration). These oak carvings possess so high an artistic merit that the South Kensington authorities have recently had casts taken from them for the Victoria and Albert Museum, and they were exhibited before the Society of Antiquaries in 1895. In each case the shield is surrounded by admirably treated vine trails. One of the bosses is charged with a chevron with a label of three points, which are probably intended for the arms of Hanningfield; another bears on a bend doubly cottised, three eagles displayed, for Badewe; and the third seven mascels conjoined within a bordure, the arms of Robert de Braybrooke, Bishop of London from 1381 to 1404. This north chapel was dedicated to St. John Baptist, and was a chantry foundation.

In the days of Henry VIII., when the wool trade and general agriculture of the district were prospering, and when the pilgrims on their way to the great East Anglian shrines of Bury St. Edmunds, or of Our Lady of Walsingham, or the Rood of Bromholm in Norfolk, were very numerous, the town of Braintree enjoyed no small repute, its population increased, and its prosperity was reflected in works on the parish church according to the taste and style of those days. Between 1522 and 1532 a large south porch was built, and the old south aisle was widened and lengthened a bay to the west against the side of the tower. A fine new clearstory over the nave arcades was built about this period, and also a new east window to the chancel, which must have afforded great opportunities for the display of painted glass then so popular. At a yet later date, namely, between 1532 and 1535, a large south chapel, termed the Jesus Chapel, was added to the chancel. The roof of this chapel, which is in good condition, has three noteworthy bosses; the western-most shows the crowned monogram of the Blessed Virgin, the next bears the arms of the Grocers' Company (a chevron between nine cloves), granted in 1531, and the third three shields conjointly pertaining to the Rochford family. In the late Tudor days this church, with its many altars, wealth of coloured glass, great rood-screen and rood, and chantry parcloses must have presented an imposing appearance. Morant says: "There were above twelve obits founded in this church; and also several guilds and fraternities; particularly those of Jesus, of St. John Baptist, of Crispin and Crispina, a Plow Guild, a Torch Guild, and a Guild of Women of Our Lady's Lights, to which belonged an alderwoman and two wardens."

Soon after the founding of the Jesus Chapel came the suppression of the guilds and chantries, and the rule of those under whom the fabric, as well as the fittings, of the church were long neglected or repaired after the most niggardly fashion. Nevertheless, this church retained much beauty of outline, and much that told of the substantial work of successive periods. In the vestry is a large lithograph, *circa* 1850, which gives an excellent idea of the church before it had undergone the numerous and severe restorations of the second half of the nineteenth century. It is a south-east view, and shows a decidedly good Perpendicular

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a.—Hanningfield Shield: Chevron and label of three points.
b.—Shield: On a bend double cottised three eagles displayed.
c.—Braybrooke Shield: Seven Mascels conjoined within a Bordure.
(The bosses are in the possession of the Rev. J. W. Kenworthy, V Braintree.)

Oak Bosses, North Aisle Roof, Braintree.

and embattled south porch; flat roofs to south aisle and south chapel, with debased battlements; a fine clearstory, with lofty pointed windows of three lights; the tower and spire as now; and a very good five-light late Perpendicular east window to the chancel.

The condition of the church having become somewhat dangerous, the late Mr. Pearson, R.A., at the beginning of his remarkable architectural career, was called in to make a report in the year 1856; but it was not until 1864-6 that his scheme was carried out. It was a most drastic one, and there can be no doubt that, later in his life, the alterations that he recommended would have been far less extensive and conspicuous. His restoration involved a new and much wider chancel arch; the providing of the aisles and the east of the chancel with new windows; the entire removal of the fine early sixteenth-century clearstory; and the destruction of the substantial south porch. New south and north porches were provided, and the whole of the new work, including the clearstory, and a large number of windows, were designed after the style of the later Decorated period. A high-pitch roof was given to the south aisle, and the north aisle was widened by eight feet. No doubt there is much excellent designing in the new work, but it is rather sad to think that so very much sound dated work of the first half of the sixteenth century was swept away, more especially the south porch and the clearstory. Two north windows of the north chapel, *temp.* Richard II., of somewhat unusual design, were allowed to retain their casing frames, though much of the mullions and tracery has been removed. The Henry VIII. south chapel was in too obviously good repair to brook much interference. It may here be remarked that there is a good turret at the west end of this chapel, in the south wall, which carries the stairs for the rood loft. That loft was gained by crossing over the screen at the entrance to the Jesus Chapel.

It remains to notice two other material points of this church. The early thirteenth century tower was obviously constructed to carry some broached covering with eaves, however low, for it has never had a parapet. Now, as for many a century, the tower is crowned with a well-proportioned broached spire of octagon shape, covered with shingles, which reaches to a height of 120 ft. This spire is of decidedly later date than the tower. Previous to 1866, instead of resting entirely on the wall plates as it now does, the spire was supported on great oak timbers, rising from the basement in the inner angles of the tower. This was a method generally adopted in many parts of Hampshire, as well as Essex and other parts where wood was plentiful and stone rare, to carry belfries and spires in the fifteenth century; and we have little doubt that the older parts of the timbers of this spire are of late fifteenth century date. The striking feature of this spire is the protruding bell-cot high up on the east side. There are a few other examples of this arrangement in Cambridgeshire, Suffolk, and Essex. Here hung the sanctus bell in old days; the old bell now serves for the clock, which has a one-hand face on the west side of the tower. The tower has now a good ring of eight bells; two new ones were added in 1899.

On the north side of the chancel is an interesting vestry or sacristy of two stories, which is somewhat of a puzzle to understand. It is clear from the exterior that it originally was a lean-to of only one story. The pointed doorway into it in the north chancel wall may be thirteenth century, of the same date as the tower, but in some ways appears to be later in the same century. The upper room, which has a modern floor and fireplace, is lighted in the east wall by a widely splayed short lancet. This seems undoubtedly to have belonged to the first one-storied vestry, and it was probably raised up here when it was rebuilt in the fourteenth or quite early in the fifteenth century. It was at that time customary to have the deacon or one of the minor church ministers sleeping in a parvise over the porch, or in some other chamber of the church to watch over the fabric and its contents in all important churches. At Braintree there was no parvise, and in the lower part of this sacristy the valuables would be kept, whilst the upper chamber would serve for the watching minister's lodgment. The solid and well-strengthened door into this sanctuary out of the chancel dates from the time when it was raised. Possibly the closing ring and plate have been taken off from the first door and re-used, and the same with the good keyhole plate; they both seem earlier than the hinges; two holes that look as if they had served for a knocker have been obviously cut in the door at a later date. The outer and ornamented side of the door is on the chancel side, as would naturally be expected; there is a like arrangement of a sacristy door at the neighbouring church of Witham, and in various other churches in East Anglia, Derbyshire, Devonshire, and elsewhere in cases where these early chancel sacristies remain. One good modern feature of this vestry must be noted with strong approval. In 1866 a new octagon font was introduced as a successor to a mere pedestal font of small dimensions and *circa* 1700 date. But this diminutive font was decidedly good of its kind, with a good cover, so that apart from associations it was quite worth preserving. The present vicar has found a suitable use for the head and cover of this font; it has been placed in a niche and serves as a vestry piscina.

In the north chancel wall, not far from the door into the vestry, an interesting aumbry has recently been found when a new imitation Early English one of good design was being placed there. The peculiarity of this aumbry is its oblong shape. It is rectangular, and is 3 ft. 7¾ in. long by 11 in. wide; the groove and slits for fasteners of a door-lid remain.

Outside the church, in the east wall of the Jesus Chapel, is a peculiar recess with a depressed arch, 3 ft. from the ground and under the east window. The recess is 50 in. wide by 44 in. high. The sill or base stone of the arch is 1 ft. 4 in. wide; a little to the right of the centre of this sill-stone is a circular depression 8 in. in diameter, and 1 in. deep, with a drain. It is impossible that it could have served as an altar, nor could there well have been any washing of altar or other church linen in such a place, and there is no trace of it ever having been covered in. The vicar, Mr. Kenworthy, offers an ingenious, picturesque, and certainly not impossible theory of explanation, in support of which certain analogies might be cited. The pilgrims on their road to the great East Anglian shrines, when visiting Braintree church, may have had their feet washed here by the master of the Jesus Guild.

The monuments of the church are of no special account or importance, save a good Classic mural monument against the north wall of the chancel to John Hawkins, Alderman of London, who died in 1633. It is an early instance of the self-advertisement of the sculptor, as "Francis Grigs fecit Anno 1645" occupies a conspicuous position below the main inscription. Near this is a brass inscription, excellently lettered, recording the death in 1677 of Thomas Wilson, of Jenkins Hall, with various interesting genealogical particulars. This plate was firmly affixed to its proper stone in the chancel floor before 1866, but when Mr. Kenworthy came to the parish in 1883 it was being used as a small-coals shovel in the coal hole. In the same situation were found three good marble mural slabs of eighteenth and nineteenth centuries, each to persons of position in the town, which had been thrown aside amid the coal and refuse when all memorials from walls and floors were removed at the chief restora-

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tion date. The vicar has recently replaced these in the north chapel at his own cost. In the north-east angle of the south chapel is a small mural memorial, with a delightfully designed border to Thomas Sturgeon, surgeon, 1742. Close to it is a small tablet to Rev. Daniel Copsey, 1826, a great Coptic scholar, with the text: "That they may have endless life," in Coptic letters. It is appropriately placed in this position, for in this chapel, long fitted up as a two-storied school, which remained until 1866, Copsey received his education.

Outside the chancel, on the east side, is the tomb of Samuel Collins, vicar of Braintree from 1610 to 1661, who died in 1667. He was of some note, and had a controversy with Laud, to whom he eventually submitted. He was confounded by Newcourt with a more celebrated namesake, who was Provost of King's College; but the Cambridge Professor died in 1651. On the church wall above this tomb is a brass inscription to the vicar's son, a man of much distinction and the author of "The Present State of Russia,"—"This grate was ordered to be set up by ye last will and testament of Samuell Collins, late Dr. in physick, eldest son to Mr. Samuell Collins, vicar of this parish, here under buryed, who served above nine years as principal physician to ye great Czar or Emperour of Russia, and after his retyrne from thence taking a journey into France, dyed at Paris, October 29th, 1760, being the 51st year of his age."

This church has undergone various minor alterations in good taste and of good local design and execution during the incumbency (since 1883) of the present vicar, Rev. J. W. Kenworthy. In 1886 the south chancel chapel was extended to accommodate the organ; and a parish room or large vestry has been unobtrusively added at the west end of the north aisle in 1894. At the latter date a fine oak reredos, excellently carved by Mr. Parmenter, of Braintree, was placed behind the altar; it is continued on each side by oak wings at an oblique angle, a new and somewhat bold experiment, but the effect is good. A wide single-light east window, clear of the vestry, has been put by the vicar in the north chapel, designed like the old ones in the north wall. The glass is a particularly good example of the later work of Messrs. Clayton and Bell.

THE ENGINEERING STANDARDS COMMITTEE.

STEADY progress is being made towards the accomplishment of the gigantic task undertaken by the Engineering Standards Committee. In the recently settled particulars of tramway rails and fish-plates, there is evidence of much hard work. In addition to defining standard sections of such material, two specifications are given, one applying to rails and the other to fish-plates. In these the following, among other points, are dealt with: chemical composition of the steel, manufacture, weight, and general dimensions of rails, testing, making holes for bolts and electric bonds, mechanical treatment, and facilities for inspection. The sheets describing the standard sections contain full-size sectional drawings, dimensioned down to the most minute detail, and the rails now recommended cover only five sections, from 90 lb. to 110 lb. per yard, for straight track, and five sections, from 96 lb. to 116 lb. per yard, for curves. A separate drawing is given for each of these sizes, and the last sheet of the series illustrates a standard tyre profile for tramcar wheels. The sub-committee by whom this subject has been considered, is under the chairmanship of Mr. Howard-Smith, and the committee on rails, by whom the findings were approved for submission to the main committee, is presided over by Sir John Wolfe Barry. It would be impossible to over-estimate the value of the series now definitely settled. A further evidence of progress may be found in the Report on Standard Locomotives for Indian Railways forwarded to the Secretary of State. The lack of standardisation in this department of work has long been a source of trouble, and we are glad to find that an approach towards uniformity is being made. In transmitting this report the secretary of the committee pointed out that although the consulting engineers and manufacturers had placed their personal services at the disposal of the committee, the compilation of the resolutions, together with the necessary calculations and drawings, involved great expense. On these grounds it was suggested that a grant of 1,000*l.* should be made by the Government of India. We are pleased to learn that the suggestion has been duly acted upon, and that the grant was accompanied by an official acknowledgment of the valuable work performed by the committee.

The sub-committee on electrical standards have published the following recommendations on standard direct current pressures and standard frequencies:—

"1. That the standard direct current pressures, measured at the consumers' terminals, be:—
110, 220, 440, 500 volts.
2. That the standard direct current pressures, measured at the terminals of the motors, be:—
For tramways 500 volts.
For railways 600 volts.
3. That 25 periods per second be the standard frequency for:—
(*a*) Systems involving conversion to direct current by means of rotary converters.
(*b*) Large power schemes over long distances.
(*c*) Three-phase railway work, where motor gearing and the inductive drop on the track rail have to be considered.
4. That 50 periods per second be the standard frequency for:—
(*a*) Mixed power and lighting on town supply mains.
(*b*) Ordinary factory power plant.
(*c*) All medium size power plant where rotary converters are not employed."

It will be seen that if these recommendations are universally adopted a very considerable step has been taken in the direction of uniformity. For example, in a five-wire distributing station there would be no choice of pressures, 440 volts between the outer mains being the only permissible pressure. In a three-wire system the choice would only be between 220 and 440 volts across the outer mains.

We are puzzled to account for the 500 volts in the first of the above recommendations. It may possibly be meant to cover the case of tramway companies supplying power to private consumers, as we can hardly suppose that electric supply stations are going to supply consumers with power at this pressure by special mains. The fixing of 500 volts and 600 volts for the standard pressures for tramways and railways is to be commended, but in actual working we suppose that a 10 or 20 per cent. variation either way must be allowed.

The frequencies adopted for the standards for alternating current work are those which electricians expected. A good deal, however, has to be sacrificed in order to obtain uniformity. Arc lamps, for example, with hard carbons always flicker perceptibly when the frequency is as low as 50, and transformers for low frequencies are more expensive than for high frequencies. Perhaps the adoption of 25 as the standard frequency for alternating currents for power transmission plant is the recommendation that is most open to criticism. We know of some power transmission plants which are working satisfactorily with a much lower frequency, and, in our opinion, the lower the frequency the less liability is there to a breakdown from the resonance effects which are sure to occur when underground cables are used.

We wish the sub-committee had given us some of the arguments for and against their conclusions; they would be more instructive than the mere statement that the leading manufacturers and consulting engineers were in favour of them. Apparently the consulting engineers are quite prepared to change their every-day practice in order to secure uniformity. We are told that after carefully weighing *all* the arguments in favour of a third frequency the sub-committee "decided not to recommend the adoption of more than two frequencies." In the excellent report of the committee on standardisation, issued by the American Institute of Electrical Engineers, three frequencies are recommended, and so some explanation of why only two are recommended in this report would be welcome. We are glad, however, that definite conclusions have been arrived at, and we hope that in their final report the reasons for the recommendations will be given.

NOTES.

Kentish Coalfields. At a recent sitting of the Coal Commission, Professor Boyd Dawkins gave some interesting evidence as to the existence of workable coal in the South-East of England. Considering the results afforded by the various borings that have been made in this part of the country in connexion with recent discoveries in France and Belgium, he arrived at the conclusion that there certainly was a coalfield, or series of coalfields, ranging from Dover in a north-easterly direction, and although unable to give any idea of its commercial value, he thought it would prove to be within workable depths. Professor Boyd Dawkins strongly advocated the advisability of further borings with the object of ascertaining the value and extent of the coalfields, the exploration of which he properly considered to be of great national importance. Since 1890, when the first seam was proved at a depth of 1,190 ft., in the vicinity of the Channel Tunnel, substantial progress has been made. The boring was continued until February, 1893, when the depth of 2,333 ft. was attained, the result so far being the discovery of nearly 22 ft. in ten seams, of coal comparing favourably with Welsh and Staffordshire coals. The sinking of a shaft was carried to a depth of 1,095 ft.,

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but owing to difficulties arising from the influx of water the capital of the company became exhausted, and operations were stopped in 1901. Last year the company was reorganised, and work is now going on with renewed energy. Two large shafts are being made on the Kind-Chaudron system, the working of which is quite independent of water; and, as a matter of fact, the pit is at the present time full to within about 200 ft. of the bank. It is considered probable that thicker seams of coal lie below the 4 ft. seam known to exist at 2,235 ft. from the surface, and the engineer entertains hope that an 18 ft. seam of iron-ore, found at a depth of 600 ft., will prove to be a valuable asset. It is too early to venture upon any definite prediction, and we must await more tangible results before giving way to undue elation.

The Philæ Temples.

It is satisfactory to learn from official sources that no subsidence has taken place, so far, in any of the underpinned buildings on Philæ Island. This result is one upon which we may congratulate Dr. Ball, of the Egyptian Government Service, and Mr. Talbot, the expert placed in charge of the works on the recommendation of Sir Benjamin Baker. We regret to observe, however, that the sandstone blocks, which are now inundated by the waters of the new reservoir, are found to absorb water to a most serious extent. In some places the damp has risen by capillary attraction to a height of some two mêtres above the highest water-level, and this is certainly a most disquieting development. Since the underpinning works were completed last year, repairs to the superstructure of the temples have been executed under the supervision of the Director-General of the Antiquities Department. These repairs consist chiefly of cement pointing, and can scarcely be considered as adding to the beauty of the buildings, and unfortunately the pointing has been introduced in some parts that are several mêtres above the highest possible level of the water. Some injury was caused last year by tourists in trying to pass through portions of the temples in boats, but this practice has now been prohibited by the authorities.

Temple of Apollo at Thermon.

The new number of the *Ephemeris Archaioligikè* (1902, Parts I. and II., pl. 1-6) is notable for the publication—long expected—of the painted terra-cotta metopes from the Temple of Apollo at Thermon in Ætolia. The temple, it will be remembered, was excavated by Mr. Sotiriades some four years ago, and the painted metopes have since lain in the National Museum at Athens. The upper portion of the structure was of crude brick and wood; the columns were originally of wood, and were gradually replaced by columns in stone. In this and other architectural particulars the temple of Thermon is analogous to the Heraion at Olympia. A cornice of terra-cotta ran round the temple, and was adorned with heads, alternately male and female, the male heads serving as water-spouts. The metopes are all in painted terra-cotta; some appear to be from the earliest temple, and date back to the end of the seventh century B.C., others may belong to the period of restoration. The subjects represented are, Perseus, with the head of Medusa quaintly tucked away under his arm; a large Gorgon's head of primitive type filling the whole space; a man bearing the sports of his hawking over his shoulder; three seated divinities and a group of two women, one of them inscribed Chelidon, the "swallow," which probably refers to the slaying of Itys. As regards technique, the figures are drawn in black, red, and white, on a buff ground. The style closely resembles that of early Attic pottery. We realise in the presence of these metopes the close dependence of Greek ceramics on the larger art of monumental painting.

British School at Athens.

The annual meeting of the British School at Athens took place on Thursday last week, too late to be included in our issue of October 24; and as a report of it was published in the daily Press a week ago, we may content ourselves here with some general observations; but we have reprinted the *résumé* of the Committee's Report, from the *Times*, in another column, in order to put the facts on record. Professor Butcher, who occupied the chair, though not, as he averred, a professed archæologist, delivered a charming little address giving an account of what had been recently done, and including some remarks on the value of archæological study in its bearing on historical and anthropological study; and speaking as a man engaged in University education, he gave some gratifying testimony as to the manner in which archæological study had recently been taken up by some both of teachers and students at Oxford, and of the manner in which both admitted the greatly increased interest and reality in historical study which they found from some knowledge of the work carried out by the peoples with whose history they were dealing. This is indeed almost the most valuable function of archæology study, that it quickens the imagination as to the real nature and doings of people whom the mere historic record seems to leave at a distance from our perceptions. Mr. J. L. Myres gave an interesting talk on the discoveries during the excavations he had conducted at Petsofá, at the eastern extremity of Crete, with lantern illustrations of many of the objects found. Among these were various types of vases, some of them exceedingly curious in their decorative representations of marine life and vegetation. A number of figurines of men and women were also shown—terra-cottas of a very early period, yet showing, among the crudely executed draped female figures, most unexpected resemblances, in a semi-grotesque way, to modern types of ladies' dress. The meeting was largely attended and in every way a very successful one.

The Destruction of Cheddar Cliffs.

In a utilitarian age, such as the present, no place of natural beauty is secure against the attacks of those to whom pecuniary gain appears to be the primary object of life. Near Buxton, the beauty of Chee Dale is being spoilt by quarrying operations, the fine limestone cliffs of Ashwood Dale are being blasted and carted away. That magnificent bluff, the Lion's Head, once overlooking the town, has entirely disappeared, and the work of ruthless destruction is extended year by year to adjoining cliffs and rocks. On the heights of Leckhampton, the quarry proprietor makes haste to destroy one of the most prominent features of the hills surrounding Cheltenham, and the unrivalled cliffs of Cheddar are slowly but surely succumbing to persistent attacks. Those who know the neighbourhood are well aware that, for some years past, the beauty of the Cheddar Cliffs has been seriously marred by quarrying, but things have now reached a critical stage. A new development of industrial activity has taken place. Quarrying and stone-crushing operations are being conducted along both sides of the gorge on a scale of great magnitude, and by the aid of the most modern engineering appliances. This is at the finest part of the pass, where the cliffs were formerly precipitous on either side. Huge masses of rock are being torn away, altering the entire aspect of the scenery, and stone-crushing machines are at work, constituting a nuisance to foot passengers and a danger to vehicular traffic. Unless prompt action can be taken it is quite clear that one of the greatest natural beauties of the West of England will be totally ruined. An appeal on the subject has already been addressed, by the National Trust for Places of Historic Interest or Natural Beauty, to the County Council of Somerset, and letters have been sent to the County Councils of Bristol, Bath, and Wells, and to other local authorities in the neighbourhood of Cheddar. Some of these bodies express the hope that the owners of the cliffs may be induced to recognise the importance to themselves, the country, and the general public, of preserving so unique a site, as far as possible, in its natural condition. But we have no hope that the owners will ever be brought to so desirable a conclusion. The only practicable way of preserving the cliffs from further injury is to buy them, or to make suitable compensation for the cessation of quarrying.

Rights over Party Walls.

The case of *in re* Stone and Hastie, reported in the current "Law Reports," contains an important decision of the Court of Appeal on a point under the London Building Act, 1894. The appellant was the lessee of a house in Queen-street, Mayfair, who held the premises on a lease for twenty-one years from certain trustees who were the owners of the premises. There was a party wall between this house and the adjoining premises which had been raised by the owners before this lease was granted. During the currency of the lease the adjoining owner had pulled down his house and rebuilt it in such a way that he made greater use of this party wall than was the case before. He had served a notice on the appellant under Section 90 of the London Building Act, 1894, and the appellant had resorted to arbitration under Section 91. The arbitrators had awarded the appellant a certain sum in respect of damages sustained by the premises, and on this head no question arose, but they had further awarded him a sum of 38*l.* 10s. 6d. in respect of the extra use made of the party wall by the new building. The decision of the Court is that this latter question was not within the jurisdiction of the arbitrators, and that their award on that

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point was invalid, and that the provisions contained in the London Building Act for throwing a proportion of the expenses on an adjoining owner in respect of extra user of a party structure only apply to the recoupment of an owner of the structure, and have no application to a tenant.

The Glasgow Railway Accident.

A Board of Trade report, issued last week, gives the result of the inquiry conducted by Colonel Yorke into the disastrous collision that occurred in July at the St. Enoch Station, Glasgow. The collision is now attributed to want of care on the part of the engine-driver, in entering the station at excessive speed, and to inattention on his part as to where he was going. So far as the rules of the Company are concerned, there is no fault to be found, for they stipulate that the speed at which a train is to enter the station shall be such that it can be stopped at any point by the hand-brake. In this case, it was proved that the train entered at a speed of between twelve and fifteen miles an hour, which is clearly too high for control by any hand-brake. The train might have been stopped by means of the continuous brake, but the driver apparently forgot that the platform to which he had been signalled was a short one, and therefore he did not apply the continuous brake until too late to avert a catastrophe. No useful moral can be drawn from the circumstances revealed, except that careful attention to rules, and rapid-acting brakes are to be desired. In concluding his report, however, Colonel Yorke makes the suggestion that the time has now arrived for a reconsideration of the brake question in this country. Bearing in mind the increasing speeds and weights of trains, it is quite clear that the importance of rapid brakes cannot be over-exaggerated. Railway companies are most conservative in their attitude towards improvements, and it is certainly surprising to find that the chief companies are still fitting their rolling stock with brakes that were introduced a quarter of a century ago, to the exclusion of improved modern types.

The "Strangers' Hall," Norwich.

Seven years ago, as we mentioned at the time, the Charity Commissioners gave their sanction to the sale of some trust property at Norwich, in which was included the house, known as "Strangers' Hall," which forms a highly interesting example of a merchant's residence in the fifteenth century. The building has been recently rescued from destruction by Mr. Leonard Bolingbroke, who has caused it to be repaired, and has equipped one of the rooms with an old loom and other exemplars of the Norwich weaving industry. The house resembles some that remain at Salisbury, Bristol, and elsewhere in Western England, and for some period served for the meetings of the ancient Guild of St. George. Its history during more than four hundred years past is ascertained; yet there is no record of its occupation by the Walloon and Dutch "strangers" who found refuge in the city from the persecution of the Duke of Alva in 1565. The hall has latterly been occupied as a grocer's shop, a business with which it was associated from its earliest days, and stands in Charing Cross between the churches of St. John, Madder-market, and St. Gregory. In the former church are the monument and brass (1540) of Nicholas Sotherton, grocer and Mayor, who owned the premises, and whose merchant's mark still exists there. A finely carved doorway opens into the outer court-yard, the entrance—gained by a flight of stone steps—is through a richly groined porch. The principal apartment presents the customary features of an oriel window, a gallery, and screen with the kitchen door and buttery-hatch at the east end, and has a king-post roof. In the former half of the seventeenth century Francis Cook, alderman and grocer, added a room on the garden side, with two rooms above it, providing, for approach to the latter, the staircase in the bay of the hall. In or about 1660 a doorway was cut through the west side of the hall for communication with the apartments at that end; some years afterwards that portion was somewhat modernised to serve as the Judge's lodgings. The collection of exhibits comprises many curious specimens of old furniture and household tools and appliances, some water-colours by Stark, and examples of the Norwich School of Artists. Beneath the hall are a crypt of three bays and some cellars which, together with the kitchen and buttery, are older than the hall itself, and are supposed to be portions of the house of Roger Herdegrey, city-bailiff in 1360, who lived on that spot

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King's College Hospital.

The proposed removal of King's College Hospital to the south of the Thames is noticeable as being the first recognition of the propriety of the London Hospitals being located with some reference to the needs of localities, and with some approach to a definite system. Nothing is more curious, when the question comes to be considered, than the erratic way in which hospitals as buildings are placed in London, and the time will certainly come when some kind of systemisation of existing and future buildings of this kind in London must take place. The removal of this building, when it occurs, will give a valuable space for legal offices, and some part of it should be secured by the Government for the purpose of relieving the existing Law Courts when the necessity shall arise. It might be desirable also to remove the Westminster County-court House from St. Martin's lane to this locality, but unquestionably it is proper that some part of the site should be reserved for public purposes, and in any rearrangement of the buildings on it the approach from Lincoln's Inn Fields should be improved. This is the usual means of access, and a very bad one, from the north-west of London to the Law Courts, and especially to the Bankruptcy Court

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The Museum of Practical Geology, London.

Having been closed during some weeks past, the Museum in Jermyn-street is again opened to the public. During the recess some important structural alterations of the interior have been effected. The changes include the abolition of the lecture-theatre, and the division of its space into two floors, of which the lower floor is fitted for storage purposes, whilst the upper floor will be ultimately devoted to the display of exhibits, though it is for the present allotted to the use of the staff of draughtsmen engaged upon the Geological Survey. The theatre, having a capacity of 600 seats, constituted a notable feature of the building, which was erected fifty years ago, after Sir James Pennethorne's plans and designs as a museum and office of mining records attached to the Geological Survey of the United Kingdom, at the instance of Sir Henry de la Beche, Honorary Director of the Survey. The museum was originally established, in 1835, at a house in Craig's-court, Charing Cross.

The Goupil Gallery.

The exhibition at the Gallery which still retains its old name of "The Goupil Gallery," though now under the management of Messrs. Marchant and Co., consists mainly of landscapes in the broad style, largely represented by modern Dutch art, which finds special favour in this Gallery, where the exhibitions are always intellectually interesting, though often sprinkled with some works in which breadth has degenerated into sketchiness. One of the first things to note, in the vestibule, is a fairly large landscape by Mr. Mark Fisher (3), with its usual life-like glitter of light on foliage, cattle, and the luminous bit of water which forms the centre of the scene. The "Autumn Evening" (6), by M. Westerbeck, jun., close to this, is a beautiful effect of evening light, but obtained with a peculiarly dry manner of painting which forms a curious contrast to Mr. Fisher's style; but contrasts of this kind are interesting as exemplifying the wide range of the art of painting in its manner of translating nature. In the larger room are a good landscapes by M. José Weiss, mostly small works, remarkable for power of composition and breadth of effect—notably "The Old Bridge" (18), "Green Pastures" (34: not much "green" in it, however), and "Morning by the Pond" (35). His two small uprights, "Morning Light" (22) and another which forms a pendant to it, are somewhat too much like Corot at second-hand. M. Jacques's "The Old Oak" (28), is a grand though comparatively small forest picture, in a sombre but powerful style which recalls another period of art, and suggests an "Old Master." In strange but effective contrast to this hangs next to it Daubigny's lovely and delicately painted little landscape, "Ferme au bord de l'Oise" (29); another example of the infinite variety of the art. Ter Meulen's "Le Troupeau" is a fine picture, exactly cut into two parallel halves by common and sky; a sort of treatment which in the last generation of English painting would have been scouted as showing want of sense of "composition," but it renders truthfully one kind of aspect and sentiment of nature. Mauve is represented by a fine study of a cow (54), quite different from the kind of picture usually associated with his name; W. Maris by a slight sketch of "Cattle Drinking" (65) which shows the hand of a master; and Mr. Clausen by a sweet pensive head of a girl under the title "Apple Blossoms" (75). There are a few architectural sketches by Mr. A. G. Webster (77 to 81), and a very bad one by M. Bauer, "Benares" (82),

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a kind of scrawl which has no business in a serious exhibition. A special feature of the exhibition is a collection of fourteen landscapes, mostly about Barmouth and Conway, by Mr. Robert Fowler, of Liverpool, who exhibits here for the first time, and whose works quite justify his admission. He seems rather to run to one class of effect—landscapes with silvery tones in a somewhat misty sunlight; but his effects are his own, and there is a fine and delicate sense of colour in his works. One of the best of them, "Menai Straits" (43), would be better if the smudgy and almost unintelligible strip of foreground, intended apparently for a range of boulders, were cut off the bottom of the picture; such mere crude indication of foreground detail hardly deserves the name of painting, and certainly does not help the picture. But Mr. Fowler is an artist to be recognised.

Some Drawings of Italy.

At the Fine Art Society's Gallery there is on view a very fine collection of water-colour drawings of Italian subjects by an Italian artist, Signor Alberto Pisa. They show a refined and delicate style of execution both in landscape and in architectural subjects; of the latter class there are many beautiful studies of Sicilian and of North Italian architecture, which have the merit, not always found in paintings of architectural subjects, of exhibiting truthfulness and finish in the architectural details without any hardness of effect. Among these we may particularly mention the interior of "The Palatine Chapel, Palermo" (43), in which we see, among other points, the effective and rather piquant incident of coupled columns, one of which is in a dark polished marble without fluting, the other in a nearly white marble with spiral fluting; an effect which architects in this country who have the good fortune to deal with costly marble might bear in mind. There are one or two other very well executed drawings of the same interior. Another particularly fine one is the interior of the Monreale Cathedral (94); and the small drawing of a doorway with a mosaic lunette over it, at "S Maria in Araceli, Rome" (90), though of a much simpler subject, is equally admirable, especially in the manner in which the texture and colour of the various materials are conveyed. Many Italian scenes in which landscape is combined with building show a true artistic feeling in their composition and their sunlight effect; one of the best in this respect is "Fisherman's House, Capri" (12). A larger drawing of "Capri" (34) is not only a very good architectural scene, but shows, in the truthful manner in which the group of donkeys in the middle of the street is drawn, that the artist has an eye for every class of subject. There are several beautiful views in and about Taormina, though the celebrated theatre ruins seem to be intentionally avoided, perhaps as being a hackneyed subject. There is one little oversight, in the drawing of the columns of the remains of the "Temple of Castor, Rome" (60), which are certainly too slender in proportion; but that is the only criticism we have to make as to the architectural subjects. The whole collection is well worth a visit, and architects should find it specially interesting.

Society of British Artists.

The task of the critic in the Gallery of the Society of British Artists, like that of the policeman, is "not a happy one." One wanders about the extensive rooms to pick out, if possible, something worth serious attention. Mr. F. Spenlove-Spenlove's little landscape and figure (4), though on a hackneyed theme, offers a better promise than usual, for this is really a picture; and there is air and light in Mr. Rex Vicat Cole's "In Springtime" (6), and sense of colour in Mr. Boot's "Evening on Ulleswater" (16). Mr. Robert Morley exhibits a life-size conscientiously executed study of the "Head of a St. Bernard" (40). Mrs. Lea Merritt's life-size group, "Nurse and Patient" (66), is one of the more interesting of the larger works, though rather too white all over for pictorial effect; this effect, however, we take to be intentional. Mr. Ayerst Ingram's large sea-painting "The Isle of Shoals, New Hampshire" (67), appears to be intended to give the effect of sea-water with many shallows in it; perhaps one ought to see the scene in reality before judging of it; to our thinking the sea surface looks rather hard and solid, but Mr. Ingram has shown that he can paint sea, and his effect may be more true than it appears at first sight; special atmosphere, too, has of course a great deal to do with the effect of sea. Mr. Ivystan Hetherington's "Passing Shadows" (119), which are cast over a flat landscape by a mass of warm-tinted cumulus clouds, is a picture with a certain artistic dignity and meaning, far superior to most of its neighbours. We notice also a small very carefully studied coast scene by Mr. Charles Collins, "Nature's Flying Buttresses" (140). Mr. F. Foottet seems to be starting as a *pointelliste* artist in his two works, "The Foreign and India Office" (153) and "To Morning" (206); these are clever in a rather self-conscious manner, the latter apparently intended in emulation of M. Henri Martin, of whom, however, one may say—

"Within that circle none can walk but he."

Mr. W. Cave Day's "A Lady in White" (224), a three-quarter length portrait, is refreshing as a bit of good style and colour. The water-colour rooms contain some good things: "The Market-place, Caudebec" (238), by Mr. W. T. M. Hawksworth; "Highcopwick, Looking through the Clearing Rain" (247), by Mr. Witherby; "The Old Sanctuary, Bayeux Cathedral" (273), by Sir Wyke Bayliss (the President), a truthful piece of architectural illustration, preferable to his pretentious picture of Milan Cathedral in the large room (accompanied by the hackneyed lines which one almost begins to wish Tennyson had never written); "At Wells" (316), by Mr. Wallace Rimington; "The Cathedral of St. Mary's, Iona" (319), by Mr. James Macculloch; "A Bedfordshire Sandpit" (320), by Mr. Sylvester Stannard; "Cottages at Sunning" (342), by Mr. Enoch Ward; "In a Berkshire Village" (344), by Mr. Charles Low; "Children of the Forest" (375), by Mrs. Kemp-Welch; "Sketch of Training Brig, Plymouth" (406), by Mr. Hawkesworth—a very good little bit of work; and a large and highly finished interior, "Ablution Fountain, St. Sophia" (401), a first-rate specimen of architectural illustration by Mr. Arthur E. Henderson. In a general way, however, the things that are the best here would be second-rate in other exhibitions. As to the things one does not like, including some of the largest and most ambitious works in the Exhibition, silence is best.

Mr. F. Dean's Pictures.

The small collection of pictures by Mr. Frank Dean (a name new to us), on view at the Woodbury Gallery, are, as far as one can judge by a very imperfect light, works showing considerable power and breadth of style. The best of them are wooded scenes, with the trees treated in masses of colour with little detail, and a general feeling for composition and contrast. "The Young Bull" (1); "Haymakers" (8); "After Harvest" (9); "Milking Time" (11); are all good landscapes—so far, we must again say, as one can judge by the light afforded. "An Old Sussex Mill" (19) shows both a fine sky and a representation of an interesting old type of building; and "A Yorkshire Mill" (35) is an effective evening scene. But the Woodbury Gallery is really only suited for the exhibition of works in black and white, which can be judged as well by artificial light. For paintings, one has to choose between insufficient light or the wrong kind of light.

The A.A. Conversazione.

The annual conversazione of the Architectural Association was held on Wednesday evening at the Galleries of the Royal Institute of Painters in Water Colours. A very large attendance of members and their friends—who were received by the President, Mr. Henry T. Hare—ensured the success of the evening. Besides the annual exhibition of oil paintings hung round the galleries a selection of work done in the Architectural Day School was also on view. Most of these were noticed by us when the annual competition took place. The drawings were supplemented with an interesting collection of photographs. Between now and the next annual conversazione the Association will be carrying on its work in their new premises, the Royal Architectural Museum.

THE WIDNES AND RUNCORN "TRANSPORTER" BRIDGE.

Early in the nineteenth century a committee was formed by the inhabitants on both sides of the River Mersey, for the purpose of considering the erection of a bridge between Widnes and Runcorn. This committee, which included Liverpool merchants and landed proprietors in Lancashire, Cheshire, and Staffordshire, commissioned Telford to report upon the feasibility of such a project. At that time, Mr. Browne, of the Deptford Chain Cable Works had designed what was really the first chain suspension bridge, and with the co-operation of Telford he had made an experimental bridge of 100 ft. span upon the same principle. This structure was tested and found to be capable of carrying vehicles with perfect safety.

As the practicability of the chain suspension bridge was thus demonstrated, Telford utilised the principle in the designs prepared for the Mersey scheme, and his report, accompanied by plans and estimates, was presented in the year 1817. He also prepared a model of the bridge to the scale of 20 ft. to 1 in., which is still preserved in a building belonging to the Shropshire Union at Ellesmere Port. The bridge was designed for a span of 1,000 ft. between the centres of the two masonry towers, a roadway 30 ft. wide, and clear headway for navigation of 70 ft. above high water level.

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The cost of the bridge was estimated at about 90,000*l.*, excluding the value of land and incidental expenses.

Although the enterprise proved to be abortive, it probably had the effect of directing the attention of Telford to the great possibilities of the chain bridge, and the design prepared at the time to which we refer was the prototype of the well-known suspension bridges at Conway and the Menai Straits.

Several later proposals have been made for providing cross-river communications at Widnes, but without practical result until the formation of the Widnes and Runcorn Bridge Company in the year 1900.

The structure now nearing completion has been designed by Mr. John J. Webster, M.Inst.C.E., of Westminster, and Mr. John T. Wood, M.Inst.C.E., of Liverpool, and is of the "transporter" type. In general design it is practically a stiffened suspension bridge, but as traffic is carried in a travelling car suspended from the underside of the bridge, the approaches are at a low level.

This idea was originated by Mr. Charles Smith, of Hartlepool, who, about thirty years ago, made designs for a transporter bridge for crossing the River Tees at Middlesbrough. More recently a number of bridges on the same principle have been built on the Continent by M. Arnodin, of Chateauneuf-sur-Loire, and one is being built in this country at Newport, Monmouth. It should be pointed out, however, that the Widnes and Runcorn bridge is in no way based on the French model, the similarity of the two forms of construction being limited to the essential principle.

By coincidence, rather than by design, the Widnes and Runcorn bridge has been erected in the same position as that chosen by Telford, and the span is also the same, namely, 1,000 ft. between the centres of the towers. The main towers, each including two steel towers braced together, are situated one on the south side of the Manchester Ship Canal, and the other on the northern bank of the river. They are approached by new roadways extending to the riverside in one case, and to the side of the Ship Canal in the other, and thence by steel viaducts. The earthwork portions of the approaches are built between stone and concrete retaining walls, and each of the viaducts consists of steel elliptical girders, supported by cast-iron columns, carrying steel trough flooring upon which a 35 ft. wood-block roadway and two 6 ft. footwalks have been made. In front of the towers, the roadways have a width of 70 ft., to allow adequate space for marshalling the traffic and for the erection of the necessary buildings.

In describing the two main towers, it will be convenient to refer to them as consisting of four individual towers built in pairs. The towers are constructed entirely of steel, and rise to an elevation of 190 ft. above high water level. Each tower has four main legs, 4 ft. 10 in. square at the base, tapering to 2 ft. 3 in. square at the top, all being securely braced horizontally and diagonally. The legs are spaced 30 ft. apart at the base, and 6 ft. 9 in. apart at the top landing, the deck of which is 10 ft. 6 in. square. Upon the top landing of each tower a circular glazed lantern, 7 ft. 6 in. diameter by 8 ft. high, will be built, and in this a powerful electric light is to be fixed. The two towers of each pair are spaced 70 ft. apart, and are braced together by horizontal and diagonal frames, the four towers forming two main towers.

Four 9 ft. diameter cylinder foundations of cast-iron filled with concrete are provided for each tower, making sixteen foundations in all. These cylinders were sunk to the rock level, which is very near the surface on the Widnes side, and about 35 ft. below the Ship Canal level on the Runcorn side. In sinking the cylinders on the latter side of the river, the use of compressed air was necessary. All the cylinders are firmly bolted to the solid rock, and braced together.

Upon the top of the towers, saddles are provided for carrying the steel cables, the saddles resting on steel rollers fixed in such manner that adjustment will be automatically made for variations in the length of the cables, due to loads and temperature changes. There are two main cables, each consisting of nineteen steel ropes, in turn built up of 127 strands of steel wire. Thus the whole cable consists of 2,413 strands, and its diameter is about 12 in.

A special feature in connexion with these cables, is the unusually high tensile resistance of the steel used, which was specified to be capable of withstanding a tensile stress of 95 tons (212,800 lbs.) per square inch.

The interstices between the strands of the ropes and between the ropes, are filled with a bitumenous compound; the complete cable is similarly protected, and finally wrapped in two layers of sailcloth saturated with bitumen.

In forming the anchorages for the cable ends an excavation was made in the solid rock at each side of the river for a depth of about 30 ft. Three sets of cast-iron anchor-plates were laid in each pit, and when one length of each anchor bar had been placed in position, several tiers of long rails of railway section were piled longitudinally and transversely upon the anchor-plates. Portland cement concrete in the proportion of 1:7, was then filled in to the level of the rails and thoroughly rammed. The succeeding lengths of the anchor bars were then fixed and filled in with successive layers of concrete. The top links of the anchor bars are made in short lengths to permit the formation of a curve leading to the backstays, and cast-iron pillow block is bedded in the concrete at each top joint. Three steel crossheads are provided for the attachment of the anchor bars on one side, and of the cable on the other. To ensure the absolute security of the connexion, each cable is left unbound for a length of about 50 ft. from the end, and the nineteen ropes, with screwed lengths for adjustment, are separately attached to the steel crossheads.

From the main cables, two stiffening girders, 18 ft. deep, are suspended, extending longitudinally from end to end of the bridge, and projecting sufficiently at each end to permit the car to be carried into the terminal stations.

The girders are placed 35 ft. apart horizontally, and are firmly braced to enable them to withstand a wind pressure of 56 lbs. per square foot. This represents the heaviest stress to which the structure will be subjected. The girders are hinged at the centre, with the object of minimising the stresses due to deflection resulting from temperature changes. To allow for longitudinal expansion and contraction, the girders are fixed to vertical rockers of ingenious design.

Rails are fixed upon the lower booms of the girders, and upon these rails will run the trolley actuating the car to be suspended therefrom. The trolley is about 77 ft. long and has 32 flanged wheels, 16 on each rail. It will be actuated by two electric motors of 35 brake horse power, fixed upon a bogie designed so as to compensate for any curvature of the lower booms of the girders, and thus to provide that the driving wheels shall always be in contact with the rails. Automatic and hand brakes are provided, of sufficient power to permit the car to be pulled up within its own length when travelling at full speed.

The transporter car, suspended from the trolley by several steel ropes, consists of a platform 55 ft. long by 24 ft. wide, with space for four large waggons and 300 passengers. Provision is made for the protection of passengers from wind and rain by means of a glazed shelter with doors at the ends and one side. A cabin for the driver is placed above the car, so that a full view of the course may be obtained. It is estimated that each journey across the river will occupy about 2¼ minutes, and that a service of nine or ten journeys an hour could be maintained without any difficulty. The bottom of the car will hang about 12 ft. above high water level, and 4 ft. 6 in. above the level of the Manchester Ship Canal.

The bridge together with the approaches and the car will be lighted with electricity, and fog signals and bells are to be provided for use as may be necessary. Owing to the absence of any available supply of electricity in the neighbourhood of the bridge, a generating station has been built and equipped at the base of the Widnes main tower.

The total cost of the structure, including Parliamentary and other incidental expenses, will be about 130,000*l.*, and the engineers hope that it will be opened for traffic early next year.

An Exhibition of Inventions.—The Corporation of Brighton have arranged to hold an International Exhibition of Inventions in the Great Aquarium during the interval between November 25 and December 12. The exhibits will be grouped in fifteen classes, and the object of the display is to enable inventors and patentees to place their inventions before the notice of manufacturers, capitalists, and the general public, and to afford them means of making practical demonstration of the use and advantages of their appliances.

BRICKLAYING BY MACHINERY.

A machine lately invented by Mr. J. H. Knight, of Farnham, is intended to take the place of the hand and trowel in bricklaying, and the hope of the patentee is that it will accomplish a revolution similar to that effected by machine tools in the workshop. Last week we had an opportunity of observing the operation of this appliance at a demonstration given at Stanley Works, Chelsea.

The nature of the apparatus, and the manner in which it is applied, will be made sufficiently clear by the following brief description. In place of, or in addition to, the ordinary scaffold poles, two vertical posts are to be fixed at each end of, and a short distance from one side of, the wall to be built, with intermediate posts at suitable distances in the case of a long wall. A horizontal girder is fixed to the vertical posts, so as to form a runner and guide for the machine. At the commencement of operations, this girder is fixed a little above the level of the first course, and as the work proceeds, it has to be raised step by step with the courses. In the apparatus exhibited at Chelsea, the vertical posts consisted of timbers having holes spaced in vertical lines to correspond with the ordinary coursing. The bricklaying machine is about 24 in. long, about 18 in. high, and of sufficient width to reach from the supporting girder to the further side of the proposed wall. It consists essentially of rollers for guiding the bricks into the proper position, a lever to push them home against the bricks previously laid, and rollers pressing them down upon the mortar. Guide rollers are fitted at the sides of the machine to keep a face on the work, while runner wheels, and a pinion gearing into a chain stretched along the top of the horizontal girder, serve to hold the machine in position, and as a means of imparting a forward motion as work progresses. The machine has two handles, one for working the travelling motion, and one for working the lever by which the bricks are pushed home.

On the occasion of our visit we found a plain 9-in. wall in course of erection. Along one side of it bricks had been stacked in a continuous range so as to be handy for laying, and near one end of the wall was a supply of mortar ready for use. Three men were engaged on actual bricklaying; one to trowel the mortar upon the top of the last laid course, one to pick up and lay the bricks in position, and one to operate the machine. If these three men were kept continuously at work, which was not the case during our inspection, further help would be required in unloading mortar and bricks from the hoist, and in stacking the bricks ready for the bricklayer. So far as we were able to judge from the demonstration afforded, the speed of the work was by no means in excess of that which might be expected from one good bricklayer and a labourer. In this estimate we take no account of time wasted during the raising of the horizontal girder on the completion of each course. The wall had already been built to a height of about 4 ft. before we arrived, and after careful examination we found the quality of the workmanship to be very poor. The face of the wall was by no means true, and the joints varied considerably in width. If we were to judge the new system by the evidence presented at the demonstration, we should feel compelled to condemn it unconditionally. We do not take this course, because it seems quite probable that more satisfactory results may be obtained when the machine and its auxiliaries have been perfected. We understand it is proposed that mortar shall be served from a hopper worked by hand, but this will not save labour, unless the man who works the machine can also attend to the hopper. It would be far better to apply electric power, so that the man who lays the bricks might control the entire apparatus; and even if he could not do this, the services of two men at most would be required. The man working the machine, as at present arranged, stands in a position where he is unable to see whether the bricks are properly laid, and perhaps to this circumstance may be attributed the indifferent character of the work. But it seems to us that further guide rollers are wanted to ensure a proper face. The existing guides may serve to keep each course true, but they are evidently not adequate for ensuring a perfectly level face for the wall as a whole.

The expenditure of much time and money is invariably required before an invention can be got into thoroughly practical shape. The

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idea embodied in this experimental machine seems to be a good one, but it is not yet presented in a form that is likely to be approved by practical men.

CONDITION OF TINTERN ABBEY.

THE following is the account, in the eighty-first Report of the Commissioners of Woods and Forests, of the work which has been done to strengthen the remains of Tintern Abbey and arrest further decay or collapse. The remains of Tintern are of such exceptional value that the Report will interest many of our readers. As to what has been done, and the spirit in which it has been done, there seems to be nothing to criticise.

"*Tintern Abbey.—Repairs.*

The first work undertaken was the preservation of the beautiful arched openings between the sacristy and the cloisters. These openings consist of two moulded and cusped arches contained under one larger arch with tracery in the head, the whole forming a most interesting and picturesque feature.

The masonry was in an almost ruinous state, this condition being in great measure due to ivy, which has grown up in the centre of the north jamb of the arch, and, gradually expanding in the course of years, had thrust the stones apart to such an extent that many had fallen out; many more were only held in position by the tendrils of the ivy on the outside, the whole wall at this point being completely disintegrated, and the ultimate fall of the arches being a question of time only.

A carefully arranged system of centring and shores was devised to keep such of the stonework in position as it was possible to retain. The loose stone was then drawn out, the whole of the ivy was removed, including the stem in the centre, which was many inches in diameter, and the stone was then replaced in the same position it had previously occupied, the whole being set in cement.

Before the shores and centres were removed, some parts of the adjoining walls were strengthened and underbuilt to give them additional solidity, and enable them to counteract any thrust from the arches; the walling above the arches was also reset in cement, and all the surface-joints were raked out and pointed with the same material.

This work has been carried out with the greatest care, without accident, and in such a manner as to preserve the old structure without any attempt to 'restore' missing or decayed portions, and the result is very satisfactory, for it is difficult to see that anything more than superficial pointing has been done. This is very creditable to the foremen and workmen employed, all of whom have so fully carried out the instructions given to them, and it augurs well for their future work at the Abbey.

The eastern bay, which is all that remains of the groined roof of the sacristy, was found to be in bad condition, both the north and east walls being very weak and unreliable. These have been temporarily shored in the hope of preventing further mischief, and it is proposed to strengthen and secure these walls and protect the groining with concrete and asphalt directly other and more pressing work has been disposed of.

At present, attention has been diverted to an even more dangerous portion of the Abbey buildings—the groined entrance on the north side of the cloisters.

The upper portion of the east wall of this building was in a very dangerous state, and leaning over to such an extent that it was considered necessary to exclude the public from this part of the Abbey for fear of accidents, and to put in strong shores to prevent the wall from falling. To add to the difficulty, there is a very weak arch beneath, the centre of which has fallen away. The groined roofs admit wet in many places, and this is gradually weakening and destroying them, and the walls, and windows, and arches are much decayed. A great part of the dangerous wall has now been removed; the arch beneath will be strengthened and the wall rebuilt to such a height as will be needed to counteract by its weight the thrust of the groining behind it: the upper parts of the walls and other exposed surfaces have been covered with cement to exclude wet; and the joints of the windows and arches, etc., have been pointed. The groining is now being covered with a layer of cement-concrete on which will be placed a coating of asphalt to completely exclude wet. The lower portion of this building will be strengthened where weak, and any exposed joints will be pointed.

The removal of the modern cottage, built into the ruins on the north-west side of the Abbey, has opened out some most interesting remains of a former entrance. The original floor has been found at about 3 ft. below that of the cottage, and the proportions and arrangement of the arches on all four sides of the entry can now be seen. The arch to the front was finely moulded, though but little is now left of this work, and over this arch was apparently an external porch or covering of some kind, the drip-mold of which still remains, and in the gable above was a two-light window. The other three arches were plainer. On the north side of the building a staircase has been discovered, starting at the newly-found level, and this staircase evidently gave access to a floor above the entrance. At the foot of the stair some winding steps lead to a doorway at the lower level.

The whole of these walls, doors, and windows are in a most dilapidated state, and need immediate attention to prevent further decay. On the north side of the Abbey, what appears to have been the old drainage system has been laid bare, and other matters of interest have come to light during the clearance of the ground on that side.

The removal of the modern buildings and obstructions to the west of the road is an immense gain, as a very fine and much extended view of the west front of the Abbey is now obtained."

ARCHITECTURAL ASSOCIATION DISCUSSION SECTION.

THE Discussion Section of the Architectural Association opened its session on the 21st inst. at the rooms of the Association, 56, Great Marlborough-street, W., Mr. J. H. Pearson in the chair, when a paper was read by Mr. J. W. Benwell, A.R.I.B.A., entitled "A Visit to Siena."

Mr. Benwell, having first pictured the city of Siena standing, as it does, upon three hills, briefly described the salient periods in its history from mediæval times, local and otherwise, showing how these influenced and left their marks upon the city of to-day, expressed in the survival of old customs and ceremonies, and in its fortifications, its public buildings, its palaces, its cathedral, and its churches.

These latter were then taken in detail and criticised by the author, who also exhibited a fine collection of photographs, as well as many detail and general sketches, illustrative of his remarks. The buildings to which chief attention was devoted were:—The Piccolomini Palace; the Palazzo Spannochi; the Palazzo Massimi; the Duomo, with its tale of unfulfilled ambition as regards the original conception for a great church, yet with much of surpassing interest in high altar, pulpit, font, frescoes, pavements, etc.; the Church of San Domenico; the Church of Fontigiusta, with marble altar and bronze tabernacle by Mariano, and a fresco by Peruzzi. The Church of San Bartolomeo was then touched upon as regards its bell turret, and the fine outline of the Church of the Osservanza, a mile and a half without the walls, where there are also paintings by Sano, and a beautiful representation of the Coronation of the Virgin, by Andrea della Robbia. Attention was also drawn to other churches of interest, where perhaps an iron screen, some picture or sculpture, font, tomb, or altar-piece, would be found. Examples of old lantern brackets, balconies, etc., to be seen in the picturesque streets were also referred to, as well as the distinguishing shields or badges of majolica ware which may be seen inserted in the walls, or carved in stone, in the sixteen different contradi or wards of the city.

An interesting discussion followed upon the points raised by Mr. Benwell in his paper. Mr. Theodore Fyfe, in proposing a vote of thanks to the author, enlarged upon the charm of Siena as a holiday resort, describing it as a delightful piece of mediæval patchwork. It was a myth as to Siena being impossible in summer. He had found July and August perfect there, the city standing high, like Perugia. He endorsed the author's remarks as to the frescoes in the Piccolomini Library; adding that the frescoes themselves were not only in excellent condition, but that, coming as they did between the beautiful wood panelling of the lower part of the room and the vault above, they contributed to a most successful end, as regards the decorative treatment of an architectural interior.

Mr. M. G. Pechell, who had also lent a series of photographs for the evening, referred to the circular-domed brick churches of Siena, as forming in themselves, an interesting study in characteristic architecture; pointing out, however, that their interiors did not as a rule bear out the expectations raised by their external expression. The loggia or cloister of the church and house of Sta. Catarina he also remembered as a delightful, though small, work by Peruzzi.

Mr. Louis Ambler thought that mediæval Siena, with its population of some 200,000, as against its present population of 27,000, must have been a little crowded. As regards the Torre del Mangia we owed the conception of such a design as that by Burges for the tower of his "Law Courts" competition design, to the architects who built the Torre del Mangia at Siena. The tower of the Bradford Town Hall was probably, in its turn, a production of the two, Burges's design rendering Bradford possible. In reference to the Church of Fontigiusta, he had admired the high altar there, and agreed as to the great beauty of Mariano's work, remarking that drawings of it were to be seen in Mr. Oakeshott's book dealing with the ornament of the Italian Renaissance. The discussion was continued by Messrs. P. J. Turner, F. Lishman, and W. A. Forsyth, and was summed up by Mr. H. V. Lanchester, who had come down as Special Visitor for the evening. Mr. Lanchester had also kindly lent several of his beautiful colour drawings and photographs for the evening, including a series of the painted tiles in the church of Sta. Catarina, which, he explained, were full of suggestion in design. The square spaces were chiefly filled with figures, while the circular ones contained a great variety of renderings of simpler form—all brushed in freely, and fitting the varying fields admirably. As regards the deception in scale of the interior of the Duomo, the strong contrast of the black with the white marble bands, he thought, did it, and compared the like result to be noticed where gold had been used in restoring the colour on the bosses of the vault of an English cathedral, resulting in the apparent reduction in height by some 10 ft. The evolution of the plan of the Duomo was next dealt with, with an interesting theory as to the hexagonal plan of the piers under the dome being a logical outcome of the change of purpose on the abandoning of the original scheme for a great cruciform church. The façade of the church of Sta. Maria dei Nevi was pointed out as a particularly good example of restraint in design; a high and broad gable of plain brickwork, with a plain circular window in the centre above a pedimented doorway, as the only breaks. Attention was drawn to the interesting and picturesque covered washing-places, like market-places, of Gothic design, built over streams issuing from springs without the walls. In old paintings of Siena he had noticed numbers of square towers rising high above the city, but obviously unfinished as regards the tops. These towers, which are now lowered to the general roof-level of the houses were eloquent of the vaunting personal ambition of those mediæval times. As regards the ciborium of San Domenico, he thought it the most beautiful thing in marble he had seen anywhere. In conclusion, he thought Siena was scarcely the best city wherein to study seriously the more severe Renaissance work as practised now-a-days, but for general interest, richness of detail, and charm of picturesque effect of a somewhat mediæval manner, it was not equalled anywhere for a stay of two or three weeks' study and enjoyment.

CHURCH, BARRY DOCKS.—The memorial-stone of the new Church of St. Mary, Holton-road, Barry Docks, was laid recently. The church consists of a nave and chancel 138 ft. long, with side chapel, organ chamber, and vestry accommodation. When completed the church will seat about 1,000 adults, and the estimated total cost is 10,000*l*. The tower will rise above the organ chamber to the height of 113 ft. The contract is being carried out by Mr. J. Cadwallader, of Cardiff, under the direction of Mr. G. E. Halliday, architect, of Cardiff, Mr. R. Bennett being the clerk of works.

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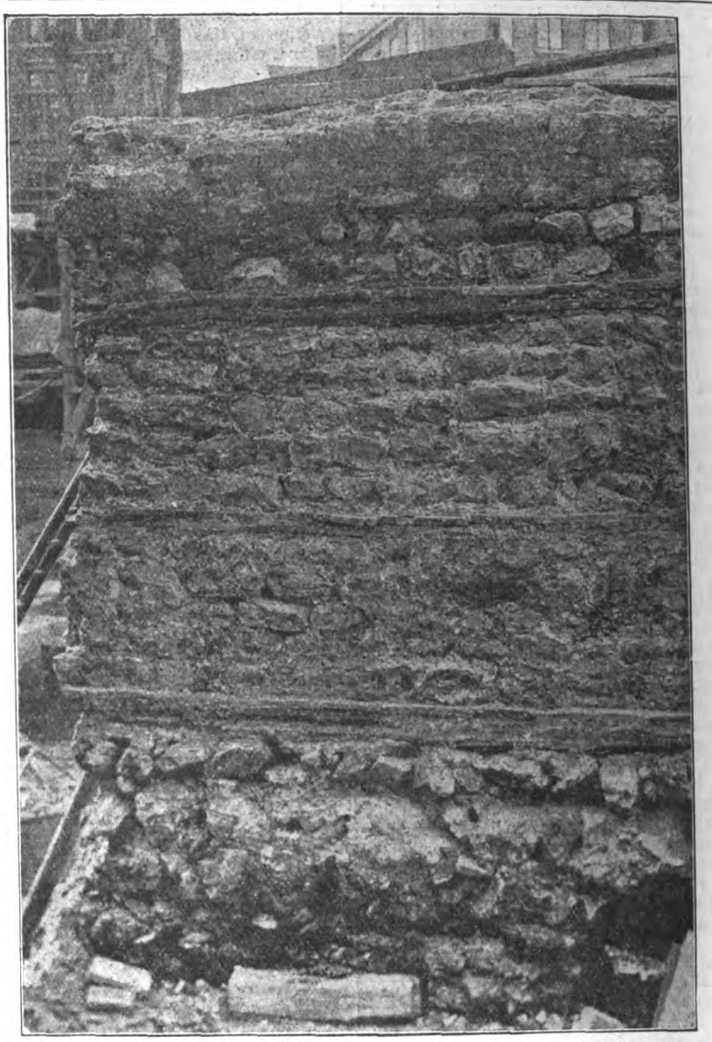
ENGINEERING SOCIETIES.

The Junior Institution of Engineers.—The annual general meeting of this Institution was held at the Westminster Palace Hotel on October 24th, the principal business consisting of the Council's report and accounts and the election of officers for the ensuing year. The report stated that the total membership was now 746. Ten meetings for the reading and discussion of papers had been held, the Institution premium having been awarded to Mr. R. W. Newman, Assoc.M.Inst.C.E., for his paper on "The Effect of Design on Methods of Construction from a Contractor's Point of View." Twelve visits to engineering works, etc., had taken place, in addition to those of the summer meeting occupying one week, Sheffield and the Peak district having been the rendezvous. The accounts showed that the sum of 300*l.* had been invested, and that the income had been 156*l.* more than the expenditure. The election of Mr. J. Fletcher Moulton as the new President, the proposed lectures on the Theta-phi diagram by Professor John Perry, the library, the certificate of membership, and the Fire Prevention Congress were referred to in the report. The election resulted as follows:—Chairman: Mr. S. Cutler, Junr.; Vice-Chairman: Mr. Adam Hunter; Hon. Librarian: Mr. H. T. Gould; Hon. Auditors: Mr. H. N. Gray and Mr. H. B. Vorley; Members of Council, Messrs. J. N. Boot, W. H. De Ritter, A. H. Huddart and J. H. Pearson; Provincial Members of Council: Messrs. V. H. Chabot, T. D. Evans, E. King, W. E. Lilly, F. S. Pilling and E. W. Porter. The programme of papers for the new session was announced:—November 20th: "Fires on Shipboard," by Mr. G. Canning. December 4th: "Gas Engines," by Professor D. S. Capper. January 22: Mr. Moulton's Presidential address. February 5th: "Producer Gas Power for Ice Factories," by Mr. Hal Williams. March 4th: "Electric Storage Batteries," by Mr. G. C. Allingham. April 8th: "Heating and Ventilation of Factories," by Mr. K. Gray. May 6th: "The Design of a Dry Dock," by Mr. A. W. Young. Those of our readers desiring particulars of membership of the Society can communicate with the Secretary, Mr. W. T. Dunn, 30, Victoria-street, Westminster.

ARCHÆOLOGICAL SOCIETIES.

Society for the Promotion of Hellenic Studies.—The Report of Council for the session 1902-1903, recently printed and circulated, records that the twenty-fourth session has been one of healthy progress in every department. The meetings at Burlington House have been well attended, and the Society has been active in publication, and in assisting exploration. A further grant of 100*l.* has been made to the Cretan Exploration Fund, by the help of which Mr. Evans has continued his brilliant discoveries at Knossos, and the annual grant of 100*l.* to the British School at Athens has been renewed for a further period of three years. A grant of 25*l.* has been made to Mr. D. G. Hogarth to assist him in exploring Greek sites in the northern portion of the Egyptian Delta. It is hoped that some account of his results may appear in the Journal. In connexion with the Journal two important steps have been taken during the past session. In the first place, the Editorial Committee, in co-operation with the Consultative Committee, have drawn up a scheme for the transliteration of Greek names in the Journal, with a view to securing a uniform system for the guidance of contributors. This scheme, which was the result of careful deliberation, is somewhat of the nature of a compromise, but it is hoped that it will prove satisfactory in working. In the second place, it has been decided to add a bibliographical section to the Journal, containing short accounts by experts of the most important publications in every branch of Hellenic study. The facsimile of the Codex Venetus of Aristophanes, referred to in last year's Report, has now been issued at the joint cost of the Society and of the Archæological Institute of America. Two hundred copies were issued at the price of 6*l.* 6s. bound in morocco, or 6*l.* in a portfolio. Nearly half the edition has been taken up in Europe and America. Another publication for which the Society has made itself responsible, that of the volume recording the results of the excavations undertaken by the British School at Athens at Phylakopi, in the island of Melos, has made steady progress during the past session, and will probably appear before the end of the year. Another item of expenditure which has been incurred during the past year has been the printing of the catalogue of the Society's library. The existence of such a catalogue should add much to the usefulness of the library, and it is hoped that there may be a small sale for it outside the Society. To members elected after the current session the catalogue will be supplied at 2s. net. The price to outsiders has been fixed at 3s. net. An important change in the management of the library has been made during the past year. Miss Johnson, who had done good service as assistant librarian for seven years, resigned her post at the end of the year, and the Council, on the recommendation of the Library Committee, decided to engage at a higher salary the services of a trained archæologist, with some practical knowledge of photography and lantern slides. Steps were taken to advertise the post at the Universities and elsewhere, and several good candidates presented themselves. In the end, a member of the Society, Mr. J. ff. Baker-Penoyre, with quite exceptional qualifications, was appointed, and has held office as librarian since Christmas. The Report adds that members who use the library must already have felt the great advantage of being able to appeal to a librarian with competent knowledge of the contents of the library, and of the use of lantern slides. In the course of the spring a thorough revision of the arrangement of the library was undertaken. Some parts had become seriously congested, and the classification was imperfect. Additional shelves have now been added, the books have been spaced out as far as the size of the room allows, the classification has been improved, and subject labels have been fixed on the shelves. It is estimated that there is now space for four years' growth. Among losses sustained by death during the past year, special mention was made of Mr. F. C. Penrose, the eminent architect, who had served on the Council since the foundation of the Society, and had for many years held the office of Vice-President. In June of next year the Society will have completed the twenty-fifth year of its existence, the inaugural meeting having been held at Freemasons' Tavern on June 19, 1879. The Council are of opinion that the occasion should be celebrated, and have already begun to consider the best steps to be taken in the matter. Full particulars will be announced later on. Eighty-five new members have been elected during the year, while twenty-seven have been lost by death or resignation. The present total of subscribing members is 819, and of honorary members twenty-five. Seven new libraries have joined the list of subscribers, making the number at the present time 150, or, with the five public libraries, 155.



The Roman Wall discovered on the Site of the Old Bailey Sessions House.

THE ROMAN WALL, OLD BAILEY.

A very fine length of the Roman wall was recently unearthed on the site of Newgate Prison. Its characteristics are identical with that portion of the wall discovered in 1900 in the rear of No. 8, Old Bailey, and it is a continuation of it in a straight line towards Newgate-street.

The following are the details:—Length, about 50 ft.; height, 14 ft. 6 in.; thickness, 8 ft. 6 in. Commencing from the base of the foundation (which is on gravel), there is 4 ft. 9 in. in height of rubble work composed of large rag-stones, then three courses of red tiles "sesqui pedales," and above this 2 ft. 7 in. of rag-stone of a smaller size, then two courses of tiles and 3 ft. of rubble work, with two more courses of tiles, followed by 2 ft. 9 in. of rubble work.

The interior of the wall is composed of rag-stone tumbled in, and grouted with an excellent lime mortar. It is a cased wall, and the tiles, as usual in Roman walling, are carried through the wall as a bond.

Unfortunately it has had to be destroyed for the building of the new Sessions House.

A valuable and interesting analysis of the mortar in the wall discovered in 1900 was

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The Roman Wall discovered on the Site of the Old Bailey Sessions House.

given by Mr. H. F. Hills in the *Builder* of October 20, of that year.

We are indebted for the above memoranda, and for the photographs, to Mr. Terry, Clerk of Works to the Corporation, and member of the London and Middlesex Archæological Society.

ARCHITECTURAL SOCIETIES.

Glasgow Architectural Association.—The opening meeting of the session was held in the Rooms, 187, Pitt-street, on Wednesday, 14th inst., when the President, Mr. W. J. Blain, delivered his opening address. Referring to the semi-jubilee of the Association, he questioned whether the early aims of its members were sufficient to carry it successfully through the twenty-five years they were now entering upon. The pioneer efforts of the Association had so helped to mould the artistic and scientific curriculum of the School of Art and Technical College classes that the members should now consider whether the Association had not outlived its earlier educational aims, and entered on a stage of its career when the senior members and the more complex problems of architectural practice should claim its first attention; and in this respect it might be appropriately asked whether the purity of style which inspired the earlier members, or a system of design absolutely in keeping with the requirements of modern use, should form the basis of our future work. He believed that somewhere between these two extremes lay the course we must eventually take, and this led him to consider as the subject of his address the importance of Glasgow as an original architectural centre. Having referred to the helpless struggle in England after the alien and debased styles of Queen Anne, Georgian, Dutch, Spanish, etc., he laid it down as an axiom that the standard of good work was judged by its entire subordination to the public use, and its continuity of growth in relation to the traditional movements of architecture in the city. Basing this axiom on the slow growth of historic style in pre-Renaissance times, he proceeded to apply it to the growth of municipal style; and having traced, at some length, the history of building in the city during the last 200 years, pointed at the fallacy of judging the progress of architecture by analysis of the works of the great architects. It was to the general average of work as represented by the minor architects and speculative builders, inspired by the greater architects, that we must look for the carrying forward of the traditions of work and the selection of the type most fit to survive for the public use. Much of this work was of excellent and original character, and the increase of wealth and changes in building and feuing conditions had given the architects an opportunity for rich and comprehensive treatment of building problems they never had before. He believed the architecture of the city had not only an unbroken continuity of growth, but contained elements of vitality and life, which did not exist in many of the larger national centres. To break with the academic must of necessity carry with it a reaction of feeling towards refined work and a singleness of purpose towards truthful living expression, that left little time or energy for the development of beauty of detail and proportion of parts. While this was our weakness, it was also our strength, and beauty of detail would come naturally, when the public was sufficiently cultured to demand it. This could only be after years of careful development. The Gothic and Classic antagonism was a thing of too recent birth to have had time to heal up the wounds it created. Time would show that instead of these styles being antagonistic, they are merely different extensions of the same truth, and that the one is as suitable, in its essence, to modern worth as the other. As in the Italian Republic each city developed along its own municipal lines, so it is along municipal lines that any great national movement in architecture can be brought about, and whatever form this movement might take, he trusted the Association would always be a factor for good and living work. The President then proceeded to lay down certain rules whereby the Association might help in developing style in the city. If they believed with him that it was better to design in a style absolutely suited to each detail of the problem set before them, then—

1st.—They must set themselves to understand the problems of the time, the keynote of which would be found in the hunger for scientific application of the laws of construction and hygiene to the purposes of the building.

2nd.—Having found out the problems, they would lay their knowledge together with a view to formulate a uniform basis of work, having in common certain principles, such as the maximum amount of light that may be obtained, with economy of heat in winter and coolness in summer. The distribution of the piers in relation to the most economical span for steel beams, etc. These principles might be catalogued, and would be subject to change as new scientific light was brought to bear on them.

3rd.—Having found some basis of style, they would set themselves to fix a system of ornamentation, suitable not only to beautify the construction, but having some relation to the purpose of the building and the traditions of the city in which they practised.

4th.—Having made up their minds on the subject, they would proceed to educate the public by popularising their lectures and inviting the public to listen. The introduction of lay members would follow, they would then begin to take an interest in the public matters of the city in reference to their profession, and, having the ear of the public to some extent already, they would be listened to when they criticised some public error in building, or pointed out some scheme whereby the amenity of the city would be improved. In some such way he believed the artistic culture of Greece was perfected; and in some such combined effort their own city, and eventually the nation, would develop a style capable of maintaining the best traditions of past work.

Liverpool Architectural Society.—At a meeting of the Liverpool Architectural Society, held in the Free Library, William Brown-street, on the 19th inst., Mr. Peter Cowell, librarian, read a paper on "Venice." A number of lantern slides were exhibited, and the address dealt with the beauties of Venice from an architectural point of view. On the motion of Mr. Rees, seconded by Mr. Grayson, a vote of thanks was passed to Mr. Cowell. The chair was occupied by Mr. John Woolfall.

NOTES ON BITUMEN.*

Bitumen, acording to Boussingault, on analysis, is found to be made up as follows:—

Carbon	85 parts.
Hydrogen	12 parts.
Oxygen	3 parts.
	100 parts.

Composition of Trinidad Pitch.

Volatile organic matter ...	76.75
Non-volatile organic matter ...	17.77
Ash	5.48

Chemical Composition of Bitumen of Judea.

Carbon	77.84
Hydrogen	8.93
Oxygen	11.54
Nitrogen	1.70
Sulphur	3.00

Bitumen has a specific gravity of 1.092; it is partially soluble in alcohol, and more completely soluble in carbon bisulphide, petroleum spirit, chloroform, oil of turpentine, coal-tar, benzol, naphtha. It softens at 58 deg. C.-60 deg. C., and melts at 100 deg. C. When distilled with water, a volatile oil, called by Boussingault "petrolene," is given off. This is probably a mixture of parrafins. The residue called "asphaltine," resembles the original substance, but does not soften below 300 deg. C., and decomposes below its melting point.

The origin of bitumen is somewhat obscure, but it is probably the result of oxidation of the

* From a paper read by Mr. Allan Greenwell to the North ern Architectural Association, February, 1903.

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unsaturated hydrocarbons in petroleum. There are two main theories, viz. :—

1. That bitumen has been formed by inorganic means, as a product of chemical action. This view is held by Mendeleeff.

2. That it is a distillate from animal or vegetable remains.

Coal tar pitch is the residue of coal tar after the separation of naphthas, phenols, creosote, and anthracene oils. It amounts to about two-thirds the original weight of the coal tar before distillation. Its characters vary with (1) temperature of distillation, and (2) quality of coal distilled.

Chemical Composition of Coal Tar Pitch.

Carbon	75.52
Hydrogen	8.19
Oxygen	16.06
Ash	0.43

Sulphur and nitrogen variable traces.

Coal tar pitch may be either *soft*, *hard*, or *medium*, according to quality of coal. The hardness depends greatly on the perfection to which distillation has been carried, and it is generally necessary to thin it down before use by addition of various tar oils. Only the heavy oils should be used, or the pitch will lose much of its binding or cementing power. It is obvious, therefore, that artificial pitch is not to be relied upon to the same extent as the natural product.

It is therefore an oxygenated hydrocarbon. It is found in diversities of strata, which may be classed in three principal divisions.

1st.—In which the containing and adjacent rocks are of igneous origin, as in the case of Cuba, where Mr. Taylor, who made a careful examination of this district, remarks :—"It seems very probable that all the bituminous matters, whether known under the names of chapapote asphalt, mineral pitch, petroleum, mastic bitumen, liquid or fixed bitumen, and other terms, simple varieties of the same mineral substance, appear at the surface of the points of fracture in the disturbed and metamorphic regions, in other words, in the centres of dislocation of the beds." The latter part of this sentence seems to indicate that the associated rocks are sedimentary, but in other parts of the same article they are stated to be "serpentine," "euphodite," "diorite," evidently of the true igneous type.

2nd.—In which the containing rocks are stratified and of the primary or secondary epochs. The mode of occurrence is usually that of disseminations in the granular form throughout the entire stratum, or that of springs of petroleum, naphtha, etc., issuing from the soil, or exuding from the fissures of the beds. The bituminous limestones of France are instances of this case.

3rd.—Where the deposits are in formations of the tertiary age, and usually accompanied by lignite or brown coal. These are the most abundant sources of asphaltic substances, and include those of Pegu, Trinidad, and of several other localities, but the descriptions are often too vague to ascertain positively to what geological group the deposits must be referred. As the Trinidad bitumens belong to this division, the species of derivation which is adopted is probably the one by which most of them have been produced, but in the case of the first two divisions other causes may have been concerned in the generation where the circumstances are very different.

Although commercially bitumen or bituminous asphalt is limited for its supply to only a few districts, it is, nevertheless, not by any means of local or limited occurrence, and this again evidently indicates that they are due to extensively operating natural causes, and not to any accidental combination of special agencies.

In Venezuela "There are deposits of mineral pitch in the provinces of Merida, and Cova, and Maracaybo. Springs of petroleum are abundant in Trugillo and Cumana (Gulf of Cariaco). The soil in the vicinity of Maturin and Guarapiche is stated to be impregnated with bitumen, and with regard to the existence of the substance in the Antilles, Mr. Cowling Taylor says: "The entire chain of the West India and Windward Islands present similar phenomena of petroleum spring beds or veins of asphaltum, and accumulations of mineral pitch, and traces of metamorphic and volcanic rocks in great abundance, and he enumerates especially Barbados, where compact bitumen or asphalt abounds, and the calcareous rocks are frequently impregnated with bitumen.

In Cuba, asphalt or chapapote is very extensively diffused, often termed bituminous coal, but is really on analysis found to be bitumen, consisting as it does of carbon 34.97, volatile matter 63.00, and ashes or cinder 2.03.

New Granada.—Bitumen prevails along the margin of the Magdalena Valley.

In Peru, asphaltum of typical purity occurs; the Incas used bitumen the same as the Egyptians.

In Mexico.—In the interior are lakes of fresh water, where the chapapote is found bubbling up to the surface. It has a pungent smell, like that of liquid asphaltum, and possesses some of its qualities.

Texas.—A lake exists within 100 miles of Houston, closely resembling the pitch lake of Trinidad. It is filled with bitumen or asphaltum, and is about a quarter of a mile in circumference.

France.—At Labsann, near Strasburgh, there is lignite, bituminous sandstone, and bituminous limestone.

Also Seyssel department of Ain.—Limmer Auvergne, Puy de la Bouriere, Puy de la Sede, and also in Sicily.

In Portugal a mine of asphalt of good quality has been discovered in the neighbourhood of Alcobaca; in Syria, asphalt or bitumen is in great abundance on the shores of the Dead Sea, black in colour and fracture it closely resembles ordinary pitch. In other essentials it seems to resemble the chapopote of Cuba. There is also a deposit of bitumen in Mount Lebanon, in rocks probably of volcanic origin.

In the provinces of Shirran and Daughestan in the Caucasus, there is a great abundance of naphtha, especially on the promontory of Baku, and an extension of this formation exists in the peninsula of Kertch in the Crimea, and there is also a bituminous formation on the peninsula of Taman. Bitumen and petroleum are also very abundant in Arabia in strata wholly composed of oceanic animal matter, and sometimes exuding from fissures and abrupt declivities caused by the intense heat of the climate.

In all the countries bordering on the Tigris and Lower Euphrates, and also at Koordistan in Persia, bitumen, petroleum, and naphtha are found, and in the Birman Empire and China it is also said to be found, although the details are not ascertained.

The bitumen of commerce may be conveniently divided into two heads, one of which we shall term asphalt, which is really a bituminised limestone containing from 7 to 20 per cent. of bitumen; and bitumen, which is wholly free from foreign substances.

Of the first of these qualities which are best known and being used to any extent in Europe, are Val de Travers, Seyssel, Sicily, Chieti (in the Abruzzia), Auvergne, Lobsaun, and Limmer. All these are known to be actual natural rock asphalts.

Composition of Rock Asphaltes (Durant Clayc) :—

	Val de Travers (Switz).	Lobsann (Alsace).	Seyssel (Ain, France).	Maestu (Spain).	Ragusa (Sicily).
Water and volatile matter	0·35	3·40	0·04	0·40	0·80
Bituminous matter	8·70	11·90	9·10	8·80	8·85
Sulphur (free or in organic combn.)	0·08	4·99	—	trace.	—
Iron pyrites	0·21	4·44	—	—	—
Alumina and iron oxide	0·30	1·25	0·05	4·35	0·90
Magnesia	0·10	·15	0·05	3·85	0·45
Lime	49·50	38·90	50·50	5·70	49·00
Carbonic acid	40·16	31·92	39·80	8·15	39·40
Combined silica	—	—	—	11·35	—
Sand	0·60	3·05	0·10	57·40	0·60
	100·00	100·00	100·00	100·00	100·00

In America comparatively little has been done with these materials, as most of the so-called asphaltum pavements there are made of Trinidad bitumen artificially mixed in certain proportions with sand or limestone, and although some of these pavements have been very successful, they do not equal the rock asphaltes produced by Nature.

The method of obtaining this bituminous limestone or rock asphalt is by mining, as the seams are of varying thicknesses of from very narrow streaks to 6 ft. and 10 ft. deep, and are found between two layers of white, hard limestone, either totally unimpregnated with bitumen, or else with mere traces of it which have the appearance of thin smoke or the faint stains in white marble, and sometimes, however, layers of sand and marl are found which have to be propped or held up by rubble.

For the purposes of the manufacture of the compressed asphalt, the rock is received from the mines in blocks of irregular shape, which are first subjected to a crushing process in a steam crusher, and broken to the size of walnuts.

The material is then passed on to a machine called a disintegrator, which reduces it to powder. The powder issuing from the disintegrator is received on an incline screen which allows the fine powder to drop through, while any grains too large for the meshes are carried over and conveyed back to the disintegrator to be re-ground. The powder thus obtained is deposited in a covered shed. When required for use it is heated in slowly rotating cylinders, very much like a large coffee-roaster, over a fire of wood or coal, until it reaches the right temperature for laying; this process takes two or three hours. The object for heating is two-fold, (1) to evaporate moisture; (2) to bring the bitumen into such a condition that it may exert the maximum of binding power when subjected to compression by the rammers. If any portion is overheated the bitumen is fused, if underheated the asphalt will not be thoroughly consolidated; hence the utmost care is needed in regulating the temperature which varies for different kinds of asphalt, since some asphalts will bear a greater heat than others without deteriorating. The extreme limits are, say, 250 deg. to 300 deg. Fahr.

The mastic which is supplied in blocks known as Val de Travers, or other mastic, is manufactured by pulverising the natural rock in exactly the same manner as for the compressed asphalt, it is then heated in boilers, and from 5 to 10 per cent. of refined bitumen is added to same, and the whole mass reduced to a mastic or thick liquid state. This is run into moulds, and when cool again consolidates into a hard elastic block, which is used in varying proportions with grit and refined bitumen for the laying of pavements.

THE CONSTRUCTION OF MILK SHOPS AND DAIRIES.

The regulations of the Public Health Department of the Corporation of London in regard to milk stores and milk shops, which were formally passed on July 23 of this year, have only recently been issued. Some of the regulations only refer to the conduct of the business in detail by those employed in it. Other portions, however, have a direct bearing on the question of what is to be provided for or disallowed in the planning and construction of the necessary buildings.

Clauses 2 and 3 provide that, generally, no building is to be used as a dairy or cowshed unless the person going to occupy it makes provision, to the reasonable satisfaction of the Corporation of the City of London, for the lighting and the ventilation, including air space, and the cleansing, drainage, and water supply of the building while occupied as a dairy or cowshed, and no one can begin so to occupy any such building without first giving one month's notice in writing to the Public Health Department, Guildhall. The lighting, ventilation, and drainage must be such as are sufficient for the health and good condition of the cattle therein, as well as for the cleanliness of milk vessels and the protection of the milk therein against infection or contamination.

No water-closet, earth-closet, privy, cesspool, or urinal is to be within, or to communicate directly with, or ventilate into, any dairy, or any room used as a milk store or milk shop; nor is any part of such room to be used as a sleeping apartment. The following regulations more concerned with construction we quote *verbatim* :—

"8. Every dairy shall be sufficiently lighted, and shall be thoroughly ventilated by louvred ventilators, ventilating shafts, or openings in the walls or roof.

9. Every dairy shall be well paved with flagstones, concrete, or other suitable material, properly set in cement, and the inner walls thereof shall be covered with hard, smooth, and impervious material to a height of at least six feet from the floor of such dairy, and such hard, smooth, and impervious material shall not be covered with cement-wash, lime-wash, or other substance.

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10. The floor of every dairy shall fall or slope towards an opening in the walls thereof, leading to a properly-trapped gully-hole outside the dairy; and no inlet to a drain shall be within any dairy.

11. Every dairy shall be provided with an adequate supply of water, and, where there is not a constant supply, with a slate, metal, or metallic-lined tank, properly covered, and provided with an overflow or warning pipe, and with piping for conveying water to the dairy. The tank shall have no communication with any water-closet or drain by means of a waste-pipe, and shall be supplied with good and wholesome water, which, if practicable, shall be procured by the occupier from a public water company, and such tank shall be cleansed as often as may be necessary for keeping the same in a clean condition."

The remainder of the regulations refer to the conduct of the business and the keeping of the premises in sanitary condition, and only concern those actually engaged in the storing and sale of milk.

THE INSTITUTION OF HEATING AND VENTILATING ENGINEERS.

The autumn meeting of this Institution was held at the Holborn Restaurant on Tuesday, October 6, when about sixty members and visitors assembled under the Presidency of Mr. Louis F. Pearson, of Beeston. Two papers were read, one by Mr. C. Ingam Haden, of Trowbridge, on "The Reck Patent Circulator System," also one by Mr. Walter Jones, of Stourbridge, on "Radiation or Pipe Surface Required for Greenhouses and for Ordinary Buildings Having Considerable Variations in Construction, Size, and Temperature," and a very interesting and prolonged discussion on both papers ensued. Ten new members were elected, and the President, in an after-dinner speech, referred to the progress made by the Institution during the past year, stating that it had been a record year for election of new members, which shows the increasing importance of the Institution. He also stated that the Government had recognised the Institution by asking them to appoint a witness to give evidence before the Royal Commission on Coal Supplies, and Mr. W. N. Haden would place his evidence at the disposal of the members as soon as it became public property. The Institution had also been invited to appoint three arbitrators to settle trade disputes, and these signs clearly showed the absolute necessity for such a body. The Honorary Secretary of the Institution, Mr. Edward Taylor, 99, Fonthill-road, Finsbury Park, London, N., will be pleased to furnish any intending member with any further particulars. The next meeting will be held at the Holborn Restaurant on January 19, 1904, at half-past two.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of this Council was held on Tuesday in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend Battersea Borough Council 1,231*l.* for works at public baths, and 1,056*l.* for provision of accommodation for persons removed on account of infectious diseases; Chelsea Borough Council 2,000*l.* for paving works; St. Marylebone Borough Council 12,265*l.* for erection of working-class dwellings; Southwark Borough Council 5,700*l.* for paving works; and Shoreditch Borough Council 200*l.* for alteration of offices, etc., at Town Hall. Sanction was also given to Battersea Borough Council to borrow 7,239*l.* for the erection of working-class dwellings.

The Lack of Employment.—A long special Report was brought up by the General Purposes Committee dealing with the unemployed question, and the recommendations of the recent Conference on the subject. The following recommendations were agreed to:—

That it be referred to the General Purposes Committee to consider and report upon the question of preparing schemes of public works, which may usefully be carried out in the county during periods of distress, and as to the probable cost of such schemes, and their bearing upon the requirements of the county.

That it be referred to the Technical Education Board to consider and make a special report (1) as to the steps which may usefully be taken for providing practical training in agricultural pursuits for workers at present in London, and (2) as to the desirability of providing lectures on the colonies for the benefit of those of the poorer classes who may wish to know of the advantages and conditions of colonisation.

That it be referred to the Public Health Committee to consider and report as to the registration and periodical inspection of the places of employment of outworkers.

That the resolution passed by the Conference on the subject of the employment of children be referred to the Public Control Committee.

That it be an instruction to the General Purposes Committee to consider, and, if necessary, to communicate with the Prime Minister (i.) on the question of constituting the conditions of unemployed workers a subject of local administration and (ii.) as to the establishment of an industrial organisation throughout the country on the lines of the suggestion made in the report of the committee appointed by the Conference.

That it be referred to the General Purposes Committee to consider and report as to the advisability of appointing a special committee to inquire into and report upon the economical difficulties of the poor.

That copies of the report of the Conference be forwarded to the county, municipal, and poor-law authorities throughout the country, and that the observations of those authorities be invited thereon.

That the General Purposes Committee be authorised to communicate with the metropolitan borough councils on the lines of the resolution of the Conference as to the preparation of schemes of public works of a local character.

That it be suggested to the various public authorities in London that, as far as practicable, public work be carried out during the "slack" seasons.

That the attention of the various public authorities be invited to the paragraph in the report of the committee to the Conference on the subject of expediting public works.

That the metropolitan borough councils and boards of guardians be invited to express their views on the suggestions (i.) that power should be conferred upon boards of guardians, either individually or conjointly, to take land for the purpose of finding work for the unemployed in times of want, and (ii.) that during periods of exceptional distress the borough councils should co-operate with the boards of guardians in order that the pauperisation of those persons whose difficulties are occasioned only by exceptional circumstances arising from a temporary scarcity of employment may as far as practicable be avoided.

That a communication be addressed to the Prime Minister suggesting that consideration should be given to the question of the preparation of schemes of works of a national character which may usefully be carried out during periods of distress.

That a communication be addressed to the Board of Trade suggesting that steps should be taken for making the official labour returns more generally known throughout the country.

That the Local Government Board be informed of the resolution passed by the Conference on the subject of disfranchisement following the receipt of poor-law relief.

That in forwarding copies of the report of the Conference to the Prime Minister, attention be invited to the various matters included therein which bear on the question of the promised inquiry into the duties of the Board of Trade and other Government departments.

That the War Office be asked to consider the practicability of altering the periods of the year during which the Militia are embodied for training.

That the attention of the various municipal authorities throughout the country be invited to the question of the desirability of public works being executed during the slack season.

Improvements.—The following recommendations of the Improvements Committee were agreed to:—

That the estimate of 760*l.* submitted by the Finance Committee be approved, and that the Improvements Committee be authorised to incur expenditure on capital account not exceeding 760*l.* in effecting a widening of 50 ft. of Trafalgar-road, near Park-row.

That the City Corporation be informed that the Council is not prepared to make any contribution towards the cost of increasing, from 40 ft. to 50 ft., the width of the new street proposed to be formed across the site of Christ's Hospital from Giltspur-street to King Edward-street, as in the opinion of the Council it would be to the interest of the owners of the property, having regard to the provisions of Section 49 of the London Building Act, 1894, to make the new street 50 ft. wide, in connexion with the development of their estate.

That the working drawings, bills of quantities, specification and estimate of the cost (5,900*l.*) of the paving and other works in connexion with the widening of Mare-street between Morning-lane and the North London Railway, authorised by the London County Council (Improvements) Act, 1900, be approved, and be referred to the Works Committee, with a view to the work being carried out without the intervention of a contractor.

The London Building Act and One-Story Shops.—The Chairman of the Building Act Committee, Captain Hemphill, was asked whether his attention had been called to the remarks of the coroner who inquired into the deaths in connexion with the recent fire at Hackney. According to the coroner, the building in which the fire occurred was "one of those wretched little shops built over the front garden in order to get more rent." The Chief Commissioner of Police had called the attention of the authorities to the extreme danger of these shops.

Mr. Waterlow asked whether the Building Act Committee had power to refuse permission for the erection of these one-story shops.

Captain Hemphill said that the Committee could, if they thought it desirable, refuse to give consent to the erection of these buildings. It was regrettable that the public did not quite understand the terms of the amendment of the Building Act which was proposed last year. In that measure was a clause which provided that where a shop front projected more than 5 ft. from the main building, the roof and structure should be of fireproof material, and that a proper passage should be provided as a means of escape in case of fire. The danger from these buildings had been constantly referred to by coroners in different parts of London, and it was to be hoped that when the new Bill was brought forward it would receive strong support from the public.

District Surveyor for South Fulham.—The Building Act Committee recommended as follows:—

"We have considered the question of the appointment of a district surveyor to the district of South Fulham, which became vacant on June 1 last by reason of the resignation of Mr. S. F. Monier-Williams upon his appointment to the district of Sydenham. The gross amount of the fees received during the year 1902 by the district surveyor for South Fulham was 697*l.*, and the average gross amount for the past three years was 802*l.* In response to public advertisements, we have received ten applications for the appointment. The Council's standing order, No. 93, provides that 'the Committee making the preliminary selection is, unless otherwise ordered, to submit to the Council three candidates, indicating at the same time, if it think fit, the candidate whom it recommends the Council to appoint.' In accordance with this standing order we have to state that, after having carefully considered the applications received, we are of opinion that the three most suitable candidates are Messrs. J. A. G. Knight, G. Tolley, and H. Griffiths. Each of these gentlemen has signed a declaration that he will accept the appointment on the terms laid down in the Council's standing order No. 250, which provides, among other things, that he will not continue private practice. The three selected candidates have attended before us, and after having fully considered their respective qualifications, we are of opinion that Mr. J. A. G. Knight should be appointed to the post. We recommend:—'That Mr. John Albert Gill Knight be appointed district surveyor for the district of South Fulham as from and including November 1, 1903, on the conditions laid down in the Council's standing orders relating to the appointment of district surveyors.'"

The recommendation was agreed to.

Gardens in Squares.—The Parks and Open Spaces Committee reported as follows:—

"For some time past we have had under consideration the question of the best means to be adopted for securing that the gardens in squares, and similar plots of land, in London should not be built upon but preserved for ever as open air spaces; and we feel sure that the Council will agree with us as to the immense benefit to the health and welfare of London which the attainment of that object would secure. On March 17 last the Council, in view of a decision arrived at on our recommendation to acquire, at full building value, less a contribution made by the vendor, two small gardens in the Borough of Stepney, instructed us to consider and report whether any measures were practicable in order to restrain owners from converting to building purposes small open spaces in the county which had been dedicated for use as 'squares' and used as such for a long period of years. The two small gardens above referred to are those at Ford-square and Sidney-square, Stepney, and the circumstances under which the Council purchased these two pieces of land were almost, if

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not quite, as pressing as in the case of the acquisition of Albert-square garden in 1901. The Council purchased the two gardens in question in view of the possibility of their being immediately built upon, and we felt justified, having regard to the situation of the land and the density of population, in recommending the Council to pay practically full building land price to secure these gardens as public open spaces. This, however, is a course that the Council is not likely to adopt in many cases, and we have earnestly considered what other means we may be able to suggest for restraining owners from utilising these small spaces as building sites, and by such restriction securing their retention, at any rate, as highly valuable air spaces. We find that there are in the county 407 gardens or enclosures, having a total approximate area of 395 acres, or three-fifths of a square mile. Of these, 301 are ordinary square-gardens, 68 are garden enclosures, not entirely surrounded by houses, but attached to houses the occupiers of which enjoy the gardens in common, whilst 38 are small enclosures alongside public roads, some being privately maintained and others claimed by Local Authorities. We may remind the Council that there already exists power under the Open Spaces Acts enabling owners to hand over to the public their interests in square-gardens. Indeed, quite recently, this has been done as regards the Nelson-square garden, Blackfriars, Viscount Halifax having transferred his freehold interest in the garden to the Council. The Council will remember, also, that the Ecclesiastical Commissioners have recently stated that so soon as the remaining leases of adjoining property shall expire, the garden of Finsbury-square shall be vested in the Council as an open space for the benefit of the public. Moreover, we expect shortly to be in a position to report that one of the principal livery companies of the City of London will make arrangements for two gardens in the eastern part of the county to be maintained for public use. We have great hopes that other landowners will sympathise with the objects which we have in view; and although we think it may not be possible to arrange that all the gardens and similar spaces shall be opened for public use, we are of opinion that a scheme which would provide for the preservation in perpetuity, as open-air spaces, of such of them as have existed in approximately their present condition for a large number of years, or of equivalent areas in lieu thereof, would receive the approval of Parliament. We regret, however, that side by side with the growing appreciation by the public of the great value to the health of London of these, in many cases picturesque, places, and with the increasing tendency of some owners to allow the public a larger use of them, there is apparent a desire on the part of some owners to obtain building land value for the gardens at the earliest moment after the lapsing of the rights of user enjoyed by occupants of adjoining houses. This desire is particularly indicated in the case of a large square in the western part of London, which is advertised for sale.

We think that legislation should be promoted with the object of preventing any square-garden in London, which shall have existed as such for fifty years or more, from being used for building purposes, such restriction not, however, to prevent any owner in rearranging an estate or any portion of an estate from building upon any such garden, provided that he sets aside, within the area of the estate or portion of the estate which he rearranges, an area equal to the garden abolished, and lays out such area as a garden contiguous on all sides to public roads, or in a manner similar to the garden which is obliterated such new garden to be subject to the same user as the former garden, unless the owner should think fit to agree with the county or local authority for the garden to be opened to the general public.

A bill of such wide extent as that above indicated would require to be well considered, and it may conceivably not be possible in the limited time remaining during which Bills for next session must be deposited to prepare such a Bill. Nevertheless, we are of opinion that the subject is one of such great and pressing urgency that any steps which may be possible should be taken at the earliest possible moment. In accordance with the Standing Orders, we have ascertained from the solicitor that the Council has authority to make application to Parliament for this purpose; and we have informed the Parliamentary Committee of our intention to ask for a suspension of Standing Orders in order that our proposal may be considered by the Council. We therefore recommend—(*a*) That the Standing Orders limiting the period for considering applications to Parliament be suspended, so far as may be necessary, to enable the Council to consider the following recommendation; (*b*) that it be referred to the Parliamentary Committee to advise in what form legislation might best be promoted in the session of 1904, to prevent garden squares in London being built upon, unless in the rearrangement of estates the owners substitute areas equal to such gardens."

The recommendations were agreed to after discussion, and Mr. Stuart Sankey's motion on the subject (printed in our last issue) was withdrawn.

The Council soon after adjourned.

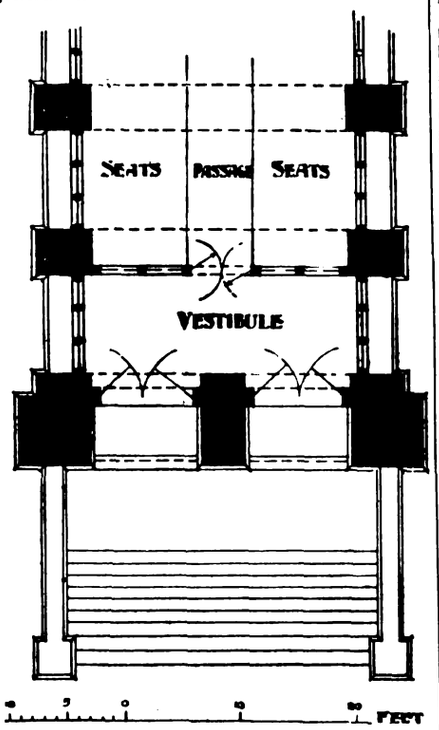
Illustrations.

DESIGN FOR WEST END OF A COLLEGE CHAPEL.

THE design was prepared with the object of endeavouring to procure a simple and solid effect in the Gothic style without introducing the usual spiky, ornamental details which seem to be so much the rage.

One often hears the modern Gothic work ridiculed as being a mere copy of the mediæval style, an opinion which one cannot help but feel is amply justified.

There is, however, a hope that the rising generation will make a bold effort to remove



Design for West End of a College Chapel. Plan.

this stigma by reviving the style in its most simple form, and thus prepare a foundation for the development of a national style, which in course of time may become universal and characteristic of the people of the nation in such manner as prevailed in the Middle Ages.

C. E. Hutchinson.

ALTAR OF THE SACRED HEART, ST. ANNE'S CATHEDRAL, LEEDS.

This altar will be erected in the north transept or eastern side. The altar will be in alabaster, with purple Brescia panels and mother of pearl inlay.

The central figure in the niche will be the Sacred Heart in alabaster, and emblems of the Passion will be carved in panels on each side.

The central figure will be enclosed in a canopy, with flèche, in oak gilded.

Mr. J. H. Eastwood is the architect.

HOUSE AT BALCOMBE, SUSSEX.

This house has lately been built for Mr. F. Campbell. The materials used were Sussex bricks and tiles from the neighbourhood of Horsham.

The architect was Mr. Gerald C. Horsley, of London; and the contractors for the work were Messrs. R. Cook and Sons, Crawley, Sussex.

BEECHGROVE UNITED FREE CHURCH, ABERDEEN.

The church is designed in a phase of Early English, but based on its development in Scotland. It is cruciform in plan, and consists of a broad nave, with narrow aisles serving as passages; north and south transepts, in which, and also over the vestibule at the west end of the nave, are placed galleries. The total sitting accommodation thus provided is about 800. The nave arches are built of rich red freestone from Dumfriesshire, and spring from massive pillars of polished pink granite.

Exteriorly, the material is grey Kenmay granite, with green slated roof and red tile ridges. The total cost has been about 10,000l. Messrs. Brown and Watt, of Aberdeen, are the architects.

DESIGN FOR A CLASSIC STEEPLE.

This design, by Mr. T. Rogers Kitsell, obtained the Tite Prize of the Institute of Architects in 1892. It was at that time the first Classic design which the author had ever made, his training having been previously entirely in Gothic work; and it was spoken of with high approval by the judges in the competition, an approval in which we quite concur.

The treatment is founded to some extent on the study of Wren's works of the same class, but with a richer treatment than Wren was generally able to allow himself. There are however various original points in it; among them the introduction of the little bas-relief groups of angels at the angles near the base; a decidedly modern touch, giving a little bit of sculptured detail near to the eye, without interfering with the main lines of the structure.

Books.

Building Construction (*Advanced and Honours Courses*). By Charles F. Mitchell, Lecturer on Building Construction to the Regent-street Polytechnic, London, etc., assisted by George A. Mitchell. Fourth Edition, thoroughly revised and much enlarged. London: B. T. Batsford. 1903.

WHEN a technical work has run to a fourth edition, which brings the total issue to 18,000 copies, the reviewer will be right in assuming that it is a book which has proved its value to teachers and students, and may be disposed to think that in noticing a new edition he needs only to draw attention to the new matter and to utter another word of commendation. This is a course which we should be pleased to adopt in this case, for there can be no doubt that Messrs. Mitchell's "Building Construction" is one of the best books on this subject which can be placed in the student's hands. On the other hand, it is greatly to be desired that a book, which is so largely used in the training of architects and builders, should be thoroughly up to date, and the reviewer may be pardoned if, in noticing a new edition, he draws attention to passages which have unfortunately escaped revision. An example of this kind is the section on "Timber," pages 126-147. To apply the term "Northern Pine" to the wood which is known in this country as red or yellow deal, is confusing. An architect specifying "Northern Pine" would almost certainly be asked by the builder for an explanation. Gefle and Soderham are undoubtedly important Swedish timber ports, but mention should also have been made of the more northerly ports, up to the Swedish frontier, which have in recent years been opened for the timber trade, and from which some of the best deals are now shipped. We may note in passing that Sundsvall appears on page 139 as Sandsvall, and on page 145 as Sunderswall. The "pitch pine" of commerce is not obtained from the *Pinus rigida*, but from three or four varieties of pine, the wood of which is known collectively in the United States as "yellow pine," the best being obtained from the *Pinus cubensis*. It is strange that no mention is made of Hungarian or Austrian oak, and that the term "wainscot oak" is not defined. Nothing is said about the important eucalyptus timbers from West Australia, Jarrah and Karri, which are now used in this country for joinery as well as for street-paving, or about American maple, which is used for joinery and flooring. Only one page is devoted to the strength of timber, and Laslett's tests appear to have been adopted by the authors in entire ignorance of the more important tests of large scantlings which have more recently been made. No writer on timber can afford to neglect the important investigations of the Forestry Department of the United States, but these do

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not by any means exhaust the valuable information which is now available on this subject.

Further criticism, however, may give our readers a wrong impression. We have no hesitation in saying that Messrs. Mitchell's book is an able and comprehensive treatise on Building Construction. That it is not perfect is merely another way of saying that its authors are human. The new edition contains a chapter on "Electric Bells and Lighting," but as the two subjects are dismissed in four pages of letterpress, it is obvious that only a bare outline has been attempted. The two pages of illustrations add materially to the value of the chapter.

Notes on Steel Concrete Construction. By Major J. Winn, R.E. Chatham: The Royal Engineers' Institute. 1903.

The present pamphlet was written by Major Winn, at the request of several of his brother officers, who expressed the desire to know what was being done with concrete steel, so that they might be placed in a position to make use of it in constructional work. As the basis of his discussion, the author has taken a work recently published by M. Paul Christophe, under the title of "Le Béton Armé," but information has also been drawn from other sources. After a brief introduction, a chapter is devoted to the definition of various coefficients for employment in calculations, and next come some notes entitled "Practical Considerations," in which such points as rust, watertightness, fire-resistance, and resistance to shocks, are very clearly and concisely discussed. Various systems of construction are then described and illustrated, and simple rules are given for calculating the strength of beams. The continental origin of some of the formulæ is to be traced in two or three of the symbols used—such, for instance, as M_f (in France denoting *moment fléchissant*) instead of the usual M, denoting bending movement, and r_c (in France denoting *co-efficient de résistance à la compression*) instead of f_c to indicate compressive strength. In addition to these, the author makes use of some other symbols unfamiliar to the average English reader, and although their significations are duly explained, it would have been better if he had adopted the customary notation. Under the title of "Arches," Major Winn has written an excellent little treatise on various types of such construction in concrete steel, and the remaining details dealt with are walls, pipes, piles, and columns.

Although the subject is not exhaustively discussed, the pamphlet serves to make clear the essential qualifications of the new material, and to place before readers easily understood and reliable rules that should suffice for the design of simple structures in concrete-steel. In one rule, however, relating to shear there appears to be an omission of some essential factor. With one or two exceptions only, the illustrations are reproduced from sectional drawings, and the book is interleaved with blank sheets, so that readers may add notes of information obtained from time to time in the course of practice.

The general scheme of this little volume is excellent, and the work constitutes a welcome addition to literature on a subject that has hitherto received too little attention in this country.

Essays on Rural Hygiene. By George Vivian Poore, M.D., F.R.C.P., etc. Third Edition, with twelve illustrations. London: Longmans, Green, and Co. 1903.

The third edition of Dr. Poore's interesting work does not differ materially from the second, although the number of pages is increased from 372 to 420. The lessons which it teaches are the same, and the additional matter consists mainly of new arguments and examples in support of his earlier conclusions. The second chapter now deals at some length with two or three subjects, which were only briefly mentioned in the earlier editions. One section is entitled "Model (!) By-laws," but much of the argument loses its force when we remember that the Local Government Board some time ago issued a set of model by-laws for rural districts—a fact which appears to have escaped the author's notice. On page 77 it is said that "every country place would do well to enact that (1) the height of a house shall in no case be greater than the width of the street upon which it abuts," but on the following page we read:—"There need be no restrictions on the height or cubic contents of any building provided its curtilage be ample." As Dr. Poore does not insist on the curtilage being divided into two portions, one in front of the house and the other behind, but defines it as a "back yard, probably," the two statements are somewhat confusing. With many of Dr. Poore's views we are in hearty agreement. There can be no doubt about the injustice of charging for water according to the rateable value of premises, or about the physical and moral dangers of overcrowding, or about the inefficiency of some of our sanitary methods, and the ignorance or extravagance which has led to the enormous increase of local rates during the last twenty or thirty years. On all these points, and on many others, Dr. Poore writes in an interesting way, and we can heartily recommend his book, particularly to persons living in the country and in country towns.

Governors and Governing Mechanism. By H. R. Hall. Manchester: The Technical Publishing Co. 1903.

Following the practice usually adopted in works upon this subject, the author commences with a reference to the conical pendulum, applied by Watt for operating the throttle valve of a steam engine, showing that the principle involved is that upon which all simple governors act. Passing on to the "isochronous" governor, which runs at an equal speed in all positions, the author condemns the "uselessness of such an instrument for the purpose of a governor." This opinion is not universally held, but there is some justification for it, as a governor so designed is very apt to cause the undesirable fluctuation, above and below the mean speed, described by engineers as "hunting." In practice this tendency is reduced by friction in the governor gear, and by the addition of a dash-pot or by the aid of a spring. The succeeding chapters describe the essential qualities that ought to be possessed by a reliable governor, and the manner in which these qualities affect the determination of the size and power of a governor for the work to be done. In chapters IX to XIV, various forms of valve gear are considered in connection with the design of the governors used therewith, and the concluding chapters are occupied with the crank-shaft governor, the inertia governor, gas engine governors, and relay governors.

The whole of this matter possesses distinct value, and the practical utility of the work is increased by the addition of two appendices, one dealing more fully with governor power, and the other containing particulars, with drawings of numerous types of governors and governing mechanism by various well-known makers.

The Manufacture of Iron and Steel Tubes. By Edward C. R. Marks, A.M.Inst.C.E., M.I.Mech.E. Second and Enlarged Edition. Manchester: The Technical Publishing Co. 1903.

The present edition of this little volume gives a very complete description of the methods invented for the manufacture of iron and steel tubes of all kinds. Adequate attention is devoted to the latest developments in this important industry, among the most useful chapters being those in which are described various processes and machines employed in the manufacture of seamless steel tubes, the piercing of solid steel billets, and the extension of hollow steel blooms by hot rolling and drawing. The list of patents given as an appendix has been thoroughly revised and brought up to date. This list will probably be of service to manufacturers and others who desire to make detailed inquiry as to the present state of the tube industry in any of its varied branches.

Gas Engines, their Action and Advantages. By W. A. Tookey. London: Merritt and Hatcher, Ltd.

The chief purpose of this little book is sufficiently explained by the title. Part I. is addressed to power users, and among other matter comprises hints that should be of service to purchasers. Part II is primarily intended for those who may be called upon to instal or to superintend the installation of gas engines, and contains some practical notes on foundations, suitable engine sites; and Part III is dedicated to the attendant, giving simple directions for starting, remedies for failures and defects, and other notes of kindred character. To those who are not familiar with the gas engine, the book should be of use, and one recommendation is that it can readily be carried in a coat-pocket of ordinary dimensions.

The Business Encyclopædia and Legal Adviser. By W. S. M. Knight, Barrister. In Six Vols. Vol. V., Pr—Z. London: The Caxton Publishing Co.

This large undertaking is nearing its conclusion, the present being the fifth of the six complete volumes. It is of a more miscellaneous and unsystematic character than the preceding volumes, full certainly of useful information, but information which a reader will have a difficulty in discovering unless some chance idea leads him to hit on a table. "Profit and Loss," "Rigging the Market," are some of the odd titles in this volume. The most important subject dealt with is, perhaps, that of railways. There are, however, none of special interest to our readers.

A Digest of the Law of Easements. By L. C. Innes. Seventh Edition. London: Stevens and Sons, Ltd. 1903.

We have from time to time had to notice new editions of this work. Its form is one which tends to brevity and clearness, and it is satisfactory to find that a book so carefully and clearly prepared is appreciated. We wish, however that the price—7s. 6d.—could be reduced. It is absurdly high for a small work of 142 pages, however well written.

The "Mechanical World" Pocket Diary and Year Book for 1904. Manchester: Emmott and Co., Ltd.

Although the actual number of pages is not increased the present edition of this popular little book of reference contains a considerable amount of new matter. The section on valve diagrams has been rewritten, and in the part devoted to beams and girders, a table has been included giving the calculated results for some frequently used moduli of structural sections. Other new tables give the weights of copper bars and stresses on bolts, steam and gas pipes.

TRADE CATALOGUES.

We have received from the General Electric Company, of Queen Victoria-street, prices and particulars of the "Angold" arc lamp and accessories. These lamps use rubber brakes, but they have a special arrangement for compensating for the wear of the rubber, and they claim that an absolutely constant "feed" can be secured by this means. It is stated that a steady strike is secured with a line resistance which consumes only 7½ per cent. of the total power supplied. A new "enclosed" type of lamp, which burns two carbons in series, is described. This type of lamp ought to prove useful when the voltage of supply is 200 or over, and would be much more efficient than the ordinary enclosed arc for high-pressure circuits. Arc lamps for "photo process" work, and an ingenious type of automatic suspension gear, with a contact device, are also described.

Messrs. Veritys, Limited, have sent us their "Circular No. 65," describing many kinds of electric radiators. The use of electricity for heating purposes is only economical when the electric company supplies current at a reduced rate for this purpose. As this, however, is now the case in many towns, a considerable demand has arisen for these electric radiators. In this catalogue, the probable cost per hour is given in every case, so that the consumer knows exactly the cost of the heating, and as it is possible to put these radiators in any part of the room, effective heating can be obtained. The absence of combustion, and the consequent freedom from vitiated air makes electricity an ideal heat producer.

Mission Church, Dundee.—A mission church is about to be erected in Well-road, Dundee, by St. Salvador's congregation. The new church is to accommodate some 300 worshippers. It consists of a nave, 50 ft. by 30 ft. The end of the building faces Well-road, and the main entrance is by a low side porch. The nave is lighted by a large traceried window in the end and a small side window, the side of the church being treated as an aisle. The nave is separated from the chancel by a stone arch, at one side of which is placed the pulpit. The minister's vestry and the choir's vestry are placed in a low building grouped at the side. The architect is Mr. James Lowe, Dundee.

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BOOKS RECEIVED.

Free Trade, Protection, Dumping, Bounties, and Preferential Tariffs. By Henry A. Agacy. (Longmans, Green, and Co.)

Dat Boexken Vauder Missen. By Brother Ghent Vauder Goude, 1507. Alcuin Club Collections; V. (Longmans, Green, and Co. 21s.)

Journal of the Sanitary Institute: October, 1903. (E. Stanford. 2s. 6d.)

The Care of a House: A Volume of Suggestions. By T. M. Clark, Fellow of the American Institute of Architects. (Macmillan and Co. 6s. 6d.)

Donatello. By Lord Balcarres. (Duckworth and Co. 6s.)

Designing Ironwork. Second series: Part IV. By Henry Adams, M.Inst.C.E. (Published by the Author.)

Pumps: their Principles and Construction. By J. Wright Clarke. Second edition. (B. T. Batsford. 3s. 6d.)

Pattern Design: a Book for Students. By Lewis F. Day. (B. T. Batsford. 7s. 6d.)

Lectures to Plumbers. By J. Wright Clarke. Second series. (B. T. Batsford. 6s.)

APPLICATIONS UNDER THE 1894 BUILDING ACT.

The London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Construction.

Strand.†—A projecting iron sign in front of No. 16, Pall Mall East, Strand (Mr. T. J. Gawthorp for Mr. Hanfstaengl).—Consent.

Hammersmith.—That the application of Messrs. Boehmer and Gibbs for an extension of the period within which the erection of buildings on the site of Nos. 283 to 305 (odd numbers only, inclusive), King-street, Hammersmith, was required to be completed, be granted.—Consent.

Hampstead.—Two two-story wooden bay windows and a wood and lead verandah in front of "Fulwood," Frognal-lane, Finchley-road, Hampstead (Messrs. Pite and Balfour for Mr. J. Young).—Consent.

Lewisham.—A library building, with projecting porch, on the south-east side of Sydenham-road, Lewisham, westward of the public recreation ground (Mr. A. L. Guy for the Library Committee of the Council of the Metropolitan Borough of Lewisham).—Consent.

St. George, Hanover-square.—Bringing forward of the frontage of No. 4, Hamilton-place, Mayfair (Mr. A. N. Prentice for Mr. L. Albu).—Consent.

Battersea.—Six houses and shops on the site of No. 174, Lavender-hill, and thirty-two houses on the east side of Latchmere-road, Battersea (Mr. W. L. Ingram for Mr. J. Jenkins).—Consent.

Lewisham.—Two one-story shops upon part of the forecourt of "Clune House," No. 137, Sydenham-road, Lewisham (Mr. W. B. Stefanoni for Mr. G. E. Farley).—Consent.

Wandsworth.—A wood, brick, and tile porch at the entrance to "Craigleith," Keswick-road, West-hill, Wandsworth (Messrs. Lee and Pain for Mr. W. H. Withall).—Consent.

Whitechapel.†—An extension of the shop front of No. 245, Whitechapel-road, Whitechapel (Mr. R. A. Hinds).—Refused.

Deptford.†—A wood and enamelled iron sign on the face of premises on the south side of Deptford-bridge, Deptford (Messrs. Peppercorn Brothers, Ltd.).—Refused.

Westminster.—An iron and glass shelter at the entrance to the Victoria-mansions restaurant, No. 24, Victoria-street, Westminster (Mr. D. H. S. Alldridge for the Westminster Trust, Ltd.).—Refused.

Width of Way.

Poplar.—A one-story office building at Leamouth Wharf, on the north side of Orchard-place, Blackwall, Poplar, with external walls at less than the prescribed distance from the centre of the roadway of the street (Messrs. J. and W. Clarkson for The Limmer Asphalt Paving Company, Ltd.).—Consent.

Width of Way and Line of Frontage.

Marylebone, West.—That the application of Mr. W. Flockhart for an extension of the periods within which the erection of a church hall on the north side of Upper George-street, St. Marylebone, to abut also upon Little Queen-street, with projecting porches and towers, was required to be commenced and completed, be granted.—Consent.

Poplar.—A one-story addition in front of Nos. 16 and 17, Leamouth-place, Orchard-street, Blackwall, Poplar (Mr. W. Dickinson).—Refused.

Line of Frontage and Construction.

St. George-in-the-East.†—Four iron bridges to connect a building on the south side of High-street, Wapping, with a proposed building on the north side of that street, eastward of Church-court (Mr. C. Dunch for the London and Northern Estates Company, Ltd.).—Refused.

Means of Escape at Top of High Buildings.

Strand.—Means of escape in case of fire proposed to be provided in pursuance of Section 63 of the Act, on the ninth, eighth, seventh, sixth, and a portion of the fifth stories of the Waldorf Hotel, Aldwych, Strand (Messrs. A. M. Mackenzie and Son for the Waldorf Syndicate, Ltd.).—Consent.

Dwelling-houses on Low-lying Land.

Poplar.—Workmen's dining-rooms, etc., on low-lying land, situated at Manchester-road, Isle of Dogs (Messrs. J. and S. F. Clarkson for Messrs. Yarrow and Co., Ltd.).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

WESTMINSTER CITY COUNCIL.

At the meeting of the Westminster City Council on Thursday last week, the Mayor, Captain Jessell, presiding, the Works, Sewers, and Highways Committee reported that they had considered a printed report by the City Engineer, upon the question of the station and subways in course of construction or to be constructed at Trafalgar-square and Charing-cross, in connexion with the Baker-street and Waterloo Railway. By their Act of 1899, the railway company were empowered to construct a station and subways in connexion therewith, having entrances in Trafalgar-square, at the south-east corner of the Strand, opposite the post-office, and the junction of the Strand and Northumberland-avenue, and at Charing-cross, opposite Trafalgar Buildings. The plans for a part of this were conditionally approved by the Council in May last, and plans were now submitted showing the completion of the scheme of subways. The Committee recommended that a communication be addressed to the London County Council referring to the works about to be carried out, and suggesting that as the public way of Trafalgar-square would be considerably broken up in connexion with the works, the present would be an opportune time to extend the subways for mains, pipes, and wires, in Northumberland-avenue, to a point opposite Morley's Hotel in Trafalgar-square, and pointing out that if this were done, the subways from Piccadilly-circus, Oxford-street by Charing-cross-road, Shaftesbury-avenue by Holborn, Northumberland-avenue and the Embankment, would, with the exception of a short length from Morley's Hotel to St. Martin's Church, be linked up. The Council agreed to this. The same Committee reported that an agreement had been entered into with Messrs. Kirk and Randall in reference to that firm's contract for the construction of new jetties and other works at Grosvenor-road Wharf, and the subsidence of a wall of some premises facing the river. In the case of any further dispute, the matter to be referred to an arbitrator, or failing agreement as to arbitrator, to the President of the Institution of Civil Engineers, or some person to be nominated by him. The Improvements Committee submitted a report dealing, among other matters, with the widening of Piccadilly between Arlington-street and Green Park. The report stated that the widening was being carried out by arrangement with the owners of Walsingham House and Bath Hotel, who are about to rebuild. The work was being dealt with by the London County Council, and the estimated net cost was 43,000*l.*, towards which the Westminster Council had agreed to contribute a sum not exceeding 4,000*l.* At the previous meeting of the City Council the plans of proposed vaults on the Bath Hotel site were received, but were not sanctioned by the Council, as the plans showed new vaults projecting beyond the existing vaults. The Committee stated that they had now been informed by the London County Council that the condition upon which the Hotel Company agreed to the widening was that they should be allowed to retain and form vaults along the whole frontage of the Bath Hotel and Walsingham House, under the *existing* footway. A letter had been received from the Hotel Company in which it was stated that owing to the Council's decision it was feared that the scheme would fall through. The report continued: "On perusing the plans we find that the proposed additional vaults are a continuation of the vaults in front of Walsingham House, to which the Council have agreed, and that they only slightly project beyond the existing curb line; therefore, were the improvement not being made, the plans would require very little emendation to comply with the Council's regulations." The Committee had, therefore, recommended the Works, Sewers, and Highways Committee to offer no objection to the amended plans when submitted to them. The Committee further reported on a letter received from the London County Council, in which that body stated it could not see its way to contribute towards the cost (1,200*l.*) of enlarging Drury-lane gardens. The Mayor reported that he had received from Councillor Emden the following volumes for the library of the Council:—"Antiquities of London and Environs," published 1791; "Some Account of London," by Thos. Pennant, published 1805; J. T. Smith's "Antient Topography of London," published 1810; "Shepherd's Views in London," published 1827; Ryde's "History of the Palace of Westminster," published 1849; "Old London" (illustrated), published 1900. A vote of thanks was passed to Mr. Emden.

Correspondence.

THE LATE H. W. BREWER.

Sir,—Your article on the works and character of the late H. W. Brewer has been much appreciated—by none more than by myself, who have known and esteemed him for nearly half a century. As a very young architectural student, going off into a more congenial line of artistic drawing, etc., I remember his coming to see some fellow-students at Hardwick's office, of whom I was one, and being much struck by his bright and enthusiastic manner and congenial "Gothic" excitement, which suited well with our Puginesque state of mind at that time. Subsequently, rejoicing in his works, I went frequently to see and enjoy them at his studio, and induced some friends to purchase; while later still I was able to induce him to do some colouring of illustrations of my own designs (at Harrow and elsewhere), which were published in the *Builder* after being exhibited in the Academy.

These drawings I cherish as some of the best, and I have them—now he is gone—to refresh my memory of a pleasant life acquaintance. But nothing more delightful than the ideal views of mediæval work published by the *Builder* were ever produced in journalistic print—to say nothing of the valuable reproductions of lost work—such as Old St. Paul's, etc., and the historic notes accompanying them by Brewer himself.

You would be doing a good work again by reproducing all these, if you could, in a collected form for our younger architects to look at, admire, and surpass, if they can.

C. F. Hayward.

P.S.—I may say that I proposed Brewer as an Honorary Associate of the Institute of Architects—asking his approval first.

THE BEGINNING OF A NEW CITY.

Sir,—In your issue of August 15, page 177, col. 1, mention is made that Tumut, in New South Wales, "will presently become one of the chief cities of the world."

It is observed that many English papers by the late mail make a similar statement. Permit me to remark, that Tumut has only been recommended by the authorised Commissioners as being suitable for the future political capital of Australia. Unfortunately, or fortunately, it does not follow that their recommendation will be carried into effect. It is for the Parliament of the Commonwealth to decide this question, and it is to be feared that our legislators will hinder the solution of this important subject. Indeed, a fair number desire that the Constitution be amended, making Melbourne or Sydney the future political capital. At this period it is not possible for any man to mention the selected site of the political capital of Australia. In the event of Tumut or any other locality in the back blocks being selected, we have it on the authority of Sir Edmund Barton that no effort will be made to construct a city by magic. This generation must be content with a city of wood, and very possibly the next generation may erect buildings of stone. It is most probable that within three years the site will be selected. Very certainly it will be the aim of the Government to plan a model city fitted for a semi-tropical climate. To accomplish this task, it will become necessary to educate the authorities, and the people, as to the setting out of such city, and certain laws concerning the mode of buildings, from a cheap cottage upwards.

Australia is the land of new cities, and they all exhibit lost opportunities, chiefly on account of the absence of a Building Act that will forbid a right of way being converted into a street, and the construction of verandahs that extend over the footpath. Mr. Horbury Hunt, one of the leading architects of this city, has given a practical example concerning the construction of

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verandahs by making them a portion of the building, and not extending over the footpath. Owing to our general laxity, his good work has not been continued, hence Australian cities are noted for their large array of dangerous and unsightly verandahs.

It is to be desired that you will use your great influence with the object of bringing before the people what things are necessary and what things are to be avoided in the setting-out of a large modern semi-tropical city.

H. W. LITTLE.

Sydney, New South Wales,
September 22.

"A PRELIMINARY IDEA FOR LIVERPOOL CATHEDRAL."

SIR,—Mr. Skipworth's reference to the policy of the committee of the Liverpool Cathedral competition, published in your last issue, is certainly not very encouraging, and knowing the predilection of the committee, as he did, one cannot but admire his pluck in submitting a design in which he conscientiously endeavoured to free himself from the traditional methods of the old school, and thereby reduce his chances of success.

I do not, however, think that his efforts are in vain. He has, at least, set a good example.

C. E. HUTCHINSON.

The Student's Column.

CONCRETE-STEEL.—XVIII.

FLOOR DESIGN (*continued*).

VERY few records have been published relative to the resistance of concrete slabs, supported on four sides, and not merely acting as simple beams supported at each end. Some experiments upon slabs were conducted by Colonel Seddon in 1874, and the results then obtained are recorded in a paper read two or three years ago before the Northern Architectural Association. These tests are rather old, and they do not apply, except in a very general way, to slabs of concrete-steel. Moreover, the strength of a simple slab affords very little indication as to the strength of a complex floor system.

If we consider a floor constructed on the lines described in the preceding article, it becomes evident that it contains no parts acting as separate slabs. It is true that the spaces between the main girders and joists are occupied by moderately thin layers of concrete-steel, but we have seen that such layers constitute a continuous compression flange common to all the girders and joists. Hence they cannot be regarded as isolated slabs. The entire floor, doubtless, acts as a slab supporting along four sides, but its complicated construction precludes the possibility of devising a general formula that will yield precise results for different types of construction, or even for different examples of the same type.

Speaking generally, we may safely say that a slab of specified thickness, when incorporated in a floor, will carry double the load that it will carry when used as a beam simply supported at the ends. Further, in spans not exceeding 4 ft., slabs forming part of a floor will support more than three times the load that would be carried if the slab were merely tested as a beam. This increased ratio is attributable to arching action caused in the material by a uniformly distributed load.

Bearing in mind the general disposition of the reinforcement, and the sectional outline of the concrete in the different members of a concrete-steel floor of scientific design, we may obtain an approximately correct idea of the conditions which lead to augmented resistance in such constructions.

In the first place, we are justified in considering that the effect of judiciously-placed reinforcement, and of haunches on the girders and joists, is to give a continuous girder action. This means that the bending moment in the middle of any span is only two-thirds of the bending moment that exists in a similar span where the ends are free.

In the second place, we may take it that interior arching effect, due to the action of adjoining floor panels, adds about one-third to the area of the compressive stress diagram, the additional compression being taken up by adjoining floor panels, instead of by the reinforcement.

Taking these two developments into account, we arrive at the conclusion that the beams forming part of a floor system are capable of carrying double the load that could be carried by beams of similar construction and dimensions when acting separately as simple beams.

In the third place, we can safely allow something for the arching effect produced by a uniformly distributed load. It must be borne in mind, however, that no arching effect is produced by loads that are free to "flow" like corn and other loose materials.

The arching action necessarily varies with the deflection and with the details of design, but the result of practical experience is to show that the increased resistance thereby given to a span of 4 ft. may be generally stated at 50 per cent. Hence, taking 50 per cent. at 4 ft. span as the starting point, we are justified in arguing that for a zero span the arching action is infinite, and that for an infinite span it is zero.

Consequently, the percentage to be added for a span of any length may be conveniently obtained by the use of a suitable diagram. In Fig. 33, we reproduce a diagram* containing a hyperbolic curve passing through the percentage of 50 per cent. at the span of 4 ft., and having the axes as asymptotes. From this diagram the percentage for a span of any length can be read off.

Summing up the foregoing conclusions, we arrive at the following simple method of determining the proportions of beams used in floor construction:—

1. Calculate the values of the moments of resistance by any of the rules previously stated for simple beams.

2. Double the values so obtained, to allow for continuous girder action, and the arching action of adjoining floor panels.

3. Add a percentage from Fig. 33, corresponding with the length of span, to allow for arching effect caused by a uniformly distributed load.

The advantage of this method of procedure is that it is generally applicable to concrete-steel construction, and does not tie the user down to any one kind of design.

For the purpose of making clear the method of calculation followed in connexion with the Hennebique system of concrete-steel floor construction, we select as an example one of the floors in a school building, erected in Paris from the designs of M. Leclerc. The dimensions and general method of treatment are taken from a *mémoire* by M. Boileau.†

This floor has a length of 38 métres (124.6 ft.), and a span of 7.5 métres (24.6 ft.). The girders are spaced 3.8 métres (12.46 ft.), centre to centre, and their ends are carried on concrete-steel stanchions, 0.27 métres (10.6 in.) square, the connexions being strengthened by the formation of concrete haunches. The floor surfaces, or slabs, between the beams are only 0.08 métres (3.149 in. thick, but they are reinforced by joists of 0.08 métres by 0.12 métres (3.149 in. by 4.724 in.), spaced 1.28 métres (4.2 ft.) from centre to centre.

The following calculations show the manner in which the strength of the various portions of the floor were determined. We have altered the notation, as far as possible, to agree with that adopted in previous articles, but metrical measurements are used to avoid tedious fractions, and to ensure the agreement of the results with the actual dimensions. For the convenience of our readers, the final calculated dimensions are given in English measure. In one or two cases where the results show fractions, the next numeral has been taken.

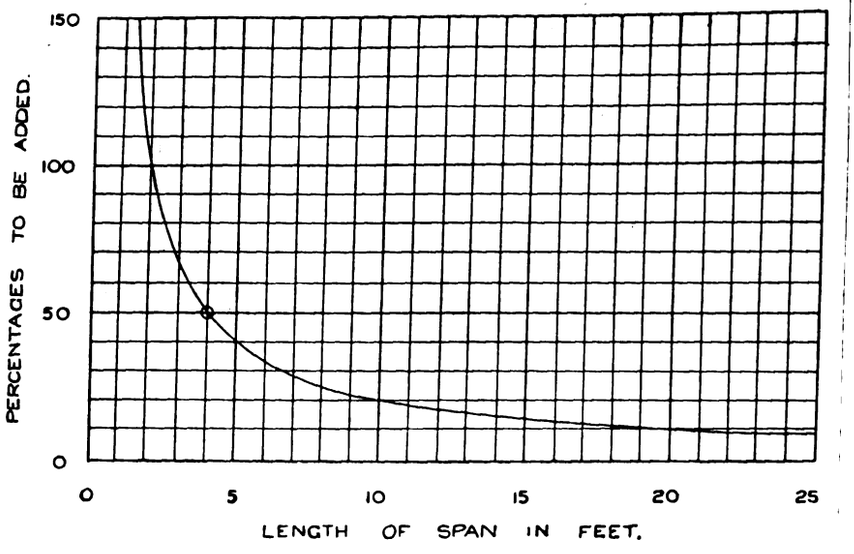

Illustration to Student's Column.—Fig. 33.

Three elements of the floor are considered, in the following order:—

(*a*) A portion of the floor surface, or slab.
(*b*) A main girder.
(*c*) A floor joist.

(*a*) The portion of the floor slab is calculated as a beam of 1.20 métres span, 1 métre wide, and 0.08 métres deep. The external load being in this case 400 kilos. per square métre, and the weight of the concrete being 2,500 kilos. per cubic métre, we have:—

External load ... $W = (1{\cdot}2 \times 1) \times 400 = 480$ kilos
Weight of concrete $W_1 = (1{\cdot}2 \times 1) \times 0{\cdot}08$
$\times 2500$ ... ... $= 240$ kilos.

Total $(W + W_1) = 720$ kilos.

Owing to the intimate connexion of the slab with the main girders and joists, it may be considered as a beam fixed at the ends.

Consequently, in calculating the bending moment (M) the ordinary formula $M = \frac{Wl}{8}$ is altered to $M = \frac{Wl}{10}$, or adding W_1 to represent the dead weight of the concrete,

$$M = \frac{(W + W_1) \times l}{10} = \frac{720 \times 1{\cdot}2}{10} = 86{\cdot}4 \text{ kilogrammétres.}$$

To calculate the necessary depth of concrete in compression, and the position of the neutral axis, we adopt the following method:—

The depth of the compression area is denoted by the expression 2H, and the distance between the centre of compression and the neutral axis, by the symbol H. The width (w) of the section is already known to be 1 métre, and the compressive strength of the concrete (f_c) is taken at 25 kilos. per square centimétre.

Then considering that the $w \times 2H \times H \times f_c = \frac{M}{2}$, it is deduced that

$$(2H)^2 = \frac{M}{w \times f_c}$$

In the present case we have

$$(2H)^2 = \frac{86{\cdot}4}{1 \times 250{,}000} = 346 \text{ sq. mm.}$$

Whence

$2H = \sqrt{0.000346} = 19$ mm. (about 0.75 in).

This result indicates the depth of the compression area, and immediately below this is the neutral axis of the slab.

The sectional area of steel in tension is thus determined:—

Let a denote the area of steel, H' the distance from the centre of the reinforcement to

* Proc. Am. Soc. C.E. Vol. xxvii., No. 6.
† Le Ciment Armé, G. Delarme. Paris, 1897.

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the neutral axis, and f_t the tensile strength of the steel per square millimétre.

Then

$$a = \frac{M}{2H^1 \times f_t}$$

Assuming the distance of the reinforcement from the lower surface of the concrete to be 0.025 métres, the distance $H^1 = 0.08 - (0.019 + 0.025) = 0.036$ m, and, taking f_t at 10 kilos, we have

$$a = \frac{86.4}{2 \times .036 \times 10,000,000} = 120 \text{ sq mm (0.186 sq in).}$$

a sectional area that will be amply provided by spacing three round bars of 8 millimétres (0.3149 in.) diameter, in the métre width of slab here considered.

(*b*) In calculating the proportions of the main girders, the floor slabs are regarded as compression flanges. Consequently every main girder of the floor now in question may be considered as having a T-section of the following dimensions:—

Compression flange, 3.80 m. wide by 0.08 m. deep.

Vertical leg of T, 0.27 m. wide by 0.35 m. deep.

Every girder of the series has to carry the following load:—

(1) The weight of the top slab, with external load, 200 kilos. and 400 kilos. per sq. m. respectively, $= (7.5 \times 3.8) \times 600 =$ 17,100 kilos.
(2) The weight of ten floor joists at 41.2 kilos. each..... = 412 ,,
(3) The weight of the girder itself $(7.5 \times 0.27 \times 0.35) \times 2,500$ ... = 1,771.87 ,,

Total $(W + W_1) =$ 19,283.87 ,,

or, say, 19,284 kilos.

Notwithstanding the efficient nature of the connexion between the stanchions and the girder, the latter is regarded as if the ends were simply resting upon supports.

Hence, for the bending moment, we have

$$M = \frac{(W + W_1)l}{8} = \frac{19,284 \times 7.5}{8} = 18,079 \text{ kgm.}$$

As the compression flange is more than sufficient for its required duty, it is not necessary to occupy space by detailed calculations.

The position of the neutral axis is found by a formula similar to that deduced for the floor slab. Let H denote the distance between the centre of compression and the neutral axis, and *e* the thickness of the floor slab.

Then

$$2H = \frac{M}{w \times e \times f_c}$$

$$= \frac{18,079}{3.8 \times 0.08 \times 250,000} = 0.238 \text{ cm.}$$

Whence

$$H = 0.238 \div 2 = 12 \text{ cm. (4.724 in.)}$$

The centre of compression is assumed to be in the middle of the flange, that is, at 4 centimétres below the upper surface. Consequently, the neutral axis is $0.04 + 0.12 = 16$ centimétres (6.29 in.) below the upper surface.

In determining the sectional area of steel required, the centre of the reinforcement is settled at 5 centimétres above the lower surface of the girder. The distance H^1 from the centre of tension to the nutral axis is

$$H^1 = 0.35 + 0.08 - (0.04 + 0.12 + 0.05) = 22 \text{ cm.}$$

The total section of steel (*a*), calculated as before, is

$$a = \frac{18,079}{2 \times 0.22 \times 10,000,000} = 4,109 \text{ sq. mm.}$$

Six round bars of 30 millimétres (1.18 in.) diameter, will amply comply with this requirement, and in order to avoid the necessity for increasing the width of the lower portion of the girder, the reinforcement can be arranged in two rows of three bars, one above the other.

(*c*) Each floor joist is considered as having a T-section, consisting of a compression flange, 1.28 métres wide by 0.08 métres thick, formed by two halves of the adjoining floor slabs, and the vertical leg of the T, measuring 0.08 métres wide by 0.12 métres deep.

It is quite evident that the quantity of concrete in compression is in considerable excess, and calculations, performed in the manner described above, show that the neutral axis of these joists would pass within the slab forming the top flange. The effect of this would be to cause tension in the lower portion, and at the same time to diminish the amount of reinforcement required in the vertical leg.

Such a development is extremely undesirable, because unreinforced concrete in tension is very apt to crack, and the saving of metal is inconsiderable.

For the purpose of adjusting the height of the neutral axis, its position is assumed in the present case to be 1 centimétre below the under surface of the floor slab. The sectional area of steel is then calculated upon this assumption.

The following values are found by calculation as before:—

$(W + W_1) = 2,788$ kilos. $M = 1,004$ kgm.

$H^1 = (0.20 - 0.14) = 0.06$, and for the area of steel we have

$$a = \frac{1,004}{2 \times 0.06 \times 10,000,000} = 836 \text{ sq. mm.}$$

For this requirement, two bars of 24 millimétres (0.944 in.) diameter may be used, placed one above the other.

From the last calculations, it becomes evident that the floor slab, regarded as a flange for the joists, is relatively too thick for the depth of the vertical leg. As the total depth of the joists is fixed by structural considerations, the correct balance can only be attained by increasing the amount of reinforcement, or by reducing the width of each span by increasing the number of joists. But the latter alternative implies a diminution in the thickness of the slab, which would detract from the general solidity of the floor. Therefore it is better to increase the reinforcement as already indicated.

Under more favourable conditions, the joists are calculated in precisely the same manner as that adopted for the main girders.

We may here remark that the addition of reinforcing bars, bent upwards towards the ends, would permit the application of the modified formula, $M = \frac{Wl}{10}$, to the girders and joists. In the foregoing calculations, this modified form of the rule is only applied to the floor slab, because the reinforcement in the floor consists simply of horizontal bars.

No details are given by M. Boileau relative to the calculation of the stirrups for withstanding shear, but this part of the reinforcement can be settled by the rules we have previously given.

Shortly after completion, a complete panel of the floor was tested in the presence of several architects and engineers, under an external load of 700 kilos. per square métre (143.36 lb. per square foot).

The maximum deflection registered was 2.8 millimétres for the main girder, and 2.4 millimétres for the centre joist. On removal of the load, the permanent set was shown to be less than two-tenths of a millimétre.

OBITUARY.

Mr. Brooks.—We regret to announce the death, on Saturday in last week, at Ashford, Middlesex, of Mr. James Martin Brooks, of Orchard Cottage, Ashford, and of No. 35, Wellington-street, Strand, aged fifty years. Mr. Brooks was the eldest son of James Brooks (who died on October 7, 1901), with whom he entered into partnership, under the style of James Brooks and Son; in August, 1901, Mr. G. H. Godsell, of Hereford, became a member of the firm, and the name was changed to James Brooks, Son, and Godsell, of London and Hereford. He was elected a member of the Architectural Association in 1877, and an Associate of the Royal Institute of British Architects in 1881. Mr. Brooks made the designs for the three iron screens inserted between the arches that open into the Lady Chapel of St. Faith's Church, Stoke Newington, as a memorial to his father, who was churchwarden there during many years. He was architect of the new church, after the Early English style, at Sandford Hill, near Longton, Staffordshire, of which the first portion was erected in 1898, at an initial cost of 3,500*l.*, and for the restoration and enlargement of the fifteenth-century chapel of the Hospital of SS. Mary and Thomas of Canterbury, at Ilford (see the two illustrations in our columns of September 13, 1890); he designed the pulpit (illustrated in the *Builder* of March 21 last), executed in Corsham and Beer stone, with a marble inlay of Greek rosso-antico in the panels by Messrs. Martyn and Co., of Cheltenham, for the Church of St. John the Baptist, Holland-road, Kensington, of which his father was the architect (1876-91). On November 20, 1886, we published his competitive designs which gained the second premium for All Saints' Church, Peterborough; on March 31, 1888, and January 19, 1901, respectively we illustrated his measured drawings of the south-west porch of SS. Peter and Paul Church, Shoreham, and the window at the east end of the north aisle of the parish church at Stone, in Kent, and of the western façade of the conventual church of St. François de Sales, in S. Trond, Belgium.

GENERAL BUILDING NEWS.

Westminster Cathedral.—It is stated that a total sum of 196,000*l.* has been expended so far upon the building works, the chapter-hall and cloisters included; the deficit on the general building fund exceeds 7,000*l.* Ninety founders have given, or promised, sums of 1,000*l.* and upwards apiece, and subscriptions have been made to defray the cost of the twenty-one marble columns for the nave and transepts (150*l.* each), the fourteen in the sanctuary galleries (50*l.* each), and the six in the sanctuary (110*l.* each).

Mount Vernon Hospital for Consumption, Hampstead.—The recent additions to this hospital consist of the third and concluding portion of the main buildings, and form the eastern block. The original design for the hospital was prepared by the late T. Roger Smith in competition, and the first or western block was erected by him in 1879 and the central block in 1892, in partnership with his son, Professor Elsey Smith, who was associated with him in the recent work. The block just completed was in the original design a repetition of the first block forming the western end of the building, but owing to the change in the treatment of consumptive patients, very considerable modifications in the plan have been necessary; but in its main bulk and in its architectural treatment it conforms as closely as circumstances will permit to the original intention. The main feature of the new block is the permanent provision of large open-air balconies for the patients on the ground, first, and second floors, and a covered walk at the level of the terrace, all of which have an aspect rather west of south. The balconies are 12 ft. wide in the clear and 71 ft. long on the first and second floors, and the whole of the front is treated with small piers and large openings, so as to secure the utmost amount of fresh air. Glazed shutters are provided for the lower part of each opening, for use in very wet or snowy weather, but the upper parts are only provided with louvred shutters. The walls have glazed brick dadoes, the front wall being lined throughout with glazed brick, but the other walls are plastered above the dado. The floors are of pitch pine, laid on Geary, Walker, and Co.'s anhydrous system, and a channel is provided for carrying off any rain that may enter through the open front. Between the open balcony and the main corridor are placed a bathroom, staircase, linen-room, and serving-room, and north of the corridor small wards are placed for the use of patients for whom the open balconies are not suited, and a sanitary block, containing bath, lavatory, slop-sink, and two water-closets, is provided. The ground floor balcony is less extensive, and the north side is occupied with a new boardroom and matron's sitting and bedroom, the space formerly occupied by these rooms in other parts of the building being now added to the patients' accommodation, and this change has allowed of a necessary enlargement of the patients' dining-room. The top floor has been devoted to the nurses' accommodation, and provides a dining-room and sitting-room with a large open balcony at the east end, and bedrooms for a portion of the nursing staff, thus setting free other rooms for the completion of the kitchen offices and for accommodating the staff of servants. A detached generating station has been constructed in the grounds of the hospital for both power and light, and the hydraulic lift formerly in use has been converted into an electric lift, and a new electric passenger and service lifts added, and the hospital throughout has been lighted by electricity. The construction of the new block is fireproof; the floors in the wards are of oak, and elsewhere of terrazzo or granolithic paving, and dadoes of glazed brick or tile are provided throughout. The sanitary arrangements in the central block, some of which were of a temporary nature pending the erection of the present block, have been reorganised, and the complete separation of the nurses' and servants' quarters, now rendered possible, have necessitated the alteration and addition of sanitary fittings on the top floor. The exterior is treated like the earlier portions, in red brick with stone dressings. Mr. E. L. Cooper, of Hampstead, has acted as clerk of works, and the general contractors were Messrs. L. H. and R. Roberts, of Islington, who also built the central block. Messrs. Massey and Allpress advised the committee as to the whole of the electrical installation, and designed and supervised this portion of the work.

Church, Kensington-gore, London.—The new Church of Holy Trinity, Kensington-gore, which has been erected from the designs of Mr. G. F. Bodley, R.A., at a cost of about 30,000*l.*,

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has just been consecrated. The south-west and north-east faces of the new church are of Portland stone, with decorative Gothic arches, and a recessed porch on the south-west, Prince Consort-road.

THE ROYAL HOSPITAL FOR CHILDREN AND WOMEN, WATERLOO-ROAD, LONDON.—The foundation-stone of this hospital was laid by the Duchess of Albany on Monday afternoon, the 26th inst. The Lord Mayor, who is President, attended, with the Sheriffs, in state, and presented to the Duchess a silver-gilt trowel, manufactured by Messrs. Elkington and Co. The building is being erected as a memorial to the late Queen Victoria (who was a Patron and Governor) in two sections. The first portion, in Waterloo-road, now in course of construction, will provide for about 100 beds and an extensive out-patients' department. The front will be faced with Edwards' Ruabon red bricks and Doulton and Co.'s buff terra-cotta. A special feature will be an open balcony on each floor for the patients' use. At the corner entrance will be a glazed terra-cotta porch, presented by Messrs. Doulton and Co. The contract for the first section is 30,000*l.* The architects are Messrs. Waring and Nicholson, and the contractors Messrs. Holliday and Greenwood, of Loughborough Park Works, Brixton.

DYMOCK CHURCH, GLOUCESTERSHIRE.—A memorial screen in English oak has recently been erected under the arch leading from the nave to the south transept, the lower panelling being returned as a protection to the pulpit stairs. The upper part of the screen has delicate tracery of Perpendicular character, and a series of carved pateræ in the cornice. A wood-block floor has also been laid in the tower, and the west doors pierced with tracery and glazed to give light for the ringers. The ancient doors have been placed in their original position in the doorway between the tower and nave. The whole of the work has been carried out by Messrs. H. H. Martyn and Co., Ltd., of Cheltenham, from the designs of the architect, Mr. Roland W. Paul, of London.

BLACKHEATH AND CHARLTON COTTAGE HOSPITAL.—For the benefit of out-patients, a new dispensary, with medical consultation-rooms, waiting-rooms, etc., are being added to this hospital, which is in the Shooter's Hill-road, Blackheath, S.E. The addition will be, like the hospital itself, of red brick, with half-timbered gables and Broseley roofing tiles. The builders are Messrs. Garrett, of Balham-hill. The architect is Mr. Edward R. Robson, of Westminster.

ST. ANNE'S CATHOLIC CHURCH, VAUXHALL.—This church, which was opened on Sunday last, the 26th inst., will present, when completed, an imposing front towards Upper Kennington-lane. It is built of red brick to all external walls, plastered inside, and has a total length of 140 ft. The plan comprises a nave 90 ft. by 31 ft., with processional aisles on each side, a north transept 22 ft. long, and shallow south transept, both 17 ft. 9 in. wide, and a chancel 35 ft. 9 in. by 22 ft. 6 in., with chapels on either side, opening into chancel by coupled arches; the easternmost bays of nave being canted in towards the narrower chancel. It is hoped in the near future to complete the fabric by the addition of a Confraternity Chapel 47 ft. by 18 ft., with arches opening into same from north aisle, which are already built and temporarily blocked up. Over this chapel will be a parish room 52 ft. by 18 ft., the end portion of this addition nearest to the road being carried up as a tower, about 96 ft. high, surmounted by a "saddle-back" roof. On the left of a deeply recessed porch to main entrance is a baptistry, groined in brick, with moulded stone ribs and carved centre-boss representing the Holy Dove. There are also smaller porches on each side at the end of the aisles, a priest's entrance, connected with the presbytery by a covered way, and an entrance in the south transept for the school children from their playground. Opening into the north transept and chapel are the sacristies, a large and commodious one for the clergy, and a smaller one for boys, from which a staircase leads to the organ chamber over the chapel on the Gospel side, and a store-room over the boys' sacristy. The high altar is of alabaster, with marble inlays and slab, and the reredos is of white stone, surmounted by a baldachino in carved wood richly decorated in gold and colours, the whole being the gift of a benefactor. The chancel stalls and benches, in oak, are already provided, as is also the font in the baptistry. The two side altars, pulpit, Communion rails, and other furniture have still to be provided. An organ is being constructed by Messrs. Walker and Sons, on the pneumatic principle, and the necessary structural arrangements for the pipes and apparatus have just been completed. The church is lighted throughout with electric light, the fittings for which are of wrought iron. The style is Early English, of the thirteenth century, of a very simple and severe form suited to brick construction. The roofs of both nave and chancel are of unvarnished pitch pine, as are also the benches in the nave and other woodwork where not of oak. The accommodation provided is for from 650 to 700 persons, and the cost of the building has been about 9,000*l.* Mr. Frederick A. Walters, F.S.A., of Westminster, is the architect, and the contractors are Messrs. Goddard and Sons, of Farnham and Dorking.

TOWER, BIRKENHEAD TOWN HALL.—The Birkenhead Town Hall tower, which two years ago last July was wrecked by fire, has been reconstructed. The ravages of the fire rendered it necessary that the lower portion of the tower, beneath the clock, should be rebuilt, and this was done in accordance with the original design. The new upper portion, which is in the Classic style, and now uniform with the rest of the building, consists of eight columns and entablature of the composite order. The four angles are finished with carved winged lions, and the tower is surmounted with a steel cupola covered with copper. The position of the clock is four feet higher than in the former building. Over the clock arches the eight spandrels are carved with figures symbolical of the flight of time. The architect was Mr. Henry Hartley, Liverpool, and the contractors Messrs. Thornton and Sons, Liverpool.

FIRE STATIONS, LONDON.—Mr. E. Smith, the Chairman of the Fire Brigade Committee of the London County Council, opened, on the 24th inst., a sub-fire station at Vauxhall. The station occupies a position on the Albert Embankment, at a point near Vauxhall Cross, the Council having utilised for the site a piece of surplus land which remained over after the completion of the widening of the embankment. The station, which is lighted by electricity, has been erected by the Works Department of the Council, the estimate for the work being 8,400*l.* The accommodation comprises appliance room with front and back entrances, and with stables opening direct into it; watch and recreation rooms, and accommodation for the staff of the station, consisting of one officer, five firemen, and a coachman. Mr. Smith also opened another new station at Pageant's Wharf, Rotherhithe-street. The station is situated between the Surrey Commercial Docks and the river. The new building has a frontage on the Thames of 92 ft. and 84 ft. to the street. The station has accommodation for a station officer, six firemen, and a coachman, and possesses a reading room and recreation room.

CHURCH, PLUMSTEAD.—The foundation-stone of a new church was laid recently in Timbercroft-lane, Plumstead. It is called the Church of the Ascension. The architect is Mr. A. E. Habershon, and the builders Messrs. Dorey and Co., of Brentford. The cost so far has been 2,500*l.*

CHURCH, TONYREFAIL.—The new Church of St. David, Tonyrefail, erected at a cost of 3,500*l.*, was consecrated recently by the Bishop of Llandaff. The edifice is in the Decorated style, accommodation being provided for 362 worshippers. It was built from the design of Mr. E. M. Bruce-Vaughan, architect, Cardiff, and the contractors were Messrs. Beames and Nephew, Cardiff.

ST. SILAS CHURCH, NUNHEAD.—The new Church of St. Silas, which has been erected in Waverley Park, Nunhead, was consecrated recently. The church has been designed by Messrs. Cutts, the architects, and has seating capacity for 750 persons. The style is Perpendicular. The edifice has a pitch pine roof, and the seats are of oak.

ENLARGEMENT OF NORMANTON CHURCH, DERBYSHIRE.—The Bishop of Derby consecrated recently the Church of St. Giles, Normanton. The additions consist of a nave, chancel, south aisle, organ chamber, and vestry accommodation for both clergy and choir. The whole church has been repaved, and the seating accommodation re-arranged. The completed scheme also includes a south porch, but for financial reasons this has been left out for the present. The number of sittings has been increased from about 260 to 550, but on special occasions it will be possible, by the introduction of chairs, to find places for at least 650 worshippers. The contract was secured by Messrs. Walker and Slater, of Derby. The lighting has been done by Mr. E. Haslam; and the heating, which is on the high pressure system, by Messrs. Jerram and Co., Derby. The restoration of the marble work and monuments was done by Mr. R. G. Lomas, of King-street. The total cost of the work is about 4,000*l.* Messrs. Naylor and Sale, Derby, were the architects.

MARKET, WOLVERHAMPTON.—The new covered wholesale market which has been erected in Wulfruna-street at a cost of 16,850*l.* for the Wolverhampton Corporation, was opened on the 5th inst. The building is erected entirely of local bricks, relieved with terra-cotta facings, and is roofed with red tiles. There are three entrances (one of which leads to the cold stores) having brick piers with elliptical arches, surmounted by terra-cotta terminals. The internal arrangements, in addition to providing a floor space of 16,461 square feet, available for letting in small lots, provides permanent covered stands for wholesale dealers, with basements below and office accommodation above. Each stand has a separate spiral staircase leading to the offices and a ladder stairway to the basement. Artificial light is provided by 18 arc lamps, and hydrants are fixed in suitable places to be used in case of fire, and for cleaning purposes. The work has been carried out by Messrs. George Cave and Son, of Wolverhampton, from plans by Mr. George Green, the Borough Engineer.

BANK PREMISES, STOCKTON.—New premises for the North-Eastern Banking Company at Stockton have been erected near the Borough Hall. The new bank has been built from the designs and under the supervision of Mr. W. H. Linton, architect. The accommodation consists of bank, offices, and residence, each section being complete in itself and entirely separate from the others. The bank itself is on the ground floor. At the rear of this is the manager's private room, whilst behind there are rooms for storing stationery, loose books, and for other purposes. In the basement is the strong room. Another chamber in the basement contains the heating apparatus, the bank premises being warmed by the hot-water system. A lift communicates between the banking-hall and the basement. Electric light will be fitted throughout the bank. The main contract has been carried out by Mr. W. C. Atkinson, the slating by Messrs. Wintersgill, the plumbing and electric lighting by Messrs. Hind and Son, the masonry work by Mr. J. Bowron, the heating apparatus by Messrs. Blakeborough and Rhodes, the painting by Messrs. Jordan and Adamson, and the plasterer's work by Mr. Cooper.

PAROCHIAL HALL, SHIREHAMPTON, GLOUCESTER.—On the 3rd inst. the foundation-stone of the new Parochial Hall was laid at Shirehampton. The site of the building is on the east side of Station-road, and the hall will be built of local stone, with Bath stone dressings. It will be in the English Renaissance style, and the entrance is to be in Station-road. The hall is designed to accommodate at least 500 persons, of whom 370 would be seated on the ground floor, and the rest in the gallery at the end. The internal dimensions of the building will be 65 ft. by 30 ft., and there will be a stage the full width of the hall, 14 ft. from front to back, and raised about 3 ft. above the floor. Caretaker's rooms will also be provided. The premises will be heated by hot-water apparatus supplied by Messrs. Crispin and Son. The building has been designed by Mr. F. Bligh Bond, of Bristol, and the contract price is 2,715*l.* The contractor is Mr. C. A. Hayes, of Bristol, and Mr. James Long is clerk of the works.

UNITED FREE CHURCH, RUCHILL, GLASGOW.—The memorial-stone of Ruchill United Free Church, Ruchill-street, was laid on the 3rd inst. The church has been designed by Mr. Neil C. Duff. The outside walls are of stone from Locharbriggs Quarry, finished with square-dressed rubble, with polished dressings. The main features of the north or front elevation to Ruchill-street are the large square tower with slated roof at west corner, rising to a height of 93 ft., and the Gothic window in the front gable, filled in with tracery and stained glass. The body of the church is reached from the street by passing through a covered stone porch, open at front and back, which also forms a connexion between church and halls, thence through the tower, in which is the stair to end and side galleries. The plan of the church shows nave, side aisles, and centre. The chancel, where the choir will be accommodated, and the organ loft, are at south end of church. The pulpit will be placed at north-east corner, near the chancel arch. The session-house and vestry are behind the chancel. The nave walls and roof are carried on polished white stone columns from Overwood Quarry, with moulded bases and enriched capitals. Springing from these are semi-circular stone arches, heavily moulded and enriched on the soffits. The chancel arch is also ornamented with stone side columns and Gothic arch. The windows throughout show polished stone to the inside, with cusped panelled lintels. The roofs are open timbering, with dressed main rafters and purlins. The church is to be lit with electric light, and heated with radiators and hot-water pipes. The total interior length of the church is 95 ft., and the width across 55 ft. Sittings will be provided for about 920 persons.

GIRLS' INSTITUTE, SALFORD.—This institute, which is to be known as the John Harling branch of the Manchester Girls' Institute, has just been erected. The cost has been about 6,500*l.*, exclusive of site and fittings. The building, which is on the Regent-road Barracks site, is in the Renaissance style, and is of red brick, with buff terra-cotta dressings, from Northwich. There are a restaurant, a gymnasium, laundry, washhouse, kitchen, scullery, pantries, and a cookery classroom on the ground floor. Above these there is an assembly-hall, with ten classrooms opening from it. The committee-room is on this floor. The hall is lighted through a large domed lantern. The institute is fitted with hot and cold water supply, hot-water heating appara-

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tus, and a separate system for steam cooking, and is lighted by electricity. There is a house for the caretaker, and an emergency exit has been provided in case of panic. The architects were Messrs. J. Earnshaw and Son.

Y.M.C.A. Buildings, St. Helens.—The new Y.M.C.A. buildings at St. Helens were opened on the 15th inst. by the Earl of Aberdeen. The architects were Messrs. Briggs and Wolstenholme. The frontage is Renaissance in style, and is faced with terra-cotta and red brick. The premises comprise an entrance-hall, bicycle "stable," and offices on the ground floor, with entrance to the old gymnasium, heating chamber in the basement; reception-hall, secretary's general and private offices, newsroom, library, lounge-room, concert-hall, games-room with temperance bar, and ladies' room on the intermediate floor; lecture-room, photographic dark-room, club secretaries' room, classroom, chess-room, ping-pong room, board-room, temporary bedroom, bathroom, and residential apartments for caretakers on second floor; and a roof garden and turret on top.

FOREIGN.

France.—The Minister of Foreign Affairs has commissioned M. Hannotin to design a series of cartoons for tapestries for the decoration of the new French Embassy building at Vienna. They will be executed at the Gobelins manufactory, and will represent scenes in Paris and its environs—the Champs Elysées, the Place de la Concorde, the Louvre, Versailles, St. Cloud, etc.——The Carnavalet Museum has received some objects of antiquity found in excavating for foundations near the observatory; among them a sculptured stele of the date of the Roman occupation.——M. Edouard André has prepared the plans for a Jardin des Plantes which the Municipal Council of Angers intends to form.——The campanile of the Church of St. Léon, at Nancy, which was in a ruinous condition, is in process of being demolished.——A new Fine Art Museum is to be formed at Clermont-Ferrand.——M. Roujon, Directeur des Beaux-Arts, has been elected perpetual secretary of the Académie des Beaux-Arts by 23 votes, against 16 given to M. Lafenestre.——The French Government is intending to erect a palace for the reception of sovereigns visiting France. It is proposed to build it on a site at the angle of the Avenue du Trocadéro and the Avenue de l'Alma, at present occupied by the Beacons and Lighthouses Department.——The Department of l'Assistance Publique has drawn up a great scheme of work which will cost 45 million francs, and will include the demolition of the Hôpital de la Pitié, which will be rebuilt on the site of the Salpêtrière, the rebuilding of the Cochin and Ricord hospitals, the building of Hôpital Herold and of two entirely new hospitals, one in Paris, for consumption; and one without the boundary, for contagious diseases.——The Ministry of the Colonies will probably be transferred to a building which the Government propose to erect on the site at present occupied by the Garde Meuble National and the Depôt des Marbres.——The Municipality of Rambouillet is about to build a new abattoir, at a cost of 103,000 francs, and a large Salle des Fêtes.——The General Council of the Alpes Maritimes has approved of a scheme for the construction of a cornice road along the Mediterranean shore at Antibes. The cost is estimated at 350,000 francs.——M. Deglane, the Chief Architect of the Grand Palais des Beaux-Arts, has been commissioned by the Government to build, at Dakar, the new palace for the Government of French East Africa.——M. Arsène Rivey, the painter, who has been a member of the New Salon since its foundation, has committed suicide. He was a pupil of Picot, Couture, and Bonnat. He had obtained several medals, and was a specialist in *genre* and portraits.——M. Léon Benonville, architect, and Inspecteur in the Department of Monuments Historiques, has died suddenly at the age of 43. He had taken great interest, especially in connexion with the New Salon exhibitions, in the improvement of design and decoration of modern furniture.——M. Théodore Lafou, member of the Société Centrale des Architectes, has died at the age of 54. He collaborated in the carrying out of the Mairie of Neuilly-sur-Seine, and obtained the first premium in the competition, in 1887, for a new Bourse de Commerce at Mans. The Société Centrale has also lost another of its members, M. Henri Brisson. He was a former pupil of Guénepin, and held an official position as Architecte-Voyer under the Paris Municipality.

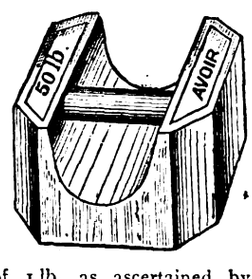
MISCELLANEOUS.

Professional and Business Announcements.—Mr. James S. Gibson, architect, has removed his offices from 27A, Old Bond-street, to 5, Old Bond-street, W.——Mr. H. S. P. Hindley, metal-worker, has removed from 49, Bread-street, E.C., to 18, Berners-street, W.——Mr. Philip E. Pilditch, of the firm of Pilditch, Chadwick, and Co., asks us to make it clear that it was not his death which was announced recently in our columns, as there appears to have been some misapprehension on the subject. Mr. J. T. Pilditch whose death we recently announced, was the Surveyor to the Battersea District for many years, and formerly practised as an architect in Parliament-street, where, by a coincidence, Mr. Philip E. Pilditch, a member of the younger generation of his family, though only distantly connected, commenced practice some twenty years ago. The latter, who is Consulting Architect to the Salisbury, Bedford, and other estates, now practises at 2, Pall Mall East.

Stratford-on-Avon.—At a special meeting of the trustees and guardians of Shakespeare's Birthplace, held a few days ago, Mr. Lionel Cust, Director of the National Portrait Gallery, was unanimously elected as a life-trustee *vice* the late Mr. Edgar Flower, and the appointment of Mr. Sidney Lee as chairman of the executive committee was announced. By a vote of nine against six a motion was carried in favour of a scheme for dealing with the two cottages that abut upon the birthplace, and utilising them as a ticket-office and depository of relics, after a report upon their condition has been made by Mr. J. A. Cossins, of Birmingham, who is the local representative of the Society for the Protection of Ancient Buildings, and after a careful examination by experts of the relics and other articles, some of which are of doubtful authenticity and, besides, have but little relation to the purposes of the trust. Mr. Lunn, Town Clerk of Stratford, submitted conveyance deeds of the property in Henley-street, given to the trustees by Mr. Andrew Carnegie, which comprises the two cottages nearest to the birthplace and the site of two that were recently pulled down. The Mayor, Mr. G. M. Bird, was empowered to sign the conveyance, upon the understanding that Mr. Carnegie made the gift quite free from any conditions and with no preference, on his part, as to the site of the projected free library in the town.

South Kensington Sketching Club.—A free exhibition of students' holiday sketches was opened last Monday in the temporary iron buildings (entered from Queen's-gate) appertaining to the Department of Science and Art. Mr. Walter Crane offers a prize for a design founded upon some form or scheme of colour in Nature adapted to a decorative purpose, and other prizes are offered by Professor Lanteri for a modelling after Mr. Gilbert's "Labour," the Duke of Devonshire for a set of coloured sketches, and Lord Londonderry for a portrait; Messrs. J. Seymour Lucas, Frank Brangwyn, T. Brock, and Walter Crane will act as adjudicators for the several awards. The exhibition will be closed on November 7.

A New Standard Weight.—A recent Order in Council gives formal sanction to the adoption of a new Board of Trade standard weight of 50 lbs., or "half-cental," in pursuance of the provisions of Section 8 of the Weights and Measures Act, 1878. The Order in Council further prescribes that the weight shall be a multiple of the imperial



weight of 1 lb. as ascertained by the Act, and that it shall be made in a particular octagonal shape, with a cross-bar, and be stamped "50 lb. avoir.," after a pattern deposited in the Standards Department of the Board of Trade.

Board of Education, South Kensington.—The following is the list of candidates to whom Royal exhibitions (art), local scholarships (art), national scholarships (art), and free studentships (art), have been awarded in 1903:—*Royal Exhibitions*:—Henry Mawdsley (Halifax); Herbert A. Budd (Hanley); Joseph R. Shea (Burnley); Edward Healey (Hull); Harry Parr (Burslem); Arthur Paul (Birmingham and Norwich); Charles F. Hill (Manchester); Theodore Barker (Salford); Lillian M. Dunkley (Brighton); Thomas C. Derrick (Bristol, Queen's-road, and Merchant Venturers' Technical College). *Local Scholarships*:—Herbert J. Harvey (Birmingham); George P. Denham (Exeter); George E. Marston (Putney); Herbert H. Stansfield (Sheffield); John B. Piercy (Chester); John M. Woodroffe (Nottingham); Harold G. Alderton (Farnham); Percy H. Jowett (Leeds); Carrie Horner (Skipton); Mabel Burras (Leeds); Bertha S. Jefferies (Bristol, Queen's-road); Arnold H. Mason (Macclesfield); Blanche Constable (Bradford, Technical College); George W. Mason (Bradford, Technical College); Francis T. Barrett (New Cross, Goldsmiths' Institute); George Halford (Bradford, Technical College); James L. Nicoll (Edinburgh, Royal Institution); Harriet L. Wyness (Dover); Richard Wallwork (Manchester); Harold Bateman (Bradford, Technical College); Harry L. Oakley (York, St. Leonard's-place); Tobias Lewis (Great Yarmouth); John S. Vickers (Lancaster); George H. J. Day (Chester). *National Scholarships*:—Joseph P. Bland, designer (Kidderminster); Arthur Morton, designer (Sheffield); Joseph B. Petch, designer (Sheffield); George P. Denham, designer (Exeter); Margaret I. Chilton, designer (Bristol, Kensington House); Sally G. Ashworth, architecture (Manchester). *Free Studentships*:—John S. Vickers (Lancaster); Gladys B. Kingwell (Exeter); Margaret Scholfield (Ashton-under-Lyne); Samuel J. McAvoy (Belfast); Andrew Samuel (Aberdeen); Harry Keast (West Bromwich); Olivia B. Rawlins (Liverpool); Louise R. Jacobs (Hull); Carrie Horner (Skipton); Charles Haworth (Liverpool); William McBride (Belfast); John Currie (Newcastle-under-Lyme); William M. Whitehead (Burnley); Alfred Hill (Burslem); Herbert H. Stansfield (Sheffield).

Discovery in Dunfermline Abbey.—As workmen were employed last week removing part of the rough stone rubble-work which filled a doorway in the south wall of Dunfermline Abbey, they disclosed a Norman doorway of the period and style of the ancient church. The arch of this doorway, which is 9 ft. higher than the floor of the church, is ornamented with chevron or zigzag mouldings, similar in character to the Norman arcade work on the inside of the walls of the church. The Norman capitals are enriched with raised floriated scroll-work. The sides and lower parts of the doorway have been much mutilated, though the double capitals of those on each side are in good condition. A long flat stone had been laid across resting on the side capitals and forming underneath a shallow chamber or recess. This was found to be filled up with partly loose stones, among which, as in the space above, were a number of fine specimens of mouldings and of carved work. The cutting in the abbey wall had been begun for the purpose of providing a site for a "Soldiers' Memorial," in connexion with the South African War. Mr. Robertson, His Majesty's Surveyor of Works for Scotland, has decided that the soldiers' memorial will be provided with another site, and that arrangements will be made for the full exposure and preservation of the doorway.

British School at Athens.—The annual meeting of the British School at Athens was held on Thursday afternoon, the 22nd inst., at the rooms of the Society of Antiquaries, Professor Butcher in the chair. We take from the *Times* the following *résumé* of the Report of the Managing Committee, which was read by Mr. Baker-Penoyre, the Hon. Secretary, who stated that the work of the school had been carried on successfully by Mr. Bosanquet, the Director, Mr. Marcus N. Tod, Fellow of Oriel, the Assistant Director, and eight students. Mr. Tod spent six months in Athens arranging the library, including the Finlay Library, and working on epigraphy with Dr. Wilhelm. He also spent three months in Crete, after a preliminary study of the epigraphy of Eastern Crete, and assisted at the school excavations at Koumeno, Hagios, Nikolaos, and Palaikastro. Mr. W. L. H. Duckworth, Fellow of Jesus College, Cambridge, University lecturer in physical anthropology, laboured on the Cretan branch of his subject, and his preliminary report was presented to the British Association, which made a further grant. Mr. C. T. Currelly, of Victoria College, Toronto, and assistant to Professor Flinders Petrie, arrived at Palaikastro in the middle of April, on the conclusion of his successful explorations at El Amorah, in Egypt. Mr. R. H. Dawkins, scholar of Emmanuel College, had made tours in Sicily and Northern Greece and prepared for publication a detailed and illustrated report of Mr. Hogarth's pottery finds from Zakro. Later he pursued his philological studies in the little-visited island of Carpathos. Mr. E. S. Forster, scholar of Oriel, classified and published the terra-cottas found at Praesos. Mr. A. J. B. Wace, of Pembroke College, Cambridge, chose the comprehensive subject of Hellenistic art, which he studied in Germany, Austria, Italy, Egypt, and Constantinople, and had published a coin bearing a hitherto unknown Pergamene portrait. Mr. E. W. Webster, scholar of Wadham, travelled for three months among ancient sites in Greece. The remaining two architectural students were Mr. J. F. Fulton and Mr. E. F. Reynolds. Two former students of the school had also been at work. Mr. Hasluck, scholar of King's, had made four separate journeys to Mysia, and was preparing a dissertation on the history and topography of Cyzicus; and Mr. A. E. Henderson, of Constantinople, to whom a small special grant had been made, had also been working at Cyzicus. The report contained also an account of the excavations at Roussolakkos (Palaikastro

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proper), which disclosed the ground plan of a Mycenaean farmstead with a hoard of bronzes and many other interesting objects. Among the gifts of books acknowledged was a most valuable one from Mr. Marling, Secretary of the Embassy in Constantinople, a copy of the *editio princeps* of Pausanias, printed at Venice in 1516. From the Hostel 58*l.*—the highest sum as yet received—had been earned in rents. The accounts were satisfactory, showing a balance of 204*l.* odd on revenue and nearly 120*l.* on capital. Mr. Tod had generously foregone his stipend of 150*l.* as Oxford Craven Fellow, and the late Lord Leighton's sisters, Mrs. Sutherland Orr and Mrs. Matthews, had presented 154*l.*, the balance of a fund at their disposal. The passengers in the steam yacht *Argonaut* had given 70*l.* to the school, including 26*l.* 10s. in new annual subscriptions, while 180*l.* was handed to the Cretan Exploration Fund.—Some further comment on the meeting will be found under the head of "Notes," on another page.

THE INTERNATIONAL FIRE EXHIBITION.—The International Fire Exhibition at Earls Court was closed on Saturday last, after a duration of about six months from the opening. The number of industrial exhibitors was 140, including numerous firms from Austria, Belgium, France, Germany, Holland, Italy, Scandinavia, and the United States, and there were also 70 general commercial exhibitors. The loan exhibitors numbered some 400, who together placed about 2,500 exhibits at the disposal of the Exhibition. They included numerous Government and Municipal departments, public institutions, and fire service organisations from all parts of the world. The Exhibition was visited by several hundred deputations from public bodies, technical institutions, and fire service organisations, nearly every British municipality of importance being represented, and there were many visitors from the Colonies and abroad. By far the majority of firemen in England also visited it, many brigades sending their whole staff by sections of fours and eights in turn. The National Fire Brigades' Union (under whose direct control the Fire Brigade Tournament was held) alone issued 55,850 day passes to firemen.

LEGAL.

LINCOLNSHIRE ANCIENT LIGHT DISPUTE.

IN the Court of Appeal, composed of the Lord Chancellor, the Lord Chief Justice, and Lord Justice Cozens-Hardy, on the 28th inst., the case of Ruscoe *v.* Grounsell came on for hearing, on the appeal of the plantiff from a judgment of Mr. Justice Lawrance, given after trial at the Lincoln Assizes.

Mr. Stewart Smith, K.C., and Mr. Vernon appeared for the appellant, and Mr. Etherington Smith for the respondent.

It appeared from the statement of Mr. Stewart Smith that the appellant owned two cottages at Lough, in Lincolnshire, and he brought his action against Mr. Grounsell, the defendant, who owned land on the western side of the cottages, for an injunction to restrain him from interfering with the free access of light to the windows of the cottages. The plaintiff's cottages had windows which overlooked the defendant's land, which land, up to 1891, and for more than fifty years before, had been used as an open yard. In 1891 the defendant, at a distance of less than a foot from the windows of the cottages, erected a shed 48 ft. in length and 7 ft. high, which seriously interfered with the light to the cottage windows. The defendant claimed that there was an agreement in writing within Section 3 of the Prescription Act which prevented the plaintiff from setting up a claim to ancient lights, relying in support of that contention on a tablet set in the plaintiff's wall on which the following words were engraved:—"1816. This stone is placed by John Atkin to perpetuate John Musgrave's right to build within 9 inches of this and any other building." It was admitted that the cottages were built before 1816. Mr. Justice Lawrance held that the tablet prevented the plaintiff from acquiring a right to light, and gave judgment for the defendant. Hence the present appeal of the plaintiff. The learned counsel submitted (1) that an agreement to come within Section 3 of the Prescription Act must be one which would form a part of the title to the property and one which a vendor would be bound to disclose; (2) that this was not an agreement expressly made or given for the purpose of defeating the right to light.

Mr. Etherington Smith argued on behalf of the defendant (respondent), that the stone having been placed in the wall by John Atkin was an acknowledgment that he enjoyed the light by the consent of Musgrave.

The Lord Chancellor, in giving judgment, said, it having been proved that the light to the windows had been enjoyed for 50 years, the onus fell on those wishing to disturb that right to light, to show that the plaintiff had not acquired a right by prescription to a continuance of the same, viz., by consent or agreement expressly made or given for that purpose by deed or writing. He was unable to hold that it was in the minds of the parties to reserve to Musgrave the right to interfere with the access of light to the cottage windows. There might be several reasons to account for the writing being placed where it was, and, looking at all the facts, he could not come to the conclusion that it was a right expressly reserved for that purpose.

The Lord Chief Justice and Lord Justice Cozens-Hardy concurred, and the appeal was accordingly allowed, with costs.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

22,898 of 1902.—W. W. HOLLINGS and J. S. HOLLINGS: *Refractory Material.*

This comprises a new refractory material, which is particularly adapted for use for furnace linings. The new material is composed mainly of any mineral carbide which is mixed or made up in any suitable proportion with any refractory or furnace lining material, such as shale, silicious matter, clay, magnesite, or dolomite. The mineral carbide may be any well-known carbide such as carbide of silicon or a double mineral carbide.

21,740 of 1902.—G. A. CHADDOCK: *Doors or Windows.*

This relates to doors or windows, and consists in providing an attachment whereby the closing member may be fitted or lowered and revolvably supported in combination with guiding devices adapted to impart simultaneously a movement of rotation (opening and closing swing), or one or more straight vertical movements alternating with one or more rotary vertical movements.

26,469 of 1902.—T. WATSON and J. P. L. HODSON: *Fowl-houses, Dove-cots, and Similar Structures for Preventing the Entrance of Foxes or Other Animals.*

This relates to a grill adapted to be suspended in the door-way or aperture of a fowl-house, dove-cot, or similar structure, having bars or spikes which swing with the grill and which are arranged in such a manner that as the grill is pushed inwards by a fox or other animal having a long body, the spikes will move down into contact with the animal's body and thereby prevent its entrance through the doorway.

17,787 of 1903.—J. SIMPSON: *Pipe Union.*

This relates to a screwed pipe connection wherein the union nut is made to take its bearing against a split ring which is sprung over a shoulder on the end of the pipe.

18,855 of 1903.—J. WRIGHT: *Construction of Lock.*

This relates to constructing the tumblers of a lock with several gates and gateways so that each set of gates can, on the insertion and actuation of different forms of keys, be put in register alternately with a space between them to allow the inserted key to move the bolt, for its stump to be transferred from one gateway to the next, the other sets of gates being out of register.

17,455 of 1903.—O. O. BRUCE, J. H. HARTLEY: *Sectional Bookcases, Showcases, and the Like.*

This relates to a bookcase, or the like, composed of a plurality of units or sections, an arrangement of rails for interlocking the sections, each comprising a vertical member secured to the side edge of the bottom or shelf of a section and projecting above and below the same, the upper projecting portion of the vertical member engaging a groove in the under side of the section side and the lower depending portion of the vertical member being adapted to engage a groove formed in the top of the next following section below.

17,620 of 1903.—J. H. HEYWOOD: *Fastening Device for Securing Sliding Sashes and the like in an Open Position.*

This relates to improved device for securing sliding sashes and the like in an open position, comprising a rod formed with a hook at its lower extremity, and having its upper extremity bent over to form an arm terminating in an eye, a screw eye secured to the lower rail of the upper sash designed to be engaged by the hook, and a bolt designed to pass through the eye with its lower extremity so bent or formed as to take a bearing against the under surface of the top rail of the lower sash, and a nut for tightening up the bolt.

25,098 of 1902.—W. BLACKBURN and R. B. HARRIS: *Mountings of Screens or Partitions.*

This consists of an improved trolley or suspending device for the top of screens or partitions, and an improved trolley or castor for supporting the bottom of same. According to this invention the partition or screen is made of a series of leaves hinged together in such a manner that they can be folded accordion fashion one against the other so as to occupy very little space. The top of each leaf is suspended from a carrying beam by means of a two-wheeled trolley, free to travel along rails laid on the top of the supporting beam. Each leaf is attached to a trolley by means of a rod or spindle, which passes through a longitudinal slot in the beam, and in this slot there lies a projection or guide-piece formed either on the spindle or trolley for the purpose of guiding and steadying the trolley and facilitating its movement. The bridge or supporting portion of the trolley is made arch-shaped or convex, to obtain strength and lightness. The bottom of the leaves are supported by means of two wheeled castors or trolleys, which are carried in metal shoes fixed to the bottom of the leaves. The wheels of the castors are carried in a forked bracket, having a central guide-piece, which, passing between the two wheels, enters a groove in the floor and between the rails on which the wheels of the castors travel. The top of the forked bracket is grooved to receive anti-friction balls on which the leaf is free to pivot.

25,177 of 1902.—THE NORTH OF ENGLAND SCHOOL FURNISHING COMPANY, LTD., and J. H. PEASE: *Folding Desks.*

This relates to folding desks, and is designed to provide means to protect the hands or fingers of children, or prevent them being nipped or trapped therein. In carrying out the invention, metal or other brackets are affixed to a portion of the desk which adjoins the front board, preferably that in which the inkwells are usually fitted. One side of the bracket is attached to the ink-well piece or other strip, and the other side projects into a recess through the front-board, in which it is allowed to work freely either up and down or to and fro as required. Pins or pivots are inserted in or fitted to the front-board and pass through corresponding holes in the loose side of the bracket, preferably one at each end to retain the ink-well piece or other strip in position, but permits it to lift or fall, or move as required, thus providing the necessary clearance for the fingers or hand should the moving parts come into contact therewith.

25,089 of 1902.—W. JEFFERSON and T. WHITAKER: *Window Holders for Sliding Sashes.*

This relates to window holders for sliding sashes, and its object is to enable the top sash in particular to be fixed or held in a partly open position. For this purpose a number of holes are formed, down preferably both sides of the top sash. The sides of the sash may be faced with metal to strengthen the sides of the holes. On the top rail of the bottom sash two levers or arms are provided which have a horizontal pin or projection to fit into the holes in the sides of the top sash. The levers meet, or almost meet, in the centre of the bottom sash, and are pivotted, or otherwise secured, to brackets fixed to the top rail in such a way that by moving the meeting ends of the levers, the pins can be moved in or out any pair of holes in the sides of the top sash opposite to them. A central bracket is provided on the top rail of the bottom sash, carrying an operating-piece or push-piece engaging the inner ends of the levers, and by which they can be simultaneously moved to engage or disengage them with the top sash. A spring may be employed to normally hold said levers in the engaged position. Provision is made for holding the parts with the pins clear of the top sash.

18,408 of 1902.—A. BENTLEY: *Ladders.*

This relates to a ladder for fire brigade use, that can be folded up into a small compass for portability and can be used for scaling buildings of any height without being supported from the ground. To carry out this invention a rod or pole is constructed, of suitable length, in convenient sections. The separate sections are joined together by a screwed sleeve joint. The top section is arranged with a screwed socket, into which is fixed a detachable hooked fitting, having a pointed portion for piercing windows and the like, and a claw for holding it in position when hooked over a window-sill coping or the like. Downward bent arms are arranged on either side of the hooked fitting, having eyes at their lower extremities to which are fastened the two sides of a flexible rope ladder.

28,368 of 1902.—TONKS, LTD., and W. H. TONKS and W. SPARKS: *Mechanism for the Opening and Closing of Fanlights.*

This relates to the construction and arrangement, or combination, of improved fanlight opening and closing mechanism, consisting essentially of a cross axis or shaft situated a short distance below and on the inner side of the hinged edge of the fanlight, the said cross axis or shaft having on it a pair of curved arms, the free ends of which carry rollers which work in the slots of slotted plates on the fanlight, the said cross axis or shaft being partially rotated to open or close the fanlight by a pair of worm and worm-wheel gears, the worm-wheel of one of the worm and worm-wheel gears being on the cross axis or shaft on which the curved operating arms are fixed to the worm gearing therewith, being on the

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

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same vertical shaft as the worm-wheel of the other worm and worm-wheel gear, which last-named worm-wheel is in gear with the driving worm, the spindle of which is rotated by a winch or cord pulley.

22,173 of 1902.—G. W. Johns: *Windows.*

This invention relates to windows, and has for its object to provide means for easily reaching the outside of sashes or window-panes for cleaning purposes, and to provide ventilation in a room through a window-frame when the sashes are closed. The styles of the sashes are made in two parts, and instead of locking bars working across the joint of the two parts, sliding tongued stops are let into the styles the full length of the sashes. These are easily removed when the sashes require to be cleaned, and when withdrawn allow the sashes to turn inward on pivots. A ventilator is placed in the top of the sash frame, means being provided to regulate the passage of air.

14,218 of 1903.—F. C. Powell: *Means for Preventing the "Steaming" of Shop Windows.*

This invention relates to means for preventing the "steaming" and "sweating" of plate-glass shop windows when the temperature of the air inside the window is higher than that outside, and consists in introducing a current of cold air from the outside to strike against the lower part of the window, and thus drive away the hot damp air and equalise the temperature on the outside and the inside of the window.

18,284 of 1903.—S. L. Mershon: *Refractory Articles of Manufacture.*

The present invention pertains to articles of manufacture of various shapes and sizes intended to withstand processes of heating to extremely high temperatures and subsequent cooling without disintegrating, deteriorating, or cracking, and further relates to articles of the above description which have the property of absorbing phosphorus from molten metals. Some of the objects of the invention are to provide variously-conformed articles, such as fire-bricks, furnace-linings, and crucibles, of material capable of absorbing phosphorus from molten metal and heat-withstanding building elements which possess the requisite qualities permitting of their being raised to extremely high temperatures and cooled without fracture, and which are susceptible of receiving a high polish and ornamental surface treatment. These and other objects are accomplished by carving, abrading, or otherwise fashioning the desired article, fire-brick, building-block, crucible, etc., from a natural fibrous, foliated, or interlocked structure of a silicate in the mass, as distinguished from crushing the stock and forming by pressure, moulding or otherwise, and vitrifying the same by a succession of graduated temperatures from low to high. The silicate used is that of magnesia, and preferably in the form of talc. A mass of this mineral is fashioned to the required shape, and is then vitrified by the slow application of graduated heats.

18,409 of 1903.—J. Pett: *Ladders.*

This invention relates to folding hook ladders, used preferably for fire brigade purposes. It consists in an improved joint for hinging the two portions of the folding ladder together and for automatically locking them when in prolongation one with the other. It further consists in a method of folding the hook portion down in between the ladder sides for the purpose of stowage in a small space and for portability.

23,275 of 1902.—T. Tregoso: *Measuring Instrument for the Solution of Triangles and other Trigonometrical Operations in Surveying and the like.*

This relates to a measuring instrument comprising a frame having lineal graduation, a quadrant fixed on the frame and having a double degree graduation, and a pivotal rule having a linear graduation, a vernier on the said rule for reading fractions on the linear graduation of the rule, verniers on the rule for reading fractions of degrees on the double degree graduation, a protractor having a double degree graduation, a pivoted scale or bar for the protractor and having linear graduations, a vernier slidable on the scale bar for reading fractions of the linear graduations thereon, and verniers on the scale bar for reading fractions on the said protractor graduations.

23,395 of 1902.—G. W. Kirk: *Covers for Manholes, Lampholes, and Flushing Tanks of Drains and Sewers.*

This consists of a steel or malleable or wrought-iron grid cast in the lids of the covers, making them practically unbreakable.

23,057 of 1902.—R. Duckworth: *Combined Rain and Waste Water Pipe and Slopstone.*

This relates to the combination of a block with a pipe cast or moulded thereon, into which the lower end of a rain water pipe may be fitted, said block being formed with a passage leading from the upper portion of the back to a point near the bottom of the front, and a pipe whose upper end is clamped to a short pipe or an extension under the holes in the slopstone through which the water is drained, and the lower end of said pipe inserted in the aforesaid passage.

18,586 of 1903.—W. E. Langdon, J. E. Fuller, and E. Fuller: *Porcelain and other Electric Insulators.*

This relates to a porcelain or other electric insulator, constructed and arranged with multiple or triple sheds or roofs, each upper shed or roof overhanging that beneath it, so as to admit of a free discharge of moisture therefrom without dripping from roof to roof.

17,008 of 1902.—P. Garrignes: *Folding Gauge or Templet for Cubing Stones and Arranging them for being Measured on the Roads.*

This invention consists of a gauge for measuring heaps or layers of stones placed on roadsides for maintenance of the roads. It consists of two wooden staves, a transverse bar, a cursor, and clamping bolts. On each of the bars are marked graduations for enabling the dimensions of any shaped heap to be readily obtained.

MEETINGS.

FRIDAY, OCTOBER 30.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. W. H. Maxwell on "House Drainage." 7 p.m.

SATURDAY, OCTOBER 31.

Sanitary Institute (Demonstrations for Sanitary Officers)—Inspection of a House in Stoke Newington. 3 p.m.

Institute of Sanitary Engineers, Limited.—Inspection of the System of Drainage and Ventilation at the Houses of Parliament. 2 p.m.

Builders' Foremen's Association (Memorial Hall, E.C.).—The Association's quarterly meeting. 7.30 p.m.

MONDAY, NOVEMBER 2.

Royal Institute of British Architects.—Mr. Aston Webb's Presidential Address. 8 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. E. Worth on "Water Supply, Sources of Supply and Distribution." 7 p.m.

Liverpool Architectural Society.—Mr. W. Curtis Green on "Street Architecture—Formal or Irregular." Illustrated by limelight views. 6 p.m.

Society of Engineers.—Mr. G. Thudichum, F.I.C., on "Bacterial Treatment of Sewage." 7.30 p.m.

TUESDAY, NOVEMBER 3.

Institution of Civil Engineers.—Inaugural address by the President, Sir William H. White, K.C.B.: presentation of the Council's awards, and reception in the Library. 8 p.m.

Institute of Builders.—Council Meeting. 4 p.m.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Sanitary Science).—Mr. R. Herton on "Details of Plumbers' Work, House Drainage and Sanitary Appliances." 7 p.m.

Sanitary Institute.—Demonstration by Mr. J. R. Leggatt of Book-keeping as carried out in a Sanitary Inspector's Office (at the Public Health Office, Town Hall, Upper-street, Islington). 7 p.m.

WEDNESDAY, NOVEMBER 4.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. E. Worth on "Sewerage." 7 p.m.

Builders' Foremen and Clerks of Works Institution.—Ordinary Meeting of the Members. 8 p.m.

THURSDAY, NOVEMBER 5.

Carpenters' Company, London Wall (Lectures on Sanitary Building Construction).—Mr. James Bartlett on "Superintendence of Buildings, Acts of Parliament, and Model By-Laws." 7.30 p.m.

Leeds and Yorkshire Architectural Society.—Annual General Meeting. Annual Report and Balance Sheet, and Exhibition of Students' Drawings. 6.30 p.m.

FRIDAY, NOVEMBER 6.

Architectural Association.—Mr. C. A. Nicholson on "Modern Churches." 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. E. Worth on "Sewage Disposal." 7 p.m.

Incorporated Association of Municipal and County Engineers.—Metropolitan district meeting to be held in London in the Municipal and County Club, 4, Whitehall-court, S.W. A discussion will be opened upon "The new By-laws made by the London County Council in regard to depositing drainage plans with the Sanitary authority." 7.30 p.m.

Glasgow Technical College Architectural Craftsmen's Society.—Professor Gourlay on "Santa Sophia, Constantinople." 8 p.m.

SATURDAY, NOVEMBER 7.

Sanitary Institute. (Demonstration for Sanitary Officers).—Inspection at Marylebone Workhouse and Public Baths. 3 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

October 14.—By Graham, Hitchcock & Co., with Stephenson & Alexander (at Newport).

Llanhennoc, &c., Mon.—Cefn Henllan Farm, 150a. 1r. 10p., f. £2,900

Tredunnoc, Mon. The Ton Cottage and 3a. 2r. 11p., f. 350

The Upper Garn or Garn Vawr Farm 136a 1r. 36p., f. 4,000

The Ynys Meadow, 10a. 2r. 17p., f. 700

The Great House Farm, 294a. 1r. 30p., f. 7,700

Two enclosures of pasture, 17a. 3r. 15p., f. 500

October 15.—Rendell & Symons (at Kingsbridge).

Loddeswell, Devon.—Coombe Estate, 293a 2r. 37p., f., y.r. 186*l.* 4,500

By G. Durrant & Sons (at Bungay).

Southelmham St. Nicholas, Suffolk.—A freehold and copyhold estate, 150a. 3r 18p. £1,425

October 19.—By R. W. Fuller, Moon & Fuller.

Croydon.—Addiscombe-rd., the Addiscombe Park Estate, area 144¼ a., f., p. (In one lot) 70,000

Croydon.—Impropriate Tithe Rent charges, commuted at 64*l.* 6s., payable on 240a of land ... 1,287

By Frith, Garland & Co.

Harringay.—35, Harringay-rd., u.t. 78 yrs., g.r. 5*l.* 5s., w.r. 32*l.* 10s. 195

140 and 142, Effingham-rd., u.t. 87 yrs., g.r. 10*l.*, y.r. 60*l.* 525

Hornsey.—65, Rayleigh-rd, u.t. 90 yrs., g.r. 7*l.*, e.r. 36*l.* 380

By Cecil Hobday.

Camberwell.—10, 14, 18, 20 and 22, Bromar-rd., u.t. 73 yrs., g.r. 33*l.* 18s., y.r. 177*l.* 1,550

Brixton.—8, Perran-rd., u.t. 76 yrs., g.r. 6*l.* 12s. 6*d.*, y.r. 35*l.* 350

By Wm. Houghton.

Walthamstow.—22, Church Hill-rd., f., p. 400

93 and 95, Chelmsford-rd., u.t. 75 yrs., g.r. 8*l.* 8s., w.r. 52*l.* 295

Protheroe & Morris (on the Estate).

Newhaven, Sussex.—Station-rd., 100 plots of building land; also four cottages, f. (in lots) ... 1,324

Norman & Son (at Stratford).

West Ham.—65 and 67, Portway, f., w.r. 58*l.* 510

Canning Town.—85 and 86, Stephenson-st., f., w.r. 41*l.* 12s. 340

East Ham.—Langdon-rd., &c., 37 plots of land, f. ... 497

By C. F. Moore (at Cirencester).

Bagendon, Glos.—The Moor Wood Estate, 372a. 1r. 25p., f. (including the Manor of Bagendon) ... 6,550

Duntisbourne Abbotts, Glos.—Three enclosures, 35a. 2r. 18p., f. 460

A freehold cottage and 6a. 190

October 20.—By Beale & Capps.

Westbourne Park.—5, St. Luke's-rd., u.t. 73 yrs., g.r. 10*l.*, e.r. 60*l.* 500

Hampstead.—26, Albion-rd., u.t. 41 yrs., g.r. 10*l.* e.r. 70*l.* 700

35, Fairfax-mews, u.t. 51 yrs., g.r. nil, y.r. 37*l.* ... 500

By Hampton & Sons.

Wimbledon.—Belvedere-gr., a freehold residence, p. 2,950

By J. H. Mellenfield.

Stoke Newington.—2, Filey-av., u.t. 77½ yrs., g.r. 6*l.* 10s., e.r. 45*l.* 405

By W. J. Rayner & Co., (at Stratford).

Upton Park.—80 and 82, Harold-rd., f., y.r. 80*l.* 12s. 875

Leytonstone.—Woodhouse-rd., Hope Cottage, f., y.r. 20*l.* 250

By Alfred Richards (at Tottenham).

Tottenham.—27, Somerset-rd., f., y.r. 25*l.* 360

3½, Chestnut-rd., f., p. 410

Edmonton.—8 to 18 (even), Barbot-st., u.t. 72 yrs., g.r. 15*l.*, w.r. 115*l.* 14s. 620

October 21.—By Allan Booth.

City of London.—74, Little Britain s., f., y.r. 60*l.* 2,180

Battersea.—Northcote-rd. f.g.r. 54*l.*, reversion in 73¾ yrs. 1,570

Cabul-rd., &c., f.g.r. 10*l.*, reversion in 61¼ yrs.... 2,380

9, Wayford-st., f., w.r. 36*l.* 8s. 415

Ilford, Essex.—6 Adelaide-ter., f., e.r. 30*l.* 400

By Foster & Cranfield.

Battersea.—327 to 337 (odd), Queen's-rd., u.t. 59¾ yrs., g.r. 48*l.*, y.r. 240*l.* 1,950

By Nott, Cartwright & Etches.

Mitcham, Surrey.—Graham-rd., three plots of land, f. 105

By Ernest Owers.

Hampstead.—Frognal-la, Manor Cottage and a third of an acre, f., p. 3,000

67, Kingsgate-rd, s., u.t. 78 yrs., g.r. 12*l.* 12s., y.r. 55*l.* 605

By Prall & Prall.

Fulham.—33, Seagrave-rd., u.t. 67½ yrs., g.r. 9*l.*, y.r. 35*l.* 250

By A. Dowell (at Edinburgh).

Blairgowrie, &c., Perthshire.—The Estate of Glenericht and Rochallie, 2,000a. 27,000

October 22.—By Middleton & Cracknell.

Haverstock Hill.—No. 158, u.t. 47 yrs., g.r. 16*l.* 16s., e.r. 90*l.* 700

By C. C. & T. Moore.

Stratford.—Sugar House-la., f.g.r. 90*l.*, reversion in 78 yrs. 2,150

Sugar House-la., f.g.r. 265*l.*, reversion in 50 yrs. 5,500

Mile End.—44, 45, 46 and 47, Beaumont-sq., u.t. 25 yrs., g.r. 20*l.* 16s., y.r. 142*l.* 1,105

Bow.—33, Malmesbury-rd., with factory, stabling, &c., u.t. 60 yrs., g.r. 10*l.*, y.r. 85*l.* 850

Limehouse.—19, Church-row, f., y.r. 28*l.* 605

Poplar.—112, West India Dock-rd., (Railway Coffee Dining Rooms), f., y.r. 68*l.* 700

By Newbon, Edwards & Shephard.

Hackney.—Amhurst-rd., f.g.r. 29*l.* 8s., u.t. 56 yrs., g.r. 5*l.* 570

Hoxton.—Newton-st., f.g.r. 73*l.* 10s., u.t. 32½ yrs., g.r. 36*l.* 15s. 440

Stoke Newington.—4, Mildmay-gr., u.t. 48 yrs., g.r. 8*l.*, y.r. 42*l.* 470

Holloway.—175, Fairbridge-rd., u.t. 64 yrs., g.r. 7*l.*, y.r. 28*l.* 280

48 to 56 (even), Brunswick-rd., u.t. 43½ yrs., g.r. 30*l.*, y.r. 150*l.* 1,060

43, 45 and 47, Vorley-rd., u.t. 43¾ yrs., g.r. 18*l.*, y.r. 92*l.* 850

Caledonian-rd.—No. 100, u.t. 30½ yrs., g.r. 10*l.*, y.r. 60*l.* 500

Canonbury.—43 and 45, Marquess-rd., u.t. 42½ yrs., g.r. 20*l.*, y.r. 120*l.* 835

Hackney.—30, Groombridge-rd., u.t. 50 yrs., g.r. 6*l.*, y.r. 50*l.* 225

By Stimson & Sons.

Portman-sq.—10, Adam-st. and 17, Baker's Mews, u.t. 23½ yrs., g.r. 23*l.*, y.r. 141*l.* 16s. 660

St. Pancras.—49, 50, and 51, Barclay-st., u.t. 17 yrs., g.r. 7*l.* 10., y.r. 90*l.* 515

Wandsworth.—2 and 4, Rosehill-rd., u.t. 77 yrs., g.r. 14*l.*, y.r. 72*l.* 650

Bermondsey.—31, George-row s., f., y.r. 36*l.* 125

Peckham.—17, 23, 33 and 39, Marmont-st., u.t. 56 yrs., g.r. 30*l.*, y.r. 143*l.* 580

By Joseph Stower.

Paddington.—32, Marlborough-st., u.t. 41½ yrs., g.r. 7*l.*, w.r. 62*l.* 8s. 300

Limehouse.—4 to 16 (even), Salter-st., f., w.r. 170*l.* 1,000

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By F. J. STAINES.

Hackney.—15, 17 and 19, Ribstone-st., w.r. 54*l.* 12s., also 20 and 21, Hockley-st., with stabling, w.r. 49*l.* 8s., f. .....

Bethnal Green.—3, Colt-la., The Tiger., b.-h., improved rental of 16*l.* for 21½ yrs. .....

Cambridge-rd., the White Horse, b.-h., and 1, Bishop's-rd. u.t. 65½ yrs., g.r. 49*l.*, y.r. 96*l.*.....

3, 5, 7 and 13, Bishop's rd., s., u.t. 64 yrs., g.r. 42*l.*, y.r. 144*l.* .....

Bishop's-rd, the George and Dragon, b.-h., u.t. 64 yrs., g.r. 10*l.*, y r. 50*l.* .....

23 to 25 (odd), Wadeson-st., and 47, Mowlem-st., u.t. 64 yrs., g.r. 57*l.*, w.r. 288*l.* 12s. .....

2 to 26 (even), Vyner-st., and 49, Mowlem-st., u.t. 19 yrs., g.r. 126*l.*, w.r. 344*l.* 10s. .....

109 to 115 (odd), Mansford-st., u.t. 74 yrs., g.r. 32*l.*, w.r. 207*l.* 6s. .....

51 to 63 (odd), Blythe-st., u.t. 74 yrs., g.r. 37*l.* 10s., w.r. 364*l.* .....

Gibraltar Walk, the Gibraltar, p.-h., improved rental of 35*l.* for 41 yrs. .....

81 to 87 (odd), Warley-st., u.t. 42 yrs., g.r. 14*l.*, w.r. 117*l.* .....

Norton Folgate.—1 and 3, Elder-st., 1 and 2 Elder-ct., and 10, Fleur-de-lis-st. (including the Elder Tree, p.-h., u.t. 16½ yrs., g.r. 140*l.*), y.r. 258*l.* 16s. .....

Commercial-rd. East.—27 to 39 (odd), Lucas-st., u.t. 28 yrs., g.r. 101*l.* 10s., w.r. 265*l.* 4s. .....

Kennington.—25 and 13, Hanover-gdns., u.t. 41½ yrs., g.r. 12*l.*, y.r. 60*l.* .....

Bethnal Green.—238 and 240, Cambridge-rd., s., u.t. 64 yrs., g.r. 40*l.*, y.r. 85*l.* .....

By J. A. & W. THARP.

Woodford.—Woodford-rd., Copsefield, f., y.r. 110*l.* .....

Leytonstone.—Park Grove-rd., f.g.r. 26*l.*, reversion in 90 yrs. .....

Stratford.—Globe-rd., f.g.r. 16*l.*, reversion in 84 yrs. .....

Chatsworth-rd., f.g.r. 21*l.* 5s., reversion in 84 yrs. .....

Leyton.—Sedgwick-rd., f.g.r. 24*l.*, reversion in 85 yrs. .....

Dawlish-rd., f.g.r. 12*l.*, reversion in 85 yrs. .....

Stratford, Leyton-rd., &c., f.g.r. 15*l.* 15s., reversion in 47 yrs. .....

Bethnal Green. 28a and 30, Hare-st., s., u.t. 56 yrs., g.r. 9*l.*, w.r. 172*l.* 18s. .....

Plaistow.—26 and 28, Howard's-rd., f., e.r. 39*l.*...

By HILBERY & Co.

Belgravia.—85, Eaton-sq., with stabling, u.t. 20½ yrs., g.r. for 16½ yrs. 80*l.* and thereafter nil, e.r. 700*l.* .....

Putney.—3, Carnalt-gdns., u.t. 81 yrs., g.r. 11*l.* 5s., e.r. 60*l.* .....

By PERCIVAL HODSON.

Finsbury Park.—28, Campbell-rd., u.t. 65 yrs., g.r. 4*l.* 15s., w.r. 114*l.* 8s. .....

By A. SPAIN & SON (at Gravesend).

Gravesend, Kent.—86, Edwin-st., f., y.r. 19*l.*.....

25, Park-pl., u.t. 29½ yrs., g.r. 11*l.* 1s., y.r. 36*l.*

October 23.—By DRIVERS'.

Holloway.—71, Carleton-rd., u.t. 71½ yrs., g.r. 10*l.*, e.r. 75*l.* .....

3, Mercer's-rd., u.t. 64 yrs., g.r. 8*l.* 12s. 6d., y.r. 55*l.* .....

Kentish Town.—66, Chetwynd-rd., f., y.r. 32*l.* .....

By EDWARD MILLARD.

Barking, Essex.—15 and 17, Heath-st. s., f., p.....

By A. J. SHEFFIELD.

Hackney.—37 to 55 (odd), Brunswick-st., u.t. 45 yrs., g.r. 22*l.* 10s., w.r. 292*l.* 10s. .....

Canning Town.—225 to 231 (odd), Prince Regent's-la. s., u.t. 77 yrs., g.r. 21*l.*, y.r. 143*l.* 12s. .....

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold gound-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks.....	1 16 6	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks ...	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons.....	1 11 0	" " "
Red wire Cuts ...	1 13 0	" at railway depôt
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ...	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks.....	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers.....	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers...	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "

PRICES CURRENT (*continued*).

BRICKS, &c.

	£ s. d.	
£875		
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	per 1,000 at railway depot.
100 Quoins, Bullnose, and Flats	14 0 0	" " "
635 Double Stretchers	15 0 0	" " "
1,170 Double Headers...	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
630 Two Sides and one End	15 0 0	" " "
1,755		
815 Splays, Chamfered, Squints.....	14 0 0	" " "
1,120 Second Quality White and Dipped Salt Glazed.....	2 0 0	" less than best.
2,650		s. d.
410 Thames and Pit Sand		6 9 per yard, delivered.
Thames Ballast		6 0 " "
660 Best Portland Cement		30 0 per ton, delivered.
Best Ground Blue Lias Lime ...		20 6 " "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

425	Grey Stone Lime	12s. 0d. per yard, delivered.
1,040	Stourbridge Fire Clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

		s. d.	
590	BATH STONE—delivered on road waggons, Paddington depôt	1	6½ per ft. cube.
455	Do. do. delivered on road waggons, Nine Elms Depôt.....	1	8½ " "
1,830	PORTLAND STONE (20 ft. average)—		
610	Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2	1 " "
380	White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2	2½ " "
510		s. d.	
625	Ancaster in blocks	1	11 per ft. cube, deld. rly. depôt
315	Beer in blocks	1	6 " "
	Greenshill "	1	10 " "
	Darley Dale in blocks ...	2	4 " "
460	Red Corsehill "	2	5 " "
	Closeburn Red Freestone	2	0 " "
980	Red Mansfield "	2	4 " "
320	YORK STONE—*Robin Hood Quality.*	s. d.	
	Scappled random blocks	2	10 per ft. cube, deld. rly. depôt
	6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2	3 per foot super. "
500	6 in. Rubbed two sides Ditto, Ditto.....	2	6 " "
	3 in. Sawn two sides slabs (random sizes)..	0	11½ " "
235	2 in. to 2½ in. Sawn one side slabs (random sizes).....	0	7½ " "
280	1½ in. to 2 in. ditto, ditto	0	6 " "
200	Scappled random blocks	3	0 per ft. cube "
	6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2	8 per ft. super. "
650	6 in Rubbed two sides Ditto	—	" "
	3 in. sawn two sides slabs (random sizes)	1	2 " "
650	2 in, self-faced random flags	0	5 " "
590	Hopton Wood (Hard Bed) in blocks		2 3 per ft. cube.
	" " " 6 in. sawn both sides landings		deld. rly. depôt. 2 7 per ft. super. deld. rly. depôt.
	" " " 3 in. do.		1 2½ " "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly.dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green.....	15 2 6	" "
20×12 best Eureka unfading green.....	17 2 6	" "
18×10 " "	12 10 0	" "
16× 8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16× 8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles...	42	0 per 1,000 at rly. depot.
Hip and valley tiles	3	7 per doz. " "
Best Broseley tiles.....	50	0 per 1,000 " "
Do. Ornamental Tiles	52	6 " " "
Hip and Valley tiles.....	4	0 per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57	6 per 1,000 " "
Do. Ornamental Do.	60	0 " " "
Hip tiles	4	0 per doz. " "
Valley tiles	3	0 " " "
Best Red or Mottled Staffordshire Do. (Peakes)	51	9 per 1,000 " "
Do. Ornamental Do.	54	6 " " "
Hip tiles	4	1 per doz. " "
Valley tiles	3	8 " " "
Best "Rosemary" brand plain tiles	48	0 per 1,000 " "
Do. Ornamental Do	50	0 " " "
Hip tiles	4	0 per doz. " "
Valley tiles	3	8 " " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in. and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ...	0 10 0	less than 7 in. and 8 in.
Deals: seconds.....	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.....	9 0 0	" " 9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ...	8 10 0	9 10 0

PRICES CURRENT—(*continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)...	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals. 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in....	14 10 0	15 10 0
" " 3 in. by 9 in. ...	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in,	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ...	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments...	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube ...	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ...	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch.....	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube.....	0 4 0	—

Prepared Flooring — Per square.

1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards ...	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0 ...	7 5 0
Compound Girders, " "	8 2 6 ...	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6 ...	8 17 6
Flitch Plates	8 5 0 ...	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6 ...	8 5 6

METALS.

	Per ton, in London £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0 ...	8 0 0
Staffordshire Crown Bars, good merchant quality.....	8 0 0 ...	8 10 0
Staffordshire "Marked Bars".....	10 10 0 ...	—
Mild Steel Bars	8 15 0 ...	9 5 0
Hoop Iron, basis price	9 5 0 ...	9 10 0
" " galvanised	17 10 0 ...	—
(*And upwards, according to size and gauge.)		
Sheet Iron (Black)—		
Ordinary sizes to 20 g.	9 15 0 ...	—
" " 24 g.	10 15 0 ...	—
" " 26 g.	12 5 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.....	14 5 0 ...	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0 ...	—
" " 22 g. and 24 g.	16 10 0 ...	—
" " 26 g.	18 0 0 ...	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0 ...	—
" " 22 g. and 24 g....	13 5 0 ...	—
" " 26 g.	14 0 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker.....	11 15 0 ...	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0 ...	—
26 g.....	14 0 0 ...	—
Cut nails, 3 in. to 6 in.	9 5 0 ...	9 15 0

(Under 3 in., usual trade extras.)

[*See also page* 445.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
Schools	Elgin Landward School Board	Not stated	Dec. 7
Public Baths, &c., Selly Oak, near Birmingham	King's Norton U.D.C.	Not stated	do.
*Elevations for Police and Fire Brigade Stations	Windsor Town Council	25 guineas	Jan. 15, '04
Hospital, for Infectious Deseases	Fraserburgh (N.B.) Town Council	Not stated	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Street Improvement Works, Derby and Wilton-streets	Prestwich Corporation	Surveyor, Chester Bank, Prestwich	Nov. 2
Road Materials, &c.	Romford U.D.C.	J. Turvey, Surveyor, Romford	do.
Additions to Library, Thornaby-on-Tees	.....	E. A. Whipham, Architect, 59, High-street, Stockton	do.
Taking Down & Re-erecting Wall, 42, Mary-le-Port-st.	The Trustees	J. A. Wright, Surveyor, 6, Unity-street, College Green, Bristol	do.
Broken Granite, &c.	Southampton Corporation	J. A. Crowther, Borough Engineer, Southampton	do.
*Clinker, Slag, Flints, &c.	Erpingham and Walsingham R.D.C.	T. J. Goldie, Bank Plain, Norwich	do.
Water Supply Works, &c.	Linlithgow County Council	W. A. Tait, Civil Engineer, 72A, George-street, Edinburgh	Nov. 3
Subway under Great Central Railway, East Marsh-st.	Grimsby Corporation	H. G. Whyatt, Civil Engineer, Town Hall, Grimsby	do.
Paving Works, between Bridge-st. & Feltham-avenue	East Molesey U.D.C.	Surveyor, District Council Offices, East Molesey	do.
Stabling, &c., Troedyrhiw, Wales	.....	J. Jones & Co., Pontyrhun Stores, Troedyrhiw	do.
Pumping Station, Eastney	Portsmouth Town Council	A. Hellard, Town Hall, Portsmouth	do.
Sewers, &c.	do.	Borough Engineer, Town Hall, Portsmouth	do.
Heating Works, Carrick House	Belfast Corporation	Sir T. Black, Town Hall, Belfast	do.
Gasholder Tank	Spennymoor and Tudhoe Gas Co.	W. Cowley, Gasworks, Spennymoor	do.
Water Main Laying, near Sheerness	Queenborough Town Council	H. Small, Borough Surveyor, Town Hall, Queenborough	do.
Street Works, Lindley-street	Mansfield Corporation	R. F. Vallance, Borough Engineer, Mansfield	do.
*Making-up Roads	Tottenham U.D.C.	Council's Engineer, 712, High-road, Tottenham	do.
Water Supply Works, Fowey, Cornwall	St. Austell R.D.C.	T. H. Andrew, Engineer, Trevarrick Villas, St. Austell	Nov. 4
House, Hayle Towan's, Cornwall	.....	H. T. Broad, Passmore Edwards Institute, Hayle	do.
Church, St. Serf's, Burntisland	.....	W. R. Simpson, Architect, 6, Bentfield, Burntisland	do.
Business Premises, Eldon-street, Barnsley	.....	Crawshaw & Wilkinson, Architects, 13, Regent-street, Barnsley	do.
Street Works, Albert and others streets	Milnrow (Lancs) U.D.C.	W. H. Foster, Council Offices, Milnrow	do.
Pier Widening Works, Stranraer, N.B.	Portpatrick &c. Jnt. Railways Com.	Engineer, St. Enoch Station, Glasgow	do.
Well Works, &c., Ballyfermott	South Dublin R.D.C.	T. J. Byrne, Architect, 1, James'-street, Dublin	do.
Sewerage Works	Watford U.D.C.	H. M. Turner, Council Offices, Watford	do.
Paving Works, Penkhull	Stoke-on-Trent Guardians	A. P. Miller, Architect, Frederick-street, Hanley	do.
Paving Works, &c., Cleadon House Estate	South Shields R.D.C.	J. H. Morton, Architect, 50, King-street, South Shields	do.
Road Works, Salisbury-road	Godstone R.D.C.	J. George-Powell, Civil Engineer, Godstone	do.
Road Works, Barfield-road, Bletchingley	do.	do.	do.
Private Street Works, &c., Grosvenor Wood Estate	Tunbridge Wells Town Council	W. H. Maxwell, Civil Engineer, Town Hall, Tunbridge Wells	Nov. 5
Seating and other works at Council Chamber	Swinton and Pendlebury U.D.C.	H. Entwistle, Surveyor, Council Offices, Swinton	do.
Laying Telephone Pipes	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
School and Teachers' House	Ketley (Salop) Education Comm.	C. R. Dalgleish, Architect, Shrewsbury	do.
26 Cottages, Burnt Oak-terrace, Gillingham, Kent	.....	E. J. Hammond, Civil Engineer, 21, Balmoral-road, Gillingham	do.
Well Sinking, Ingatestone, Essex	Chelmsford R.D.C.	J. Dewhirst, Engineer, Avenue Chambers, Chelmsford	do.
*Making-up Roads	Ealing Town Council	Borough Engineer, Town Hall, Ealing, W.	do.
Walling, &c., May Royal Estate, Hebden Bridge, Yorks	.....	G. Buckley & Son, Architects, Tower Chambers, Halifax	Nov. 6
Bridge and Piling, Brickendon	Hertford R.D.C.	J. W. Riggs, Surveyor, St. Elmo, Bengeo, Hertford	do.
Road Works, Siddick, near Workington	St. Helen's Colliery Company	J. S. Moffat, Architect, 53, Church-street, Whitehaven	do.
Shed, &c.	Chichester Corporation	T. Pym-Jones, Surveyor, Lion-street, Chichester	do.
Cells at Court House, Enniskillen, Ireland	Fermanagh County Council	H. H. Archdall, Court House, Enniskillen	do.
Sewage Disposal Works (Contract No. 2)	Worcester Corporation	T. Canik, Civil Engineer, Guildhall, Worcester	do.
Bridge Works, Hamilton, N.B.	Lanark County Council	W. L. Douglass, Civil Engineer, District Offices, Hamilton	Nov. 7
Sewers, &c.	Hipperholme U.D.C.	F. Massie, Civil Engineer, Tetley House, Wakefield	do.
Shop, &c., St. Leonard's-road, Windsor	.....	P. H. Grove, Architect, 14, Alma-road, Windsor	do.
Parade Extension Works, Royal Prince's Parade	Bridlington Corporation	E. R. Matthews, Civil Engineer, Town Hall, Bridlington	do.
*Dwarf Boundary Walls, &c., &c.	Fulham Borough Council	Borough Engineer, Town Hall, Fulham, S.W.	Nov. 9
*Wood Paving	do.	do.	do.
*Well Sinking, near Baldock	First Garden City Ltd.	G. R. Strachan, 7, Victoria-street, S.W.	do.
Cast-Iron Pipes (6 miles)	Yeovil Corporation	T. & C. Hawksley, Civil Engineer, 30, Great George-street, S.W.	do.
Borehole for Water Supply Works, near Baldock	.....	G. R. Strachan, Civil Engineer, 7, Victoria-street, S.W.	do.
Alterations to Hospital, Beckett-street	Leeds Guardians	T. Winn & Sons, Architects, 92, Albion-street, Leeds	do.
*Making-up, &c., part of Hither Green-lane, Lewisham	The Corbett Estates	R. Stewart, 24, Sloane-square, S.W.	do.
*New Hospital, adjg. St. Stephen's Ch., Haverstock Hill	Hampstead General Hospital Com.	Young & Hall, 17, Southampton-street, Bloomsbury, W.C.	do.
Heating Works at Workhouse	Limerick Guardians	J. O'Malley, Borough Engineer, Workhouse, Limerick	Nov. 10
*Making-up of Streets	Barking Town U.D.C.	Council's Surveyor, Public Offices, Barking	do.
*Additions, Ordnance Survey Office, Southampton	Commissioners of H.M. Works	H.M. Office of Works, Storey's Gate, S.W.	do.
*Government Offices, Leicester	do.	Registrar, County Court, Leicester	do.
*Telephone Exchange, Engineer's Office, &c., Manchester	do.	The Secretary, H.M. Office of Works, Storey's Gate, S.W.	Nov. 11
*Repairs and Redecoration, Norwood School Infirmary	Lambeth Guardians	Guardians' Offices, Brook-street, Kennington-road, S.E.	do.
*Alterations and Additions to Town Hall	Herne Bay, U.D.C.	Council's Surveyor, Town Hall, Herne Bay	Nov. 12
*Iron and Glass Verandah to Town Hall	do.	do.	do.
*Dust Pails and Cast-Iron Manhole Covers	Bethnal Green Borough Council	Chief Inspector, Town Hall, Bethnal Green	Nov. 14
*Erection of Library	Chadderton U.D.C.	Groome & Grant, Architects, 2, St. Peter's-square, Manchester	Nov. 16
Bridge Works	Bristol Docks Committee	W. W. Squire, Engineer, Cumberland-road, Bristol	do.
*New Sewers	Corporation of London	Engineer, Public Health Department, Guildhall, E.C.	Nov. 17
Electrical Plant	Kilmarnock Corporation	Kennedy & Jenkins, Civil Engineers, 17, Victoria-street, S.W.	Nov. 18
Electric Lighting Works	Wednesbury Corporation	F. J. Warden-Stevens, Civil Engineer, 34, Victoria-street, S.W.	Nov. 20
*New School, &c.	Tottenham Education Committee	G. E. T. Lawrence, 22, Buckingham-street, Adelphi	Nov. 23
*Water Supply Works	Rochford R.D.C.	Council's Engineer, Rochford, Essex	do.
*Public Baths	Kings Norton and Northfield U.D.C.	Not stated	Dec. 7
Conveniences, Abbey-road	Barrow-in-Furness Corporation	Borough Engineer, Town Hall, Barrow-in-Furness	No date.
Concrete Retaining Wall (150 ft.)	Morpeth R.D.C.	J. M. McGregor, Surveyor, Market Place, Morpeth	do.
Two pairs Semi-detached Villas, Menston, Yorks.	Mr. Jabez Cole	W. H. Sharp, Architect, 239, Rooley-lane, Bradford	do.
Churchyard Extension Roads, &c., Shotton, Co. Durham	.....	S. Wilkinson, Architect, Mosley Chambers, Newcastle	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Applications to be in
*Architectural Assistant	Walthamstow U.D.C.	130*l.*	Nov. 5
*Clerk of the Works	Camberwell Guardians	4*l.* 4s. per week	Nov. 12
*Stores Audit Clerk	Woolwich Borough Council	130*l.*	Nov. 16
*Chair of Architecture	Liverpool University	See advertisement	Dec. 31
*Surveyor	Croydon Education Committee	Not stated	No date.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvi.

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PRICES CURRENT *(Continued)*.

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	13 17 6 ...	—
Pipe in coils	14 7 6 ...	—
Soil pipe	16 17 6 ...	—
Compo Pipe	16 17 6 ...	—
ZINC—Sheet—		
Vielle Montagne ton	26 0 0 ...	—
Silesian	25 15 0 ...	—
COPPER—		
Strong Sheet per lb.	0 0 10½ ...	—
Thin „	0 0 11¼ ...	—
Copper nails „	0 0 11 ...	—
BRASS—		
Strong Sheet per lb.	0 0 10 ...	—
Thin „ „	0 0 11 ...	—
TIN—English Ingots „	0 1 4 ...	—
SOLDER—Plumbers' „	0 0 6 ...	—
Tinmen's „	0 0 8 ...	—
Blowpipe „	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
„ fourths	1⅝d. „ „
21 oz. thirds	3¼d. „ „
„ fourths	2⅝d. „ „
26 oz. thirds	3⅝d. „ „
„ fourths	3⅛d. „ „
32 oz. thirds	4⅛d. „ „
„ fourths	4⅝d. „ „
Flatted sheet, 15 oz.	2⅛d. „ „
„ 21 oz.	3¸d. „ „
½ Hartley's Rolled Plate	1½d. „ „
¼ „ „ „	2d. „ „
⅛ „ „ „	2½d. „ „

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels... per gallon	0 1 9
„ „ „ in drums	„ 0 2 1
Boiled „ „ in pipes or barrels...	„ 0 2 0
„ „ „ in drums	„ 0 2 4
Turpentine, in barrels	„ 0 3 8
„ in drums	„ 0 3 10
Genuine Ground English White Lead	per ton 19 0 0
Red Lead, Dry	„ 19 0 0
Best Linseed Oil Putty	per cwt. 0 8 0
Stockholm Tar	per barrel 1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

Tel. Tel. 6112 Gerrard. Telegrams, "The Builder, London."

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROPRIETORS OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under.....6s. 6d.
Each additional line.....1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines or under.....4s. 6d.
Each additional line.....0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

FOUR lines or under.....2s. 6d.
Each additional line.....0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed o the publisher of "THE BUILDER, Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

TO CORRESPONDENTS.

S. W.—H. R. (Amount should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l*., unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BERWICK-UPON-TWEED.—For laying kerb, channel, and concrete footpath west side of Berwick Bridge, for the Corporation:—
Geo. Brough, Berwick £142 5

BISHOPS STORTFORD.—For the supply of broken granite road metal (1,352 tons), for the Urban District Council:—

	£ s. d.	
Grimley & Son, Sutton	0 13 0	per ton for granite.
Bridge, near Wisbech	0 10 3	„ „ chippings.
Charles Wright, Exors., Stansted, Essex	153 11 3	

BRIDLINGTON.—For the erection of a Shelter round the bandstand, Prince's Parade, for the Corporation. Mr. E. B. Matthews, C.E., Town Hall, Bridlington. Messrs. Mangnall & Littlewoods, architects, Spring-gardens, Manchester:—

Bricklaying and Masonry.—Sampson & Siddall, Bridlington £795 1 0
Joinery.—E. E. Yeomans, Bridlington ... 347 11 7
Painting.—J. Riley, Bridlington 121 9 0
Ironfoundery.—Sykes & Co., Guiseley..... 875 0 0
Plumbing.—W. A. Walker, Bridlington... 121 13 0

BRIGHTON.—For alterations, &c., to the offices of the Education Committee, for the County Borough of Brighton. Messrs. T. Simpson & Son, Surveyors to the Committee:—

Sattin & Evershed	£329 10	G. R. Lockyer.....	£289 0
Wm. Taylor	300 0	Gates & Sons	273 10
James Barnes	297 0		

[All of Brighton.]

BRIXTON (Devon).—For the execution of drainage works, &c., for the Plympton St. Mary Rural District Council. Quantities by Mr. W. E. Horton, Plympton:—
Bennett & Gardiner, Eburton, Plymouth* £322

BURGESS HILL (Sussex).—For the execution of private street works, Ferndale and other roads, for the Urban District Council. Mr. Edwin Brown, Surveyor:—

Name.	Ferndale-road.	Glendale-road.	Alexandra-road.
	£ s. d.	£ s. d.	£ s. d.
W. Oram, Burgess Hill	1,154 17 8	543 7 8	277 13 9
E. H. King, Worthing	*1,064 13 10	*492 16 3	*202 10 6

CAMBERLEY (Surrey).—For the execution of road works, &c., Upper Park-road, for the Frimley Urban District Council. Mr. F. C. Wren, surveyor. High-street, Camberley:—

A. G. Osenton ...	£640 3 0	Thomas Turner	£419 18 0
Prescott & Co...	533 14 6	Mott & Sons ...	410 8 0
Free & Sons.....	540 8 0	R. Cunningham, Fleet*.....	383 0 0
W. H. Wheeler..	473 8 0		

CARMARTHEN.—For the erection of a house, Longacre-road, for Mr. T. H. Richards. Messrs. George Morgan & Son, architects, King-street, Carmarthen:—
Rees Davies, Carmarthen* £585

CROYDON.—For proposed pair of houses to be built in Temple-road, Croydon. Mr. Frank Windsor, architect, 1, High-street, Croydon:—

J. Horrocks	£1,618	D. W. Barker	£1,565
D. W. Waller	1,585	E. J. Saunders	1,480

DARTMOUTH.—For the erection of the "Royal Oak" inn, for Mr. H. Swayne. Mr. E. H. Back, C.E., architect, Dartmouth. Quantities by architect:—

Vanstone, Thos.	£1,065 0	Willis & Anderson	£808 0
Pillar, Robt. T. ...	920 0	Back & Watts, Dartmouth* ...	803 8
Smale	836 0		

DINAS POWIS (Wales).—For the construction of sewers, &c., Eastbrook, for the Llandaff Rural District Council. Mr. J. Holden, C.E., 35, St. Mary-st., Cardiff:—

Coke & Co. ...	£12,630 4 10	Chas. Davies,	
John Rees ...	12,590 10 10	35, Court-rd.,	
John Gilson...	12,580 0 0	Cardiff*	11,490 3 2
Frank Ashley	12,279 12 3	J. E. Evans ...	9,491 5 4

ESH WINNING (Durham).—For the construction of streets and sewers, for Sir Walter Smythe, Bart. Mr. H. T. Gradon, architect, 22, Market Place, Durham:—

Johnstone Bros.	£1,198 16 5	J. W. White ...	£823 0 0
John W. Tiffin	960 0 0	McLaren & Son	775 3 5
Walton Bros....	924 0 0	Lough Bros., Sunderland*	749 10 10
Hill & Meredith	837 0 10	Jas. Robson, withdrawn;...	733 5 3
Walter Craig ...	888 11 5		
Wm. Robson ...	875 12 2		
John Carrick...	836 9 9		

HAROLD WOOD.—For the erection of a detached house, situated at Harold Wood, Essex. Mr. D.S. Stephens, architect, 11, High-street, Romford:—

J. Philpot	£1,231 14	Dowsing & Davis	£1,250 10
Hammond & Son	1,271 0	W. Hunnable* ...	1,179 16

HUDDERSFIELD.—For the execution of sewerage works, Meltham, for the Urban District Council. Messrs. J. B. Abbey & Son, C.E., New-street, Huddersfield:—
Edmondson & Wyatt, Werneth, Oldham*...£1,240

ILFORD.—For the extension of sewage outfall works &c., for the Urban District Council. Mr. H. Shaw, C.E., Town Hall, Ilford:—
D. T. Jackson, Barking* £14,845

LLANDAFF (Wales).—For the construction of a pumping station, &c., Fairwater-grove, for the Rural District Council. Mr. James Holden, engineer, 35, St. Mary-street, Cardiff:—

Barnes, Chaplin & Co.	£3,185 14 8
E. Osmond	2,685 13 4
Charles Davies	2,664 17 4
J. E. Evans	2,660 19 5
John Rees	2,625 13 4
Frank Ashley	2,532 14 5
The Public Works Co., 20, Victoria-street, Westminster*	2,427 10 9

LONDON.—For the making of Seward Road, for the Hanwell Urban District Council. Mr. S. W. Barnes, Assoc. M. Inst. C.E., Council Offices, Hanwell, W. Quantities by the Surveyor:—

R. W. Swaker	£1,335 0 0
R. Ballard, Ltd.	1,256 12 0
T. Watson, Junr.	1,241 2 7
B. Nowell & Co.	1,195 12 0
J. Mowlem & Co.	1,156 15 8
H. Morecroft	1,150 0 0
W. Neeve & Son	1,081 0 0
J. Macklin, Hanwell*	1,059 3 8

LONDON.—For making up Bracewell and other streets for the Hammersmith Borough Council. Mr. Mair, Borough Surveyor, Town Hall, Hammersmith:—

	Cardross-street. sq. yd. s. d.	Norland Market. sq. yd. s. d.	Bracewell-road. £
Wimpey & Co., The Grove, Hammersmith*	11 6	11 8	721
Brunswick Rock Asphalte Co.‡	9 6	9 6	—
Josiah Smart§	11 0	11 6	—
London Asphalte Co.	12 6	12 6	—
Nowell & Co.	—	—	818
Peters & Co.	—	—	811

‡ Not including excavating. § Mastic Asphalte.

LONDON.—For the construction of sewer works at Jermyn-street and Dorset-street for the Westminster City Council:—

	Dorset-street.	Jermyn-street.	Total.
	£ s. d.	£ s. d.	£ s. d.
Johnson & Langley	128 0 0	2 174 1 0	2,302 1 0
Mowlem & Co. ...	151 0 0	1,535 0 0	1,686 0 0
George Bell.....	109 0 0	1,510 16 2	1,619 16 2
A. J. Neave.....	74 0 0	1,533 4 0	1,607 4 0
Kavanagh & Co.	171 0 0	1,295 18 9	1,566 18 9
C. W. Killingback	134 0 0	1,312 2 2	1,446 2 2
Wm. Kennedy ...	91 0 0	1,311 14 3	1,402 14 3
D. R. Patterson, James-st., Camden Town*	89 10 0	1,209 0 0	1,298 10 0

[*See also next page*

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LONDON.—For repainting the external iron and wood work of the Abbey Mills pumping-station, together with the superintendent's house and workmen's cottages attached thereto, for the London County Council:—

Sage & Co., Ltd.	£1,970	11	1	C. & W. Hunnings	£839 12 4
Hogg & Son	1,594	5	0	A. C. Inns	796 0 0
Bate Bros.	1,519	4	2	Excelsior Co.	764 0 0
Wales Bros.	1,360	0	0	F. Willmott	725 3 1
F. W. Hardy	1,320	3	11½	A. Balfour	638 8 10½
Chas. North	1,129	4	2	H. C. Horswill	634 17 8
Proctor & Son	1,071	15	10	J. T. Garbutt	624 0 0
Horlock & Son	999	12	6	Jas. Gregg	579 6 1
A. J. Sheffield	981	0	0	General Builders, Ltd.	529 0 0
F. Webster	969	16	3	Wollaston Bros.	516 0 0
Wm. Reason	942	0	0	Chapman & Sturton*	500 0 0
Fowler Bros.	892	10	2	Richard Athey	488 13 3
Vigor & Co.	855	0	0		

PONTEFRACT.—For the erection of a free library, Salter-row, for the Corporation of Pontefract. Messrs. Garside & Pennington, architects and surveyors, Pontefract and Castleford. Quantities by architects:—

Wm. Walker	£2,005	0	0	Thompson & Sons	£1,847 0 0
Jos. Bentley	1,986	12	2	Gelder Bros. & Woodcock	1,798 12 0
Perry & Son	1,972	2	7	Henry Gundill, Pontefract*	1,744 4 8
Geo. Spur	1,959	4	8		
A. Askam	1,902	15	11		

£150 allowed for wood block floors not in above contract.

PONTYPOOL.—For the erection of a wall for the Presbyterian Church of Wales. Messrs. Habershon Fawckner & Co., architects, 41, High-street, Newport Mon. Quantities by the architects:—

J. Morgan	£3,811	Bailey Bros.	£3,110
Jewell & Sons	3,589	Morgan & Evans, Pontnewynydd*	2,997
Morgan & Co.	3,360		
C. Shopland	3,187		

PORTSMOUTH.—For additions to post mortem room at rear of public baths, Park-road:—

F. J. Privett	£217	J. Tanner, Southsea*	£190
W. W. Learmouth	205		

PUDSEY (Yorks.).—For works at Union Mills. Mr. C. S. Nelson, architect, 15, Park-row, Leeds.

Appleyard Bros., Bramley, W. Leeds* £1,890

RIPLEY (Surrey).—For the execution of sewerage works for the Rural District Council. Mr. John Anstee, C.E., Commercial-road, Guildford:—

W. Norris	£6,975	0	0	Higlett & Hammond	£5,566 0 0
Jackson	6,652	19	0	G. A. Franks, Guildford, Surrey*	5,449 0 0
Johnson & Langley	6,651	2	8	Davis & Ball	5,439 7 3
Osenton	6,338	0	0	Streeters & Todhunter	5,243 0 0
Kavanagh & Co.	6,164	0	0		
Hebbern	5,926	0	0		
Trimm	5,819	0	0		

SELLY OAK (Birmingham).—For the erection of house, Bristol-road. Mr. Alfred J. Dunn, architect, 86, Colmore-row, Birmingham, and 31, St. Michael's-square, Gloucester:—

Loud & Sons* £910

WOLVERHAMPTON.—For the execution of private street works, &c., Balfour-crescent, for the Corporation:—

James Owens £118 8 3
W. H. Reading, Wolverhampton* 95 16 0

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following list of tenders:—

SOUTHWARK (Keeton's-road).—Forming garden.

G. Footer	£25	19	6	Cutbush & Son	£15 15 0
Goff & Sons	25	0	0	W. C. Benedict	14 5 0
F. Hollick	25	0	0	A. Durrant*	13 13 0
R. Neal	16	5	6		

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	Buckingham-street.	Caledonian-road.
J. Bond*	£ 9 18	£20 5
Coules & Son	18 15	21 10
Hendry & Pattison, Ltd.	51 0	26 10
Landers, Ltd.	21 0	19 4
London Warming and Ventilating Co., Ltd.	15 0	*18 10
Rockhill Bros.	13 5	21 10
Wontner-Smith, Gray & Co.	24 10	24 0

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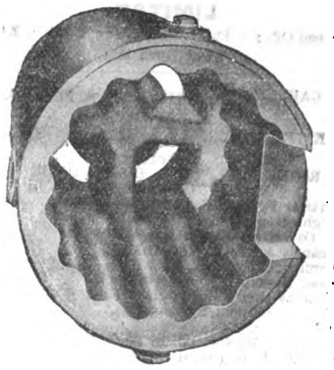

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Katharine-street, Croydon.
October 28th, 1903.

UNIVERSITY OF LIVERPOOL.
ROSCOE CHAIR OF ART.

The Council invite APPLICATIONS for the CHAIR OF ARCHITECTURE now vacant.

The emoluments of the Chair are derived partly from a fixed endowment of 375l. a year, partly from a share of students' fees.

The election will be for five years and the Professor will be eligible for re-election. He will not be debarred from engaging in private practice, so far as it does not conflict with the duties of the Chair.

Applications and testimonials must be forwarded to the Registrar of the University on or before DECEMBER 31. For fuller details apply to the SECRETARY, the University, Liverpool.

WALTHAMSTOW EDUCATION COMMITTEE.

The above Committee require a competent ARCHITECTURAL ASSISTANT for their Architect's Department.

Commencing salary 130l. per annum, payable monthly.

Applications, on forms to be obtained from the undersigned, should be sent in not later than mid-day, THURSDAY, 5th NOVEMBER.

Third-class return fare allowed to selected candidates.

T. W. LIDDIARD,
Secretary to the Committee.

Offices, High-street,
Walthamstow,
October 28th, 1903.

PARISH of ST. GILES, CAMBERWELL.
CLERK OF THE WORKS WANTED.

The Guardians of the Poor of the Parish of St. Giles, Camberwell, London, require the services of a CLERK OF THE WORKS to supervise certain alterations to the Old Infirmary Buildings at Havil-street, Camberwell, also the building of a New Board Room, Offices, and Relief Station, when a Tender is accepted for same.

Salary 4l. 4s. per week.

Forms of application can be obtained by forwarding a stamped addressed foolscap envelope, or by personal application here, and the same must, when duly completed, be returned to me not later than first post on THURSDAY, the 12th NOVEMBER.

Canvassing the Guardians, either directly or indirectly, is prohibited, and will disqualify any candidate.

CHARLES S. STEVENS,
Clerk to the Guardians.

Guardians' Offices,
29, Peckham-road, S.E.
October 26th, 1903.

METROPOLITAN BOROUGH OF WOOLWICH.
APPOINTMENT OF STORES AUDIT CLERK.

The Council of the above Borough invite APPLICATIONS for the APPOINTMENT of a CLERK in the Borough Accountant's Department to audit the Stores Accounts of the Council.

Applicants must be between the ages of 25 and 35 years, and have had experience in auditing Stores Accounts.

Salary, 120l. per annum.

The person appointed will be required to devote the whole of his time to the duties of the office, and to reside in the Borough.

Applications, in candidates' own handwriting, on forms to be obtained from me, accompanied by copies of not more than three recent testimonials, which will not be returned, to be delivered to me at the Town Hall, Woolwich, not later than TEN a.m. on MONDAY, the 16th NOVEMBER, 1903, in envelope marked "Stores Audit Clerk."

Canvassing Members of the Council, either directly or indirectly, will disqualify.

Selected candidates only will be notified of the appointment when made.

By Order,
ARTHUR B. BRYCESON,
Town Clerk.

Town Hall,
Woolwich.
October 23th, 1903.

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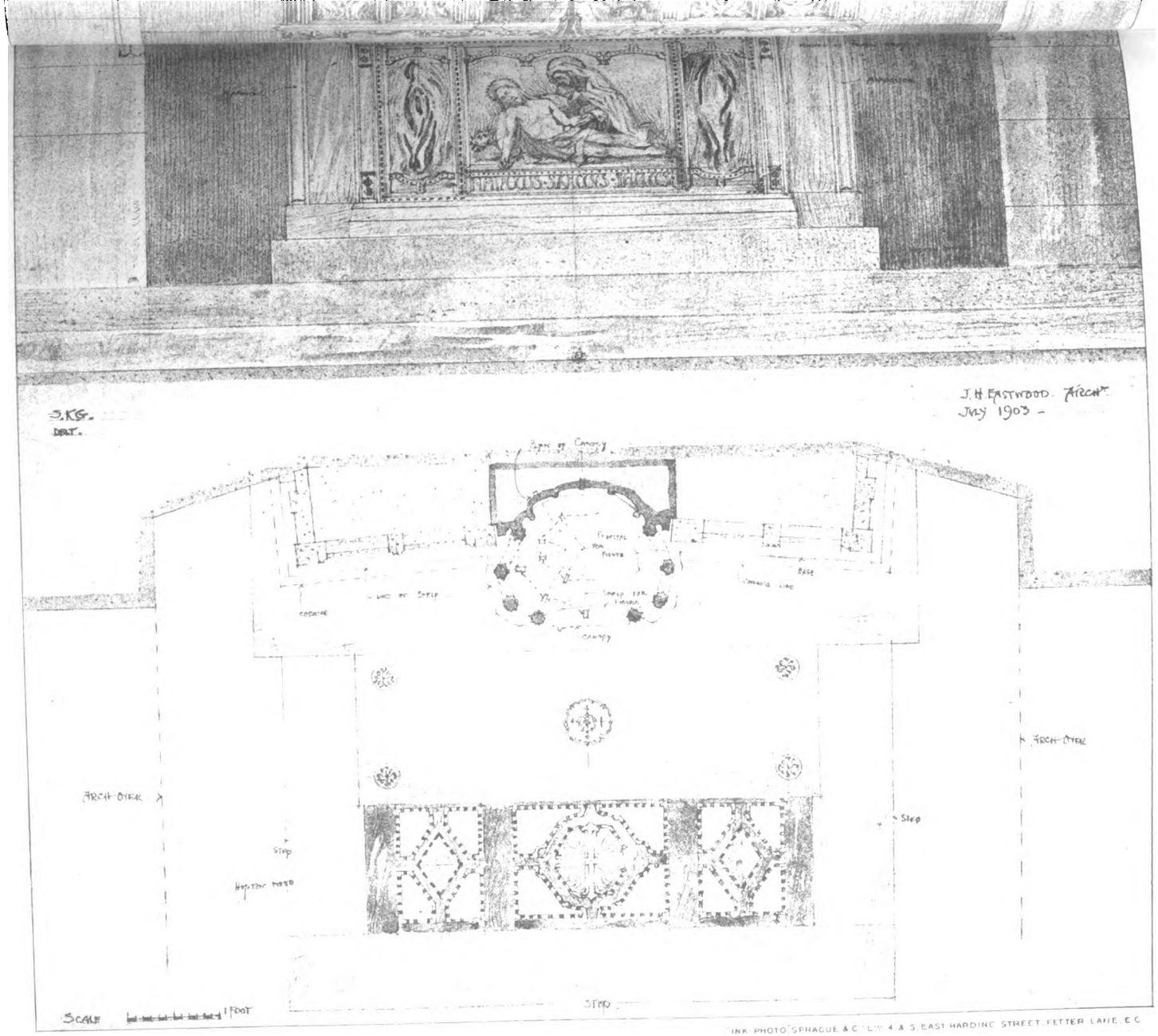
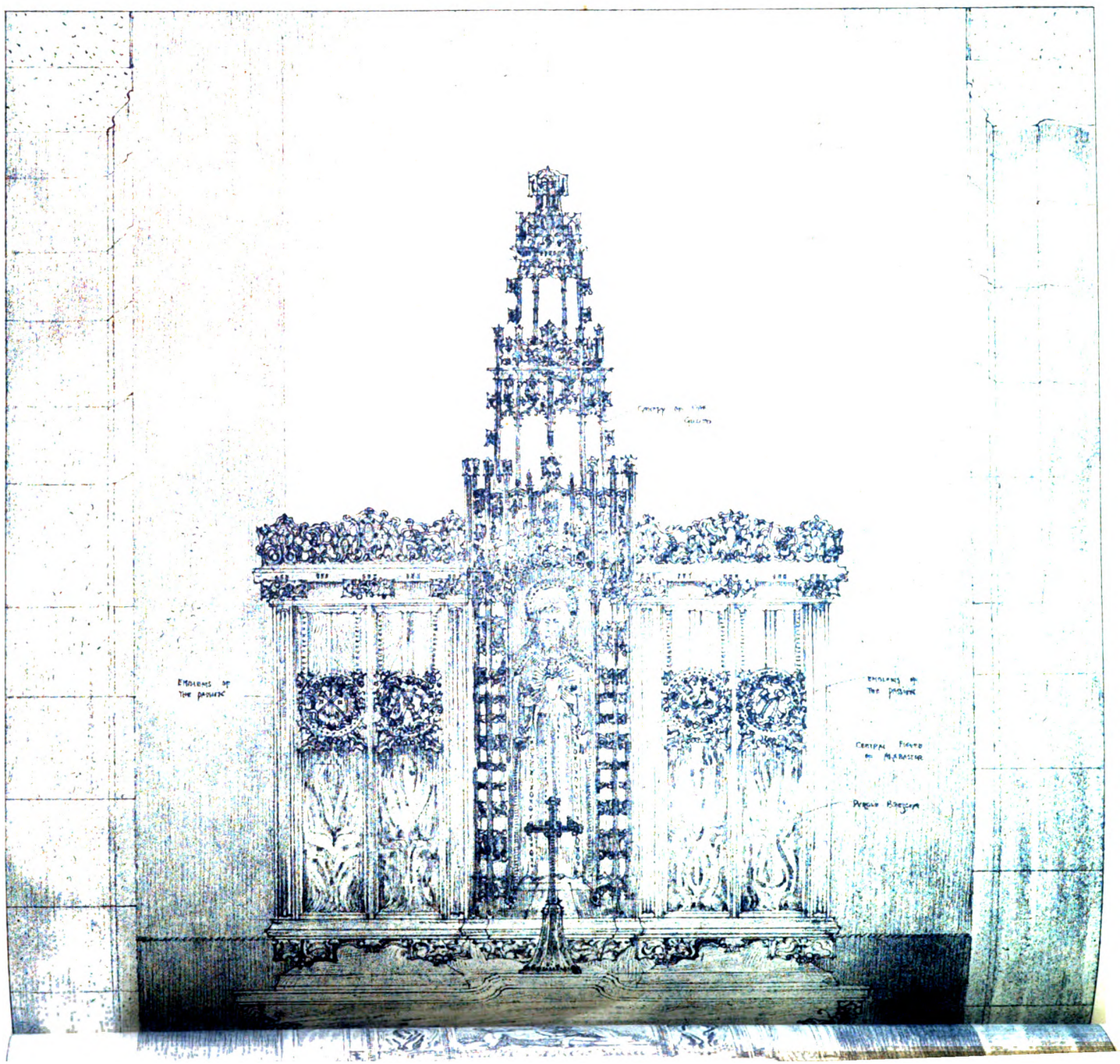


ALTAR, CATHEDRAL CHURCH OF ST. ANNE'S, LEEDS.—Mr. J. H. Eastwood, A.R.I.B.A, Architect.



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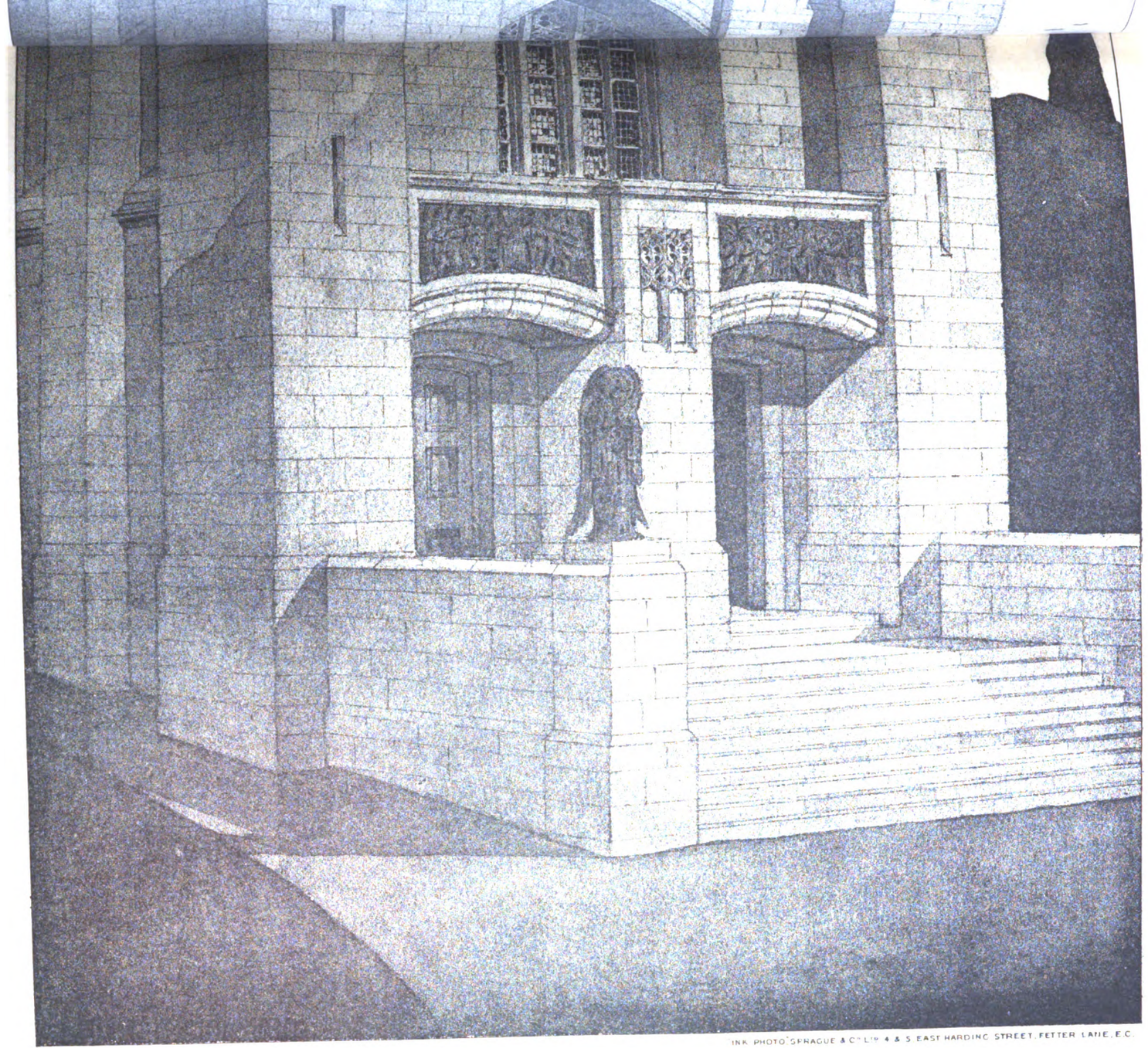

DESIGN FOR THE WEST END OF A COLLEGE CHAPEL.—By Mr. C. E. Hutchinson, A.R.I.B.A.

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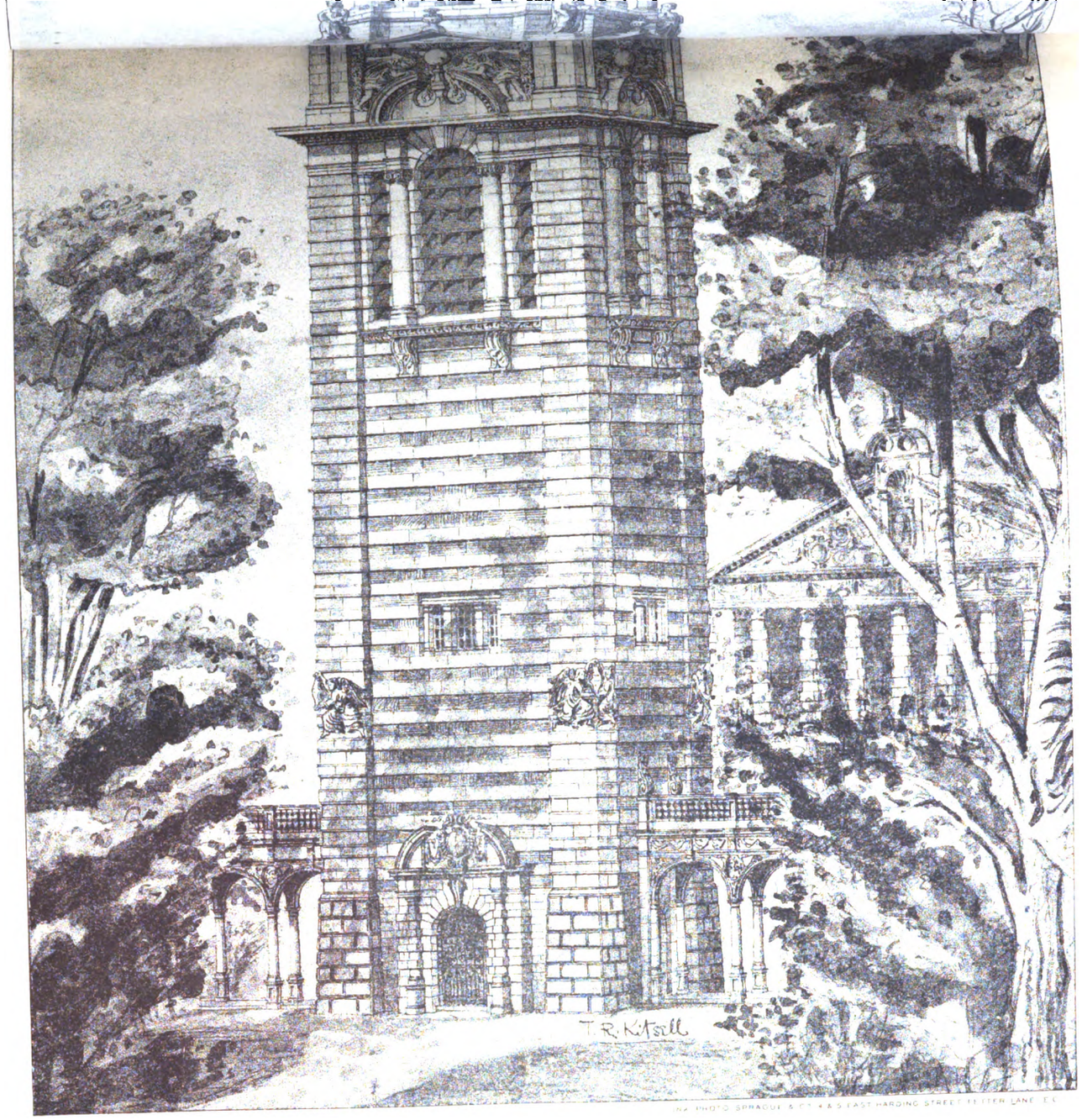

DESIGN FOR A CLASSIC STEEPLE.—By Mr. T. Rogers Kitsell, A.R.I.B.A.

Tite Prize, R.I.B.A., 1892.

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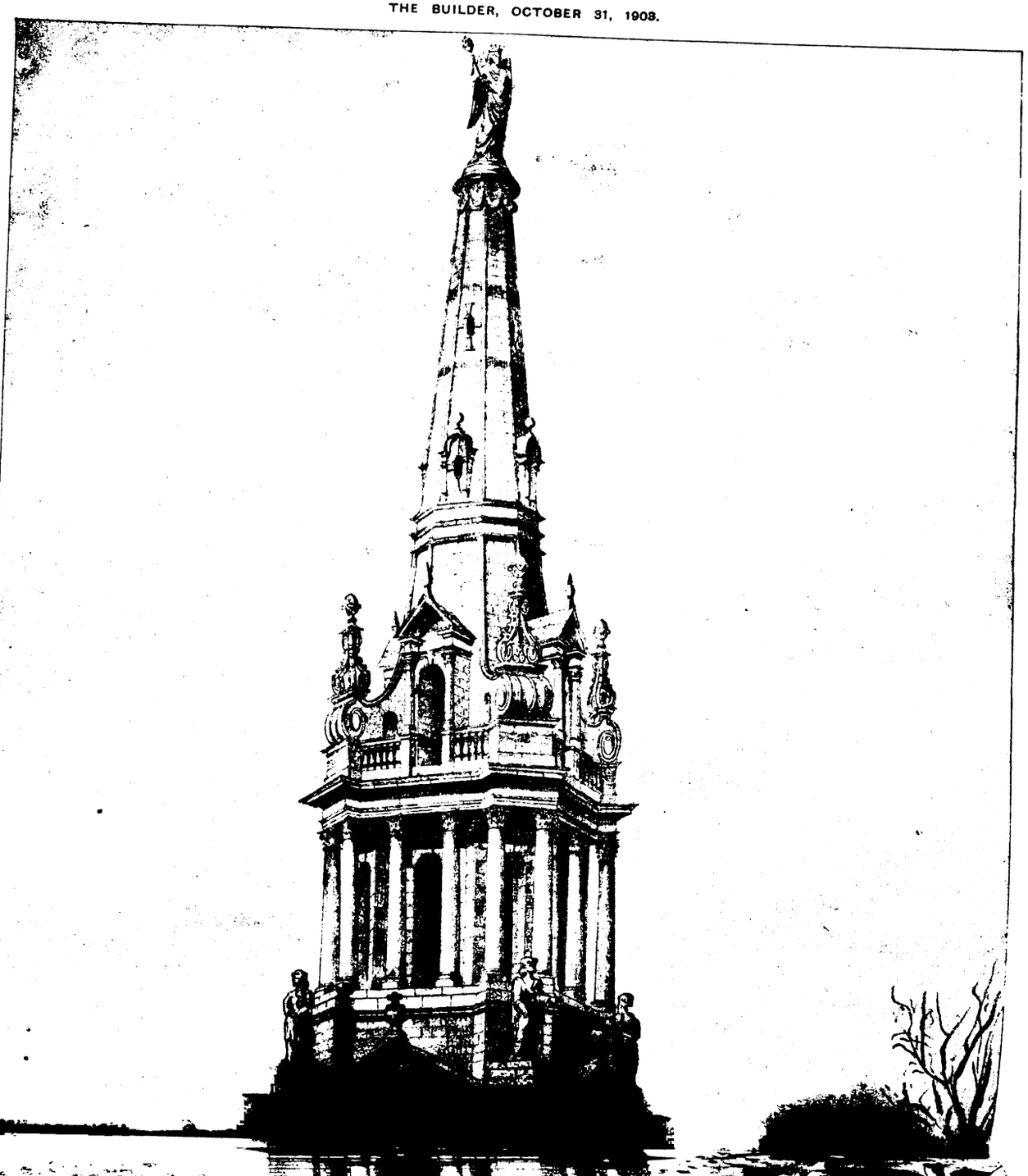

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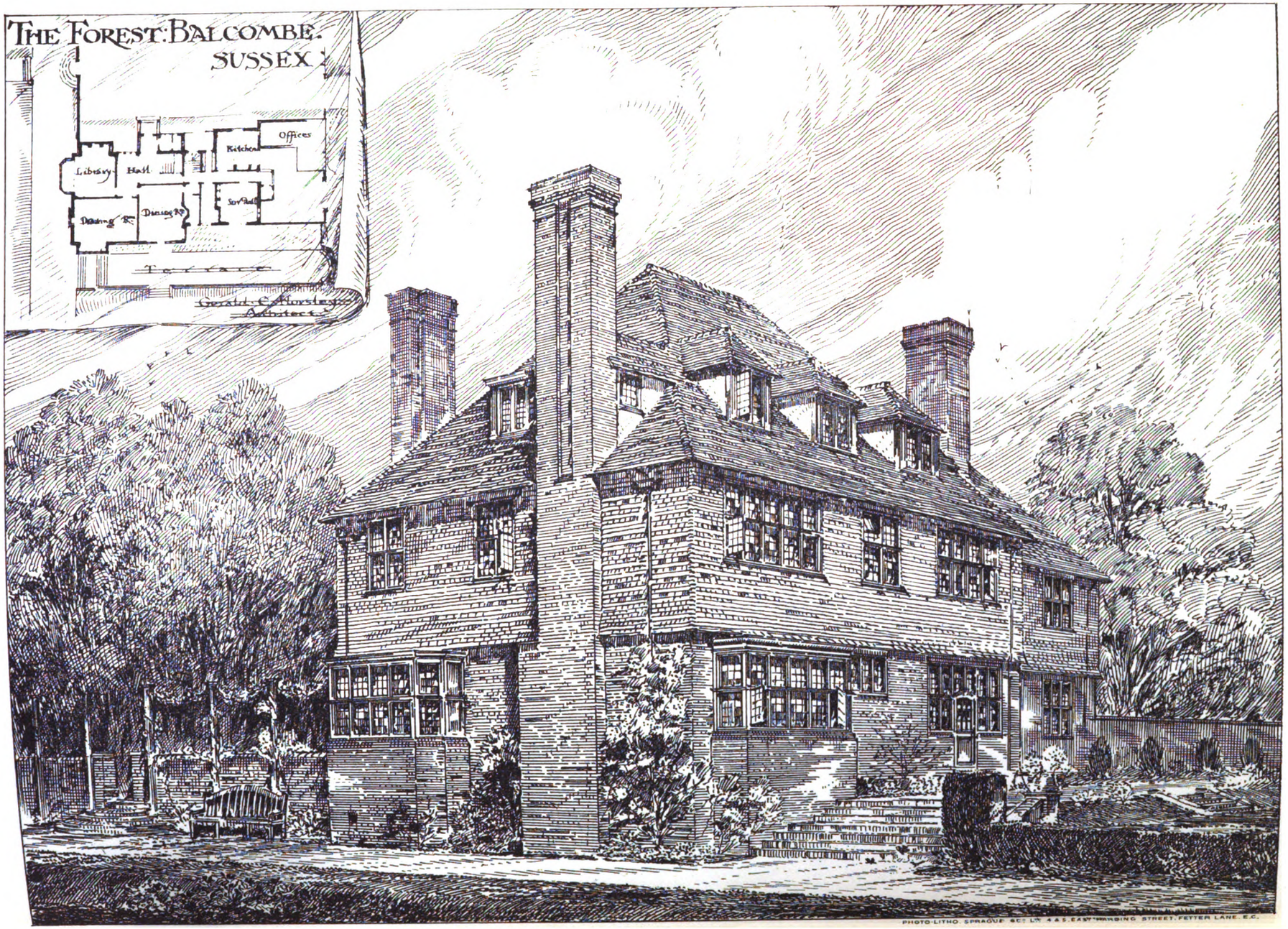
THE FOREST: BALCOMBE. SUSSEX.



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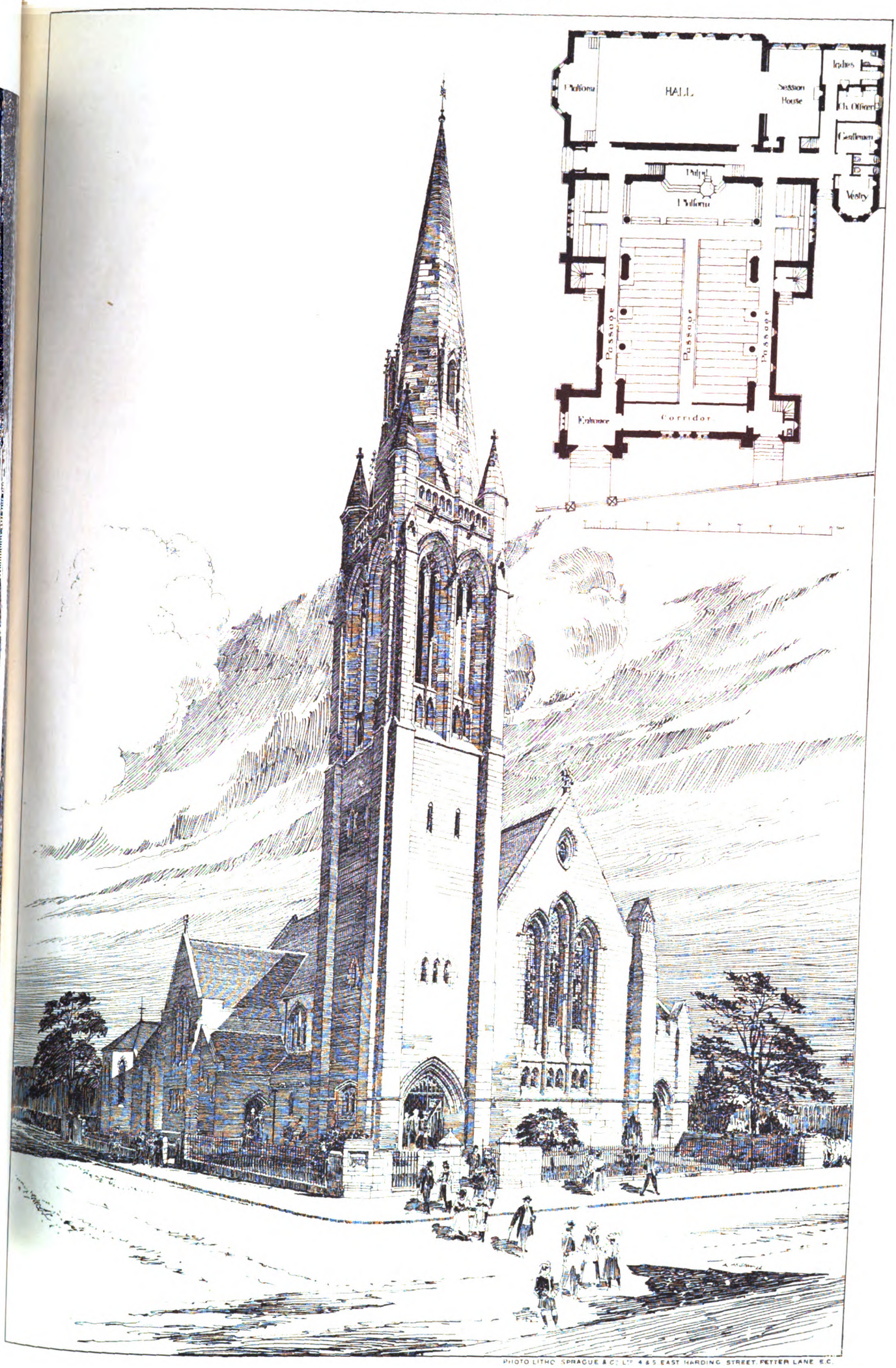

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BEECHGROVE UNITED FREE CHURCH, ABERDEEN.– MESSRS. BROWN & WATT, ARCHITECTS.

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The Builder.

VOL. LXXXV.—No. 2170. NOVEMBER 7, 1903.

ILLUSTRATIONS.

Proposed House, East Grinstead ... Mr. T. E. Collcutt, F.R.I.B.A., Architect.
Additions, St. Mary Magdalene, Addiscombe ... Mr. E. B. Lamb, Architect.
St. Mary's College, Woolhampton, Berks ... Mr. Frederick Walters, F.S.A., Architect.
Entrance Lodges, Toddington ... Mr. E. J. May, Architect.
Administrative Offices for the Port Elizabeth Harbour Board ... Messrs. Jones & McWilliams, Architects.

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What is a House?

IT would appear a simple, almost ridiculous question to ask what is a house; but it is a question which of late years has puzzled the judges of the High Court not a little, and has caused them to give decisions which it is not easy to reconcile one with another. It has done more than this, it has caused the expenditure of considerable sums on litigation, and, having regard to the unquestionable state of confusion of the law on this point at the present moment it seems likely that the question will be the cause of much more expenditure and a good deal more litigation.

Many of our readers have at some time in the course of their lives—especially if they are architects, surveyors, or builders—had to do with restrictive covenants in regard to buildings, such as that only a house shall be erected on this or that spot, or that only a house exceeding a particular sum in value shall be built. But with changes in social habits, and changes caused by the want of space in towns, and from other circumstances, we find a constant increase, not only of flats pure and simple, but of buildings containing two or three separate dwellings. It is not, therefore, very surprising that were covenants in deeds come to be applied to the facts of to-day, difficulties, unforeseen when these deeds were signed, crop up.

It will probably explain the present question best if we refer in more or less detail to the latest decision which raises the question "What is a house?" This case is that of Ilford Park Estates, Limited, v. Jacobs (Law Reports 2 Ch.D., 1903, p. 523), and it appears in the October number of the official reports. In the deed which produced the litigation there was a stipulation that on a certain plot of land conveyed to the defendant, "No house should be erected of less value than 300*l.*" One would scarcely have anticipated much difficulty in applying these words. The trouble arose in this way. The defendant proposed to erect a double tenement building—we avoid the word house—on the plot. These tenements were quite distinct and complete in themselves, and had no communication with each other. They were entered by separate front doors set back under a common archway, and the interior staircase leading to the first tenement was cut off by a 4½ in. brick wall from the ground floor tenement. There were separate water-closets on the ground floor in the rear of the building, that belonging to the first floor tenement being entered by a staircase from the kitchen. There was no way of getting from one tenement to the other, except through the front doors. The cost of the whole building would exceed 300*l.*, but the cost of each tenement would be less than that amount, and therefore, said the plaintiff, the defendant is committing a breach of the covenant, and should be prevented by injunction from proceeding with the building.

It may seem at first sight that this was a somewhat unreasonable decision. If there had not been the particular division in the whole building to enable two families to live in it, there is no question that it would have been in accordance with the covenant. Why, then, if for all outward purposes the dwelling was in accord with the covenant, should it be objected to because it was so constructed that two families could live in it? But the reason which may be given in defence of the decision, and which probably influenced the judge's ruling, becomes obvious if we consider what are the motives, in the case of houses built on an estate, for requiring that they should not be below a certain specified value. It is not merely the desire to secure, in an architectural sense, a certain class of building in regard to external appearance; it is the desire to secure a certain class of tenant, or to avoid having tenants on the estate below a certain class. If, for instance, on an estate where houses were specified not to be below a cost of 3,000*l.*, a man built a house of that value but divided it up into a dozen small sets of rooms in flats, the result would be that the owner of the estate would have tenants on it of an inferior class to that which he wished to attract, and whose neighhood would probably be objected to by the superior class of tenants who lived in self-contained houses; to that extent injuring the property. This consideration no doubt complicates the question a good deal from a legal point of view, but it is surely impossible to overlook it.

Apart from this question, no doubt, the definition of a house is capable of being settled purely on grounds of structural character, and ought to be more definitely settled than at present. A house is defined in the Oxford English Dictionary as "a building for human habitation," which for the purpose of settling this kind of dispute is not of much assistance. But in popular opinion a house is, we think, a building intended for human habitation, standing alone or separated vertically from adjoining edifices. It will be immediately asked—Is a building constructed for flats, with a common staircase, a house? The answer can be given at once. It is. For in the case of Kimber v. Admans (Law Reports, 1900, 1 Chancery, 412) it was expressly decided, both by Mr. Justice (now Lord Justice) Cozens-Hardy and by the Court of Appeal, that it was a house. It was, said the judge, none the less a house because it was divided into separate messuages; and Lord Justice Lindley, in the Court of Appeal, said what does "house" mean? "Does it refer to the mode in which the building to be erected is to be sub-divided or let, or does it refer to the aggregate of the rooms, or whatever the contents of the building may consist of? I think that the latter is the meaning, the house is the whole amalgamation." This decision has clearly settled that a building—however large—used as flats is a house. Why then should a building divided into two dwellings only not be a house? It seems that some stress has been laid on the fact that in a block used as flats there is a common staircase, but this fact seems immaterial. It might well be that a block of flats could be constructed, for the sake of privacy with several private staircases. Could it be argued, in such a case, that this fact had made it not one, but several, houses? Practically, in regard to questions of letting, it is so; and in the recent case on this subject a decision of the House of Lords seems to have been regarded as showing that a building with separate tenements and separate staircases was not one

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house. That case is Grant v. Langston, decided in 1900, but that case, an appeal from the Court of Session in Scotland, was a decision on a section of the Customs and Inland Revenue Act, 1875, which runs: "Every house or tenement which is occupied solely for the purposes of any trade or business, or of any profession or calling, shall be exempted from the duties," on inhabited houses. In that case the facts were almost exactly the same as in the Ilford Park case, with this difference, that the ground floor was solely used for business purposes, the upper story as a dwelling house. Therefore for the purposes of taxation there was a separate method of using the premises, and this method had to be regarded from the point of view of the Statute. "A hundred years ago there was not much difficulty," said the Lord Chancellor, in saying what was a "house," but builders and architects have so altered the construction of houses, and the habits of people have so altered in relation to them, that the word "house" has acquired an artificial meaning, and the word is no longer the expression of a simple idea. We believe that, looking at the matter from the popular and common point of view, a house is regarded as a building separated vertically from another. Whether separate staircases make two divisions of one building, in the mind of ordinary men two "houses," still remains to be settled; and we hope that the Ilford Park case may come before the Court of Appeal, so that those who have to do professionally with building may have the law settled in a systematic manner. How is a surveyor or an architect to advise a client when there is, according to the law as it stands, a vital difference between a flat and what is often called a maisonette? He will be only the more puzzled if he happens to read legal judgments, when he finds one judge relying on a separate staircase, as making an important difference, and another saying, as Lord Davey does, "whether that difference (the separate staircase) is sufficient to make any real distinction, it is not necessary for me to say." On the whole, we doubt whether, if the Ilford case, or one similar in its facts, should go to the Court of Appeal, it would be decided in the same way as Kimber v Admans. But it is at all events desirable that the law should give professional persons a simple and satisfactory rule, when they come to consider the question—"What is a house?"

DONATELLO.

LITTLE as we know of the life and character of Donatello, apart from his art, something is indicated in the mere fact, of which many who know and appreciate his works are not aware, that his popular name is a diminutive, and his real name Donato. The circumstance seems out of keeping with the usually severe and intellectual character of his work, and therefore we must connect it somehow with his personality, and conclude from it that he was one of that class of artists whose greatness appears mainly in their productions, and who, outside of their art, are not notable for any special seriousness of dignity of character or manner. Even in that more naïve age people would hardly dub a man "Little So-and-so" unless he were rather an ordinary sort of person in everyday life—a man you could clap on the back and crack jokes with. One could not for a moment fancy Michelangelo ever being known as "Buonarottelli." And the consideration is not without its artistic significance. There is a very parallel kind of difference between the works of the two men. Serious is his artistic aim as Donatello was, it is the seriousness rather of a gifted and earnest craftsman to whom the art was everything, than of a great mind to whom the art was a form of expressing thought which was greater and deeper than the artistic form. Behind Michelangelo's sculpture and painting there is something else which is above the visible work, something which prompted it, but which it could only partially express. Such figures as those of the Medici tomb, the Delphic Sybil, the floating figure of the Deity in the roof of the Sistine chapel, have a kind of intellectual significance, which it is impossible to analyse, but which is symbolic of what is greatest in the human intellect. We know and feel that the creator of those works must have been a great and sublime intellect, even apart from his plastic power; and who might rightly exclaim, in regard to his visible productions—"Shall I be judged by only these?" We do not feel this stamp of intellectual greatness, apart from sculptural power, in the works of Donatello. Serious they are, and grave in aim and conception, where the subject is grave, but they do not suggest the existence in their author of a conception beyond what the marble could embody. His figures of various prophets, for instance, are incisive, characteristic, and individualised. There is no doubt as to the kind of personage he wishes to portray; and they strike one as being not so much conceptions as portraits of prophets, as if the actual personages had sat to him. The intensity of realism in them is remarkable; but if one compares them (and it seems the fashion to do so now) with the works of a similar class of Michelangelo, it may be said that we are always conscious of a touch of the *bourgeois* in Donatello: an impression which exactly corresponds with the fact that he should have been called by a kind of pet name of good fellowship. Perhaps the only exception to this is what we have always regarded as his greatest work, the "St. George." This figure, as a symbol of courage, confidence, chastity (for there is all that in it), and total absence of boast or pretentiousness, is the highest ideal of a young Christian soldier that art has produced, and denotes in sculpture a conception of such a character which is quite above the ordinary or popular conception. But in this respect it stands alone among his works.

We are not intending in any way to oppose the modern estimate of Donatello as one of the greatest sculptors of the Italian Renaissance; one of the greatest, in fact, in the history of the art. He was for a long time greatly underestimated; he is an instance of one of those artists whose real powers, not appealing to the popular mind, have been long overlooked. The admirers of Canova, in the early part of the last century, had probably for the most part hardly ever heard of Donatello, and would have been astonished had they been told that he was by far a greater sculptor than their idol; just as, at an earlier period, the worshippers of Bernini would have been equally astonished at a similar judgment between him and Donatello. The modern fame of the latter is one of the remarkable examples of the manner in which truth and sincerity and original power in art will always in the long run assert themselves, even after generations of neglect and indifference. But in all such cases of revival there is a tendency to exaggeration; and there is a certain exaggeration in regard to Donatello at present. There is a tendency to class him with Michelangelo, whereas in reality there is a gulf between them, Michelangelo was a sublime idealist in art. Donatello was a realist—but a realist of exceptional power of execution and individuality of style.

Referring to what we just said as to the significance of his popular appellation, it is rather surprising that Lord Balcarres, in his remarkable monograph on Donatello*, makes no mention at the outset of the fact that this was not his real name (though he alludes to it at the close of the book), and does not even give his proper family name. It is true that the book is a critical and æsthetic essay and not intended as a biography, for which in fact there hardly seem to be any materials worth speaking of. Still, when one takes up a book with the title "Donatello," one may expect to find that information included, without having to go to another book to get it. Mrs. Foster's note to her translation of Vasari states that in the Fiscal register for 1430 he is called "Donato di Nicolo di Betto Bardi," and as Lord Balcarres refers to the fiscal documents in regard to the evidence of the date of his birth, he might conveniently have given us this information at the same time. It is added that in other documents he is referred to as "Donatello," or when mentioned in reference to his works, as "Donatello Fiorentino"—"Little Donato the Florentine." Lord Balcarres accepts Vasari's date for his birth, 1386; not indeed on the evidence of that pleasant biographical romancer, which is worth little enough, but for other reasons which he gives.

The omission of the family name and style is however, about the only fault to be found with Lord Balcarres's book, which as a whole is a most refreshing example of thoroughness both in information and in critical thought. With eleven or twelve exceptions, he tells us, he has seen the original of every existing piece of sculpture, architecture, and painting mentioned in the book; those of Donatello's contemporaries as well as his own works. No pains have been spared, evidently, to give a complete account and estimate of Donatello's art, and the numerous excellent photographs with which the work is accompanied are of the greatest value in giving a kind of all-round exhibition of his works on a small scale, and enabling the reader to institute comparison between works of different periods and different classes of subject.

The figures made for the Duomo at Florence, of which nine, we are told, are

* "Donatello." By Lord Balcarres. London: Duckworth & Co. 1903.

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now accepted as the work of Donatello, and which form the earlier illustrations in the book, are for the most part essentially mediæval in feeling; in their directness of expression, their powerful and downright style of execution, and in their absence of grace. One point which the author does not, as far as we observed, allude to, is that in many of them—in the figures, for instance, of Joshua, Jeremiah, and Habakkuk, the heads are too large or the stature too short (whichever way one chooses to put it); a common fault in mediæval work. The fault is the greater because the statues were intended to be placed high up, for which reason some of the details of anatomy are (rightly) exaggerated; but in the matter of stature a figure to be placed high up requires exaggeration rather than shortening, to allow for the effect of perspective. What strikes one as most remarkable in these figures is their strong and almost defiant originality of style and character. They are not beautiful, but they are at the farthest possible remove from artistic commonplace; and it is the commonplace which is the death of art. There is not the same strong originality in the seated figure of St. John, which Lord Balcarres admires so much; dignified it certainly is; but while the figures previously referred to are stamped with Donatello's own impress, the St. John is a figure which any competent sculptor might have produced; it has not in the same degree the sign-manual of Donatello. One of the most remarkable of the Florence Campanile sculptures, and the one perhaps that most makes one think of Michelangelo, is the group of Abraham and Isaac, in which the sculptor has shown such a remarkable power in getting two figures into a niche only intended for one, yet in such a manner that the difficulty of the situation seems only the occasion for an additional force and vigour in the design. Isaac kneels just in front of Abraham, forming one vertical line of composition with him, the nude figure of the youth contrasting with the full drapery of his father in a sculpturesquely effective manner. There have been few finer examples of a technical difficulty turned to artistic advantage.

The St. George is a work of beauty in a sense in which the prophets of the Florence Duomo certainly are not; but it is a beauty stern, severe, and rather mediæval than classic, in spite of the fine proportions of the figure which we find in this case. On a later page Lord Balcarres makes some excellent comments on the relation between Donatello and the classical school of sculpture. Flaxman, as he says, was justified in the remark that some of Donatello's work could be placed beside the best productions of ancient Greece without discredit. The St. George could; but that is not to say that the St. George is Greek in character, or that Donatello was in any way striving to copy the art of the ancients. "Donatello may be the mediæval complement of Phidias, but he is not his artistic offspring." Any one who thought so could not rightly understand either Phidias or Donatello.

The essential distinction between Donatello and the Greek school is shown again in one of the few of his works in which grace and beauty of line predominate—the beautiful and poetic relief of The Annunciation. Here the figure of Mary, rising and slightly drawing herself back in an attitude expressive of surprise mingled with reverence, has almost equal beauty with Greek sculpture, but a beauty of a different kind; not merely physical, but residing partly in spiritual expression, a quality which Greek art knew not. The most Greek-like work of Donatello is the nude bronze David in the Bargello; there is in this something of the simplicity and directness of aim of Greek sculpture; but it must be admitted that it is not equal to Greek work in actual beauty of design: where Donatello comes into competition with Phidias on this ground he is beaten. But the David is no sham antique; there is none of that attempt to be antique which went far to wreck Canova and almost entirely wrecked Gibson; it has distinctly a Renaissance character of its own, but it is the work which might best be put into comparison with what a Greek might have done, because it depends on form only and not on sentiment. On the other hand, no Greek artist would have consented to execute such a thing as the bust of Niccolo da Uzzano; he would not have undertaken anything so ugly; but as an example of what sculpture can do in forcible and characteristic portraiture it is unsurpassed. Another most striking element in Donatello's art is shown in the low relief of the "Pazzi" Madonna at Berlin, in which the antique and mediæval spirit seem to meet; the lines and the style are of Greek severity and purity, but the expression in the Madonna's face is such as no Greek artist ever imagined and no Greek woman (probably) was capable of. This we take to be an undoubted Donatello; if it be not his, there must have been some unknown sculptor as great as he in the same style; and that the same artist should have produced this grave and pathetic work as well as the gay and joyous romp of children of the Cantoria Gallery, is a remarkable testimony to his versatility of power. In this one point, too, the pourtrayal of child life, he was superior to Michelangelo, whose children are not childlike. The greatness of Michelangelo, as Lord Balcarres points out, lay in the fact that he rose to the conception of ideal types of humanity; an abstract position to which Donatello did not attain.

NOTES.

Gardens and Squares. The intention of the London County Council to take action to enable the Council to safeguard the gardens in the London squares and to prevent them from being built over will, we hope, be carried into effect by a Bill in Parliament next year. It is most important that these open spaces should be kept permanently as air spaces, but if Edwardes square falls a victim to the builder, there is no saying how many more may follow. There will, therefore, we trust, be no opposition to the proposed Bill which is desirable in the interest of every class of the community. A bill might also very well be drafted so as to include a clause giving the Council power to take over and take charge of any square garden, which the majority of proprietors desire should be managed by and at the expense of the Council, and, if so managed, then such gardens should be open to the public for the whole or part of each day. There is probably more than one London square which might be of much greater public utility than it is at present, and be much brighter and gayer, and be of equal use to those living near if it were in the hands of the County Council. Another point for consideration arising out of the same matter is whether, having regard to the growth of London, those who are covering what used to be the outskirts with buildings, should not be obliged by law to leave certain open spaces for the public use. As it is some of the more central parts of the metropolis, as, for instance, Bloomsbury, are better supplied with "lungs" than many of the newer districts.

Electric Traction. In considering the future of electric traction it should be remembered that when the possibilities of the system have undergone the exhaustive tests to which steam railways have been submitted during the past seventy or more years, it may be found that entirely new traffic conditions have arisen. Even at the present stage electricity has escaped from the conventional methods associated with steam traction, and has evolved various systems, each specially applicable to some distinctive requirement. Thus electric traction in the form of tramways and railways has been found more or less suitable to the following conditions of transit:—Urban traffic, tunnel work of main line traffic in cities, inter-urban communication, main line traffic, and high-speed express connexion between two or more large cities. Railway companies in all parts of the country already suffer from electric tramway competition, and are seriously considering how they may maintain their position, and the question is being asked whether it would pay to adopt electricity on lines hitherto wedded to steam. It is doubtful whether expenses could be reduced by electrification, and railway managers will be well-advised if they look rather to securing additional traffic by the provision of better facilities and greater comfort for passengers in conjunction with lower fares. In this way they may hope to compete with electric tramways and light railways.

A Light Case. The case of Ruscoe *v.* Groundsell (*Times*, October 29), decided by the Court of Appeal, was somewhat unusual in the facts disclosed. The appellant was the owner of two cottages which had windows overlooking land of the respondent, which, until the year 1891, had always been used as an open yard. In that year the respondent had erected a shed in the yard within a foot of the appellant's windows, which interfered with the light. The appellant brought an action in respect of the interference with the light, but the respondent set up the defence that there was an agreement in writing which prevented the appellant acquiring the right by prescription to the light under Section 3 of the Prescription Act. The agreement relied upon was a tablet in the respondent's wall, on which was engraved: "1816. This stone

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is placed by John Atkin to perpetuate John Musgrave's right to build within nine inches of this and any other building." The Court below held that this was an agreement which prevented the plaintiff from acquiring the right to light, but the Court of Appeal reversed this judgment, not on the ground that this tablet could not be an agreement within the statute, but because it was not sufficiently explicit in its terms to constitute an agreement "expressly given" for the particular purpose of defeating a right to the light being acquired.

The Dangers of House-breaking.

An inquest held last week at Westminster throws light upon the reckless methods practised by contractors in the work of demolishing buildings. One of the witnesses, a workman engaged in pulling down a building in Southampton-row, stated that he threw a piece of timber over the party wall after shouting "below," but, misjudging the distance, the wood struck the wall and falling upon the head of a fellow workman fractured his skull. The working foreman stated that he ordered the timber to be thrown down when men were at work below "because they were supposed to know their work," and he calmly suggested that the man who was killed might have escaped if he had looked up when warning was given. The contractor for the work propounded to the coroner the amazing theory that trade competition precluded the adoption of regulations for the safety of the men. It seems that the Factory Acts do not apply to buildings in course of demolition, an omission that ought to be remedied without delay. The case is important as revealing the existence of a most dangerous trade without any regulations in force for the protection of the men employed. We fully endorse the remark of the coroner that legislation is required in the interests of men engaged in hazardous enterprise of the kind.

Another Lift Accident.

We seem to be in the midst of a mild epidemic of mishaps to lifts and hoisting machinery. Once more a serious accident has taken place at the Savoy Hotel extension works, this time in connexion with an electric lift, intended for materials. In spite of notices posted at various places on the works, to the effect that the lift must be used for materials only, five workmen entered the cage early on Saturday last at the top floor of the building. Soon after the descent had been commenced, some part of the apparatus, presumably the rope, gave way and the cage fell with great rapidity to the ground. Fortunately no lives were lost, but the men were more or less seriously injured. For this they have only themselves to blame, and the contractors appear to be free from responsibility. Nevertheless, it is distinctly unsatisfactory that any such failure should take place, for all lifts and hoists ought to be constructed in such a way that the cage may be held up if the ropes break or any part of the mechanism gives way. Even if a goods lift is not used by passengers there must always be danger to innocent bystanders if a heavy cage should be precipitated violently to the ground. The efforts of lift makers to ensure safety cannot be of the least use unless contractors and others will make a point of seeing that safety devices are kept in proper order. A second accident which ocurred at the Savoy Hotel on the same morning seems to strengthen the suggestion that there is something radically wrong with the handling of materials on the extension works. On this occasion a steel girder weighing several tons fell upon one of the workmen, who was removed in a terribly crushed condition to the Charing-cross Hospital. Some explanation as to these constant accidents is certainly desirable.

The Fine Art Society.

An exhibition of water-colours and studies by Sir E. J. Poynter attracted a very large gathering at the private view at the Fine Art Society's gallery on Saturday last. The studies for pictures and single figures are, it need hardly be said, of the greatest value and interest. Among them are various studies for figures and heads for the fine picture of the "Storm Nymphs." One or two studies for a figure of Minerva, especially the one on red paper (24), are fine examples of the design and treatment of drapery. Some studies of armour for the mosaic of St. George in the Houses of Parliament are very fascinating; there is also a small scale study for the whole picture. Among others which particularly interested us are a head drawn in silver-point (7); a nude study (27), peculiarly fine in line and pose—we wish we could see it developed into a picture on a large scale; a noble study for the head of St. John the Evangelist at St. Paul's (53); the study of a head, numbered 95; some architectural sketches in Italy (40 and 45) and in Surrey (48); and two sketches of Walhampton Garden and Wharncliffe Crags (94). The collection of water-colours shows a surprising number of careful works on a small scale, as the relaxations of a painter generally occupied in the severer and more difficult forms of art; as examples of water-colour they would not, for the most part, take the highest place in an exhibition devoted mainly to water-colour art; they have not the true water-colour style; they are rather transcriptions of scenes than pictures in water-colour. An exception is the wonderful little picture entitled "The West Wind, Lynmouth" (125), painted in 1865, showing an effect of wind on a sea viewed from a high point, looking down on it almost, as in what is generally called a bird's-eye view; this would be a remarkable work in any exhibition. In "The Park at Studley Royal" (158), and "A Roman Garden" (179), we have also a broad pictorial character; and the little picture of "Ships in the Bay, Funchal" (145), with the houses in the foreground, is very fascinating, more so than the larger and more elaborate "Morning Sunshine, Funchal" (162), which is rather a topographical study than a picture. Among the others those in which buildings take a prominent part are the best; "The New Barn, Rottingdean" (130), and "Bridgnorth" (155), with its houses piled over one another up the hill, are admirable of their kind; also "Playtime, Rottingdean" (169), and "Dover Castle" (178) dark in the distance against the sky, with the town in the foreground. A small oil painting of "The Vision of Endymion" (121), which finds place in the collection, is perfectly beautiful in the design and treatment of the figure of Diana in an orb of lunar radiance.

Illustrations to the Jungle Book.

At the Dutch Gallery, 14, Brook Street, is a collection of water-colour drawings by two brothers, Mr. Maurice and Mr. Edward Detmold, in illustration of Mowgli and the animals in Mr. Kipling's imaginative work "The Jungle Book." These are not ordinary book illustrations, but large highly-finished coloured drawings, which are in course of being reproduced in colour as a portfolio. Mr. Kipling's extraordinary realisation, as it almost seems, of animal character and the animal point of view is well worth the serious illustration by the artist; and Messrs. Detmold's work is in many respects well worthy of the book it illustrates. There is something a little too strange about some of the drawings; an attempt to force a more striking effect into the animal figure than seems quite natural. "Baloo," for instance, by Mr. E. Detmold is rather—we were going to say a super-human, but we should more correctly say a super-bearish bear, an abnormal creature, and the fur texture is not quite conveyed either; and in "The Buffalo Charge," by the same artist, the whole effect seems too flat and the buffalos do not keep their distance in the picture, but the head of Shere Khan crouching in the foreground is fine. We should like to have seen more of Shere Khan (we assume that every reader knows the ordinary names of these immortal animals); he only appears once. But the picture of "Mowgli and the Red Flower," with Bagheera crouched in a heap and glowering at the fire, is exceedingly powerful; and "Mowgli's Revenge" (Mr. Maurice Detmold) in which we see again the naked man-cub, is admirable; his Mowgli is not so fascinating a boy as the one we saw in the Royal Academy this year, but the conception is much more in accordance with the spirit of the book. Others that are very fine are "The Return from the Elephant Dance," and "Akela, the Lone Wolf," both by Mr. E. Detmold; the last named is quite pathetic. Mr. Maurice Detmold's baboons in the "The Cold Lairs," and his highly-elaborated portraits of Kaa, and of Rikki-tikki-tavi and the cobra, are all remarkable studies. Besides the Jungle-book illustrations, there are two very original sketches, one by each brother, for stained glass windows symbolising "India" and "Africa," and two or three charming pencil drawings of scenery on grey-tinted paper. Altogether a remarkable little exhibition.

Mr. Holiday's Windows.

Mr. Holiday has on show at his studio, Oak Tree House, Hampstead, some exceedingly beautiful stained glass: Three small lights for St. Leonards, St. Andrews, Scotland, and one of the east windows of St. Cuthbert's, Willesden. The latter is a double light window, and the subjects are associated with the raising of Lazarus. On the right is Our Lord leaning on the arm of St. John, and on the left is Martha kneeling by the side of Mary with the news, "The Master is come and calleth for thee." The drawing expresses grace and true religious feeling, and the

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work has all the sanctity of good glass, glorified by a blazing harmony of colour.

The Woodbury Gallery.

The small room at the Woodbury Gallery contains a collection of water-colour sketches—they are hardly more than sketches—by Mr. Aubrey Waterfield, of scenes chiefly in Italy and Sicily, which show a good deal of feeling for colour and effect in the rapid transcription of actual scenes. Among those which are especially good are "The Harbour, Palermo" (43); "The Foreign Barge" (70), a study of a barge moored in a tidal river; "Richborough" (72), a very slight sketch of landscape which might be worked out into a fine picture on a larger scale; "Ships at Palermo" (78), showing the picturesque of a collection of sails; and another drawing of Palermo Harbour (80). The drawings, though slight, are very artistic in quality.

Messrs. Tooth & Sons' Gallery.

The exhibition at Messrs. Tooth and Sons' Galleries gives us the opportunity of seeing again two important pictures which have not been seen in public for a good while; Sir L. Alma-Tadema's large painting—much larger than usual with him—"The Picture Gallery, Ancient Rome" (79), and Mr. Peter Graham's "Wind and Rain, a Storm in the Highlands" (67), first exhibited at the Academy many years ago, if we remember right, under the simple title "Wind." It is in a far bolder and less conventional style than those pictures of hills with cattle in the foreground, all on much the same pattern, so to speak, which this artist gives us now. M. Bouguereau's "Printemps" (90) looks much better here than it did in this year's Academy; it is in a more favourable light; it is not a thing one cares for; only, for the kind of thing, it is so very well done. Among the other contents of the large room is a splendidly painted cow, "Vache au pâturage" (57), by Herr Van Marcke—a work of the highest art in its way, only a little spoiled in composition by the posts and cross-rail which have the appearance, from their position, of being put there to support the animal's head. There is a grand little landscape of M. Harpignies—"Paysage, Ciel Orageux" (92), and another by the same great artist, "Clair de Lune" (101), in which however, the moon is too large—it would have perhaps been difficult to give the effect of radiance with a moon of the true angular dimension; and there is a landscape by Mr. J. L. Pickering, "A Bedford Farm" (105), of great originality of style and colour. In the small room Thomas Collier's grand landscape "After the Storm," Pattenham Common" (35), was worth a better light; it is the finest thing in the room, and is hidden away in a corner. Some examples of Prout, Isabey, Creswick, Varley, and G. Fripp, in the same room, take us back in an interesting manner to old schools and methods; while Herbert's "Fishing boats in a storm" (10) is an amusing relic of the scenic stage of marine painting, when inky clouds and a light-brown sail relieved against them formed the regular programme. We have got beyond that nowadays, at all events.

Mr. McLean's Gallery.

We cannot say that the exhibition at No. 7, in the Haymarket is very interesting. One of the best things in it is Mr. McWhirter's "Scotch Firs, Rothiemurchus" (15), a much broader and less conventional landscape than those in which the white birch-tree is the prominent and familiar object; we fancy it has been seen at the Academy, or else one on very similar lines. There is also Herr Israels' fine and pathetic picture "The Missing Boat" (21). Mr. Charles Stuart's "On the Banks of Loch Awe" (34) and Wimperis's "On the Scotch Moors" (45), are good landscapes, and Mr. J. H. C. Millar shows a powerful treatment of sea in "Off the Casquets" (28). Mr. J. W. Godward, whose work is usually prominent at this gallery, having made his mark as a realistic painter of the figure in his "Campaspe" at the Royal Academy some years ago, has never done anything to carry further the promise of that work; "The toilet of Venus" (32), which is in a central position here, is merely an adequately painted but totally uninteresting nude, without either sentiment or (in the higher sense) artistic power; and one cannot go on caring for works of this kind. There are some very good names in the catalogue—such as Rosa Bonheur, Lhermitte, Roybet, Weiss, etc., but they are not represented at their best; they are all pictures worth something, but do not go to constitute a very interesting exhibition. One is reminded again of Isabey by a rather large painting (for him) "The Marketplace at Rouen" (22), but it is in a style which, in the present day, is only historically interesting.

Messrs. Dowdeswell's Galleries.

The exhibition of pictures and drawings of Mr. Charles Whymper, at the Dowdeswell Galleries, under the general title "Fur and Feather," is perhaps in a sense more interesting to sportsmen than to artists, as it consists principally of studies of birds and animals with a landscape, in most cases, merely as background. There is a night view of Westminster Palace, it is true, brought under the general subject by the introduction of a flock of birds passing, but it is hardly a picture of importance as such. Many of the studies of birds are however admirable; and "Ring Plover and Nest" (13) shows an excellent bit of foreground study also. Among others may be mentioned a fine study of an eagle (20),one of a "Moose Feeding" (28), his characteristically heavy head well given; "The Haunt of the Heron" (34), and "A way they have in the Highlands" (43), showing the skins and remains of various predatory animals impaled along the huntsman's fence, including (tell it not in the Shires!) a whole row of foxskins, for in Scotland it is a virtue, and not a crime, to shoot a fox; an instance of what Burke called "geographical morality." But why does Mr. Whymper paint a blackbird (56) with a red bill?

"With that gold dagger of thy bill"

wrote Tennyson; and our observation agrees with the poet's.

The Poverty of R.A. Exhibitors.

It appears that to exhibit a work at the Royal Academy Exhibition is to be taken as an indication that you are a needy person, likely to be in want of money, and open to the blandishments of the money-lender. At all events, that is the natural conclusion from a letter which has been received from one of these gentlemen by an architect who was an exhibitor at the last Academy, and which commences:—

"Dear Sir,—Seeing your name in the Royal Academy catalogue, I venture with apologies to forward my private business note, with respect to money which can be quickly advanced, from 50*l.* to 1,000*l.*, without publicity."

There is something touching in this tender solicitude to relieve the (presumably) struggling artist.

LETTER FROM PARIS.

The Exposition de l'Habitation, now being held in the large hall of the Grand Palais des Champs Elysees, will close its doors to the public on the 15th inst. This is the first exhibition of the kind at Paris, and during the two and a half months since its opening it has enjoyed a moderate success, chiefly with the general public, which has taken an interest in the examples of small economical houses of various taste and design erected in the Exhibition, as models of fully-installed and furnished houses which can be built for intending small house-owners on the instalment plan. The remainder of the Exhibition appears to lack interest, except in one or two portions, to either the public or the professional man, and has not achieved great success in the way of exhibits of a practical or novel nature. The chief exhibits consist of furniture in various forms of modern art; a certain number of the usual type of fixtures for gas and electricity, and several specimens of bronze and ironwork; and known materials for construction, including some of the varieties of armoured concrete construction. The whole, however, has merit as a first venture, and no doubt the organisers will learn from this exhibition much to their advantage for future exhibitions of this kind. This "Exposition internationale de l'Habitation" was sanctioned by a law made in January of this year by the Minister of Public Instruction, to be held at the Grand Palais from July to November. The exhibition was chiefly intended to prove to the public by means of drawings, models, and full-size specimens of family dwellings, that the laws of 1894 and 1896 concerning cheap dwellings could be put to a practical use, and that such dwellings could be built in an economical and yet solid manner, and be provided with all the adjuncts necessary to sanitation and health. Unfortunately, those who have designed the small houses presented to the public at this exhibition, appear to have given more attention to picturesqueness and modern art design than to really useful planning and practical installation, sanitation, and ventilation, and the interiors are not comfortable to English ideas. One of these houses attracts much attention from the fact that it will be given away in a lottery to the visiting public, to be drawn at the closing of the exhibition. The first floor of the Grand Palais is devoted to the display of a very large number of, in some cases, interesting drawings sent in by building societies and various provincial co-operative societies. These galleries are, however, little frequented, except on the days when conferences are held by the various societies.

Amongst the types of small houses are:—An economical dwelling designed by M. Lavirotte, architect; a type of a small dwelling which can be dismounted, by M. Bénouville, architect; a small house constructed by the Societé d'Epargne, shown as a type of house to be built on the instalment system; a small family dwelling, by MM. Bouvard and Umdenstock, architects; and a rather expensive small house in "modern style" designed by M. Charles Slumet, architect. An interesting glass and iron pavilion, with the novelty of armoured glass steps leading up to it on either side, is shown by the Manufacture des Glaces de Saint-Gobain.

For the last few days Paris has been in possession of a third Salon, the necessity for which has not been demonstrated. The public however, crowded to the "Salon d'Automne" on varnishing day, in the brilliantly lighted

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basement galleries of the Petit Palais, for this is an evening as well as a morning exhibition, and might in fact better have been confined to the evening, for the daylight lighting is very inadequate in this crypt, with its barred windows. The organisers of the exhibition have spared no pains to render it attractive by means of hangings, electric lights, and fine furniture, but the result is not happy, and the basement of the Petit Palais will hardly become a favourite place for exhibitions. The Salon d'Automne will be open till December 10; what the success in the way of attendance on the ordinary paying days will be, remains to be seen. The Société des Artistes Decorateurs will succeed it, and will probably be very attractive, the President, M. Dubufe, having already shown his taste and perception in the annual arrangement and decoration of the galleries of the new Salon exhibition. The exhibition of the "Syndicat des Peintres et Sculpteurs" is to follow, and then that of the lithographic artists and etchers, to open on April 30. Other demands have been made for the use of the basement galleries, but it is probable that the Municipality will, after these first few exhibitions have taken place, reserve them for the requirements of the permanent Art Gallery. A great part of the artistic possessions of the Municipality are still in the stores at Auteuil; there is sculpture enough to furnish these galleries, where space might also be found for some interesting and valuable architectural models, such as those of the Sorbonne, the Abattoirs, the Halles, etc., and M. Charles Normand's interesting series of comparative models of Parisian streets in their former and their existing state. As to the Salon d'Automne iself, it offers a curious mixture of the characteristics of the two summer Salons. Painters of the Old Salon, such as M. Guillemet, find their conservative works alongside of the productions of MM. Besnard, Carrière, and Jacques Blanche. The set of artists called the "Independants" fill a large space, and the glare of the electric lights is not kind to their eccentricities. In the section of architecture, which, though limited, is interesting—there are designs by MM. Louis Bonnier, Breffendille, Jourdain, Lavirotte, Louis Perin, Schutz, Selmersheim, Tronchet, and others.

The work of constructing the main portion of the new steel viaduct to be erected across the Seine, near the Pont d'Austerlitz, for the new line of Metropolitan Railway, has been entrusted to the Société de Constructions de Levallois-Perret, Paris, the time allowed for the completion of the work being twelve months. The work of constructing and erecting the metallic approaches to the viaduct on either side of the Seine has been given to MM. Daydé and Pillé, constructing engineers at Creil. Premiums of 120*l.* each were awarded to this latter firm and to the Compagnie de Fives-Lille. The contract price for the viaduct is 17,000*l.* and for the approaches 10,000*l.* The viaduct will be in the form of a light metallic arch in two halves, with pivot junctions at the apex and at each abutment. The apex of the arch will be at a height of 45 ft. above the water level, the span of the arch will be 453 ft., and the width of the viaduct nearly 29 ft.

The foundations for the new viaduct at Passy, also for a new line of metropolitan railway, are nearly completed, and the metallic portion of the bridge is rapidly being constructed by the Etablissements de Creil. It is expected that the new line and the viaduct will be ready for service in about twelve months. The viaduct will consist of two portions, one crossing from the Quai de Passy to the Ile des Cygnes, a length of 360 ft., the other portion continuing the bridge as far as the Quai de Grenelle, a distance of 290 ft. The railway line will be placed on the upper portion of the bridge at a height of 52 ft. above the level of the river, the portion reserved for ordinary traffic being at a height of 26 ft.

The proposed construction of a Palace for the reception of royalty visiting Paris, on the ground now occupied by the Depôt de Phares or central station of the French lighthouse service in the Avenue d'Iéna, has been rejected owing to the difficulties which the transfer of the Depôt de Phares to another site would raise. The piece of ground surrounding the Depôt would hardly be large enough for the construction of a suitable palace, and it is considered impossible to find in Paris another piece of ground for the transfer of the Depôt, for a greater difficulty would arise at the present time than that found in 1867, when the Depôt was transferred from the Quai Debilly to its present site, and regulations made that buildings to be constructed on ground within a certain radius of the lighthouse should not be raised above a fixed height, so as not to intercept the rays of light from the Depôt. There is no piece of ground within Paris at the present date where such a right could be maintained.

M. Henri Marcel, a former Conseiller d'Etat and member of the Conseil Supérieur des Beaux Arts, has been appointed Directeur des Beaux Arts in succession to M. Roujon. M. Marcel is not only an accomplished amateur and connoisseur in Art, but also an able writer and a frequent contributor to the *Gazette des Beaux Arts*, the *Revue de l'Art*, and *Art et Decoration*. He is the author of a noteworthy work on Millet, and has in preparation another on Velasquez. The nomination of M. Roujon to the position of Perpetual Secretary of the Académie des Beaux Arts has left a vacancy to be filled up in that section of the Institute, which will give rise to a good deal of competition. Among the principal candidates are M. Georges Berger, President of the Union Centrale des Arts Décoratifs; M. Jules Comte, a former directeur of Bâtiments Civils; M. Bouchot, curator of the Cabinet des Estampes; M. Gonse, curator of the Louvre; and M. Charles Normand, President of the Société des Amis des Monuments Parisiens.

The demands of street improvement have necessitated the demolition of the Hôpital Laennec in the Rue de Sèvres; and in spite of the protests of the Vieux Paris Committee, the chapel of the hospital, which is rich in historic associations, and contains the tombs of the Turgot family, who played so important a part in the history of Paris and of France, is to be destroyed.

It is announced that the conservatories on the Cours la Reine (built in connexion with the 1900 exhibition) are not to be pulled down but are to be made use of for an annual floral exhibition. The site occupied in that exhibition by the Ville de Paris Pavilion, is to be transformed into a large grass lawn, surrounded by chestnut trees, and sloping down towards the water's edge. This alteration will complete, very happily, the decorative treatment of the Cours la Reine, which extends to the Place de la Concorde.

M. Paul Guadet, architect, Inspecteur de Batiments Civils, has been nominated architect of the Legation of France at Tangiers, in the place of M. Bénard, who has been commissioned by the Mexican Government to construct the Parliament House at Mexico. M. Bénard has therefore resigned his functions and has left for Mexico, whilst M. Guadet has gone to Tangiers to look over the site for the future palace, and consider the materials afforded by the locality. The proposed site is a large one, close to the shore, covered with gardens, and said to be very beautiful.

The administration of the Grand Hotel in the Boulevard des Capucines has opened a competition amongst architects of all nations for schemes for the complete transformation of the existing open courtyard into a covered winter garden and the arrangement of a new carriage entrance in the Rue Scribe. The designs are to be sent in by December 15th, and premiums to the sum of 240*l.* will be distributed amongst the authors of the three premiated schemes.

At its last meeting, presided over by M. Frantz Jourdain, the Commission du Nouveau Paris instructed several of its members to submit schemes for the transformation and rearrangement of the Palais Royal. The chosen members are: MM. Ch. Plumet, Hector Guimard, Castelin, Lavirotte, Pierre Selmersheim, Collin, Denis, Bénard, and Henri Bans, all enthusiastic devotees of "Art Nouveau."

At a meeting of the Society des Amis des Monuments Parisiens, to be held on the 3rd inst, M. Charles Normand will read a paper on the Metropolitan of 1856, and the questions concerning the proposed destruction of the Parc de la Muette, the future stations of the Metropolitan Railway and their design, and the re-arrangement of the Champ de Mars.

The Chambre des Deputés has nominated a commission to prepare at once the construction of a new Parliament Hall, or "Salle des Séances." A sum of 120,000*l.* will be devoted to this work, and M. Buquet, the architect of the Chambre, is at present examining the nature of the ground in the large courtyard where it is proposed to erect the new hall.

A jury composed of painters, sculptors, and architects has awarded the Prix Lattainville of a value of 80*l.* to Mlle. Rondanay, pupil of M. Humbert. The programme given by M. Pascal required designs for the decoration of the end wall of a grand staircase leading to a library, as well as the decoration of the vaulted roof, and also the landing and the lantern lighting the staircase. The competitors were to represent Letters, Sciences, and Arts framed in a decoration of architecture and ornamentation. The award of the prize to a female student is interesting to those who are partisans of allowing these students to compete in the Prix de Rome competitions.

The Association Provinciale des Architectes has opened a competition amongst young students, members of one of the provincial schools of fine arts, for designs for "Un Hôtel des Postes et Telégraphes" for a town of 10,000 inhabitants.

The Municipality of Arles has decided to demolish the old ramparts which are historical and are well-known for their picturesque and artistic value. The Minister of Fine Arts has, however, saved one portion from destruction by classing as a 'monument historique" the Maison d'Ozé with its two towers of the sixteenth century flanking the Porte de la Cavalerie close to the railway station.

M. Deglane, the architect of the Grand Palais des Champs Elysées, has received from the State an order to construct a palace at Dakar for the Governor, this town becoming the capital of French West Africa. M. Deglane intends to build the palace entirely of artificial stone to be made on the spot with powdered stone, cement, lime, and an agglomerate to be imported from Europe.

A competition has been opened for designs and plans for the reconstruction of the abattoirs of Angers. The work is to cost 40,000*l.*, and premiums of 200*l.*, 120*l.*, and 40*l.* will be awarded.

One of the most celebrated paintings of De Neuville, the "Cimetière de Saint Privat," has been offered to the State by a well-known deal, M. Roland Knoedler. It will be placed in the Louvre.

The death is announced, at the age of sixty-six, of M. Léon Schindler, member of the Société Centrale des Architectes. He was a pupil of Lequeux, and his first professional work consisted in acting as resident architect for the works of the Collége des Jesuites, Rue des Postes. In 1862, he was attached officially to the service of the Department of the Seine, as Architecte Inspecteur of the Asile d'Aliénés at Evrard.

BROMLEY PUBLIC LIBRARY COMPETITION.

In this competition fifty sets have been sent in, and with a few exceptions they are decidedly mediocre; in fact, several are so hopeless that they are unworthy of serious consideration, except to illustrate the surprising incapability of their authors, both as designers and draughtsmen.

The conditions supplied a well-arranged plan and section of the lending library, magazine, reference, and news rooms in block, and in this respect were ideal, the competition becoming merely a matter of architectural treatment.

The winning design, by Messrs. Squire, Myers, and Petch, of 19, Pond-place, South Kensington, is well chosen. In the plan the authors have introduced several accessories which are not required in a small branch library, such as librarian's room and anteroom, and private entrance, public lavatories, etc., but the design of the façade is on the whole the most satisfactory. It is a Renaissance design in stone, and is cleverly concentrated by the use of simple flanks to a three-quarter columned central feature carried up both stories, the attic windows being set back behind the balustrade. The result is dignified and suitable.

The second premium is divided by Mr. C. Harold Norton, 14, Bedford-row, and Mr. A. F. McGregor Milligan, South Castle-street, Liverpool. Mr. Norton's plan is better than that of the winner, as the requirements have been adhered to and the simplicity of the plan preserved. The unfortunate introduction of a cornice dividing the central part of the façade in the middle, spoils an otherwise able design. The design by Mr. Milligan does not merit its position. A useless service passage is introduced in the ground plan, and the elevation is feeble.

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No. 6 diverges from the accepted method of lighting, and introduces an octagonal central gallery over the lending library, which draws light from the upper story windows. This is the only design treated in this manner, and is successfully handled. The elevations are designed in a quiet, rather domestic, late Renaissance of brick and stone—charming, but not monumental enough. No. 5 is a heavy Renaissance design, which cubes much too high. No. 26 also suffers from being too generous, with a story higher than necessary.

No. 17 is one of the few with the borrowers' space placed laterally, and is, as in all the others, a failure. The façade, in brick and stone, is treated in two three-quarter gables of doubtful character.

No. 1 is a bad plan, the author having ignored the plan supplied. The façade is in brick, with some merit, but quite unsuitable.

No. 14 is in l'Art Noveau style, a beautifully-drawn freak of the rounded angle order.

No. 36 is the best-looking set of drawings sent in, with a bad plan, which gives no supervision. The elevation is a clever study of Renaissance in stone, with large, circular-headed windows to lending library, and a well-proportioned order to both stories.

No. 7 is a clever design, with a large French roof and attics, with scarcely enough glass area to the lending library.

No. 10 is a Renaissance design with some merit, and an unaccountable circular-headed pediment in the middle of the façade.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

OPENING MEETING OF NEW SESSION.

THE opening meeting of Session 1903-1904 of the Royal Institute of British Architects was held on Monday evening at No. 9, Conduit-street, Regent-street, W., Mr. Aston Webb, R.A., F.S.A., President, in the chair.

The late Mr. H. W. Brewer.

The minutes of last meeting having been taken as read,

Mr. Alex. Graham, hon. secretary, said he was sorry to say that since the last meeting, in June, several members of the Institute had passed away. The first name he had to mention was that of a gentleman of high distinction as an architectural draughtsman, a man of great research, and a man possessed with high imaginative powers, *i.e.*, Mr. H. W. Brewer. To younger men, Mr. Brewer was probably little more than a name,* but to those who were acquainted with him in the sixties and seventies of the last century Mr. Brewer stood pre-eminent as a draughtsman of the highest order, and those who were acquainted with the pages of the *Builder* would remember the splendid drawings Mr. Brewer executed for that Journal from 1854 down to recent days. Mr. Brewer was a draughtsman of high quality, especially in his knowledge of mediæval work, not only in this country, but also in France and in Germany. Mr. Brewer seemed in his interpretation of the works of mediæval masters to have caught the spirit of the men who designed the great works which we all admired, and his imaginative powers were shown particularly in a panoramic view, which was published some fifteen years ago in the *Builder*, of Old London in the time of Henry VIII. This was followed by a similar treatment of Old Paris, and there were others of a similar nature which had appeared in the pages of the *Builder*. Mr. Brewer's death was a great loss, not only to the Institute—he was elected an honorary Associate in 1897—but to the whole profession. In earlier days, when photography was in its infancy, and the arts of reproduction which are so familiar to us were unknown, Mr. Brewer's drawings, executed by himself and cut by himself on the wood, were very remarkable productions. He could not help thinking that some of the deceased gentleman's drawings might be exhibited in that room. Thanks to the kindness of the editor and proprietors of the *Builder*, some of Mr. Brewer's original works had been exhibited in Catherine-street, but it was very desirable that on some evening early in the session, when there would be a large gathering of students and others, the drawings should be exhibited. It was his mournful duty to move that a letter of sympathy be sent to the relatives of Mr. Brewer, not only sympathising with them in their loss, but expressing on the part of the Institute a sense of the great part Mr. Brewer took in architectural progress during the last forty years. He would put that resolution, and ask those present to endorse it in the usual way.

The motion was agreed to in silence.

Other Deceased Members.

Mr. Graham also announced the death of Professor W. H. Corfield, M.D., consulting adviser on matters of sanitation to H.M. Office of Works, and an honorary Associate of the Institute since 1883. The name of Dr. Corfield was so familiar to all of them, and the work he had done was so fully recognised, that it was unnecessary for him to dilate on them. Professor Corfield was a pioneer in many matters connected with hygiene, and those of them who had, through choice or necessity, to make a study of sanitary science had always found in Dr. Corfield a man who assisted them in every possible way. His labours were not only recognised in this country, but had met with full appreciation in foreign countries, and it was very satisfactory to the Institute as a body to know that Dr. Corfield worked with them as a colleague for many years. He desired to move a resolution similar to the one agreed to in regard to Mr. Brewer.

This having been agreed to, Mr. Graham further announced the decease of Mr. H. Ford, elected a Fellow in 1870. Mr. Ford had a large practice in the City of London. Another name was that of Mr. A. J. Barlow, Associate, elected in 1880. The last name he had to mention was that of Mr. J. M. Brooks, elected in 1881, son of their lamented friend and colleague James Brooks, who a few years ago received the Royal Gold Medal of the Institute.

Statutory Examinations.

Mr. Locke, secretary, announced the results of the statutory examinations held by the Institute on the 22nd and 23rd October. There were seven candidates, of whom five passed and two failed. The successful candidates were Messrs. W. G. Green, Acton; E. W. Lees, London; A. George Morrice, London; A. P. Stokes, London.

These gentlemen had been awarded by the Council certificates of competency to act as district surveyors under the London Building Act.

In the Building Surveyors' examination the following candidate was successful: Mr. W. D. Jenkins, Sparkhill, Birmingham. This gentleman had been awarded by the Council a certificate of competency to act as building surveyor under local authorities.

President's Address.

The names of some candidates for membership having been read,

The President read the following address:—

Colleagues, Ladies, and Gentlemen,—For a second time it is my privilege as President to address you on matters of interest and importance in connexion with architecture and this Institute. But first permit me to express a hope that all present have been able to take, since we last met some change of air and scene so necessary for the due performance of our work. During the last twelve months there has not, perhaps, been any very striking development to chronicle. Our work is of such a character that twelve months is but a short period. Still, events have occurred which may have far-reaching effects in the future, both as regards our art and this Institute, and it will be my duty to refer to some of them in my address this evening.

As regards our membership, ninety-seven new members have been elected during the year, and we have lost fifty-five by death or resignation. Of our new members, twenty-six are Fellows, seventy-one Associates, and, in addition, thirteen Associates have been elected to the rank of Fellow. All this is satisfactory, as far as it goes, but you will all agree with me that it does not go nearly far enough; and we must not be content until this Institute includes among its members all reputable practising architects or, at any rate, until we are satisfied that we have thoroughly investigated and removed as far as is possible all reasons for this not being so.

One matter concerning the affairs of this Institute, which I fear must shortly be dealt with, is the question of the election of Fellows, which, under existing rules, can hardly be said to meet the views of anybody. It is not very satisfactory to the Fellows on account of its indefiniteness and uncertainty; and it is even less so, I have reason to believe, to Associates, who, not unnaturally, object to find admission to Fellowship less difficult than entrance to Associateship. And yet it is by no means easy to devise a remedy for this state of things. It is easy to see that everyone wishing to join the Institute must do so as an Associate, but under our Charter everyone desirous of becoming an Associate must first pass an examination, but there are, admittedly, many whom we should like to join us, who, from their age or standing, or want of leisure, could hardly be asked to submit themselves to the examination qualifying for Associateship.

How is this difficulty to be overcome? The only way that occurs to me is to do as was done in the case of Associates; and to fix a date, say four or five years hence, after which, except in very exceptional circumstances, entrance to Fellowship otherwise than through the Associateship is absolutely closed. The fact that this would make the Fellowship somewhat more difficult to attain would increase its value in the eyes of the profession and the public, and would, in my opinion, rather attract than discourage membership. It was distinctly so in the case of the Associateship, and I believe would prove to be the same in the higher grade. But, if this were done, it would be necessary, during the intervening period, to open the doors to the Fellowship wider than at present, so that no reputable practising architect desiring to join us should be debarred from doing so. This is a question for the members of the Institute themselves to settle, and the Council, I am sure, would be glad to hear a full expression of opinion on a subject that must affect the future welfare of the Institute. I hope that an evening may be found during the session when this matter may be fully discussed.

One event of last session, that I hope may lead to good results, was the meeting of the Presidents of the Allied Societies on the day after our annual dinner, when together with our Vice-President, Past-Presidents, and myself, we informally discussed matters of interest, amongst these being the facilities for architectural education at present available in the various centres (especially in regard to the establishment of day schools); the question of the compulsory registration of architects; the admission to Fellowship of Presidents of Allied Societies, and of members unanimously proposed by an Allied Society. No resolutions were moved, but valuable information was exchanged.

Another interesting event was the visit of Mr. C. F. McKim, of New York, to receive the Royal Gold Medal. Mr. McKim brought with him a large number of illustrations of the work of himself and his colleagues, and has left behind him, I am sure, an enhanced opinion of the progress of architecture in America at its best, and a pleasant reminder of the public spirit which is alive in that great country to ensure the beautifying and ennoblement of her cities. May I also add that Mr. McKim has left amongst those he met a very high appreciation of the man himself, his personality, and a desire to see him some day again amongst us?

I have to thank you for the encouragement you gave, by your presence in goodly numbers, to my experiment of informal "At Homes." They afforded us an opportunity for seeing for the first time a large number of the working drawings, sketches, and designs of two very distinguished architects, John Francis Bentley and William Eden Nesfield (which could only be shown in an informal way), and at the same time of bringing many professional friends together for a short time in friendly intercourse; and they have not, therefore, I hope, ended altogether in smoke! I propose to continue the experiment this session, and trust you will again contribute to their success by your presence. One evening I hope to have the drawings of another eminent architect, the late John Loughborough Pearson; and it has occurred to me that the exhibition, on another evening, of the water-colour sketches made by ourselves during our holidays might be of interest—painters, of course, being excluded on that occasion!

Another event in which this Institute has taken a keen interest is the acquisition of a permanent home by the Architectural Association. It is a striking testimony to the high

* We cannot understand how Mr. Graham came to make this remark, seeing that we had been publishing drawings by Mr. Brewer every year up to our last New Year's number in January of this year; and the last drawing which he made for us is still unpublished, and will be issued with our next New Year's number.—ED.

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appreciation in which the work done by the Architectural Association is held that the Architectural Museum buildings and their contents should have been handed over to the Association as a free gift by the unanimous wish of the subscribers to the museum, accompanied, I believe, by the full approval of all members of the profession. But the Association have a serious work in hand to adapt the premises to their present and future requirements, involving them in an outlay far beyond the means at present at their disposal. Your Council felt sure they were interpreting your desire to show the interest of the Institute in the work, and have voted a sum of 500*l.* towards the Building Fund.

The Day School so successfully started by the Association seems destined in its new premises to work almost a revolution in our architectural education (or want of it); but as I went through the spacious courts of the Ecole des Beaux Arts the other day, with their full-size models of columns and entablatures, together with examples of Renaissance and Mediæval work, I said to myself: the Architectural Association are only at the commencement of their work; they cannot stop, but must go on, and when they have completed their schools must complete and extend their museum, and we older architects must take care to see them through with it. It has been a pleasure to the Institute for many years to lend this room to the Association for their meetings, and we shall miss them when they go; but we hope often to have their presence amongst us, for we need the energy and initiative of the younger men.

In this connexion I may briefly refer to the question of our own premises, mentioned in my last address. I then ventured to express my own opinion that this question of premises, though very important, could hardly be considered an immediately pressing one; and the question of a joint building has now been solved by the gift of premises to the Association. At the same time your Council and officers have not lost sight of the matter, and it is possible they may have some proposals to lay before you in connexion with this subject later in the session.

Another event must be noted, *i.e.*, the adoption and issue of a form of conditions of contract, which has been accepted both by the Institute of Builders and ourselves. (It is some indication of the importance of this document, and the complicated nature of some of an architect's work outside his art, that this result has taken some eight years to arrive at.) This contract, while recognising the absolute authority of the architect over the workmanship and materials used on the works, has defined, as far as is possible, the relative responsibilities and duties of the client, the architect, and the contractor; and though it is, of course, too much to expect that any document could be drawn that would meet every case that may arise, we believe it will be found of great use to all engaged in building operations.

The last Council election was made the occasion of bringing before us again very prominently the question of the compulsory registration of architects, a subject which also made its appearance in the columns of the *Times* and in the list of Bills which were presented to Parliament during last Session. As stated in a circular sent round to members of the profession, it is some sixteen years since this matter was first formally brought forward and a Bill prepared; but in reality the subject was mooted by members of the Institute as long ago as 1854, and brought up in subsequent years, without, however, any action being taken. I mention these dates to show that inaction on the part of this Institute has been deliberate and intentional, and does not arise from any want of due consideration of so important a matter. For myself, I was honorary secretary of this Institute from 1889 to 1892, when the question of registration was brought most prominently forward, and thus became well acquainted with the details of the proposals and the arguments for and against them. Those arguments appear to me to remain much the same to-day, on both sides, as they were then. Then, as now, there was a considerable body of opinion in favour of the proposal, and I certainly do not wish in any way to minimise the amount of it. Then, as now, there was a considerable body of opinion strongly against it, and under these circumstances I venture to say, gentlemen, the thing for the moment is outside the realm of practical politics; for any experienced politician will tell you that Parliament would never grant compulsory powers of the sort proposed, except at the general request of the members of the profession interested, and at present there can be no doubt that the profession is sharply divided on the point.

I think I ought to say to you quite frankly, as your President, that personally I am not a supporter of the proposal at the present time, though I agree that the large body of opinion in favour of it cannot and must not be ignored. Evils there undoubtedly are, which should be removed; but, personally, I would try every possible alternative before applying such drastic remedies as those proposed by this compulsory registration, which, I believe, must be repugnant to every artist, whether a supporter of the proposal or not. I am well aware that there are a large number of architects, especially amongst those practising outside the Metropolitan area, who are in favour of compulsory registration; but I find, amongst the leaders of our profession, those whose work we admire, and on whose judgment we rely, that they are, as far as I know, almost to a man, strongly against the proposal; and I say again therefore to myself, we should hopelessly divide the profession by pressing the proposal at the present time. Consideration it is bound to have, but acceptance is hardly likely to be obtained by putting a pistol at the head of the Institute and demanding registration or our life. Remember, this proposal would not only register certain architects, but would decline to register others. A registration which gives one man a right to call himself an architect, and refuses it to another, is a very difficult and serious matter; and I must say I should be sorry myself to have to pronounce judgment, for while "A" may think "X" a good architect, "B" may not consider him an architect at all. Who, then, is to decide?

I think I clearly understand the grievance against which registration is proposed as a remedy. Put quite shortly it is this:—An architect, let us say, in a country town, is endeavouring to carry out artistic work and to uphold the honour of the profession; but he finds much of the work he considers should go to him taken up by others whom he knows are not artists in any sense of the word, and are untrammelled by any notions of honourable professional conduct, and have no right to be called architects at all. So he says let a law be passed that every man must pass a prescribed examination before he can call himself an architect, and then will the public be able to separate the sheep from the goats. I admit the grievance, and sympathise most sincerely with my friend; but I doubt the wisdom or efficacy of the proposed remedy.

I would ask this question of those who favour registration:—Is it proposed for the benefit of architecture or architects? I know they will say and believe it is for *both*. Well, then, take the benefit to architecture first, as it should be taken. It will be admitted, I think, that good architects will do just as good architecture whether they are registered or not; it will therefore make no difference whatever to our best architecture. Our friend replies: that may be so, still it will prevent an enormous amount of bad architecture being perpetrated throughout the country by incompetent men. I take leave to doubt this; I fear that when registration became compulsory, though you would register much *ability*, you would also register much *inability*. That is the danger, and I fancy our friend would find himself worse off than before. Much of our building (it cannot be called architecture), is done by speculating builders, auctioneers, etc., who very properly do not now call themselves architects, and registration would not affect them as far as I understand it. It is true they would not be able to recover their charges as architects in a Court of Law, but builders are not paid by fees, and they would not call themselves architects. They will continue their work, and be perhaps even helped, for probably some of the best amongst them would work up and pass the examination and carry on their poor buildings under the full authority and sanction of a Government diploma, and we shall see on the window blind "Estate Agent and Government Architect," and many such like combinations. Will this improve our architecture, or help our friend?

Then, again, we have generally thought a man who has the right to call himself an architect acquires the right by the buildings he has designed and whose erection he has superintended. This is the test we ask of our own Fellows, but this compulsory registration would require that he be hall-marked "Architect" by Government examination, probably before he has designed or superintended a single building. Surely this is putting the cart before the horse, and cheapening the title of architect! We admit Associates by examination, but require seven years to elapse and evidence of actual building before he becomes a Fellow. Suppose a man obtains the Government diploma, and his buildings turn out unsatisfactory, what will happen then? In fact, is it possible to decide on paper whether a man is an architect, or on the same evidence to deny him that honourable name?

Another difficulty is:—What standard of architectural excellence is to be fixed for the right of this Government diploma? It must, apparently be the same for the practitioner in a distant country district as for our larger cities. Is this fair or desirable?

Again I would ask, sympathising, as I do, all the while with this grievance: is all this ticketing and docketing compatible with our art? Protection is in the air, I know, and I am not rash enough to express any opinion upon it. But I do know that Art has always been free. Let us not be the ones to shackle it. An artist is born, not made; no questions or answers admit him into the fold, only his work. We are constantly being told that doctors and lawyers have these Government diplomas, and so ought we; and if we venture to suggest that painters, sculptors, and engineers have none and require none, we are told that has nothing to do with it. But why not? Are not painting, sculpture and engineering more nearly allied to architecture than law or medicine? I should have thought so.

Then, as regards its benefits to architects. We are told that this diploma is essential in order to make the lazy ones work; the Institute examination, they say, is not sufficient inducement, and we must therefore compel them to come in. I can only say again, I do not think so. The lazy men we should admit, for this reason, had far better remain outside. Again, as regards the benefit to architects, I would ask you to remember that if this proposal were legalised to-morrow, the engineer, the borough surveyor, and surveyor, if members of the Institution of Civil Engineers or the Surveyor's Institution, would be exempted from all restrictions, and would continue to practise architecture precisely as they do at present. The registered architect would come to be looked upon more as a luxury or as a consultant, to be called in on very important matters only, and so a large part of the work, which is already so greatly encroached upon, would finally slip away from architects altogether. It would also be necessary that all those calling themselves architects at the time of the passing of the Bill, whatever their qualifications, would receive the Government diploma, so I am afraid our friend in the country town would receive no relief in his lifetime.

The words of the memorial addressed to the Council in 1891 appear to me as true now as then:—"That a diploma of architecture would be a fallacious distinction, equally useless as a guide to the public and misleading as an object for the efforts of the student." And, further, "that no legislation can protect the public from bad design." While saying this, I would like those who are in favour of the compulsory registration of architects to believe that we are entirely in sympathy with every effort to raise the status of architecture and the architect in this country, and it is on this very account that I have ventured to discuss the matter at some length this evening. It seems to me that we must first come to some agreement amongst ourselves as to the standard to be set up, and how it is to be tested, and until this is defined registration would be useless and fallacious.

I am reminded of a story you will probably all remember, told by the late Bishop of London at one of our dinners, of an Oxford Don leaning over a wall and watching two undergraduates trying to induce a tortoise to put his head out of his shell by holding out some tempting bait, but without result; and at last the Don quietly saying to those undergraduates, "Don't you think, gentlemen, you had better try the other end?" And I would venture to say to you, gentlemen, don't you think we had better try the other end? If, as I think, there is no probability of getting what we all want—a higher appreciation of architecture by legislation at the present time—would it not

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be better to redouble our efforts to gain the same results by raising the standard of architecture amongst ourselves, by encouraging the higher education of our young men, so that in time superior attainments may make membership of this Institute a recognised qualification in the eyes of the public, as I believe is the case already, to a great extent, not only at home but in the Colonies also?

Professor Kerr, in a very interesting address on registration, said it was open to question whether, when the Institute started standing committees on art, literature, practice, and science, it should not have added a fifth on Education, and I think he was right. Education is everywhere the cry, and if this Institute is to take a more prominent part in architectural education, it will be necessary to depart, to some extent, from the position it has taken in this matter up to the present time.

Up to the present we have been satisfied, and I think rightly so, by endeavouring to arrive at and suggest a standard of architectural education by means of our examinations, leaving the preparation and education of students to others. During the last session your Council had laid before them for their consideration certain draft proposals on architectural education, drawn up by a body of well-known architects interested in this question, though not at present members of this Institute, including such well-known names as Mr. Reginald Blomfield, Professor Lethaby, Mr. Mervyn Macartney, and Mr. Halsey Ricardo. These proposals set forth the proposition that neither the system of articled pupilage, nor the training in polytechnics and art schools had proved satisfactory, and that a combination of the two systems was desirable; that architectural education at present suffers from want of organisation, and should be taken up by a representative body of architects—such as this Institute— which shall be accepted by the public and profession as authoritative. The proposals suggested a preliminary course of training in schools and workshops, and a subsequent course in the office of a practising architect, an endeavour being made to co-ordinate and bring into line existing institutions, by the adoption, in conjunction with these institutions, of a uniform system with a central body such as this Institute at the head.

This, omitting all details, which are, of course, important, gives a fair idea of the proposals, and, I believe, commended itself to the Council as not only a desirable proposal, but also an eminently practical one. The Council having ascertained that the authors of these proposals would be willing to assist the Institute in working them out, by appointing some of their number to act on a Committee, the Council have appointed an Education Committee; and amongst those outside the Institute who have accepted an invitation to join our deliberations are Sir Arthur Rücker, Principal of London University; Mr. T. G. Jackson, Treasurer of the Royal Academy; Mr. Sidney Webb, L.C.C.; Professor Perry, of the Board of Education; and Mr. Basil Champneys; while the authors of the draft proposals nominated Mr. Reginald Blomfield, Professor Lethaby, Mr. Halsey Ricardo, and Mr. Macartney.

This Committee has met and discussed the matter and, with the aid of a sub-committee, has drawn up and adopted a report which is now under the consideration of the Council, and I am not, therefore, in a position to bring it before you, though I hope to be able to do so early in the course of the present session. We are encouraged to hope that we may be enabled to obtain the co-operation of the various teaching bodies in London in the scheme, and in course of time to extend our operations to the chief cities of the kingdom. We also hope to constitute a Board of Architectural Education, bringing upon it distinguished men interested in the subject, whether members of the Institute or not, its main duties being those of an advisory board on the courses of architectural studies in the various schools and their examinations. As the scheme develops we hope to have the assistance of our Allied Societies, and to offer facilities to their members to participate in the advantages of these improved methods of education, and first and foremost we hope to unite in one great effort for the improvement of the education of our younger brethren and give them advantages we sorely miss ourselves.

I feel I must apologise for having detained you so long on purely technical points on such an occasion as this, leaving me, unfortunately, but little time to deal with architectural matters of more general interest.

The past year has seen some notable events in architectural history—the opening of Truro Cathedral, completed in the course of fifteen years, with the exception of its western towers; the selection of a design for the new cathedral of Liverpool; the opening up of a large portion of the Strand improvement by the London County Council, and the erection of an important building on a portion of its site; the adoption of a design by the same body for the new Vauxhall Bridge; and the selection of a design for the great university at Cardiff. Further progress has been made with the great Government buildings in Whitehall and elsewhere, including, it is understood, the purchase of the remainder of the Great George-street site; while the Government have completed their great post-office building at West Kensington.

A note of warning greatly affecting London has been sounded during the last few days by the advertising for sale, for building purposes, three of the principal squares in Kensington, which, if carried out, would greatly interfere with the amenities and healthfulness of the Royal borough; and if the same process were carried through London it is almost impossible to realise the havoc that would be wrought. Fancy Berkeley Square, Belgrave and Eton Squares, Bloomsbury and Gordon Squares, and many others, all covered with huge blocks of flats! This, of course, is not likely to happen at present; but as long as they are in private hands it might happen at any time. Gardens with the backs of houses looking upon them are not so vulnerable, as they are difficult of access, and the houses themselves have considerable rights over them. I was myself offered the freehold of one of these gardens as a free gift some years ago, the owner being anxious to be free of its management and maintenance. But these gardens, as I pointed out last year, do not give to London what the squares do—a sight of grass, trees, and sometimes flowers. True, they might be kept much better than they are, and be made much brighter than they are; but as they are we are grateful for them. It has been suggested that Parliament should obtain some control over these open spaces, which would not interfere with landlords' and frontagers' rights, bevond the disability of covering them with buildings; and we must earnestly hope that Parliament and the County Council will lay their heads together to this end.

It has been my good fortune to see Truro Cathedral since it was completed, and all who have done so will, I am sure, agree with me that the new nave is a noble addition to the building, and that, accepting the literal use of a previous style in which its designer was so thorough a master, the result is impressive and worthy of the great effort made by Cornishmen for its erection. The deflection of the main axis of the nave, some six feet, I believe, in a length of 300 feet, and mainly caused by the necessities of the site, lends, I cannot doubt, advantage to the general effect, both internally and externally. Externally one could wish the material had been entirely granite, but probably the cost of this would have been practically prohibitory.

Since last we met Liverpool has also decided upon a cathedral, designed on mediæval lines by a young man bearing an honoured name in the architectural world, whose success must be a matter of encouragement to young men, and demonstrates once again the immense opportunities opened to young architects of ability by the competition system. It does not come within my province at this stage to refer critically to the design; but I am sure you will join with me in wishing Mr. Gilbert Scott success in his great and responsible undertaking. The appointment of Mr. Bodley, one of the assessors, as joint architect with Mr. Scott to carry out the work is contrary to our "Suggestions," and must not be looked upon as a precedent. The circumstances were very exceptional. I understand it was done with the complete concurrence of Mr. Scott, and was only agreed to by Mr. Bodley after great pressure had been put upon him, and when it became evident that the award would otherwise be put aside.

The widening of London Bridge is in full progress, and the temporary covered footways on either side suggest what picturesque and welcome adjuncts they would be to our bridges. These, the most exposed portions of our roadways, cannot be crossed in wet and windy weather without great discomfort, which those covered ways would entirely obviate.

While on the subject of our streets, we may be permitted to wonder what is to be the end of the forest trees planted on the verge of so many of our footways, delightful when young, but now that they are up to the tops of our houses rather darkening and obstructing to the view of handsome buildings. The huge electric standards, also, now being planted down the centre of our streets, seem to require immediate attention, both as regards position, design, and the curious colour they are painted.

The visit of Mr. McKim last summer naturally brought into prominence American practice in matters connected with our art, and especially with the control exercised in America over public improvements, and he left in our library a book containing a report which deals with the improvement of Washington by laying it out on a large and comprehensive scale; I commend a study of this book to all interested—and what architect is not?—in the laying out and improvement of our great cities. This book recounts how a small body of experts were appointed to prepare and submit a general plan for the development of the entire park system of the district. This Committee, I understand, virtually put aside their large and profitable private work for nearly a year, and devoted their time and experience to the service of the nation, a sacrifice made without any pecuniary reward. The Committee consisted of two architects, Mr. Burnham and Mr. McKim, a leading sculptor, Mr. St. Gaudens, and Mr. Olmsted, whose name is identified with what is best in garden architecture in America. For the proceedings of this committee I must refer you to their report, merely stating here that a short tour to the principal capitals of Europe was made, and then a comprehensive plan for the laying out of Washington was produced and laid down on the noblest and grandest lines, fully illustrated by drawings and models. The committee describe the realisation of the scheme as a stupendous task, much greater than any one generation can hope to accomplish; but they add that the hearty and intelligent co-operation with which the plans have been received by the officers of the Government, the Committees of Congress, and the public generally, make it practically certain that the development of the national capital will be prosecuted on the lines proposed.

Since this was written I understand a large sum has been voted, which will enable a substantial start to be made.

Again, at our annual dinner I ventured to give some particulars of a Commission appointed under the Charter of New York, composed of experts, who also act without fee or advice, in all art matters in connexion with New York. This is carrying out to some extent the more complete system in existence in France, where the care of all public buildings in Paris is entrusted to (1) the Minister of Public Instruction and Fine Arts; (2) the Minister of Justice and Public Worship; (3) the Prefect of the Seine; and (4) the Prefect of Police. Each of these Ministers is advised by a Council, mainly formed of architects of distinction. The duties and constitution of these Councils are very fully set out in a book by our late secretary, William H. White, entitled "Architecture and Public Buildings," published in 1884, which contains a great deal of most interesting information on this subject. It is under this direction that Paris as we see it to-day has been produced, and the same system is followed all over France. As the author says: "None, having an understanding of these matters, can traverse Paris without feeling that the authority which initiates and controls the great works of architecture in that capital, is a real and competent authority, to which the State turns for guidance and on whose judgment the Parisians rely."

Every public building throughout France, great or small, has an architect attached to it, and, where necessary, an assistant architect, who, commencing in some humble capacity at the Council of Civil Buildings, in due time is admitted as assistant to this Board, or Council, which gives him right of presentation to a public building in course of construction, as subordinate to the architect who is carrying it out, spends his days on the works, and may rise, if he conducts himself well, to be assistant architect or joint architect to a building, and ultimately architect-in-chief. In course of time he is summoned to take the place of Councillor on one of the various Boards, and ultimately the Academy of Fine Arts, who educated him,

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will hear of him again, and finally elect him to their body. Thus the State not only assists in providing an efficient system of architectural education, but also provides itself with an efficient body of trained architects to undertake its public buildings, all working on a well-defined tradition, and producing works of great excellence, which we cannot but admire. I do not propose to compare these systems with the course adopted in this country, partly because you are all well aware what that is, and also because I am afraid the comparison could hardly be in favour of this country. Not that I mean, for a moment, that the French system in its entirety would be suitable here; it tends no doubt to a loss of individuality, which would hardly be tolerated here, for though we talk a good deal of working on traditional lines, I am not sure whether we have yet learnt the lesson of sinking our own individuality sufficiently to do so.

I have mentioned these systems in force in France and America to draw attention once more as I ventured to do last year, to the pressing need there seems to be in Great Britain, and which I think most of us feel, for some authority to whom schemes of public improvements should be submitted, not necessarily for sanction, but for consultation and advice. The work could hardly be entrusted to any single individual, but there would surely be no difficulty in finding men of skill, taste, and authority enough, and with patriotism enough, to form such a Commission as that established in New York, and on the same terms, if asked to do so by His Majesty's Government.

And how enormously such a body would strengthen the hands of the authorities carrying out great works and the architects designing them; public confidence would be increased, and schemes would be executed which are now often either dropped altogether or carried through in a half-hearted way as a compromise—a method desirable no doubt in many concerns of life, but absolutely fatal where art is concerned. The essence of a work of art is its completeness, and there compromise can find no place. I do not mean necessarily high finish or elaboration, but the expression of a complete idea; take something away from it or add something incongruous to it and it is destroyed as a work of art, and though this is understood as regards painting and sculpture (for who would venture either to add to or take away from a fine picture?), it is in no way understood or recognised as regards buildings. A house is designed to stand on a broad terrace, the terrace is cut out and surprise expressed that the house does not look as was expected. A building is arranged with certain approaches which are entirely omitted, or in matters of detail the windows are divided with bars giving scale to a building, and these are cut out.

But I have wandered from my subject, viz., the need of some authority to whom to refer our public improvement schemes. A case in point has lately arisen on the question first raised by Mr. Hamo Thorneycroft, on the alignment of the eastern end of the Strand Improvement Scheme. All who have taken part in that controversy will acknowledge the great consideration shown by the London County Council in the matter, first, by putting up boards to show the various proposals; and, secondly, by inviting representatives of your Council to meet their Committee and discuss the matter on the spot, which we did with great advantage, I believe, to both sides. But now who is to decide on the merits of the various plans? Would not the deliberate opinion of an independent body carry great weight with the public, who I believe are willing enough to pay, if assured they will thereby get a good thing? Since these words were in print the County Council has decided, and we have been officially informed that in the opinion of the Council not one of the proposals made (including that, I presume, of their own adviser) offers sufficient advantages to justify the Council in incurring the great expense which would be involved in increasing the already adequate width (100 feet) of the portion of the thoroughfare in question; and so what appeared to many brought up to consider such matters a great opportunity is lost to London. The decision may be right or may be wrong. My point is, and I speak with all respect: Are we satisfied with the competency of the tribunal to decide so important a matter?

Then, again, the solution of the Vauxhall Bridge design, which dragged on for so long, and was so happily settled as soon as collaboration between engineer and architect was established, would have been still further greatly accelerated had there been some such commission to which the matter could have been referred.

Again, there is that most thorny question of the control of the great new street from Holborn to the Strand. The Committee of the London County Council paid us the compliment of consulting us in the early stages, while the laying out of the street was under consideration, and also with regard to obtaining designs, with every intention, we fully believe, of carrying the accepted one through; but nothing has been done, so far, and this, as we firmly believe, not from want of will on the part of the Committee and officials, but from want of power, which the strong opinion of a competent authority would have supplied.

Gentlemen, I venture to think the formation of such an authority should be advocated by this Institute, in conjunction with the public bodies concerned, and that finally something might be done to place this matter on a more satisfactory basis. The interest that architects naturally take in our cities, and London in particular, is my reason for bringing it forward. The public are singularly apathetic in the matter. We have so long preached to them the beauty of old work that they have apparently taken our view, and regard modern work with comparative indifference. They resent, and no doubt in many cases rightly, the least interference with ancient buildings, but treat with unconcern the vast modern changes now taking place in our cities. The study of the past, invaluable to the student, delightful for instruction, and refreshment to all of us, must not take the place—for us at least—of the all-absorbing present and future. Last century was spent by us in research and retrospection; let us now show the result of our studies, and spend this one in action and progress. Let us see that our buildings are beautiful, as beautiful as we can make them, and with a beauty that tells of our time; not original, perhaps, but at least distinctive; let us see that they meet the present complicated requirements, that they are well placed for sun and air, cheerful, wholesome, gladdening; that we put something of ourselves into them, in order that they may give out something to others, and let us remember how great a responsibility rests upon us architects in our work. Ruskin, addressing the Architectural Association, once said: "What a peculiar importance and responsibility are attached to your work when you consider its permanence and the multitudes to whom it is addressed. We frequently are led by wise people to consider what responsibility may sometimes attach to words which yet, the chance is, will be heard by few and forgotten as soon as heard. But none of *your* words will be heard by few and none will be forgotten for five or six hundred years, if you build well. You will talk to all who pass by; . . . all those little sympathies, those freaks of fancy, those jests in stone, will occupy mind after mind of utterly countless multitudes long after you are gone; you have not, like authors, to plead for a hearing or to fear oblivion. Do but build large enough and carve boldly enough, and all the world will hear you; they cannot choose but look."

Let us, then, resolve that we will go straight forward, adding our little something to the great story of our noble art.

"Guests of the ages at to-morrow's door,
Why shrink we? The long track behind us lies,
The lamps gle m, and the music throbs before,
Bidding us enter; and I count him wise
Who loves so well man's noble memories;
He needs must love man's nobler hopes yet more."

The Right Hon. Lord Windsor, P.C., First Commissioner of Works, in proposing a vote of thanks to the President for what was really a remarkable address, said he would like to say how deeply he appreciated the honour they had done him in nominating him as an Honorary Associate of the Institute. He was greatly honoured by this proposal. He would have hesitated very long before saying anything that evening had the President dealt with all the subjects of his address from a technical point of view. There were certain subjects dealt with which he (the speaker) would not think of expressing an opinion on, but there were other matters which did not affect the Institute of Architects alone; they affected everyone all over the country who had any share in the architectural work of the great towns and cities. One of the most important matters referred to by the President was as to the advantage, the importance, of having some recognised body of competent persons who could be referred to, and who could advise on the selection of designs for the great architectural buildings in this country. The President had given some instances of the proceedings in other countries, and he (the speaker) ventured to think that the instance of the United States was of very great practical importance. In the States they had started on these lines, and had proved that they need not apply to the Treasury for the expenditure of any money in obtaining the advice they seek—that the foremost artists and architects of the country gladly gave up their time and ability to help the State in this great work. He did not doubt for one moment that the artists of this country, who were foremost in all branches of art, would be found willing to take up this honourable work—and they had the President's assurance that this was so. Very few of them could doubt that London—he took London because it was the metropolis of the Kingdom—had suffered in the past, and suffered terribly, from the want of a broad view of the manner in which their chief architectural works should be designed in order to make the city a magnificent one. He would take a part of London which was directly under the jurisdiction of the Government, *i.e.*, Whitehall. They must all feel that if the design and the plan for dealing with Whitehall had, from the commencement of the rebuilding of the public offices there, been laid out on broad lines with a really fine scheme, that a most magnificent approach to the Houses of Parliament could have been made. The blame was not in any way due to the architects, but to those who had instructed them. The architects had built fine buildings, but they had been permitted to consider only the actual work upon which they were engaged. There was no particular reference to any existing buildings, and certainly no reference whatever to anything which might be designed in the future. But though they might have lost many great opportunities, it was never too late to mend, and he wished to express his absolute sympathy and concurrence with the words of the President when he hoped that some such body as he had indicated—some such advisory body of competent persons—should have their voice in the laying out on a large scale of the streets and buildings of London. He would go one step further. He had no right to say anything beyond expressing his own personal concurrence with the President's views, but he could say this, *i.e.*, if the views which the President had expressed were, as he believed they were, the opinion of the Council of the Institute, he would gladly undertake to lay them before His Majesty's Government, and whether it might be possible for anything to be done or not for some time, those views should be placed before the Government, and no time should be lost in having this expression of opinion fully considered. He might say a word or two about an important building with which he was intimately connected, *i.e.*, the new University College building for South Wales and Monmouthshire. He was glad to have an opportunity of saying that they were grateful to the four architects who had sent in designs, but the pity of it was that the authorities were only able to build a portion of one of the designs. What he felt when he looked at those designs was that they should all be erected. One had been selected, but at present there was money enough to build only a part of it. He trusted that the money would soon be forthcoming for a much larger portion, if not the whole. The President had made some reference to the trees which had been planted in the streets of London, which raised rather an important question to London people. What was to be the future of forest trees growing in the streets? It seemed to him that we were too much afraid of the pruning knife, and that trees in towns and cities should be made entirely subservient to the architectural lines. Forest trees with spreading branches were absolutely suitable in open parks and gardens, but they did not seem to be suitable as the surroundings of buildings. He knew there was the great difficulty to be faced in London, *i.e.*, the inevitable smoke. Hardly any other tree, although they might have grown well when planted some hundred years ago, would stand the London smoke like the plane tree, and that was not a good tree to deal with in pruning. Still, we had the plane tree, and we had to deal with it to make a beautiful green support to the architectural buildings which existed. He had seen an anxious letter in the newspapers that the

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Office of Works and the Government were going to make a new road right across the Green Park, which, it was said, would destroy the whole beauty of the Park. So far as he knew there was no foundation whatever for that statement. Such a scheme would be a very important one, and it would not be carried out until it had been sufficiently considered by Parliament and the public generally. Such a thing would not be done in a haphazard way, and there was no intention to do anything of the kind—certainly no intention to do anything of that kind in connexion with the Queen's Memorial.

Mr. H. T. Hare, in seconding the vote of thanks, said that the address of the President of the Institute was always looked forward to with cheerful anticipation for a *résumé* of the events which had occurred during the past year. In the present instance, their President had the happy faculty of crystalising and expressing the thoughts which were in other minds as well as in his own, and expressing them in a manner which was concise, clear, and instructive. The ground covered by the address was considerable, and he did not propose to follow the whole of the points dealt with. The question of registration had been dealt with in a more exhaustive manner than had been the case in previous addresses, and the subject was one which had been, and would be for some time, a burning one amongst architects. He did not propose to follow the arguments which had been used against the Bill at present before Parliament, for that would not be the place or occasion; but there could be no doubt that the state of affairs which had given rise to the promulgation of such a Bill was a lamentable one, and though they might fail to sympathise with the proposed means of reform, one could not fail to have sympathy with the objects the promulgators of the Bill had in view. The most important point touched on in the address was as to the control of public buildings, for it was one of the largest questions which concerned them as members of the architectural profession, and it was one of the most serious questions in regard to the future improvement of London and large cities. It was very gratifying to all of them to have heard Lord Windsor's remarks, and especially his acceptance of the views expressed by the President. It was a matter of congratulation to the Institute, and to the country at large, that such a man as Lord Windsor, with large and sympathetic ideas, should be the first Commissioner of Works. That some control of design must and would be necessitated in the future—he hoped in the near future—must be evident to anyone who looked around, and who compared the state of this country with that of other countries on the Continent and in America. No one could fail, if they noticed the way in which public improvements were carried out in other countries, to have a certain amount of shame when they saw how such things were done in this country. The reason usually given for the small and mean way in which our public improvements were carried out was the need for economy, and the cheapest course was generally adopted. This was a most narrow-minded, and the worst, course to pursue. The scheme which was controlled by the largest idea and governed on the broadest lines was the one which in the long run would prove to be the most remunerative. He thought that this was sufficiently evident from the great schemes for improvement which had been carried out in Paris during the last generation or two. He believed that almost all those schemes had been remunerative in the narrowest monetary sense, and much more so in the general advantage they had been to the city. As President of the Architectural Association, he wished to make a few remarks arising out of the President's address. Mr. Webb was one of the most honoured of the past-Presidents of the Association, and it was highly gratifying to him, the present President of the Association, to hear the very sympathetic way in which Mr. Webb had referred to the work of the Association, and to what had been referred to as the great departure at present going on in the way of removing the premises of the Association to Great Tufton-street. The Institute and the Association had been for many years more or less in touch with one another, and the sympathy and support which the Association had received from the Institute had been gradually increasing. The association of the two bodies had become more and more intimate. For some years the Association had had the privilege of using that room for meetings, and they appreciated that greatly, and in the present removal, etc., they had had the advantage of the advice of the President and Council of the Institute, and all this had been crowned by a most generous donation to the Building Fund. The work the Association was carrying out was one which must appeal to all architects; it was the education of the next generation of architects. Everyone must have felt that the education of architects under the pupilage system was not all that could be desired, and much improvement was necessary. This the Association was endeavouring to deal with by a system of day school work preparatory to pupilage. The course had been in existence two years, and the result had been most gratifying. What it would lead to in the future it was impossible to say, but he looked forward to the time when this work would extend to something much larger. It might even supersede the system of pupilage; but that was looking too far ahead, and one had to go step by step. He believed the system in America was almost entirely a collegiate one. The step the Association had taken must be entirely for the good of the profession, and must command the sympathy and support of all interested in the arts.

Mr. Reginald Blomfield said he was honoured in being asked to say a few words that evening. He could not agree with Mr. Hare that the most important matter dealt with by the President in his exceedingly interesting address—admirable in every respect—was the control of public buildings, important as it was. The most important question before them was the education of the young architect. That was far more important. Architects who were carrying on their daily work felt that, though they did the best they could for architectural students, there was much more to be done than had been done so far. The President had sketched a general programme that was now before the Council, and in regard to which some men outside the ranks of the Institute had been glad to co-operate to the best of their ability. The present position of architectural education was far from satisfactory. The system of pupilage to which they were all accustomed had been going on for many years, and it had some excellent points, but half of it was wasted. A student, when he went into an office, did not know how to take advantage of his opportunities or how to proceed with his studies. He remembered when he went into his uncle's office, at the age of twenty-three, that his uncle was surprised that he did not know what a mitre was, but there was no reason why he should have known that. A student ought, when he entered an architect's office, to know what he had to learn. That was the point, and it was in that respect that a remedy had to be found. The idea was that the defects of the present system could be remedied by the introductory training to be obtained in a well-equipped school. In that respect the Architectural Association had done wonders. He was never a member of the Association, but he had the highest admiration for it. For years it had pursued its way, through good report and evil report, by its own resources, and it had done admirable work and was stronger than ever. It had taken fresh premises, and it was to be hoped that it would be the nucleus of a centre of training; but it was working on its own resources, and educational reformers would like to see it reinforced. The Association required more equipment than could ever be provided by an individual body working with such resources as the Association possessed. Its system of architectural education needed development and organisation to a point it had not yet reached. They would like to see the school system as at present administered by the Association carried to a further point, and supplemented by a complete system of training in what was roughly called the workshop but in modern technical training was called the laboratory. The laboratory was not a place for the manufacture of chemicals, but a place where a student could come into contact with the actual facts with which he would have to deal in after life. That was to say, when the student designed a building he would have some idea of what timber and stone were. Some students did not seem to know. There were not many opportunities of learning such things in the master's office, and the student failed to grasp the importance and meaning of things. Now, they wanted students to visualise the things he was brought into contact with. Again, the laboratory should give opportunities for research in construction. That was a point in the study of architecture which seemed to have been neglected since the days of Wren. There had been many excellent architects since the days of Wren, but he questioned whether they had studied construction scientifically, as they should. They had been too much occupied by the particular fashions of the times in which they lived. It was time to get out of this ruck, and though the programme before them was a large one, it was not revolutionary. The idea was to develop and co-ordinate the existing system, and the programme was one which should appeal to all architects. The senior members of the profession who were past masters of the art ought to put their shoulders to the wheel, and to members of the Institute he would particularly appeal. They had in their President a man of rare sagacity and tact, and he was more likely than anyone to lead to a successful issue the scheme he had referred to. He thought it was the duty of all architects to co-operate in the scheme and to give any programme put before them a candid and impartial hearing.

The vote of thanks having been heartily agreed to,

The President briefly replied. Thanks were due to the visitors that evening, and especially to Lord Windsor for the sympathetic way in which he had entered into his (Mr. Webb's) proposals. There were many painters and architects of distinction there that evening, and had there been time he would have asked some of them to have joined in the discussion.

The President announced that the next meeting will be held on November 16, when M. Homolle, Director of the French School at Athens, will read a paper on the Monuments of Ionian art at Delphi.

The meeting then terminated.

THE ORDER IN MODERN ARCHITECTURE.*

A VERY able American critic, Mr. Russell Sturgis, made a plea some time ago in *Scribner's Magazine* in favour of the Classic order for town hall designs. He said that while on the one side the architect might admire a new and original treatment of such a building, he could quite excuse a committee for wishing that the building should, to their eyes and those of the townsfolk, "look like a town hall." A columnar order might be illogical, it might be a mere following of example and tradition, but in modern times it had come to be traditionally associated with a town hall (a sentiment which must, I am sure, appeal to Birmingham people), and it was quite natural and pardonable, said Mr. Sturgis, that the clients should wish this tradition adhered to, and that they should not be put off with a town hall without an order, while the neighbouring towns rejoiced in columnar dignity. It should be added that in the United States the prejudice in favour of a classic order for a town hall or a Government building appears to be still as strong and as general as it was in England more than half a century back. Latterly, we have rather gravitated towards the picturesque town hall; but the recent French sympathies of the Americans in architecture have given almost a renewed impulse to their love of the classic order, and few important American designs of recent date are without it.

That is the popular view in regard to the Classic order. Except for churches, in which for the most part the popular mind, in this country at least, demands Gothic, and thinks that a church which is not Gothic "does not look like a church"—with this exception it will be found that the public connects the Classic order with the idea of serious architecture on a large scale, and especially for a public or official building. This, of course, is mere association and habit, for the dear public does not concern itself with reasons for its architectural taste. It is our business to apply thought and reason to the subject, and to consider how much truth, if any, is to be found in the popular idea, or to what better purpose it may be turned.

Some very clever and enthusiastic Englishmen of the younger generation, who believe in a totally new revival of architecture, regard the columnar order as Artemus Ward regarded the Red Indian, as "poison wherever met with." They declare that nothing but hunting down and killing it will leave any chance for

* A paper read before the Birmingham Architectural Association, on October 30, by Mr. H. Heathcote Statham, F.R.I.B.A.

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a true and genuine modern architecture to grow and develop. The Classic order, in their eyes, is merely a conventional straight-jacket under which the free life and the art of modern architecture is stifled and killed. As far as I know, this sect is a purely insular one, having no votaries in any other country. Whether there is any truth in its tenets depends very much on what you want to make of architecture in the future—whether you wish it to be a mere building craft or a form of intellectual expression, a point which will be returned to at the close of this dissertation. It also depends on a secondary question—what value are we to attach to tradition in architecture? It can hardly be denied that the whole history of architecture down to the present day has been a history of tradition. Even the Renaissance in Italy and the Gothic revival in England, though they broke into the tradition of the moment, did so in order to hark back to an older tradition. To say that we are to break with tradition altogether, and start on a new career, owing nothing to our predecessors, is to propose something which at all events has never before been proposed or attempted in the history of architecture; and there is the question, not only whether it is wise to attempt, but whether it is even possible to the human mind to carry out, such a programme; or perhaps one might say, such a negation of programme.

The mere imitative adoption of one of the orders, Greek or Vitruvian, as part of the exterior expression of a building, is no doubt a very academical way of treating architectural design; there is no life in that. But the general form of column and capital, which is the most important element in the order, has almost become an inevitable part of architecture. The upright stem or shaft, with some kind of decorative treatment at its apex, is found in the very earliest architecture that we know of. Had it not gone further than Egypt, we might have escaped it, for the Egyptian column, in any of its forms, has no convincing æsthetic completeness. It was the Greek who imposed it on the world, by fashioning it to such perfection; the Roman who distributed it, a little spoiled of its refinement, but still not materially altered, over a great part of the face of the earth. It may be said to have become an integral part of architectural expression. The gothic shaft and cap is only another form of the same thing. We can hardly think of a feature for carrying vertical weight, but in some form of the column and capital. Those who want a variation may try the Mycenæan and Cretan form of column, enlarging upwards instead of diminishing, with which Mr. Evans's discoveries at Knossos have recently familiarised us; but I do not think the result would be very happy, except on a small scale, and as a decorative feature. In that sense there is, of course, something like it in Elizabethan architecture.

The more debateable ground in regard to the classic order is that its main forms have become so rooted in our minds that they have been largely used in architecture as a means of expression on the face of the wall, in the shape of pilasters and half columns, crowned with the face form of the entablature, when the whole is constructively but a wall, and there is no question of weight-carrying columns bridged over by architraves. Many architects and critics of the modern-mediæval school have poured vials of contempt upon this practice; and as to many instances with reason. When pilasters or half columns are spaced along a front in a mechanical matter, merely because the architect wanted to put something, and did not know what else to put, that is a poor and superficial way of designing, and it may be added that it is found in just as crude a form in some buildings of the Italian Renaissance as in any modern work; one has only to recall the Rucellai Palace at Florence, with its mechanically-repeated pilasters in each story. It depends on whether or not it is done with a distinct aim at a certain expression and balance of design. Those who think that this mural use of the order is only a special vice of Renaissance and of modern architecture may be reminded that the Greeks themselves employed it in their best period on one face of the Erechtheion, in order to harmonise that portion of the building with the adjacent portico; and also, to the eye, in that little gem of Greek architecture, the Monument of Lysicrates; though it is curious that in this case the apparent half columns are worked completely in the round, the wall masonry being carried round them with a semi-circular joint, a construction which seems so unmasonic as to suggest a doubt whether the colonnade was not originally designed as an open one, and built in as an after-thought. It is true that the columns are only fluted on the outer half, but on the large temples we know that the fluting was done after the columns were *in situ*, and it may have been so here also. At all events, we see that the Greeks did not despise the wall colonnade as a means of expression, and those who consider that Gothic at least is clear of this kind of face design must have forgotten the numerous wall arcades, which are just the same kind of resource in another form, and also the fact that the shafts in arcade piers are in many cases merely a means of expression, and that the cap and arch-mouldings over them would stand independently of the shafts; so that it is hardly fair to visit this sin, if it be one, solely on the heads of Renaissance and modern architects.

We may consider the classic order in three different lights: In its structural employment by the Greeks, and to a certain extent by the Romans; in its decorative use by Renaissance and modern architects; and in its possible further modification in modern use. In the Greek colonnaded temples the order was the expression of actual structure; the colonnade and entablature were, practically, the architecture, as far as the exterior was concerned; the cella was screened away behind them, and hardly affected the design except as a kind of background; the columns were real weight-bearing features, carrying a superstructure which really depended on them for its stability. The æsthetic problem, considered as a whole, was therefore a very simple one. It was only the expression of the simplest of structures, a block laid from one support to another, with no lateral pressure. Its complication and refinement lay in the design and the variation of the details. In this respect it presents the most refined and intellectual form of architectural design in existence, that in which every detail is designed and proportioned in relation to the whole. This is what renders the study of the orders—the Greek ones especially—so valuable in an educational sense. It fosters, as I think no other study does, the perception of proportion and scale in architectural design. It is for this reason that we—rightly—set beginners in architecture to draw and study the orders, and that the French Ecole (which perhaps carries it a little too far) exacts a most intimate and learned knowledge of them; and it is because engineers (in this country) do not go through any such training that they mostly have not a notion what "scale" in architecture means. Whether this is any reason for reproducing the order in structural form in modern buildings, or whether there are any occasions on which it is suitable to do so, is a point we will recur to afterwards.

The essential difference between the way in which the orders were used in the structural columnar buildings of the Greeks and their use by the Renaissance and in many cases by the Roman architects, was never better indicated than in an expression used by Mr. Lethaby in a notable lecture which he delivered in London some years ago. Speaking of Wren, he said: "It was Wren's peculiar merit that he saw exactly what could be done with the Renaissance box of bricks." Mr. Lethaby is one of the reactionary spirits, who want to hunt down the orders, and precedent, and tradition, and all that, and I do not agree with his views; but he certainly has a way of putting things, and I do not think I ever heard a neater critical generalisation than that as to a great deal of Renaissance work, and much of Wren's in particular. The Renaissance architects took the whole thing to pieces, and put the pieces together again as their fancy suggested. Much of it was charming, but when you come to think of it the resemblance to the child's box of bricks is undeniable. Look at Wren's various steeples, for instance—many of them admirable in outline and character; but how much they suggest the work of a builder who has so many columns of one size, so many a little smaller, so many finials in the shape of vases, etc., to play with, and proceeds to fit them together in the most elegant and effective manner. Take some of the characteristic buildings of the Italian Renaissance, and see what an impression they give of pieces of different sizes and shapes put together to make a design.

The manner in which the order was used on the majority of the Roman triumphal arches gives, one must admit, the excuse of bad example to the Renaissance architects. For in these the column was planted on in front of the main plane of the erection, in such a manner that its whole function as a supporter of the entablature was gone, and the entablature had to be broken out and brought forward above the column in order to give the column something to do. After that, there came the problem of giving the entablature something to do, since there was a large square space left on the top of it which was useless. So, then, to bring this into use, a statue was put on the space; but the bulk of the entablature was far too great for the statue, and the column far too massive a feature to be reasonably required for supporting it, so that we have the absurdity of a very large architectural feature constructed in order to carry something quite disproportionately small and light. The Renaissance architects did not, indeed, erect triumphal arches on this model, though they imitated the fallacy of breaking the entablature; but the ill-effect of the example was manifest when France tried to become Roman under Napoleon, when Percier and Fontaine erected the triumphal arch of the Carrousel as a kind of free copy of the arch of Septimius Severus, and you see there the absurd effect of these small statues acting as finials over the columns and entablature. But apart from triumphal arches, which are seldom erected now (because they are useless and built only for beauty, and we are not so silly in these days as to build anything purely for beauty)—apart from this, the trick of breaking the entablature over the column, first practised by the Romans, has been the parent of a whole host of absurdities in modern treatment of Classic materials. The greatest absurdity of all, of course, is when columns are used to carry an arcade, interposing a square block of entablature between the capital and the springing of the arch; an absurdity of which Wren and his compeers and immediate successors became so sadly enamoured, quite overlooking the fact that the arch in such a case takes the place of the entablature, and that to introduce both is to mingle two opposite principles of structure. We have pretty well got it into our heads now that this is a mistake, and I believe it is no longer practised—at least, I do not remember any recent instances. But apart from the arcade, every instance of treating the entablature, even on the face of a building, by breaking it out over the capital, is essentially an absurdity, since it contradicts the very meaning and origin of the entablature, which was a horizontal mass resting on the tops of the columns; and here, just where it ought to bed upon the capital, and to break joint over the centre line of the column, you introduce a projecting mass which destroys all the meaning of the structural relation between column and entablature, and gives the impression that the architrave line is discontinued just where it ought not to be. I am quite aware that this is done in many otherwise good modern buildings by good architects; I am aware that it is done in Inigo Jones's banqueting-house. But I maintain that it is an essential absurdity, and that a man who cannot make the materials of the order serve his purpose without such misuse of them, had better let them alone. The Romans themselves set a better example in some of their triumphal arches. If you compare the Carrousel arch with the arch of Trajan, it is obvious how much more truly architectural is the treatment here, where, instead of merely breaking the entablature in a slice over the columns, the whole centre portion is brought forward, and the entablature retains its proper meaning and appearance as a horizontal block resting on the columns and on the central console. While we are on the subject of arches of this kind, it is worth noticing the new and original treatment given to the Roman idea in the arch designed by Blondel, in 1672, as the Porte St. Denis, at Paris. Here, to all appearance, the order is discarded, but it is not exactly so in reality. The traditional features of architrave, frieze, and cornice, are retained as the crown of the structure, the mass of wall itself taking the place of the ornamental column; and instead of the column, enrichment is obtained by a perfectly suitable feature, the sculptured bas-relief of trophies, which does not, like the columns of the Romans, pretend to be a structural feature, but is purely and frankly decorative. The design of this arch is a very good example of modern application of Classic materials, and it has had a good deal of influence on modern French architecture, the

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idea of the bas-relief pyramid or stele, with its sculpture, being a favourite one with the Ecole des Beaux Arts school of architects.

The use of the classic cornice without the column, and with the wall taking the place and the proportion of the column, is one form of the adaptation of the classic order to modern use, which, illustrated in such buildings as the Farnese Palace, was imitated by Barry in the Reform Club, and by others in similar buildings. The idea was illustrated in buildings which, like the Riccardi and Strozzi Palaces, though they belong by date to the early Renaissance, are far more mediæval than Renaissance in feeling. And there is one of the best known structures in the world, the castle of St. Angelo, which is a curious illustration of this treatment being forced by mediæval hands upon what was once a classic structure, for there can be no doubt that what Hadrian originally built there was a Tholos—a circular building with a columnar order round it, which was cased up in mediæval times, to transform it into a castle, the machicolation probably occupying the line of the original cornice. Byron, who, of course, knew nothing of architecture, accused Hadrian of having erected a mass of masonry as featureless as the pyramids, in a kind of imitation of them.

"Imperial mimic of old Egypt's piles,
Colossal copyist of deformity"

he called him—quite inexcusably. It was probably a beautiful piece of classic architecture originally.

But this is a digression. To come back to the early Renaissance, buildings like the Strozzi and Riccardi Palaces preach eloquently of one thing—the power and grandeur of a great massive cornice. Our classic cornices of to-day are mostly such feeble things. According to a large-scale measured section in the Institute of Architects' library, the Strozzi cornice actually projects more than nine feet from the wall face. The projection is, of course, a great deal more than the thickness of the wall. When you see it in section, this looks rather alarming, even un-architectural. How it is rendered secure I do not know, but as it has remained *in statu quo* for over five centuries we may say that it is secure. I do not approve, however, of a cornice projecting more than the thickness of the wall, but here is where building by contract comes in. Contract walls run thin. But our modern cornices are feeble concerns in comparison. Even if we wish to make them bold and gigantic, a paternal building Act steps in. According to the London Building Act, "no cornice shall project more than 2 ft. 6 in. over the public way." When we were discussing the London Building Act at the Institute in 1894, I prepared a little diagram for edification on this point, showing the actual section of the Strozzi cornice, and the section it would assume under the "2 ft. 6 in. projection rule" of the London Building Act. The contrast was admitted to be instructive, though the argument had no practical result. However, the lesson is to try bold and large effects, and not be too timid. And in respect of the cornice there is this alternative: if we cannot project so much as we would wish, we may try depth and richness, instead of great projection, adopting a different kind of outline in our cornice. I have no example to give, but I think something might be done in this way to get beyond the small and feeble effect of our modern cornices.

From cases in which the whole wall represents the columnar proportion of the order it is a natural step to those in which the order is used in the whole height of the building. There are two ways of introducing the order: To proportion it to the whole building, or to employ small orders in different stories. The difficulty with the former almost always is, in modern buildings, that we have to divide the interspaces into more than one story. Then the critic of perfection says, this is an architectural falsity—a sham. Well, that depends a little on how it is done. San Gallo made a model for St. Peter's in the storied-order fashion, small orders one over the other. When Michelangelo was looking at it with someone else, he said, "Ah! you will find plenty of pasture there," and he was supposed to mean a compliment. But when he was twitted about this afterwards, he replied, "When I said pasture I meant for ox-headed people." He wanted a big order, and carried it out at St. Peter's. He has been blamed for this as reducing the scale of the building by his gigantic order. But I am not sure that the fault lies exactly there. The scale of St. Peter's is reduced internally by having too few and too large bays, so that the eye does not get a measure of the length, and the exterior mistake is in the two stories of comparatively small windows to a building which was one great cell. In short, the mistake is not in the columns so much as in what is between them. A colossal colonnade is a grand object. Just look at those stupendous fragments of the Temple of Diana, in the British Museum, which almost overawe one: "There were giants in the earth in those days." What must have been the effect of that entrance portico when complete? The Ephesians might well have been irritated with St. Paul for not appreciating it. Take the interior of the Pantheon, one of the grandest buildings in the world, in spite of its defects. Would it not have been still grander if, instead of this wall broken up into two stories, and the small columns here and there as framework to niches, there had been one great order filling the whole height to the springing of the dome, with a cornice in proportion? In the Pantheon at Paris—a far less grand interior no doubt—Soufflot recognised this, and carried the dome and the barrel vaults on one large order, and a noble interior it makes. I always try to make time for a few minutes in it when in Paris, just as a sort of refreshment. It is so spacious, so calm, such a unity about it. And here the entablature is turned to its proper account as a lintel on which to base the vaults, while leaving an open colonnade below. It is used in somewhat the same principle in Assisi Cathedral, where the entablature goes over the small arches and forms the impost to the larger ones. The Medici Chapel, at Florence, is a simpler example, in which the piers supporting the arch are not so much pilasters as a projecting portion of the wall, taking the place of the column. Neither of these, however, are at all equal to the Paris Pantheon in grace and finish of architectural treatment, taking the architectural design as a whole.

The foregoing are cases in which the height of the order really represents the height of the main division of the building, from floor to impost. They are in no sense illogical. The question is different when we come to the employment of a large order on the exterior of a building when the building itself is in two or more stories. The question of more than two stories, however, may be neglected, for two vertical stories between the order may be taken to be the utmost that can be allowed, admitting that it is justifiable to employ a large order at all as a face decoration. Is it admissible? The only defence of it lies in the fact, on which some stress has already purposely been laid, that the column and entablature, and the column especially, have become such a part of the architectural thought and habit of mankind, so interwoven with our associations of architectural dignity, that we use the form to impart to a block of building an architectural dignity and expression which the mere wall with openings in it would not have. It may be done well or it may be done ill. Take the older wing of the Louvre designed by Du Cerceau. There we have a great set of pilasters which are designed and spaced so as to divide the façade into a set of compartments, alternately treated with a different finish. Fergusson, while giving it as an example of the period, speaks of it with an angry contempt which I do not think is at all justified. I think he is right in one point—that it was a mistake to push the upper windows through the architrave; a treatment which gives it a more conventional appearance than it would otherwise have had. The pilasters are not constructional, but they are traditional, and impart a traditional dignity; and the manner in which they are grouped seems to me to remove this from the mere "box of bricks" treatment; there is a certain thought and consideration about it. It is not logical: but art does not live by logic alone, and I confess that to me it seems a fine and dignified facade, to which the order imparts a largeness and breadth which it would not otherwise have had. I think it would have acquired more consistency and effect, however, if the windows in the centre of each group had been treated differently from those between the groups. The design, however, shows that it is possible to treat two stories of windows between an order, without bad effect, only they must be distinctly in a different architectural plane from the order. When you come to more than two tiers of windows, the discrepancy becomes too great between the scale of the order and the scale of the windows.

Greenwich Hospital is an example of a long low façade which gains very much in effect from the river by the introduction of the columns; you can see how heavy it would look if they were removed; though, with deference to the shade of Wren, I think it would have looked still better had the order been rather higher and the attic smaller. The so-called attic is often the most conventional and least admirable feature of modern classic buildings. Otherwise, this façade shows that the introduction of the order is a means of architectural effect and of supplying the element of contrast. You may gain in æsthetic propriety by removing it, but you lose in picturesque effect. Which is worth most? That is one of the questions I will propose to you. There is a more modern English building which is really a one-story one, in which the order is used as a means of expression and contrast with almost absolute propriety; I mean the Bank of England. This was a building which was to be enclosed like a fortress in its outer walls, with no window openings in them. To relieve the monotony of the blank wall, portions of it are set back and decorated with a colonnade, thus importing the traditional architectural element into it. It certainly looks well. We might no doubt have said to Soane—"Why not design a column of your own, instead of taking an order ready made?" There, again, you have the question—Do you gain more than you lose by originality, supposing you to adopt the columnar form at all? On one side is a new interest, on the other side the dignity and association of tradition. Which is best? Another question for you.

The Parliament Houses of Berlin is an example of a building in which the order has been used on a large scale in a manner which is worth note. The angle pavilion, with its immense useless attic, is very bad; but there is something in the way the columns are introduced in the lower portion of the façade which seems to connect them more intimately than usual with the design. They are half-round columns, and, with the masonry joints running through them and the string course dying into them, they have not the look of being planted on which we so often see. They get away from the "box of bricks" idea; they are half-round projections assuming the treatment of an order. Now, if you want to relieve the surface and give more expression to a wall, it is possible to carry that idea further; to have projections which, without being exactly columns, are treated somewhat on the same principle, with a decorative finish at the top, taking the place of the capital and yet not a capital. I tried that once in a competition design, and succeeded, at all events, in puzzling my critic. The competition was reviewed for the *Builder* by a man who was not allowed to know that the editor was in it. He mentioned the style of most of the designs, but when he came to my own he wrote, "We are utterly at a loss to specify the style of this very original design." That was what he said, at any rate, and whether the originality was true or not, it was at all events a satisfaction to feel that one had evaded being labelled and pigeon-holed. I would suggest that there is a path open in that direction—details suggested by the Classic order, but used or introduced in a different fashion. Only, do not go into competitions with that element. Competition committees and assessors cling to orthodox design. It is safer.

The modern employment of a great columnar order absolutely free, that is to say, really carrying the superstructure as in a Greek peristylar temple, is at all events not open to the charge of the applied order, of being a mere piece of decoration; and if well carried out it looks as fine now as it did twenty-four centuries ago. But there are few modern occasions in which it is practically suitable. The Paris Bourse, perhaps, may be considered one of them, for in an Exchange where a great deal of business is done in a peripatetic manner the open colonnade may have a real and very agreeable utility in fine weather. I see no reason why the Madeleine might not have been an equal success. I do not see why the columned temple may not be perfectly suited for a modern Christian place of worship, with a grand effect both externally and internally. But the Madeleine is ruined by a gimcrack interior quite out of keeping with the exterior: and, of course, it may be admitted that the exterior is too merely imitative. The same may be said of your own town hall, which, nevertheless, I cannot help admiring as an architectural spectacle, though I am afraid that,

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like St. George's Hall at Liverpool, it illustrates the fact that the columned temple form of building does not lend itself well to the requirements of convenience of planning for a public building. There is another celebrated building in which the exterior colonnades have been severely criticised as being merely an empty show and a loss of space, viz., the British Museum. A loss of space they certainly are in a sense; yet one cannot help thinking that, at the time the building was erected, it was rather a fine thought of the founders of the Museum that they should spare no expense to have a dignified frontispiece to what they evidently foresaw was to be a great institution. The question is of practical import at the present moment, as new ground has been purchased on the north side, and the Museum is eventually to be more than doubled in extent, and the plan at present proposed is to repeat the southern façade, colonnades and all, towards the north, for the sake of architectural grandeur and unity. I received a letter from a distinguished amateur a few days ago, asking me to join in opposing this, as an architectural mistake in the practical sense. On the other hand, an eminent painter of architectural subjects, who for several years lived in chambers opposite to the British Museum, told me that those colonnades "were a daily joy to him." That is certainly a point of view to be considered, as well as that of architectural unity. Which view is right? I can hardly make up my mind; I shall be obliged if you can help me.

When smaller orders are introduced, each confined to one story, the true sense of their introduction is to use them so as to produce emphasis at special points, not to repeat them mechanically all over the surface. The one good point in the exterior of the Versailles Palace, the one thing that strikes you besides its size, is the emphasis given to the two wings that project into the vast expanse of uneven paving, like two headlands into the sea, by the boldly treated colonnade and pediment at the end of each. In such a front as that of Saint Sulpice, at Paris, we see the mistake of want of concentration of the order. The colonnades in the centre portion, where there is a void and where the columns are really acting as supports, would have far more effect if the side towers were left plain in contrast, instead of having a face order planted on them. On the other hand, Gabriel's fine façade at the top of the Place de la Concorde, with its rusticated arched ground story and the order above forming the loggia, is a really charming example of the true architectural use of a colonnade for expression and contrast.

One exceptional building with storied orders is the Luxembourg—exceptional in this way, that while each story contains its engaged columns one over the other, the hardness and littleness which might have resulted from this is quite carried off by the varied treatment of the rustication which is carried all over the building, and gives a remarkable breadth of effect to what would otherwise be a rather tame design. Fergusson, in one of his captious criticisms, complains of this rustication; but the fact is, it is just the rustication which saves the building, giving it texture and the look of masonry instead of cabinet-work.

Baltard's fine church of St. Augustine, in the Boulevard Malesherbes, is one I would draw attention to in reference to the clever and effective treatment of the internal order. The church stands at the junction of two streets at an acute angle, and the outer walls follow the line of the streets, the plan expanding as you approach the choir. There is a colonnade on each side of the nave, which commences with an engaged pilaster on the wall; then another a little more projecting; then they get free of the wall and form an open colonnade, the outer aisle walls slanting away in the rear of it. It is a fine, and as far as I remember, a unique interior effect.

If it be admitted, as already suggested, that we cannot well get away from the columnar order in architecture—that it is a form which has imprinted itself on the human mind as an element of architectural conception—is it not possible to put new life into it by variations of treatment in detail? The decorative capital seems in the first place to afford an opportunity for this; an opportunity surely much neglected. The late Mr. Richard Hunt, the eminent American architect, on seeing a student attempting a variation on the Corinthian capital, said, "Do you think you can make a better capital than the Jupiter Stator?" and on being answered in the negative, said, "Then why not stick to it?" or words to that effect; and this is very much the feeling of the French school and of the Americans who follow its lead. Practically, it seems to be the feeling also in England. We see accepted forms of Classic capital imitated over and over again in every detail; just taken out of the books. I one day received an indignant letter to tell me that the late Mr. Ewan Christian, in carrying out the National Portrait Gallery, which forms architecturally part of the National Gallery, was not properly imitating the capitals in the older portion of the building, but carrying out a variation on them, and asking me to protest. I replied that he showed his sense in striving after a little individuality of detail in his own portion of the building. But the attempt is hardly ever made. That it is not made is to a great extent sheer indolence. It is much less trouble to take a ready-made form. But a foliage capital is just the kind of thing in which some new studies might be made. The conventionalised acanthus has not surely exhausted the possibilities of decorative foliage of a Classic type. I should like to see a prize offered for the best study of an original capital of the Corinthian capital type. Perhaps I may offer one myself one of these days.

We have not been without instances of attempts to vary the treatment of the order as a whole. One remarkable one was made many years ago by Elmes in St. George's Hall, where the square columns with the panelled screens between them are a translation of late Egyptian architecture into Greek form. That was a totally new idea in modern classic architecture. A recent fashion has been the employment of little colonettes, with a greatly exaggerated entasis. I do not think that is a very beautiful or a very sensible addition to the field of classic architecture; it is a fashion of the moment, and likely to go out again. Mr. Belcher, an architect who is striving after originality and picturesque effect, on classic lines, has made some not unsuccessful experiments with the order. One is that, in an applied form, he chooses to use it without adhering literally to the accepted proportions, as in his competition design for the South Kensington Museum, where the applied pilasters are used in a somewhat lengthened out proportion, to give an effect of verticality while preserving the horizontal character of the building as a whole. A perhaps more interesting experiment is that which he made in that very original building, the Institute of Chartered Accountants, where an order is used in the upper part of the building, with a crowning feature which represents the architrave and cornice of the classic entablature, but with the frieze omitted. This was perhaps done with the object of keeping the crowning of the facade more in proportion with the columns, for it is a difficulty which always occurs when you use a one-story order at the top of a building, that you are liable to find the entablature either too light in proportion for the whole building, or too heavy for the columns. Therefore, as a general rule, if a small order is used in the upper story (a rather favourite incident in our modern free classic buildings), it is better to treat it as separated from the main cornice a little, instead of being immediately connected with it, so that the eye refers the cornice to the whole building, and not to the upper colonnade merely. In the Chartered Accountant's this is not the case; the cornice is more referable to the order than to the building as a whole; but at any rate the architect has shown that you may exercise some liberty with the classic entablature, and leave out the frieze if you do not want it.

Among the methods of using pilasters as a means of diversifying the face of a building, there is one which is always to be condemned—viz., the trick of building out pilasters on corbels, when they cannot be carried up from the base of the building. That is the last resource of bad designing. There is precedent for that, too; but it is a bad precedent.

As an example of the variations which may be made in the treatment of the column, I may refer to the interior of Mr. Skipworth's fine and original study for the Liverpool Cathedral, published in the *Builder* of October 24th, where the column on the face of each pier is treated near the top with a delicately-indicated spiral line, formed of fillets which appear to develop out of the surface of the columns. The main feeling and tendency of the whole design, it is true, is Gothic; but the incident could equally be introduced in a classic column. I only mention it as one suggestion that variations are possible, and that our columns need not all be cast in the same mould.

The form of heavily spiralised column, as if the whole thing had been twisted by machinery, found in examples of *rococo* Renaissance, is only suitable on a small scale, for a shaft or baluster rather than a column. On a large scale it is a monstrosity. Scale is an element in all these things.

Referring to what was said before, as to the educational value of the Classic order, and the reasons for it, brings us round to consider the application of that to the possible ideal of modern architecture. Greek buildings, and a good many both Roman and Renaissance buildings, have the effect of being complete architectural ideas, in which every detail is considered and nothing is left to chance or what is called happy accident; they are conceptions complete in themselves. We see few such buildings in the present day; partly perhaps because the hurry of modern life and its demand for every building being finished quickly leave no time for this careful evolution of design. But that is the true architectural ideal. Architecture, in its highest sense, is not mere craftsman's work, or the production of buildings which are called picturesque because they have the appearance of having been thrown together by accident; an appearance which is picturesque in an old building that was really added to at different times, but which, when it is done consciously, loses its charm, and is in fact as conventional a thing as any employment of the orders. Architecture is a form of intellectual expression, and has been most completely so in the best productions in which the Classic order was associated. We do not want to copy the orders, but we may very well take them as a basis to work upon in the endeavour to produce something as perfect as those who first evolved them produced. As an example on a small scale take the pylon of the new bridge at Paris. That is not a copy of anything; it is an employment of Classic materials in a new combination and with the greatest refinement of line and detail. I call a thing like that really a work of art. I suggest that a great building (if one's clients would only give one time) may be equally so; and that the Classic order affords both an example of perfection, and also furnishes materials for intelligent though not blind and imitative use, to the same end.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend the School Board for London 200,000*l.* for new schools, etc.; Deptford Borough Council, 5,338*l.* for paving works, etc.; Shoreditch Borough Council, 1,710*l.* for brick and pipe sewer; and Holborn Guardians, 2,000*l.* for erection of casual wards, etc. Sanction was also given to the Council of the Royal Borough of Kensington to a loan of 27,098*l.* for erection of dust destructor.

Chief Officer of Tramways.—On the recommendation of the General Purposes Committee, Mr. A. L. Coventry Fell was appointed chief officer of tramways at a salary of 1,500*l.* a year.

Tenders.—The Highways Committee recommended:—

(*a*) That, subject to the result of the usual inquiries proving satisfactory, the tender of Messrs. John Musgrave and Sons, Ltd., be accepted for the supply and erection, for the sum of 96,713*l.*, of the four 5,000 h.-p. steam engines required for use at the electricity generating-station now being established at Greenwich, in connexion with the electrical working of the Council's tramways. . . . .

(*b*) That, in connexion with the supply of the engines referred to in the foregoing resolution, Messrs. John Musgrave and Sons, Ltd., be allowed to sublet the following portions of the work to the undermentioned firms or to such other firms as may be approved by the engineer under the contract, namely, (1) to Messrs. John Brown and Co., Sheffield, the manufacture of the heavy forgings; (2) to Messrs. J. Webb and Co., Bury, the manufacture of the light forgings; and (3) to Messrs. W. Jessop and Sons, Sheffield, the manufacture of the steel castings. . . .

This gave rise to some discussion, in the

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course of which Mr. Torrance said he thought it was a dangerous thing to invite tenders and then not accept the lowest, and he considered the Council were entitled to a fuller explanation. To pass over the lowest tenders caused comment and gave rise to a good deal of disappointment.

Mr. Waterlow pointed out that it was necessary to be very careful in the purchase of machinery, and to a large extent they had to rely on the reputation of the maker.

Sir W. Collins considered that Mr. Waterlow's argument was one in favour of selected tenders as against open tenders.

Mr. Benn (Chairman of the Committee) read a Report on the matter from the responsible officer, the Electrical Engineer, who pointed out that two of the lower tenders were incomplete, and one not according to specification. The engines were the largest ever made for a municipality, and many points had to be considered. It was felt that the firms tendering below the one recommended had not sufficient experience or had not sufficient capacity in their workshops for carrying out the work satisfactorily.

The recommendation was carried.

Tramway Extension.—The same Committee brought up a Report dealing with the question of acquiring the undertaking of the South London Tramways Company. They pointed out that the tramway was 5¾ miles in length, and was not remunerative. If the Council took over the undertaking and electrified it, it would be necessary to make extensive street widenings, and the total capital sum which would have to be provided was estimated at over 450,000*l.* Having regard to the capital commitments of the Council, and to the fact that the Council could seven years hence acquire the undertaking, the Committee recommended that the powers in respect of purchase be not exercised at the present time.

Mr. Dolman moved that the recommendation be referred back for further consideration. He said the tramway in question carried 6,500,000 people yearly, and the deficit on the undertaking, if acquired, would only be 2,400*l.* the first year, and that deficiency would decrease yearly.

Mr. Dew seconded the amendment, which, after considerable discussion, was agreed to.

Housing and Fiscal Policy.—Mr. A. Smith asked if the Chairman of the Housing Committee could tell what effect any increased price of building material brought about by the imposition of tariffs would have upon the housing policy of the Council.

Earl Carrington said it was now difficult to make both ends meet with regard to the Council's housing schemes, and he would view with considerable apprehension any rise in the price of building material or labour.

Holborn to Strand.—The Improvements Committee brought up the following paragraph, the recommendation being agreed to:—

"By an agreement between the Council and the Duke of Bedford, scheduled to the London County Council (Improvements) Act, 1899, the Council is required to sell to His Grace certain surplus land in connexion with the Holborn to Strand improvement, having a frontage to the northern side of the western portion of Aldwych. The agreement further provides that with a view to maintaining a harmonious character in the elevation of all buildings which shall be erected fronting on Aldwych, the elevation of any buildings to be erected on the site to be conveyed to the Duke of Bedford shall be previously submitted to the Council for its approval, but that such approval shall not be unreasonably withheld. In accordance with this agreement plans have been submitted of the proposed elevation of a block of buildings, consisting of the Waldorf Hotel, with a theatre at either end, to be erected in Aldwych between Catherine-street and Drury-lane. Messrs. Mackenzie and Son, the architects for the Waldorf Hotel, and Mr. W. G. R. Sprague, the architect for the two theatres, have readily accepted various suggestions which have been made in order to secure greater harmony in the general treatment, and we consider that the design as now amended may be approved. We have arranged for the design and a perspective drawing to be placed in the Council chamber, and we recommend:—That the design submitted to the Improvements Committee on October 28, 1903, for the elevation of the Waldorf Hotel and two theatres adjoining proposed to be erected on the northern side of Aldwych between Catherine-street and Drury-lane on land to be conveyed by the Council to the Duke of Bedford, be approved."

Gardens in Squares.—It was reported by the Parks Committee that the Mercers' Company had agreed to lease to the Council York-square and Arbour-square, Stepney, for twenty-one years at the nominal rent of 5s. per year. The same Committee recommended:—"(*a*) That application be made in the next Session of Parliament to secure the continuance of the restrictions against, and prevent any building over, the garden of Edwardes-square, Kensington. (*b*) That it be referred back to the Parliamentary Committee to communicate with the owners of garden squares in London, and to advise the Council as to what Parliamentary powers are desirable for the preservation of such garden squares."

After discussion, the recommendations were adopted.

Land Auctions.—The Corporate Property Committee reported as follows:—

"We report that the valuer on 13th instant submitted to public auction several plots in Aldwych, and Kingsway; Southampton-row; Mare-street, Hackney; Long-lane, Bermondsey; Tower Bridge-road; and the Clarence-street artizans' site, Rotherhithe, with the result that lot 8, Southampton-row, lot 1, Long-lane, lot 13, Mare-street were disposed of, and that lot 12, Mare-street was let, as the result of negotiations in the room after the auction.

The Clarence-street, Rotherhithe, site, which was offered on a 999 years lease, failed to elicit a bid, and we have informed the Bridges Committee that we have been unable to dispose of the site.

The results of the usual inquiries which have been made as to the ability of the several intending lessees to carry out their obligations under their leases have been found satisfactory."

Mr. Howell J. Williams said he thought the conditions might be revised, and he could see no reason why the eighty years' period should not be altered to ninety or ninety-nine years.

Mr. Campbell said the Council ought to grant leases for periods of ninety-nine years.

Mr. Mullins, Chairman of the Committee, said a report would shortly be brought up dealing with the matter.

The Council soon after adjourned.

ENGINEERING SOCIETIES.

Society of Engineers.—At a meeting held at the Royal United Service Institution, Whitehall, on Monday, the 2nd inst., Mr. J. Patten Barber, President, in the chair, a paper was read on "The Bacterial Treatment of Sewage" by Mr. George Thudichum, F.I.C., F.C.S., and of which the following is an abstract:—The author prefaced his remarks by stating that the extensive experiments which had been carried out during the last seven or eight years by various authorities had yielded results very gratifying to those who had first introduced bacterial methods. The principle that sewage could, in the large majority of cases, be purified by biological means alone, had now found practically universal acceptance, that being endorsed by the Interim Report of the Royal Commission now sitting. He pointed out that, that being so, there was no longer any need to argue as to principle, but the best methods of application might still be discussed with advantage. The two main points which were still being argued were (1) the relative merits of the anaërobic or septic, as compared with the aërobic, or coarse-grain contact system; and (2) the various ways of applying the effluent from the preliminary treatment to the finishing filters. The author then proceeded to discuss the first point, and after setting out the arguments *pro* and *con* at some length he finally gave it as his opinion that the anaërobic process was more in accordance with the teachings of Nature, and, moreover, possessed certain specific advantages over its rival, such as the averaging of the sewage flow; the greater ease with which regular periodic working of the filters could be obtained; the absence of trouble from loss of water capacity through deposition of solids; and the easier and cheaper cleansing, if necessary. The necessity for covering a septic tank was then dealt with, the author stating that he thought it desirable, since it prevented disturbance of the bacterially-active scum, avoided risk of nuisance, and enabled use to be made of the gases evolved during the putrefactive process, as was actually done at Exeter. As regarded the question of the best method of applying the primary effluent to the secondary beds, the author hesitated to express an opinion, since excellent results had been obtained by either method, and the evidence available was not yet sufficient to enable a definite verdict to be arrived at. The author then discussed the question of sea outfalls, and the possibilities of pollution of shell-fish by sewage or sewage effluent. He thought that in some cases the standard demanded was too high, and suggested that reasonable safety was all that should be asked for, since absolute safety was practically unattainable. The author concluded by pointing out how the present methods of sewage treatment had been gradually built up, tracing the growth of the so-called Sutton system from its early commencement to its maturity.

ARCHITECTURAL SOCIETIES.

Ulster Society of Architects.—The October general meeting of the Ulster Society of Architects was held on the 26th ult., in the Society's Rooms, 16, High-street, Belfast. Mr. W. J. Gilliland (Vice-President) occupied the chair. The action of the Society having been reported with reference to its representatives on the Technical Institute Committee, the following resolution was passed unanimously:—"That the action of the Council of the Society in withdrawing its members from the Committee of the Technical Institute on account of the unsatisfactory nature of the representation be approved of." The meeting also decided, "That we co-operate with the other societies interested in art in endeavouring to obtain a representative expert art committee in connexion with the Art Gallery of the Free Library and Technical Institute." Prizes were then presented to students of the Designing and Sketching Club. A Report, prepared by Sir Thomas Drew, P.R.H.A., who adjudicated on the merits of the drawings, was read. He awarded the prizes in class "A," which consists of those students who have had four years' experience in the profession, to E. R. Kennedy (first), S. J. M'Avoy (second); and in class "B," which consists of junior students, to H. M. Scott (first), and E. G. Trobridge (second). It was intimated to the students that when a sufficient number presented themselves examinations for the qualification of Associates of the Royal Institute of British Architects would be held by the society on behalf of the Royal Institute of British Architects, and the students were urged to avail themselves of this opportunity, as well on account of the educative advantages as the importance of possessing a recognised qualification.

COMPETITIONS.

Public Library, Mansfield.—A special meeting of the Mansfield Town Council was held at the Town Hall recently to discuss the Report of the Free Library Committee as to the designs for the new free library building, towards the cost of which Mr. Andrew Carnegie has contributed the sum of 3,000*l.* The report of the assessor, Mr. A. E. Bromley, stated that he had thoroughly investigated the six sets of drawings sent in for competition, and was of opinion that, all things considered, the first premium should be awarded to Mr. E. R. Sutton, Nottingham, whose design was marked No. 1. The Committee recommended the adoption of the assessor's report, that design No. 1 be accepted, with the slight modification suggested by the assessor, and that design No. 3 (sent by Mr. Goodacre, Mansfield) be awarded the second premium. After discussion, it was decided to place the rooms at the Town Hall at the disposal of the Committee for the purpose of exhibiting the design.

Bromley Public Library.—The accepted design in the recent competition for Bromley Free Library is by Messrs. Squire, Myers, and Petch, 19, Pond-place, South Kensington. The second premium was divided by Mr. C. H. Norton, 14, Bedford-row, London, and Mr. A. F. M'G. Milligan, 17a, South Castle-street, Liverpool. There were fifty competitors. The building is to cost 7,500*l*

Public Offices and Town Hall, Acton.—The Urban District Council of Acton at their meeting on the 3rd inst. decided to adopt the design of Mr. W. G. Hunt, architect, 17a, Vicarage-gate, Kensington, London, W., which had been awarded the first place in the competition by the assessor (Mr. J. Macvicar Anderson, F.R.I.B.A.) for the new Public Offices and Town Hall, Acton.

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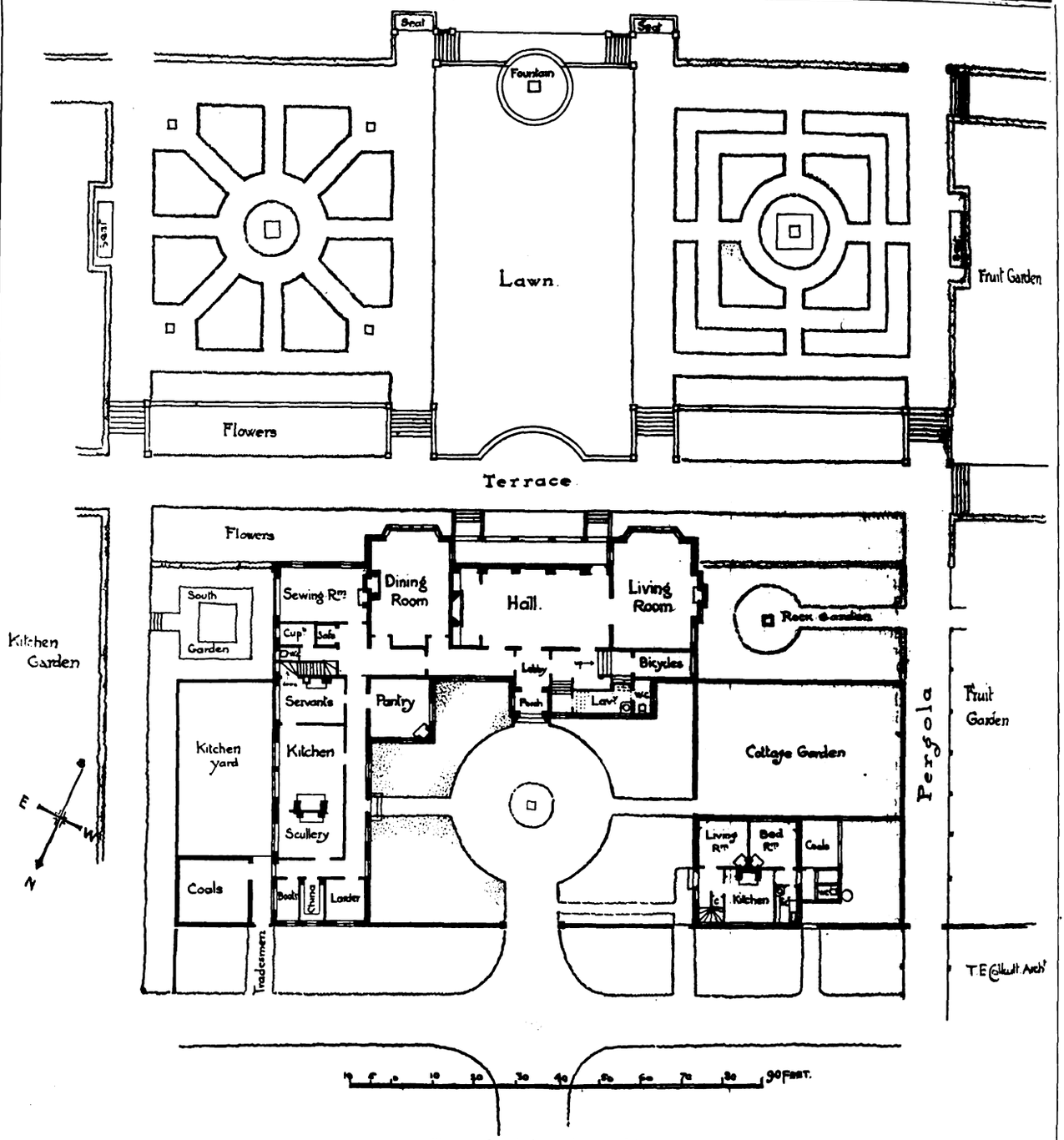

House, East Grinstead. Plan.

Illustrations.

HOUSE AT EAST GRINSTEAD.

THIS house was designed to be built in local stone walling and local stone dressings quarried on the estate; the covering to the roof being in Westmorland green slates, and the whole of the outside woodwork in English oak.

Mr. T. E. Collcutt is the architect.

CHURCH OF ST. MARY MAGDALENE, ADDISCOMBE.

PROPERTY in the parish of Addiscombe having fallen much in value since the commencement of this church, the work of its completion has been slow.

The first portion (shown on the plan by the hatched lines) was erected in 1868-9 by the late E. B. Lamb, and consisted of the chancel, east portion of the nave, the two transepts, and the baptistry, vestry, and lowest stage of the tower. The latter was left open, having only a temporary wooden porch placed against the door opening into the baptistry; this was, at that time, the main entrance door.

The lower stage of the tower has been lately completed from designs prepared by Mr. E. B. Lamb, son of the original architect, by adding a lofty three-light window on the south, and an entrance at the east with a similar three-light window above it. The temporary porch was removed, and replaced by double arched and traceried stone screen between the tower and the baptistry, the two arches meeting on a jasper marble column. The entrance doors are of oak, lofty, and with traceried panels. The screen doors are of oak with teak panels, and a cresting of tracery and shields carried over the head.

The west side of the church is enclosed by a temporary wall constructed of quartering and plaster. Owing to some difficulties between the diocesan authorities and the vicar designate, public worship was not carried on for some time, and the building became much neglected and uncared for after the death of the original architect. The insufficient protection occasioned by the temporary wall, being allowed to become ruinous, caused much damage to the interior.

On his appointment to the living, the present vicar, with the help of donations from the parishioners, restored the damaged portions, and much money has been spent since on furnishing and decorating the church.

The roof is open-timbered, and very elaborate, intersected at the crossing, and with hammer-beams and struts brought down the piers, and resting on four small marble columns to each pier. The span of nave and transepts, from centre to centre of piers, is 42 ft. The nave roof continues down over the aisles, with arched ribs under the valleys resting on stone corbels, and terminating with a buttress outside. A flèche gives both ventilation and light at the intersection of the nave and transept roofs, and sheds picturesque rays of light through the timbers. The church is designed in the Late Decorated period, but treated freely and untrammelled. The windows are lofty, and afford ample light, consistent with a reverent quietness. The temporary wall at the west still remains, for want of funds to carry out the completion.

The chancel is wide and deep, the windows standing back within an arcade of stone arches, with traceried spandrels resting on marble columns. There is a large crypt under the chancel, which will accommodate a congregation of 100 people.

A new stone credence table, designed by Mr. Lamb, has been erected on the south side of the chancel, with a traceried canopy and a cluster of marble columns supporting the table.

The interior of the church is unique in form, and very spacious, and will, when completed, afford seating on the area for over 1,000.

The view shows the design for the completed west end and eastern tower, all of which still remains to be done.

The architect for all the additions is Mr. E. B. Lamb, of London.

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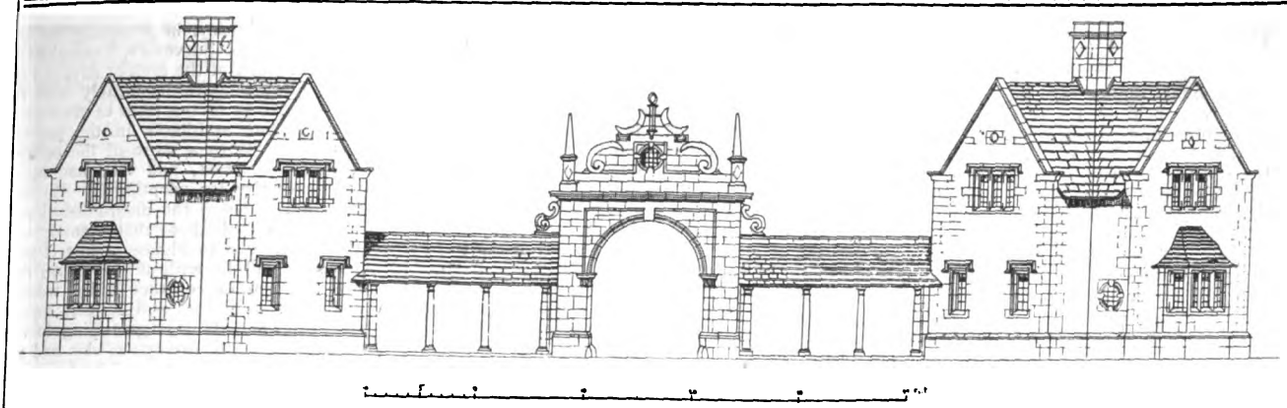
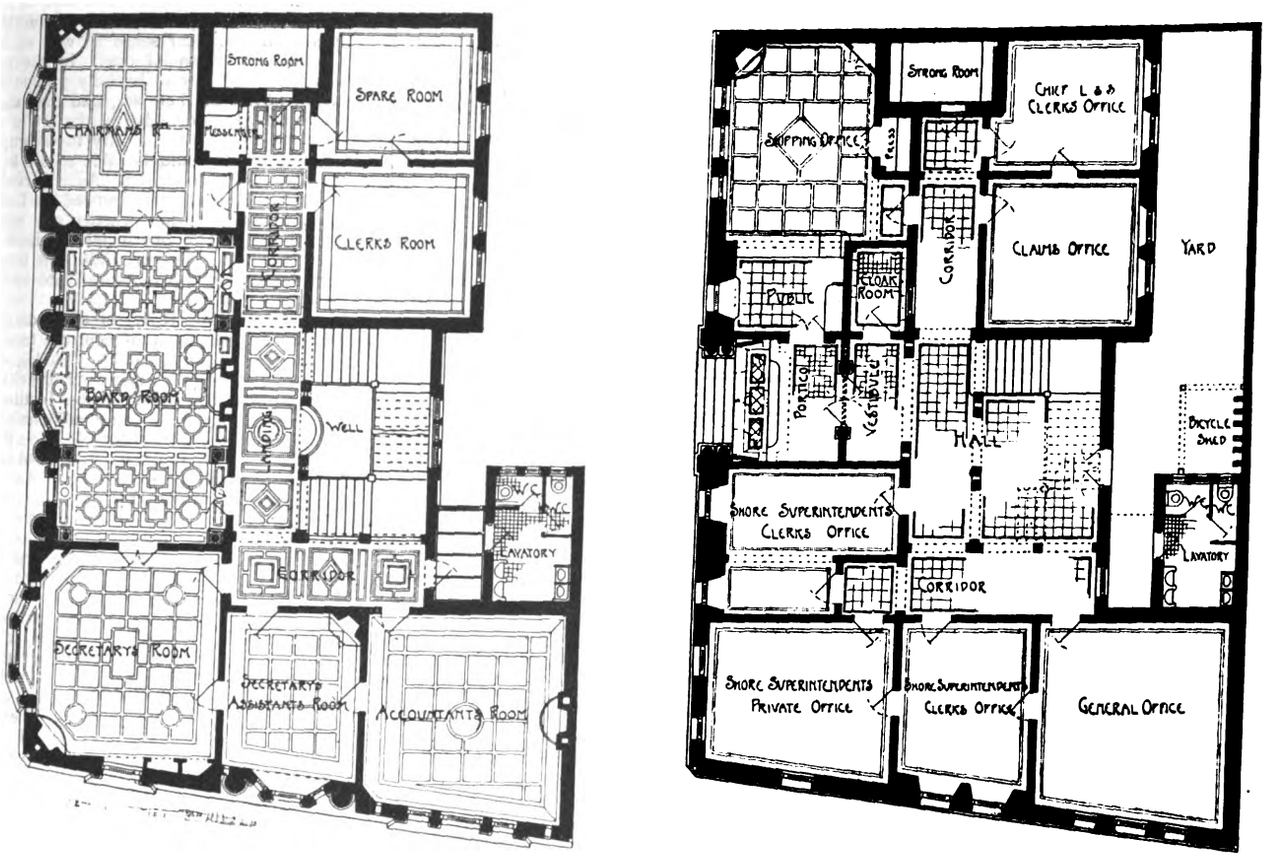


Lodges, Toddington, Gloucestershire. Elevation towards the grounds.



Ground Plan. First Floor Plan.

Administrative Offices, Port Elizabeth Harbour Board. Plans.

ST. MARY'S COLLEGE, WOOLHAMPTON, BERKS.

With the exception of the chapel, the whole of the existing buildings of this college have been erected since 1885, the latest portions, which are the most prominent in our illustration, having been completed in 1895.

The college was erected for Catholic educational purposes, and was intended for the reception of boys, proposing to follow later on either an ecclesiastical or professional career. The buildings provide accommodation for about 150 students, together with the requisite number of professors, and in addition there is a domestic block occupied by the matron and servants. On the ground floor there is a spacious study hall and dining hall, together with classrooms of various sizes, all connected by a cloister. On the upper floor, with the exception of the dining hall, which is carried to the full height of the building, are the dormitories and professors' rooms.

In the illustration the buildings on the right comprise the domestic block; the tower in the central position forms the main entrance for visitors to the college, and gives access to the reception-rooms and, by a staircase, to the masters' quarters. The large block on the left comprises on the ground floor the study hall, and, above, the rooms of the masters.

The whole of the buildings are externally of red brick, with Ham Hill stone dressings and tile roofs. The total cost has been about 18,000*l*. The architect is Mr. Fredk. A. Walters, of Westminster, and the contractors for the main portion were Messrs. James Longley and Co., Crawley, Sussex.

NEW ENTRANCE LODGES, TODDINGTON, GLOUCESTERSHIRE.

These lodges have been designed for the main entrance into Toddington Park, and will be seen, when approached from the house, at the end of a long, straight drive.

They are to be built in local stone, and the roofs covered with stone tiles. Mr. E. J. May is the architect.

NEW ADMINISTRATIVE OFFICES, PORT ELIZABETH HARBOUR BOARD.

The design for this building, which is now in course of erection, was selected by the Harbour Board Commissioners in a limited competition held in August last year.

The exterior is of brick, faced with cement rough-cast and smooth cement work (the ship frieze over portico also being modelled in cement), and all coloured white, on a plinth of blocks of imported red sandstone; the roof is of Westmorland green slates, the whole of the external window frames and doors being of teak. All the windows to the principal suite of rooms on the first floor will be double glazed to prevent annoyance from the noise of the waggon traffic which constantly passes this corner.

The portico steps will be of marble, and the floors of vestibule, hall, and corridors on ground floor of slabs of red and white marble. Lavatory floors and walls tiled. The upper floors are of concrete and steel fire-resisting construction.

The various contracts for the work amount to about 25,000*l*. The architects are Messrs. Victor T. Jones and W. J. McWilliams, of Port Elizabeth and Johannesburg; the builder Mr. J. Kohler, of Port Elizabeth; the steelwork contractors Messrs. Dorman, Long, and Co., of Middlesbrough, while the whole of interior hardwood panelling, staircase, and decorative materials, etc., are being supplied by Messrs. Liberty and Co., of London.

MR. H. W. BREWER'S DRAWINGS.

So much interest has been evinced in the collection of the late Mr. H. W. Brewer's drawings on view at the *Builder* office, that it has been decided to keep it open for another week, Saturday excluded; that is, till Friday, the 13th inst. Admission between the hours of 12 and 3, on presentation of address card.

Memorial Tablet, Nottingham.—A memorial has been erected to the memory of the Rev. L. Wilkins, in St. James Church, Nottingham. It takes the form of a bronze decorative tablet, and has been designed and executed by Mr. George Frampton, R.A.

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THE INSTITUTE OF BUILDERS:

ANNUAL DINNER.

The annual dinner of the Institute of Builders was held in the Whitehall Rooms, Hotel Métropole, Charing Cross, on Thursday evening last week, Mr. W. F. King, President in the chair. A large company was present, including:—Mr. Aston Webb, R.A., F.S.A., President of the Royal Institute of British Architects; Mr. H. T. Hare, President, Architectural Association; Mr. A. Buck, President, Surveyors' Institution; Sir W. Emerson; Sir J. Sawyer, M.D. (London); Colonel S. G. Bird, C.B.; Mr. C. W. Green, President of the National Federation of Master Builders; Mr. P. Preston, Master of the Worshipful Company of Carpenters; Colonel C. W. Stephenson, V.D.; Captain Hemphill, L.C.C.; Mr. E. White, L.C.C.; Mr. H. J. Williams, L.C.C.; Professor R. E. Smith; and Messrs. T. W. Aldwinckle; S. D. Adshead; T. D. Atkinson; J. J. Appleby; C. H. Barnsley; S. Barnett; H. A. Bartlett; H. H. Bartlett; G. W. Blackall, C.E.; L. Blake; A. C. Blomfield; C. J. Blomfield; A. Boden; S. Bolten; E. A. K. Briggs; J. Carmichael; H. Carter-Pegg; W. Clarkson; J. H. Colls; A. W. S. Cross; A. W. Cooksey; S. B. Depree; E. Dummett; A. Dixon; B. Dawson; F. L. Dove; F. J. Dove; G. Oliver Estcourt; Alderman Ellis, J.P.; B. P. Ellis; B. Greenwood; B. J. Grover; J. Gallimore; W. Grant, J.P; T. Gregory; J. S. Gibson; H. W. Horner; L. Horner; H. A. Heffer; J. A. S. Hassall, Secretary of National Federation of Master Builders; T. Holloway; F. Higgs; W. Higgs; H. F. Higgs; F. H. A. Hardcastle; J. Hunt; J. Hudson; C. W. Hall; J. S. Holliday; J. Herbert; A. Harrison; R. A. Hill; W. Hill; G. C. Hudson; H. W. Hill; G. W. Humphreys; R. S. Henshaw; J. Hindsley; C. Heathcote; E. T. Hall; G. Inskipp; W. Campbell Jones; C. E. King; A. A. Killby; E. J. Kett; G. R. Kett; G. Kett; A. Krauss; W. J. Locke, M.A.; H. Lovegrove; D. W. McInnes; F. G. Minter; J. Morely; F. M. May; L. J. Maton; F. May, J.P.; H. Northcroft; H. M. Newlyn; W. Nicholson; A. E. Parker; H. Porter; W. A. Pite; J. Randall; T. Rowbotham, J.P.; T. M. Rickman, F.S.A.; E. S. Rider; C. J. Smithem; E. J. Strange; G. G. Scott; W. Sapcote; W. H. Scrymgeour; E. J. Stubbs; H. T. Steward; J. Slater; T. H. Smith; G. C. Sherrin; H. P. Shepherd; W. Shepherd; W. S. Shepherd; H. J. Treadwell, A. W. Turnbull; E. J. Turnbull; H. W. Trollope; F. Wall; H. Wall; J. Wells; C. Wall; W. F. Wallis; T. B. Whinney; F. G. Wallis; J. A. Wallis; and T. Costigan, Secretary of the Institute of Builders.

The loyal toasts having been honoured, Mr. E. White, L.C.C., proposed "The Imperial Forces." Referring to the reform of the War Office, he said that that task might be undertaken by a committee of the master builders, or, failing them, the L.C.C., who would not be likely to refuse.

Colonel Stanley G. Bird, C.B., responded. Speaking of the Report of the War Commission, he said that that report was signed by a builder and contractor, *i.e.*, Sir John Jackson, and that was the only instance on record, he believed, of a builder sitting on a Royal Commission, and that Institute ought to congratulate itself in having had one of its members honoured in this way. He thought that builders and contractors played an important part in the defence of their country, seeing what they did in the work of constructing harbours, docks, etc.

Sir William Emerson proposed the toast of "The Institute of Builders and President." He said that occasions of that kind served to enhance the good feeling which should exist between architects and builders, and on occasions such as this dinner this feeling was not clouded by some impending and portentious bill of extras. Confidence between architect and builder was necessary for the proper carrying on of work. However beautiful a design might be, it ran great risk of being spoilt if the work was inferior or faulty, and in the matter of the embellishment of a city or town a great deal depended upon builders—quite as much as upon architects. That was a very important matter, because most nations were judged by the buildings they left behind them. The Institute of Builders was doing very good work in many ways, and there was one matter in that connexion he would specially refer to. At last, after a number of years, a form of conditions of contract had been agreed upon between the Royal Institute of British Architects and the Institute of Builders, which was a very important matter. Such a step inspired confidence between architects and builders and in the minds of clients. Without such conditions it was simply a matter of the character of the architect and the character of the builder, and many people looked dubiously upon contracts based on this. The form of contract as agreed to would be of the greatest use to everybody in the country concerned in building matters—in fact, beyond the British Isles, for they might be interested to know that in connexion with a large building contract that would be let in Calcutta before long, this particular form of contract had been approved by the legal advisers to the Government of India, subject, of course, to those necessary changes to make it applicable in India instead of England. He believed he was right in the belief that the Institute of Builders had been in touch with the City Corporation on the question of the congested state of our streets, with a view to seeing if it would be possible to convey materials through the streets of London at certain hours only. The congestion of our streets was an important matter, and if builders who used a number of carts and waggons could make some arrangements with the officials to this effect it would do much to help to relieve this congestion. The past and present commercial feeling in regard to our streets, which resulted in our streets being made so narrow in order to get as much money out of the land as possible, made it impossible to get streets of a proper width, and the remedy seemed to be to decrease the number of vehicles in the busy hours of the day. In connexion with every profession and trade there was some sort of an examination, and he had heard that the Institute of Builders thought of instituting examinations for builders. He thought that that was a very necessary proceeding. He thought that builders, as well as doctors, lawyers, architects, surveyors, and accountants should give some proof that they had been suitably educated and were capable of carrying on their work properly, for both life and property depended on that. He hoped that builders would be guarded in their aspirations heavenward, otherwise London would soon become a city of skyscrapers, like Chicago and New York, and that would not be good for the physical development of the people. With the toast he coupled the name of their President, Mr. King.

Mr. King, in reply, said that one of the chief reasons for the existence of the Institute was the promotion of good feeling between architects and builders, and he took it that they had not failed in that respect, and the presence of so many architects that evening was an indication that that effort was reciprocated. He thought that they might congratulate themselves on having got rid of that hardy annual the conditions of contract. He hoped that those conditions would grow in favour, and he believed that they would all feel the advantage of the work which had been accomplished. The advantage of such a settlement would be more apparent as time went on. They owed the settlement to the President and Council of the Royal Institute of British Architects and several other gentlemen, who had laboured for years in the matter. He had a most grateful recollection of the courtesy and kindness with which he was received by the President and Council of the Institute of Architects, and of the businesslike manner in which the builders' proposals were considered. He desired, also, to congratulate the Institute of Builders that this matter had been carried through at last. In the year's work he thought that the Institute's influence had been well maintained. In negotiations with the City Corporation and the L.C.C., they had been able to make their influence felt. Though they had nothing to report with regard to technical education, he thought they had been able to effect some good. More interest was taken by builders in the Institute, and the fact that their membership was increasing year by year showed that members of council and committee had worked for the Institute very zealously and had watched its affairs very closely. The amount of time they had given on its behalf was very considerable. He thanked them for their kindness and courtesy to him, for that had made his tenure of office most pleasant. Once more he would like to refer to their able secretary, Mr. Costigan, who did such valuable work for the Institute.

Mr. C. H. Barnsley, in proposing the toast of "Architects and Surveyors," eulogised the architectural work of the present day, and said that it would compare favourably with that of past times. As to the form of contract, he was afraid that architects in the provinces had not yet risen to a sense of the equity of this form of contract, and they had not yet seen the necessity for adopting it. He would suggest that some of the distinguished architects they had with them that evening might use their influence to induce architects in the provinces to fall in with the universal desire to have a form of contract which would be acceptable by architects and builders throughout the country. It was gratifying to know that architects and surveyors who had risen to the highest positions were ready to make sacrifices of time and money in order to impart to the rising generation the knowledge they had obtained by years of hard work and experience. Builders ought to be men of practical standing; they ought to know their business in a technical sense as well as in a commercial and financial one. In the same way, architects ought to be fully grounded in the technicalities of their art, and they should have a thorough knowledge of the art of construction as well as the ability to design, for if they had they would be able to set before builders what they required. As to surveyors, the builders in the provinces envied the London builders, for the London practice was not the provincial one. The provincial architect was too often his own surveyor. With the toast he coupled the names of Mr. Aston Webb and Mr. A. Buck.

Mr. Aston Webb, R.A., in responding, referred first to the form of contract to which reference had been made. Thanks, in a great measure to the tact and conciliatory manner of the President of the Institute of Builders, a complete form of conditions of contract had at last been agreed upon—as perfect as it was possible to make it. In regard to education, it interested the Institute of Architects very much to know that the Institute of Builders were thinking of adopting some system of education. The Institute of Architects discovered some time ago that the "pick-me-up" system of education was not a good one, and they had been for years endeavouring to systematise and arrive at some process of education for young architects. If the Institute of Builders seriously undertook this work, and if the experience of the Institute of Architects would be of any use, it would be placed at their service most gladly and willingly. There were many points in which the education of builders and architects must be the same; the question of materials and questions as to the various crafts, were matters that both architects and builders were supposed to know all about. In addition to knowing what they wanted, they had to know many other things, and it had struck him that one craft or trade might be dispensed with. He would mention that craft—the craft of the carpenter—with a good deal of diffidence, especially as they had with them that evening the Master of the Carpenters' Company (though the interests of the Company were wide, and extended far beyond the particular trade of carpenter). He was sorry to say it, but he thought that that trade could be to a great extent dispensed with, it was to some extent a relic of mediævalism, and he did not think that they would be sorry to see the end of those span roofs with Bangor slates over a flat ceiling, which was an inflammable thing and harboured dirt. He believed that an iron and concrete roof would be very much better. He thought they could dispense with sagging floors they saw in so many houses, and rotten joists, and he could not but think that iron and concrete floors would be better and quite as cheap if they were generally used. If they could dispense with those creaking old stairs they knew so well, and have instead concrete stairs, that would be a further improvement, and he thought they could dispense with those wooden partitions which crack, plastered, and with sappy laths which spoilt our ceilings. There was one thing they would miss, and that was the grand old open timber roofs which they could not have without the carpenter. Of course, he did not include the joiner with the carpenter. Architects and builders must look ahead and try and keep themselves abreast of the times. It was essential that our forms of construction should improve. He was not as ready as some people to continually extol the past at the expense of the present. He was inclined to agree with what had been said, *i.e.*,

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that we could do as good building work now as ever. The wind might roar and the waves might break, and yet, he believed, Dover harbour would exist and remain strong for centuries. The seas had made one or two attempts on it already, and had had to retire defeated. Those great buildings which were being erected at Whitehall, when time had touched them with colour, would compare well, he hoped, with buildings of the past. He trusted that as time went by, people of future times would look back on our buildings as we do on those of past ages, and would say, as we do: "They dreamt not of a perishable home who thus could build."

Mr. Alfred Buck replied for the surveyors. The Surveyors' Institution included landed surveyors, building surveyors, quantity surveyors every surveyor they could think of. He belonged to the first class, and he did not come into contact very much with architects and builders. As to the carpenter, when they had done with him he (the speaker) hoped they would send the carpenter down into the country, where he was wanted, and where he would be usefully employed in erecting such useful and necessary buildings as cowsheds and pigstyes. He was sorry to say that the carpenter, the man who could put up a rough but sound roof and who could make and hang a gate, was departing for the towns, and it would be a good thing to get him back into the country. As to examinations, if builders instituted a system of examinations, he hoped they would be better for it, but he would advise them to join the Institute before the examinations were required. The Surveyors' Institution had a system of examinations, and candidates were examined in what they ought to know—on subjects which were necessary for them to know if they were to practice their profession.

Mr. Benjamin I. Greenwood then proposed "The National Federation of Master Builders." The Institute of Builders was a National Institute, and its members came from all parts of the country. That being so, it might be thought that there was some overlapping, seeing that the Federation was a National Federation. That was not the case and, if he might say so without presumption, the Institute might be called the House of Lords of the trade, and the National Federation the House of Commons. The Federation carried on its work more efficiently than ever. The difficulties of organisation were stupendous—probably greater than in any other trade—for the interests and customs were so varied. The customs in the north were very different from those in the south, and to combine these varied interests was a most difficult problem, and had it not been for the indomitable determination and optimism of those in charge of affairs, the Federation would never have been carried to the position it now occupied. As to the form of conditions of contract, one of the chief advantages of the settlement was that when architects and builders were agreed, the client was very likely to agree without referring the matter to his solicitor. Before the present settlement, though some architect's contracts were open to objection from the builder's point of view, the solicitor's contract was a great deal worse. The present agreement was likely to be beneficial to all concerned. As to buildings of the present day, he quite agreed that they were equal in design and stability to those of the past. He would be glad to accept a contract for the erection of another pyramid in the desert of Sahara on the two conditions which appertained in the past, *i.e.* (1) time for the completion of the contract to be unlimited; (2) the price to be unlimited.

Mr. C. W. Green, President of the National Federation, who responded, said that the building trade at the present time was free from serious labour disputes, and that result was largely due to the federation by the National Federation of Master Builders' Associations. He desired to thank the President and Council of the Institute of Architects and Mr. King for the settlement of the form of contract. He rejoiced to see that the form of contract was accepted in the north as one of the finest and best forms ever issued, and the demand for it had been great. Its fairness had been specially referred to, and lawyers had said that they could not beat it. Although this result had taken some twenty or twenty-five years to bring about, it was one of the finest achievements of the various bodies concerned. He hoped that architects and clients in the provinces would be induced to accept the form.

The last toast was "The Visitors," which was suitably proposed by Mr. H. H. Bartlett, past President of the Institute, coupled with the name of Sir James Sawyer, M.D., who, in reply, said as to examinations, that in the medical profession they were over-examined. He would advise them to take care that they did not do the same for themselves. They were not improved by the over-examination of the present day. One of the best ways in which a medical man could train himself was by apprenticing himself to a medical man who had succeeded and who knew his work. If a doctor practised his calling with anything like honour and respect, he must make the prevention of disease his first aim, and his profession had always aimed at this. He thought that if every time anybody went to occupy a new house they took the opinion of a skilled architect or surveyor as to its sanitary condition, his profession would not be so necessary. He told people to watch the three D's, *i.e.*, the drains, the drink, and dryness. If people would get the opinion of a skilled architect or builder as to whether the water-supply was good, whether the walls were so built as to exclude the moisture rising from the earth, and the drainage efficient, it would be a good thing for all.

The proceedings then terminated.

FORM OF AGREEMENT AND CONDITIONS OF CONTRACT.

THE following is Clause One, as revised and agreed to by the Royal Institute of British Architects, the Institute of Builders, and the National Federation of Building Trade Employers of Great Britain and Ireland, in the Schedule of Conditions of Contract:—

"The works shall be carried out in accordance with the directions and to the reasonable satisfaction of the architect, in accordance with the signed" ["said" in the old clause] "drawings and specifications, and in accordance with such further drawings, details, instructions, directions, and explanations" ["of the same" in the old clause, has been omitted] "as may from time to time be given by the architect. If the work shown on any further drawings or details, or necessary to comply with any such instructions, directions, or explanations, be, in the opinion of the contractor, extra to" ["extra to" takes the place of "in excess of"] "that comprised in the contract, he shall, before proceeding with such work, give notice in writing to this effect to the architect. In the event of the architect and contractor failing to agree as to whether or not there is any extra" ["excess" in old clause] "and of the architect deciding that the contractor is to carry out the said work, the contractor shall accordingly do so, and the question whether or not there is any extra" ["excess" in old clause], "and if so the amount thereof, shall, failing agreement, be settled by the arbitrator as provided in clause 32, and the contractor shall be paid accordingly. The contract drawings and specification shall remain in the custody of the architect, and shall be produced by him at his office as and when required by the employer or by the contractor."

In the form for use where quantities form part of the contract, the following new clause has been inserted:—

"12A.—Should any error appear in the bills of quantities other than in the contractor's prices and calculations, it shall be rectified, and such rectification shall constitute a variation of the contract, and shall be dealt with as hereinafter provided."

As to the first clause, we certainly think that the word "extra" is a more explicit and legal form of expression than "excess." The form, which is published by the Institute of Architects at 1s. per copy, is stamped by the seals of the three institutions concerned, and we are glad to know that it has given very general satisfaction.

COURT OF COMMON COUNCIL.

THE usual Court of Common Council was held at the Guildhall on Thursday last week.

Mr. Wm. Cooper submitted a petition of members of the London Chamber of Commerce and firms being users or makers of lamps and signs carrying on business within and without the jurisdiction of the Corporation, asking for modifications in the regulations in regard to lamps and signs. The petition was received, and referred to the Streets Committee.

The by-laws made under section 5 of the City of London (Public Health) Act, 1902, in regard to the demolition of buildings in the City, and which were approved on October 15 last, were sealed.

Among the correspondence received was a letter from the St. Pancras Borough Council, asking the co-operation of the Corporation in obtaining legislation in dealing with contracts. The letter was referred to the Streets Committee for consideration.

The Lord Mayor laid before the Court a copy of the resolutions passed at the recent International Fire Prevention Congress, which contained suggestions for amending the Building Acts. The matter was referred to the Streets Committee.

There was some discussion with reference to a statement made at a recent meeting of the London County Council, in regard to the action of the Corporation on the subject of the Building Act Amendment Bill.

Mr. Morton explained that early in the year his Committee were instructed by the Court to arrange for a conference with the London County Council, the Westminster City Council, and the various Metropolitan Borough Councils, with the object of considering the Bill. A number of owners of property were heard, and the result was that in May last a letter was sent to the London County Council asking for copies of any proposals put forward by that body to be sent to the Streets Committee of the Corporation. That letter was acknowledged by the Council, and on June 15 a letter was received from the Committee of the Council, in which it was stated that a previous resolution had been rescinded, with the object of allowing the Building Act Committee to prepare proposals for a general amendment of the Act of 1894. Another letter was received on June 25 from the London County Council, in which it was stated that a draft of the Bill was in preparation, and asking the Corporation to make any proposals it desired. The Streets Committee of the Corporation thereupon wrote asking that a copy of the draft Bill should be submitted to them, but no reply was received from the County Council Committee. He had since been informed that the London County Council were going to drop the Bill next session. The London County Council had thought that the Corporation should prepare suggestions, and on the other hand the Corporation considered that the Council should submit to them a copy of the draft Bill, as the responsibility would rest on the County Council. The Corporation was anxious to assist the London County Council, particularly in the work of protection from fire. After further discussion the matter was allowed to drop.

In reply to a question, Mr. Deputy Pryke said that the Bridge House Estates Committee had carefully considered the question of the paving material to be used on London Bridge, and as the gradient on the south side of the bridge was somewhat steep, they had decided to lay granite sets on that portion.

A letter from the Clerk to the Croydon Rural District Council asking if the Corporation would be willing to assist in the preservation of Purley Beeches, which has been threatened with destruction, was referred to the Coal and Corn Committee for report.

METROPOLITAN ASYLUMS BOARD.

AT the meeting of the Metropolitan Asylums Board on Saturday last it was agreed, on the recommendation of the Finance Committee, to apply to the Local Government Board for an order authorising the expenditure of a sum not exceeding 15,000*l.* on alterations and additions to the Fountain Hospital, such expenditure to be defrayed by means of a loan repayable within a period of five years. It was agreed also to make a similar application in regard to the erection of a boat and mast shed at South Wharf, the estimated cost being 1,275*l.*

Leavesden Asylum.—The Asylums Committee submitted a long report dealing with the disposal of sewage from this asylum. They stated that recently they had had a letter from the Hammersmith Board of Guardians urging that "steps should forthwith be taken to render the sewage harmless by proper methods before it is applied for the purpose of fertilising the land." The Committee had referred the matter to the Leavesden sub-committee, from whom they had received a report on the matter. The sub-committee reported that in their opinion there was no justification for the Board of Guardians' suggestion that the presence of tuberculosis among the patients at Leavesden was in any way due to the existing methods of disposing of the sewage. It was agreed to send a copy of the sub-committee's report to the Hammersmith Board of Guardians. The Works Committee in their report stated that they had considered the following motion which was referred to them and to the Hospitals Committee some time ago:—

"That whenever the Board may decide to pull down or alter a temporary structure at any of their infectious hospitals, or to make any

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alterations in any of the permanent buildings, which might involve the removal of material from the site, it be an instruction to the committee concerned to make arrangements for all timber and other woodwork to be stacked, with a view to the same being burnt on the premises, and not to allow the same to be removed from the site unless ordered by the Board."

The Committee stated that they could not recommend the Board to agree to its adoption, as they considered that each case should be dealt with on its own merits.

MANCHESTER SCHOOL OF ARCHITECTURE.

ARRANGEMENTS have now been completed by a committee consisting of representatives of the Owens College, the Technical Instruction Committee, and the Manchester Society of Architects for giving at the Victoria University instruction and training leading to a degree in architecture. Mr. S. H. Capper, who has been appointed Professor of the new School of Architecture thus established at the University, is inaugurating his work in Manchester by delivering a series of four public lectures at Owens College. The first lecture was given on the 20th ult., when he spoke on the Monastic Orders and their architecture.

Mr. J. W. Beaumont, President of the Manchester Society of Architects, introduced the lecturer, and remarked that the recently established School of Architecture was an entirely new experiment for Manchester, and he felt certain that under the guidance of Professor Capper it would be a great success. The idea of inaugurating the school by a course of lectures open to the public was a good omen. The more the public could be induced to take an interest in the study of architecture the better it would be for the community at large and for the architectural profession. The average public man spent about one-third of his life in towns. Surely, therefore, it was incumbent upon him to see that his surroundings were of the pleasantest and most healthy kind, and he was dependent to a large extent for these things upon the architects of the city. The School of Architecture had been founded in order to give the best education possible to students of architecture, and for that reason the public ought to take great interest in it. He believed that in a few years they would see in Manchester great results from Mr. Capper's work and teaching.

Professor Capper said that it was with the object of tracing to some extent in one great movement, at any rate in European history, the connection between history and the art of architecture that he proposed to treat the subject of his four lectures. The monks and their abbeys, the great Monastic Orders of the Middle Ages, had given us at once a splendid page of European history, and perhaps an equally splendid page of architectural history. On the one hand if we went into the noble abbey of Westminster, which enshrined the history of the British people in a way that could be predicated of no other building, he thought, of any other country or time, we had history in architecture brought into the mind in a way which was quite incomparable. As Rudyard Kipling had said: "Standing in the darkness of that Abbey you can feel the wings of the dead centuries circling about your head." On the other hand if we passed into the county of Yorkshire we could not help being struck with the wonderful number, and at the same time the beauty, of the ruins there, the crumbling but still exquisitely beautiful remains of the homes of the monks who had passed away. On this the western side of northern England we had no such show of ruins, no such tributes to past history. There was, of course, the magnificent Furness Abbey, but apart from that Yorkshire could easily claim the pre-eminence in monastic ruins. Why was that? That again was a page of English history. Those ruins, so beautiful in their decay, bore witness to the savage fury of William the Conqueror and the horrors of devastation with which he overwhelmed the north of England in his final crushing and successful attempt to establish his rule. The north of England was laid prostrate. It had been, in a sense, the cradle and the nursery of civilisation in England, but it lay crushed and ruined by the devastation of William the Conqueror, and it was not until the succeeding century, until those abbeys whose ruins we now admired arose, that the work of havoc was undone, and that the land laid waste was once more brought back to fertility and tillage, and the ruin and destruction of the Conqueror were in turn effaced by the slow, patient, steady, and extremely successful work of the monks. The monks took us back to quite an early period in the story of the Christian Church. They began in the East with the ascetics, the anchorites, men who dwelt alone. In the West there arose great monastic establishments. With the help of lantern pictures Professor Capper showed the difference between the architecture of the two classes of monks. How did this difference arise? he asked. The lives led by the ascetics and the Benedictines explained the difference. The Benedictines of the West achieved their grand results simply from the fact that they started from the idea that man could work better in community than alone. Midway between these two classes were those associated with the Celtic Church. These monks lived a quasi-isolated life, but they gave us little in the way of architecture. At Iona in Scotland there was perhaps the best type of the architecture they achieved. The lecturer proceeded to deal with the rise of the Benedictine Order, which began in the sixth century, the rules of life of the Benedictines, the progress of the Order, the subsequent rise of the Clugny Order, and then the Cistercian Order, and traced the effect of these Orders on architecture. It was the Cistercians to whom we owed the recovery of the north of England from the ravages of William the Conqueror. The Cistercian movement spread with great rapidity, especially in England. The chief reason why it found such universal acceptance was the fine one that it put the tiller of the soil, the manual labourer, on very much of an equality with the monk. It was the first time such an entirely democratic view was taken up. The Monastic Orders reached their highest point about the time of the Cistercians. The monks always represented the more active and eager side of the Church in the Middle Ages. In England there was no doubt that the abbeys helped to consolidate the realm, and paved the way for King Alfred's rule. They were of incalculable service in gathering people together, as centres around which an organised life could grow, and as outposts of civilisation.—*Manchester City News.*

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Bermondsey.—A one-story shop upon part of the forecourt of No. 200, Southwark Park-road, Bermondsey Mr. E. Hills for Messrs. Carter and Sons).—Consent.

Marylebone, East.—Bay and oriel windows, balconies, and a porch upon the Weymouth-street frontage of a block of residential flats proposed to be erected on a site abutting upon Great Portland-street, Weymouth-street, and Charlotte-street, St. Marylebone (Mr. W. G. Shoebridge for Mr. L. Peczenik).—Consent.

St. George, Hanover-square.—Wood and glass enclosures to an existing portico at No. 36, Charles-street, Berkeley-square, St. George, Hanover-square (Mr. W. West for Mrs. Denison).—Consent.

Wandsworth.—Wooden porticos, with wooden balustrades over, to three detached houses, on the south side of Woodthorpe-road, Putney, westward of "Yeovil" (Mr. F. C. R. Palmer for Mr. W. H. Earland).—Consent.

Norwood.†—One-story shops upon part of the forecourt of No. 129, Coldharbour-lane, Norwood (Mr. E. E. Bird for Mr. J. Hayes).—Refused.

Norwood.—One-story shops upon part of the forecourts of Nos. 125 and 127, Coldharbour-lane, Norwood (Mr. E. E. Bird for Mr. E. Jackson).—Refused.

Kensington, South.—A studio at the rear of No. 19, Cottesmore-gardens, South Kensington, to abut upon Stanford-road (Messrs. Lee and Pain for Mr. F. Roe).—Refused.

Width of Way.

City of London.—A building on the site of Nos. 8, 9, 10, 11, and 12, Half Moon-passage, Aldersgate-street, City, with external walls at less than the prescribed distance from the centre of the roadway of the street (Messrs. Woodrow and Helsdon for Messrs. W. H. and L. Collingridge).—Consent.

Dulwich.—A two-story warehouse on the north side of a public footway leading from Camberwell-green to Camberwell New-road, Camberwell (Mr. A. E. Mullins for Mrs. S. Melhuish).—Consent.

Kensington, South.—A building on the north-east side of Hornton-street, Kensington (Messrs. Chesterton and Sons for Messrs. Daw and Son).—Consent.

Southwark, West.—Two dwelling-houses on the north-east side of Lancaster-street, Borough (Mr. G. A. Lansdown for Mr. J. E. Lamerton).—Consent.

Whitechapel.—Buildings on the northern and southern sides of Romford-street, Commercial-road East, Mile-end Old-town (Messrs. R. Plumbe and Harvey for the Chairman and House Committee of the London Hospital).—Consent.

Lines of Frontage and Construction.

Hoxton.—Iron bridges and staircases at Nos. 175, 176, and 177, High-street, and Nos. 9 to 15, Anning-street, Shoreditch (Mr. F. Dudley for Messrs. R. and J. Hill, Ltd.).—Consent.

Kensington, South.—An iron and concrete enclosure to a passengers' lift at No. 26, Kensington Palace-gardens, Kensington, to abut upon Bayswater-road (Messrs. Aldin Brothers and Davies for Lady Bouch).—Consent.

Width of Way and Construction.

City of London.†—Permission to retain temporary wooden buildings on the south side of Little Somerset-street, Mansell-street, Aldgate (Mr. L. S. Hebermann).—Refused.

Space at Rear.

Kennington.—Shops with residential flats over at No. 39, Wandsworth-road, Kennington (Messrs. J. A. J. Woodward and Sons for Mr. J. Dennis).—Consent.

Line of Frontage and Space at Rear.

Battersea.—Three buildings on a site on the north-west side of Battersea Park-road, and south side of Home-road, Battersea (Mr. E. Cannell for Mr. F. Priddis).—Consent.

Wandsworth.—The retention of nine houses with bay windows on the east side of Bective-road, Wandsworth (Messrs. Boyton, Sons, and Buckmaster for Mr. W. Hattersley).—Consent.

Deviation from Certified Plans.

Whitechapel.—Certain deviations from the plans certified by the District Surveyor, under Section 43 of the Act, so far as relates to the proposed rebuilding of No. 6, Leman-street, Whitechapel (Mr. S. Hicks for Messrs. W. Coates and Co.).—Refused.

Width of Way and Deviation from Certified Plans.

Holborn.—Building upon the site of Nos. 7, 8, and 9, Summers-street, Nos. 1 to 6, Summers-court, and Nos. 11, 12, 13, and 14, Back-hill, Hatton-garden, Clerkenwell (Messrs. J. G. and H. G. Needham for Messrs. Andrews and Verioni).—Refused.

Cubical Extent.

Fulham.—A van shed on a site on the side of Townmead-road, Fulham, which together with a building adjoining will exceed in extent 250,000, but not 450,000, cubic feet (Mr. W. T. Hanman for Messrs. Macfarlane, Lang, and Co.).—Consent.

Dwelling-houses on Low-lying Land.

Rotherhithe.—Two blocks of workmen's dwellings on low-lying land situated between Fulford-street and Seven Step-alley, Bermondsey (Messrs. Brocklesby, Marchment, and East for the Metropolitan Borough of Bermondsey).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

BOOKS RECEIVED.

LIGHT AND WATER. By Sir Montagu Pollock, Bart. (G. Bell and Sons.)

THE HOME MECHANIC. By John Wright. (John Murray. 12s.)

THE EVOLUTION OF EARTH STRUCTURE. By T. Mellard Reade. (Longmans, Green, and Co. 21s.)

ELECTRIC LIGHTING AND POWER DISTRIBUTION. By W. Perren Maycock, M.I.E.E. (Whittaker and Co. 7s. 6d.)

METAL WORKING: A Book of Tools, Materials, and Processes, etc. Edited by Paul N. Hasluck. (Cassell and Co. 6d.)

APPLIED ART EXHIBITION, CHELMSFORD.—There is to be an exhibition of applied art in the Shire Hall, Chelmsford, on December 1 to 5 inclusive; rather a short period for making the most use out of such an exhibition. The objects of the exhibition are stated in the prospectus as follows:—"(*a*) To stimulate the application of art to manufactures amongst all sections of the community; (*b*) to show the results produced by the students of the Chelmsford art classes; and (*c*) to raise funds towards the equipment and fittings of the new Chelmsford art buildings. The total net proceeds, after deducting expenses, will be handed over to the Chelmsford Technical Instruction Committee for this purpose." Among the objects exhibited will be a fine model of the Westminster Cathedral.

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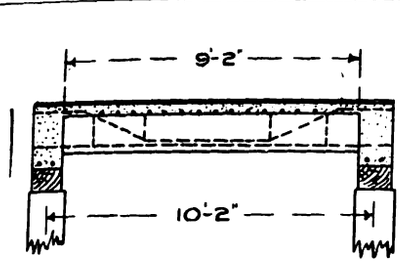
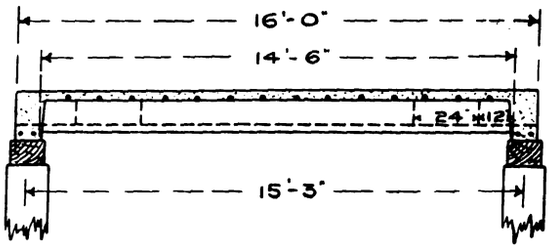


LONGITUDINAL SECTION



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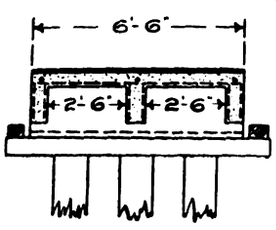
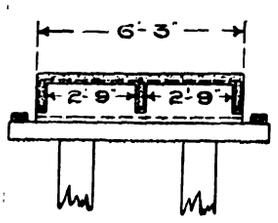


TRANSVERSE SECTION

Fig. 34.



TRANSVERSE SECTION

Fig. 35.

Illustrations to Student's Column.

The Student's Column.

CONCRETE-STEEL.—XIX.

EXAMPLES OF FLOOR CONSTRUCTION.

IN the following notes we give particulars relative to the dimensions and general construction of some typical floor slabs and complete floor systems, and in nearly every case are appended the results obtained from actual tests.

Expanded Metal Slabs.—Table XXIII contains particulars of experiments conducted by Mr. A. C. Hurtzig, M.Inst.C.E., upon concrete-steel slabs with reinforcement of expanded steel. The slabs were tested as beams simply supported at the ends, therefore the results may be assumed to be about two-thirds those which would have been obtained if the slabs had been supported along all four sides, or one-half those to be expected if the slabs had been incorporated in a floor system.

TABLE XXIII.—Expanded Steel Floor Slabs tested as Beams. (Hurtzig). Proportions of concrete by volume, Portland cement 1 ; sand 1 ; Thames balla t 2 : water 0 5.

Mark of Slab.	Expanded Steel.		Slab.			Breaking Load.		Centre Deflection. (Total breaking load = 1·00.)			
No.	Mesh.	Strand.	Clear Span.	Width.	Age in Days.	Total.	Per sq foot.	0·25	0·5	0·75	1·00
	in.		ft. in.	ft. in.		lbs.	lbs.	in.	in.	in.	in.
1	3		6 6	2 0	63	6,720	516·32				
2	3		3 6	2 0	63	0,408	1,344·00				
3	3		6 6	2 0	63	7,302	568·06				
6	3		3 6	2 0	63	13,440	1,919·68	—			
A	3		6 6	2 0	77	6,720	516·32				
B	3		3 6	2 0	77	15,456	2,209·76				
C	3		6 6	2 0	77	16,800	2,400·16				
D	3		6 6	2 0	77	7,392	567·84				

Table XXIV.—Test of Expanded Steel Floor Slab (supported on four sides). Proportions of Concrete :—Portland Cement, 1 ; Fine Clinker, 4 ; Age, 49 days.

Distributed Load per sq. ft.	Deflection at centre.	Remarks.
lbs.	in.	
112	—	No deflection.
140		
224		
280		
336		Measured after an interval.
392		Slight crack on underside extending from corner towards centre.
448		
532	—	Crack across centre in direction of longest span.
588	—	Load carried 1½ hours, slab then collapsed.

Table XXIV. shows the deflection of a concrete-steel slab as reported by Mr. A. T. Walmisley, M.Inst.C.E.* This slab measured 12 ft. 6 in. by 11 ft. by 5 in. thick, and was composed of 1 : 4 clinker concrete, with expanded metal reinforcement near the under surface. The metal had a 3 in. mesh, and ¼ in. by 3-16 in. strands, and was laid in four sheets with a 12 in. lap, the overlapping meshes being secured by steel clips. A 3 in. support was provided along the four sides of the slab.

Expanded Metal Floor for Office Building.—A series of useful tests upon an expanded metal floor was conducted in 1900 by Dr. Bovey and Mr. Kennedy at La Presse Building, Montreal. The floor slab was essentially a sheet of concrete about 3 in. thick, reinforced by expanded steel embedded about 1 in. above the lower surface. The sheet rested upon steel girders and floor joists encased in concrete, both connected with the same material in the floor slab.

It will be seen that although the slab was of concrete-steel, the floor as a whole does not represent true concrete-steel construction. For this reason we do not state any of the results obtained from test No. 1 upon the complete floor.

Test No. 2 related to one panel of the slab, and is suitable for our present purpose. This panel measured 13 ft. 2 in. by 7 ft. 4 in. between the supports, and 3 in. thick. A layer of sand was spread about 12 in. wide over the middle of the panel along the 13 ft. 2 in. span. Over this a pine board 1 ft. wide was laid for supporting the load.

The uniformly distributed load upon the panel was 240.3 lbs. per square foot, and the maximum concentrated load was 120 lb. per square foot spread over the longitudinal axis for a width of 12 in.

Table XXV. gives the deflection under the several loads applied.

After removal of the external load, the deflection was found to be 0.02 in. at the left support, 0.04 in. at the right support, and 0.02 in. at the centre of the span.

Test No. 3 related to a panel measuring 14 ft. by 6 ft. by 3 in. thick, under a heavy distributed load.

A thin layer of sand was spread over the slab, and on this 1 in. pine boards were laid, upon which pig iron and bags of sand were placed. Table XXVI. shows the central deflection under the various loads.

Table XXV.—Test of Expanded Metal Floor Panel (Concentrated Loads).

Total Load in lbs.	Deflection in inches.		
	At Supports.		At Centre.
	Left.	Right.	
2,500	0·045	0·08	0·07
5,000	0·100	0·13	0·14
8,000	0·140	0·19	0·22
10,000	0·180	0·24	0·28
11,580	0·220	0·28	0·34

Table XXVI.—Test of an Expanded Metal Floor Panel. (Heavy Distributed Loads.)

Total load in lbs.	Time.	Load in lbs. per sq. ft.	Deflection at centre in inches.
0	10.15 a.m.	—	—
12,320	10.55 a.m.	0·120	128·6
22,800	11. 5 a.m.	0 285	238·5
32,800	—	0 505	343·1

After removal of the load, the recovery was as follows :—

Total load in lbs.	27,800	25,300	0
Central deflection in ins.	0.500	0.480	0.085

A little later the deflection at the centre became 0.08 in., and it was thought that further recovery would be evidenced after a longer interval had elapsed.

Ransome Floor Panel (experimental).—Comparative tests of full-size floor panels were made in September, 1902, for the Building Department of the Borough of Richmond, New York. These experiments were intended to throw light upon the actual relation of theory to practice in commercial construction, and to satisfy the officials as to the strength of the Ransome system of twisted steel reinforcement.

The concrete in the first floor tested was mixed in the proportions of 1 part of Portland cement, 2 parts clean sharp sand, and 4 parts gravel varying from ¼ in. to ¾ in. diameter, and sufficient water was used to flush readily to the surface in tamping.

Deflection was measured, by means of an engineer's level, on a rule set upon the middle of the centre joist, and also on top of the concrete over the supports. The differences of these readings permitted correction for any errors due to settlement of the supports. The total displacement was also checked by means of a bevelled gauge moved between a hori-

* Proc. British Association, 1900.

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zontal straight-edge and the lower side of the centre joist.

A section of the floor is given in Fig. 34, and the following statement shows the details of construction:—

Top Slab.—9 ft. 2in. long between main girders, 6 ft. 6 in. wide, 3½ in. thick with ¾ in. granolithic finish, reinforced with ¼ in. square twisted steel bars near the lower surface, and spaced 6 in. centre to centre.

Main Girders.—6 ft. 6 in. long by 24 in. deep by 12 in. wide, spaced 10 ft. 2 in. centre to centre, each reinforced with two ½ in. square twisted steel bars 2 in. above the lower surface.

Floor Joists.—9 ft. 2 in. long by 13½ in. deep below floor slab, by 6 in. wide, spaced 3 ft. centre to centre, reinforced with two ⅞ in. square twisted steel bars placed horizontally, two ⅞ in. square bars bent upwards towards the ends of the joists and anchored into the main girders, and four ⅜ in. U-shaped stirrups placed vertically.

From this description it will be seen that the complete panel formed a structure comprising a slab, two girders and two joists forming an outer frame, and one joist acting as a central rib.

It should be noted, however, that continuous supports were fixed below the two end girders, so that these members were not subjected to any direct load.

Loading was effected by piling pig iron over the middle joist on a width of 3 feet between the end girders, and when the load of 110,218 lb. or 4,007 lb. per square foot, was reached, the central deflection was about 1-16 in.

As no more pig iron was then available, it became necessary to abandon the test. Consequently, no theoretical deductions could be established, but the result quoted is quite sufficient to show the strength and rigidity of the construction.

Two other floors were afterwards tested, one of concrete made as stated above, and the other of concrete mixed in the proportions of 1 part Portland cement, 2 parts sand, and 4 parts ¾ in. screened trap rock.

Fig. 35 shows the section adopted, and the details of these floors were as follows:—

Top Slab.—14 ft. 6 in. long between main girders, 2½ in. thick, reinforced with ¼ in. square twisted steel bars near the lower surface, and spaced 12 in. centre to centre.

Main Girders.—6 ft. 3 in. long by 18 in. deep by 9 in. wide, spaced 15 ft. 3 in. centre to centre, each reinforced with two ⅜ in. square twisted steel bars 2 in. above the lower surface.

Floor Joists.—14 ft. 6 in. long by 9 in. deep below floor slab, by 3 in. wide, spaced 3 ft. centre to centre, reinforced with one ¾ in. square twisted steel bar placed horizontally, and anchored into the main girders, and four ¼ in. U-shaped vertical stirrups.

Tables XXVII. and XXVIII give the centre deflections under various distributed loads for these two floor panels, the loads being applied on a width of 3 feet, as in the other case, between the end girders, which were supported on timber frames resting on piles.

In the gravel concrete panel, the first sign of failure was observed between loads of 28,652 lb. and 30,952 lb. Fine vertical cracks then appeared at regular intervals near the centre of the span, diagonal shearing cracks appeared at 30,952 lb. load, about 2 ft. from the supports, and these cracks increased in size until at the maximum load the openings were about ¼ in. wide. Cracks were also developed at the junction of the floor slab with the supporting girders.

In the stone concrete panel, the first evidence of failure occurred between loads of 25,477 lb. and 28,756 lb., when diagonal shearing cracks commenced, and increased proportionately with the loading.

Both panels showed a satisfactory degree of elasticity, but the concrete made with gravel proved to be stronger than that made with broken stone.

Failure resulted from shear, and not by exceeding the ultimate strength of the steel in tension or of the concrete in compression. This result shows the advantage to be derived from the use of reinforcement disposed so as to withstand shearing stresses.

Ransome Floor for a Foundry.—This floor was built in Paterson, New Jersey, for a foundry having a main building 100 ft. long by 88 ft. wide, and a wing 100 ft. long by 22 ft. wide. The floor was built at street level, and was proportioned for a load of 250 lb. per square foot. It was made in panels 22 ft. long by 5 ft. 6 in. wide, the material being 2 : 3 : 5 Portland cement stone concrete. The beams, joists, and floor slab are reinforced with twisted square steel bars in accordance with the Ransome system.

Table XXVII—Test of Ransome Floor Panel (Supported at Each End). Gravel Concrete Steel—14 ft. 6 in. Span.

Distributed Load		Centre Deflection in inches.
Total in lbs.	Per sq. ft. in lbs.	
9,800	225	1/16
11,046	254	1/16
13,523	310	1/16
16,642	382	1/16
19,578	450	1/16
22,696	521	1/16
25,501	586	1/16
28,652	658	1/16
32,680	752	1/16
35,800	822	1/16

Table XXVIII.—Test of Ransome Floor Panel. (Supported at Each End). Stone Concrete-Steel—14 ft. 6 in. Span.

Distributed Load.		Centre Deflection in inches.
Total in lbs.	Per sq. ft. in lbs.	
9,559	219	1/16
11,228	258	1/16
13,900	319	1/16
16,528	379	1/16
19,879	456	1/16
22,925	527	1/16
25,477	585	1/16
28,756	661	1/16
31,097	712	1/16
32,784	753	1/16

The floor slab is 4 in. thick, with a ¾ in. finish of 1 part of cement and two parts of sand with 50 per cent. ½ in. gravel, and is reinforced with ¼ in. square bars spaced 6 in. apart.

The slab is carried by concrete-steel joists, 22 ft. long by 7 in. wide at the top, tapering down to 6 in. at the bottom, and projecting 12 in. below the slab. The joists are spaced 5 ft. 6 in. apart, and are reinforced at the bottom with two 1¼ in. square bars.

The joists are carried by concrete-steel girders, supported on cast-iron columns, which are spaced 11 ft. apart in rows 22 ft. apart. The girders are 14 in. deep by 9 in. wide at the top, tapering down to 8 in. wide at the bottom, and are reinforced by two 1¼ in. square bars.

Both the girders and the joists are monolithic with the floor slab, and each section of 22 ft. by 11 ft. was completed in one continuous operation. At the walls, the girders are supported on steel I-beams framed into the columns.

Since the completion of the floor, core ovens have been built upon it, heavy castings have been moulded and poured at any convenient part, and 20-ton loads have been wheeled across it on the flanges of a four-wheeled truck with a 6 ft. by 2 ft. wheel base. In spite of these severe practical tests, no perceptible deflection has been noticed, and no cracks or chippings have been observed from impact. The shafts for an electric motor and a blower are suspended from the floor by bolts in holes drilled through the concrete, and the bearings are said to be quite firm and solid, while there is no sign of difficulty from vibration.

Ransome Floor for a Power House.—A floor similar to that described above, is in use at the power house of the Edison Electric Lighting Company, Paterson, New Jersey. The floor slabs are 10 ft. by 4 ft. by 4 in. thick, and are reinforced by ¼ in. square twisted steel bars spaced 12 in. apart. The floor joists are 10 ft. long by 15 in. deep by 4 in. wide, and are reinforced with single ⅞ in. square twisted steel bars near the bottom. The main girders are 12 ft. long by 18 in. deep by 9 in. wide, and are reinforced with three 1 in. square twisted steel bars near the bottom.

Although this floor was only calculated for a load of 250 lb. per square foot, it showed no sign of permanent set or injury under a test load of 500 lb. per square foot applied when the concrete was forty days old, and the elastic temporary deflection proved to be less than 1-32 in.

OBITUARY.

MR. A. C. KENNARD.—We much regret to have to announce the death of Mr. A. C. Kennard, one of the partners of the Falkirk Iron Company, and Chairman of the Blaenavon Iron Company. The deceased gentleman, who was a J.P. for Stirlingshire, was the son of the late Mr. R. W. Kennard, M.P. for Newport, Isle of Wight, and has all his life been associated with the iron trade, as represented by the two important firms above mentioned.

MR. HARDMAN.—We have to announce the death, at his residence, St. John's, No. 150, Hagley-road, Birmingham, of Mr. John Bernard Hardman, in his 61st year. Mr. Hardman was chief partner and principal of the two firms of Messrs. John Hardman and Co., and Hardman, Powell and Co., of Birmingham and No. 24, Haymarket, London, stained-glass manufacturers and metal workers; the former and older firm was founded by his father, a friend of A. W. Pugin. He was educated at St. Mary's College, Oscott, the Oratory at Edgbaston, and the Catholic University of Dublin. Thirty years ago Mr. Hardman was invited by the British Commissioners of the Vienna International Exhibition to be English juror for exhibits of art metal-work and jewellery; for his services on that occasion he received the knighthood of the Order of Franz Josef of Austria. In the course of last year Mr. Hardman, who played a useful, albeit unostentatious, part in municipal and local affairs, was elected Chairman of the Board of Management of the General Hospital, at Birmingham, which he joined in 1876; he served for a while on the Committee of the General Dispensary. During the period 1879-1895 he was a member of the Town Council, and took a warm interest in the material and commercial progress of the city of Birmingham. In recognition of his liberal benefactions and valued services to the Roman Catholic Church, and mainly in the diocese of Birmingham, he, in February, 1901, received a papal brief from the Vatican conferring upon him knighthood in the Order of St. Gregory the Great.

GENERAL BUILDING NEWS.

WESLEYAN METHODIST CHURCH, ROTHERHAM.—On the 29th ult. the foundation-stone was laid of the Kimberworth Wesleyan new School-Chapel. The new building will be used for preaching services until the larger church is built, and the old chapel, in the meantime, will be renovated and adapted for the Sunday school. The present scheme consists of a central hall, 59 ft. long by 29 ft. wide, with classrooms opening direct into it on either side, having glazed screens between with lifting sashes. The infants' classroom is 23 ft. by 12 ft. 6 in., and is divided from the central hall by a folding glazed partition, the whole of which can be folded back, and the infants' room would then form a transept addition to the assembly hall. At the opposite corner there is a minister's vestry with lavatory, etc. In order to make use of the fall in the site, a basement is provided at the front, which consists of a church parlour, 18 ft. by 11 ft. 6 in., ladies' lavatory, also a kitchen, heating vault, and coal place. The style is fifteenth century Gothic. The accommodation is as follows:—Children, including the classrooms, about 480; or adults, excluding classrooms but including transept, about 300. Mr. J. E. Knight, of Rotherham, is the architect, and Mr. Richard Snell the builder.

WESLEYAN CHURCH, COLCHESTER.—The memorial stones of a new Wesleyan Church now in course of erection at the corner of Harsnett-road and Wimpole-lane, Colchester, were laid recently. The building, which is in the Gothic style, and will be adorned with a spire, is of red brick and stone, and is being constructed by Messrs. Dobson and Son, to the designs of Messrs. Goodey and Cressall, architects. It will provide seats for 500 persons, whilst the schoolroom will accommodate 250. The estimated cost of both buildings is 5,000*l.*

COTTAGE HOME, STYAL, WILMSLOW.—On the 28th ult. the additions to the cottage homes at Styal, near Wilmslow were opened. They will provide accommodation for another 120 children and officials. Mr. J. H. Broadbent (Manchester) was the architect. The cost of the work was 10,450*l.*

PARISH HALL, EASINGTON, DURHAM.—The corner stones of a new parish hall were laid at Easington recently. The total cost of the building amounts to about 1,300*l.* The architects are Messrs. Potts and Sons, Sunderland. The builder is Mr. Ramshaw, of Haswell. The building measures 68ft. by 26ft. and has a class-room 20ft. by 16ft. It will seat 300 persons.

WORKMEN'S CLUB, NEWSHAM, NORTHUMBERLAND.—The new premises which have been built by the New Delaval and Newsham Work-

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men's Club, at Newsham, were opened recently. The building is of red bricks, with stone facings, and has been erected by Mr. William Redford, contractor, from plans prepared by Mr. John Goulding, architect, Blyth. The contract price amounted to 2,030*l.*

GRANGE U.F. CHURCH, GRANGEMOUTH, NEAR GLASGOW.—This new church, which was opened on the 29th ult. is a severe type of early English Gothic. The principal or longest front, in which is the main entrance, faces Grange Bank-road, along which it extends 126 ft. A square tower, about 70 ft. high, is placed at the north end of this front, and the principal entrance is at the base of this tower. The entrance doorway is deeply recessed, and has a moulded pointed archway leading into the vestibule. Internally the church is divided into nave and side aisles by the three pointed arches on each side. At the pulpit end an arch of wide span divides the church from the organ chamber, which is continued beyond the church. The ceiling is semi-octagonal in form, divided into bays by the main couples, and lined with dressed timber, which has been stained a dark oak shade. The church will seat over 630 persons, and the hall in connection is seated for 400 people. There are also a large session-room, vestry, etc. The total cost is expected to be about 4,000*l.* The architect is Mr. John B. Wilson, Glasgow.

CREMATORIUM FOR LEEDS.—It is proposed to erect a crematorium at Lawnswood cemetery, at Adel, Leeds. The plans have been prepared by Mr. W. S. Braithwaite, architect, of Leeds.

MASONIC HALL, BALLYMACARRETT, BELFAST.—A new masonic hall, Ballymacarett, Belfast, is now in course of erection. Messrs. Graeme-Watt and Tulloch are the architects. The total cost will be about 3,000*l.*

MISSION HALL, OTLEY.—A new Primitive Methodist Mission-hall in Leeds Road, Otley, has just been opened. The structure, which is of stone, will serve the purposes of a church and Sunday school. The main hall is 24 ft. by 35 ft. 6 in., vestry 12 ft. by 9 ft., and scullery 6ft. by 9 ft. The woodwork is of pitchpine, and the seating accommodation is for 150 people. Mr. Wall (Fairbank and Wall), Otley, is the architect.

GRANTHAM NURSES' HOME.—A new nurses' home has been erected at Grantham, in memory of the late Queen Victoria. The home is situate in Castle Gate, and the building has a frontage of 30 ft. to that street, with a depth of 80 ft. The south and west walls are treated in red brickwork, with Bath stone plinths and bands up to the chamber floor level, and above that with timber framing, filled in with rough cast plaster. On the west front there is a large octagon bay window in Bath stone, with moulded jambs and mullions, and above an overhanging gable, carried up in timber work and plaster and supported on wood brackets. To the right of the main entrance a lobby leads to the kitchens, and in front is a screen, with door leading to the hall. Off the hall is a small room intended for the reception of visitors, and further up is the nurses' sitting-room and the boardroom. A staircase leads to the upper rooms, consisting of four bedrooms and bathroom on the first floor, and two attics on the second. The contract has been carried out by Messrs. Rudd and Son, of Grantham, under the supervision of the architect, Mr. R. J. Girling, of Buckminster.

CLUB, MOSTON, LANCASHIRE.—A new building has been erected in Dean-lane by the Moston Conservative Club Company, Ltd. The building has been erected by Mr. T. H. Thomas, of Manchester, under the superintendence of Mr. E. W. Leeson, architect, whose designs were chosen in competition.

CHURCH, SALFORD.—The new Church of St. Ignatius, Salford, has just been consecrated. The building fronts Oxford-street, leading into Regent-street, and is bounded on the east and south by new streets recently made by the Corporation of Salford. The material is brick, with terra-cotta dressings, and the nave columns are of mottled red Runcorn stone. The east end is apsidal, and the columns of the arcading are of variegated serpentine, the circular-headed panels being filled with mosaics representing vases of lilies on a gold ground. The altar table and reredos are executed in oak, chestnut, walnut, and yew grown on the Tatton estate, and the picture of the Last Supper has been painted by the Hon. Mrs. Mitford, with gold background and other enrichments in gold. The altar cloth and frontal of silk, ornamented with white lilies and gold cross, have been embroidered by the Duchess of Buckingham and Chandos. A campanile is placed at the west, or Oxford-street, end. Opposite the west door is a recess containing a font of Caen stone with granite shaft. In addition to the usual church accommodation, a parish room is provided in the basement under the choir vestry and south transept, with separate entrance from the new street on the east side. The buildings throughout are supplied with electric light from the Corporation cables. This portion of the work has been executed by Messrs. F. W. Smith and Company, of Salford, and the terra-cotta is the work of Mr. Jabez Thompson, of Northwich. The church has been erected from the designs and under the superintendence of Messrs. Darbyshire and Smith, architects; and the whole of the work has been carried out under contract by Messrs. W. Brown and Son, contractors, of Salford. The actual cost of the structure and parish room, with its furniture, is about 9,461*l.*

HOSPITAL, LARNE, IRELAND.—The Smiley Cottage Hospital, Larne, has just been completed, and will soon be ready for occupation. The building has a frontage of 140 ft., and the central block has a depth of over 80 ft. All the outside walls are built hollow, the lower portion being faced with Belfast red perforated bricks, and the upper portion pebble dashed, with the gables in half-timber work. The roofs are covered with red Staffordshire tiles. The central block contains on the ground floor the boardroom, matron's room, nurses' dining-room, with kitchen, scullery, pantries, and storerooms. The wards for male and female patients, each of which is designed to accommodate six adults, are situated on each side of the central block, and at the extreme ends of the building and communicating with the wards are dayrooms, which are so designed that in case of emergency each will accommodate four additional beds, which brings the total accommodation of the ground floor up to twenty beds. In connexion with each ward, but cut off by corridors opening to the outer air, are bathrooms, etc. In the rear, and connected to the central hall by a short corridor, is the operating-room. On the first floor are three private wards, and five bedrooms for nurses and servants, with two sets of baths, etc., for patients and staff. In the rear of the building, and having a separate entrance from the yard, are a washhouse and laundry. A large drying-shed is also provided in the yard, and a shed for an ambulance carriage. The central hall is panelled in oak for a height of 8 ft. from the floor, which, with the floors of the corridors, is laid with oak parquet. The floors of the operating-room, bathrooms, etc., are laid with marble terrazzo, and all the other floors are of selected maple, wax polished. Almost the whole of the internal plaster work has been done in Keene's cement. The operating-room, which is top-lighted, has its walls covered with ivory white glazed tiles. The wards, dayrooms, operating-room, hall, and corridors are heated throughout with hot-water pipes and radiators on the low-pressure system. Open fireplaces are also provided in all rooms. The wards, etc., are ventilated by galvanised iron extraction tubes in the ceilings, connected to exhaust ventilators in the roofs, and Tobin's tube inlets in the walls. A small mortuary fitted up for post mortems is provided in a separate block at the rear of the site. The work has been executed by Mr. James Ferris, of Larne, while the sub-contractors engaged were: Heating, Messrs. Musgrave and Co., Ltd., of Belfast; ventilation, Messrs. Donald and Donald, of Glasgow; plumbing and gasfitting, Messrs. Kilpatrick and Son, of Paisley and Larne; parquet and terrazzo floors, Mr. J. F. Ebner, of London; stained and leaded glazing, Messrs. George Walton and Co., of Glasgow; wrought-iron gates and railing, Mr. George Jones, of Belfast. The whole of the work has been carried out from the designs and under the supervision of Mr. N. Fitzsimons, architect, of Belfast, with Mr. William Harpur as clerk of works.

PROPOSED NEW WESLEYAN CHURCH, MEXBOROUGH.—The Wesleyan Methodists of Mexborough are about to build a new church, and it is proposed to spend over 4,600*l.* on the scheme. A central site in Bank-street has been acquired, plans have been drawn up and approved, and the work will be put in hand at Christmas. The architects are Messrs. John Wills and Sons, of Derby and London, and the contract has been given to Messrs. C. Sprakes and Son, of Doncaster.

CLUB AND VILLAGE HALL, EMBLETON, NORTHUMBERLAND.—A club and village hall has been opened at Embleton, Northumberland. The building is constructed of local basalt whinstone, with Accrington red brick facings and rough cast gables. The west portion of the structure provides for separate clubs for men and women, having billiard-room, reading-rooms, library, and four rooms upstairs for caretaker. On the east of the club rooms is the large hall, 65 ft. by 27 ft., with stage 15 ft. by 27 ft., under which is a store for tables and stage apparatus. On either side of the platform are separate retiring-rooms for the ladies and gentlemen, which are so placed as to be also available for additional reading-rooms or committee-rooms for the men and women's clubs. The work has been carried out by Messrs. Elliot Bros., contractors, Preston, from the plans of Mr. J. Wightman Douglas, architect, Alnwick and Newcastle, whose designs were selected in competition.

LONDON BAPTIST ASSOCIATION CHURCH, STREATHAM.—This building occupies a corner site in Mitcham-lane. The portion of the church erected at present includes the nave and aisles, as far back as the transepts, galleries, tower and temporary apse, also two vestries which form a church parlour when the dividing folding partition is thrown back. The buildings are designed in a late period of Gothic, faced in red brick and stone dressings. The seating is circular on plan, in orham wood, wax finished; the pulpit is in oak and handsomely traceried and panelled. The accommodation provided is: On the ground floor, 270 adults, in gallery, 200 adults, total 470. In the complete scheme there will be 856 sittings, for a mixed congregation of about 1,000 persons. The architects are Messrs. George Baines, and R. Palmer Baines, London.

CHURCH, DALMUIR.—On the 29th ult. the new church which has been erected in Dumbarton-road, Dalmuir, was opened. The building will provide accommodation for 800 people. Mr. G. A. Paterson, of Glasgow, was the architect, and the total cost of the work is 5,000*l.*

WORKING CLASS DWELLINGS, ROTHERHITHE.—On the 31st ult. the foundation-stone was laid at Rotherhithe of a block of dwellings for the working-classes. The new tenements will provide for 980 persons. The design for their erection was thrown open to competition, and, on the adjudication of Mr. John Slater, that submitted by Messrs. Brocklesby, Marchant, and East was adopted. The estimated cost will be about 41,000*l.*, and the ground rents of the site will be about 2,800*l.* As planned, there will be twenty-five single rooms, 165 tenements of two, and forty-three of three rooms each. The builders are Messrs. W. Lawrence and Son, of Waltham.

METHODIST CHURCH, KINGSTOWN, DUBLIN.—The foundation-stones of a new Methodist Church have just been laid in Kingstown. Mr. G. F. Beckett, of Stephen's Green, is the architect of the new church, and the builders are Messrs. J. and P. Good, Limited.

PROPOSED ISOLATION HOSPITAL, BURSLEM.—Mr. R. J. Reece, M.D., an inspector of the Local Government Board, recently held an inquiry into the applications of the Burslem Town Council for sanction to borrow 13,000*l.* for the provision of an infectious diseases hospital, and 275*l* for the provision of a disinfecting station and apparatus. Mr. R. T. Longden, architect for the hospital, submitted and explained the plans of the proposed building. He stated that the site was situated three-quarters of a mile from the centre of the town, and the cost of the land, including a house, which would be converted into part of the administrative block, was 3,000*l.* He also explained that three diseases were proposed to be treated at the hospital—diptheria, scarlet fever, and typhoid fever—and the accommodation provided consisted of 40 beds, together with three convalescent wards. After Mr. Longden had explained the plans in detail, the Inspector suggested that for the purpose of providing more sleeping accommodation for the nurses, an additional story should be added to the administrative block.

MISCELLANEOUS.

INSPECTION OF DANGEROUS BUILDINGS, MANCHESTER.—At a meeting of the Improvement and Buildings Committee of the Manchester City Council on the 27th ult., the City Architect (Mr. H. Price) presented a Report on the inspection of property. In August last a Report was submitted on the collapse of certain property in Henry-street, Ancoats, by which two children were killed, and the subsequent verdict of the coroner's jury, in which the opinion was expressed that there had been negligence on the part of the Corporation Inspector of Dangerous Buildings. At present, it was stated, there is only one Inspector of Dangerous Buildings employed by the Corporation, whose duties covered the whole of the day. It was only possible for the Inspector to deal with properties to which his attention was called by the police or the sanitary department, and his time was so fully occupied that it was impossible for him to make anything like an inspection of any district with a view to the discovery of dangerous properties. During the last three months 330 reports had been received from various sources, necessitating 450 visits, or about six a day. There had been served also 244 preliminary notices as the result of these visits. Twenty-four notices under the Public Health Act were sent to various owners. Dangerous buildings required immediate and continued attention, until the source of danger was removed. The City Architect complained that this work, under the present arrangement, was inadequately performed, not on account of any failing on the part of the Inspector employed, but by reason of the large area covered and the increasing number of dangerous buildings. Building inspection, to be satisfactory, must be regular and frequent. Whatever arrangements, if any, were made by the Committee, each Inspector, the Report urges,

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should in the first place be held responsible for his own district.

MEMORIAL TO QUEEN VICTORIA, CROYDON.—On October 27, the Princess Louise unveiled a memorial statue of Queen Victoria, which has been erected upon a site in front of the Town Hall and Municipal Buildings at a cost of nearly 1,000*l*. The fund, raised by public subscription, amounted to about 1,300*l*., and the balance will be given to the Croydon General Hospital. The statue, executed by Mr. Williamson, of Esher, represents the Queen seated, wearing her crown and State robes, and holding the sceptre in her right hand.

PROPERTY IN KENSINGTON.—The sale is fixed for November 18 and 19 next of Lord Kensington's freehold property in the Earl's-court district, which at present yields in ground-rents an aggregate of about 2,500*l*. per annum, with reversions, beginning at Christmas, 1905, to rack rentals estimated at upwards of 40,000*l*. per annum. The sale extends to Edwardes-square and Pembroke-square, to the former of which belongs a beautiful garden extending over three acres. The projected destruction of that garden has aroused a considerable amount of public feeling, and, as recorded in our columns, has prompted certain steps taken by the London County Council. Other portions of the estate consist of a part of Kensington-crescent, and the terraces on the south side of the main road opposite Holland Park. The houses on the east side of Hornton-street, leading from High-street to the top of Campden-hill, are gradually being demolished for the building, by Messrs. C. A. Daw and Son, contractors, of a row of about twenty houses, after the plans and designs of, we understand, Mr. Frank S. Chesterton, for Sir Walter G. F. Phillimore, Bart.

FLOODING OF BASEMENTS OF HOUSES.—In connexion with this subject, the last four-weekly Report of Dr. Orme Dudfield, the Medical Officer of Health to the Borough of Kensington, contains the following remarks:—"In the morning of the 15th inst. there was a somewhat heavy rainfall at North Kensington, with the result that a considerable number of houses in St. Mark's-road and Silchester-road, in that district, were again flooded, shortly after six o'clock. The inundation was not to the same extent as on September 4, the depth of water above the flooring of the basements being only some three inches. But, of course, the usual unpleasant consequences were experienced, by the deposit of filth under the floors, so much more difficult to get rid of than filth on the surface. On the morning in question it was high water at London Bridge at 8 a.m., and therefore I assume that the storm water and sewage could not have been discharged direct into the river at Lot's-road, when the flooding happened, but would have to be lifted by the pumps. I understand that apparatus has been provided at the station for automatic signalling when the water in the Counter's Creek sewer attains a certain height, so that the pumps may be put in motion by, or without, the order of the engineer at the Western Pumping Station (1¼ miles distant) under whose direction the Lot's-road station has been placed. It would be interesting to know how many pumps were at work, and at what precise time pumping began? Obviously some time must elapse before the flood water can begin to make its appearance at Chelsea, and before that happens the mischief may have been done. It is beginning to be feared that the station will not be able to overtake the work for which it was built. Be this as it may, it is to be desired that the County Council should put in hand, as soon as practicable, the construction of the new main sewers designed for the purpose of preventing these terrible floodings. The plans, I believe, have long since been prepared, and, as I understand, approved. It might be well that the Council should communicate with the County Council on the subject."

"BRAINTREE CHURCH."—In the article on the above in our last, "the neighbouring town of Barking" should have been "the neighbouring town of Bocking."

A ROMAN VILLA IN GLOUCESTERSHIRE.—While searching for some Roman remains found by a farmer named Adey at Ifold, near Painswick, in 1868, but of which no details came to light or print, Mr. St. Clair Baddeley, of Rome, has laid bare a good mosaic pavement, and found a base, cap, and column of local stone, with mouldings of a superior type.—*Times*.

MEMORIAL WINDOW, YATE, GLOUCESTERSHIRE.—A stained-glass window, dedicated to the late Rev. G. L. Harvey, has just been placed in the parish church of St. Mary, Yate. The memorial has been executed by Messrs. J. Bell and Son, of Bristol.

LONDON WATER.—At Tuesday's meeting of the London County Council the Water Committee reported as follows:—"During the three months ended 30th September last 624 samples of water were taken by the chemist from the metropolitan water companies' mains, and 234 samples from the rivers Thames and Lee above the intakes of the water companies. The chemist has submitted to us his report on the results of the analysis and the microscopical and bacterial examination of the samples, and we find that the results clearly show that the filtered water supplied to consumers during the three months was generally inferior to that supplied during the corresponding period of last year, the quantity of nitrogenous organic matter present in the water being generally much greater. The character of the filtered water was on many days bacterially and microscopically of indifferent quality, and the chemist expresses the opinion that the water drawn from the mains of some of the companies was on several occasions undesirable for drinking purposes. As the water supplied by the Kent Waterworks Company during the latter part of August was found to be organically of an entirely different character to that usually supplied, thirteen special samples were collected from the mains of the company. The water was found to have a distinct colour, and although the total organic matter contained in it was not much greater than usual, the nitrogenous organic matter present was from one and a half times to five times as great. A careful consideration of the results leads to the belief that the water supplied by the company was more or less contaminated with water of a much inferior degree of purity. The chemist has also, at the request of the Metropolitan Water Board, examined a number of samples taken from the wells belonging to the Kent Waterworks Company. Seven out of thirteen samples were organically of the character and quality usually supplied by the company, while five others contained a little more nitrogenous organic matter, one of them having a remarkably high percentage of mineral matter present. The remaining sample was largely polluted owing to special circumstances. Our attention has been called to the analysis, by the public analyst of the Metropolitan Borough of Southwark, of samples taken from the mains of the Southwark and Vauxhall Water Company and the Lambeth Water Company on 14th and 15th September respectively. The amount of total organic matter present was not ascertained, but the results of the analysis of the samples in other respects are confirmed by those obtained in the Council's laboratory on the same day. It appears, however, that a much larger quantity of nitrogenous organic ammonia was present on several other days before and after the dates mentioned, and we would therefore point out that analyses made intermittently are of no use to the consumers as a check on the water supplied to them, and that a partial analysis is often misleading."

THE USHER HALL, EDINBURGH.—At a meeting of the Lord Provost's Committee of Edinburgh Town Council on the 21st ult., it was agreed, by ten votes to two, to approve of the recommendation of the Sub-Committee with regard to the preparing of plans for the erection of the Usher Hall. The recommendation was in favour of the plans being entrusted to Mr. Morham, the City Superintendent of Works, and his staff.

LEGAL.

EMPLOYERS' LIABILITY ACT.

HOW SHOULD THE WORKMEN BELOW BE PROTECTED?

AT the Brompton County Court, on October 30, before Judge Stonor and a jury, John Papworth, a joiner, 33, Archell-road, Fulham, S.W., brought an action, under the Employers' Liability Act, against the London Exhibitions Company, Ltd., Earl's Court, S.W., claiming 300*l*. in respect of personal injuries, said to have been sustained owing to negligence on the part of the defendants or their servants.

Mr. Arthur Page, counsel, appeared for the plaintiff, and Mr. J. W. Moyses, counsel, for the defendants.

The plaintiff stated that in March last he was in the employ of the defendants, assisting in the erection of the "Chop House" at the Earl's Court Exhibition. He had to take his orders from the foreman of the job, Proctor, who was under the leading hand, Smith. Two carpenters were working at the under portion of the gable roof, below which a level ceiling was to be formed—although the ceiling joists were not yet fixed—and underneath, on the floor, plaintiff and another man were working. For the men above to stand upon were two 7 in. by 2½ in. planks, laid side by side between two of the principals. These two men, it appeared, were shifting a plank, which fell and struck plaintiff with great force upon the lower part of the back and head. For two months he was in bed, and he was still attended by a doctor.

The plaintiff bore out counsel's opening statement. He added that he had had some fifteen years' experience in the trade, and maintained that, instead of having only two 7 in. planks to stand upon, the men above ought to have had a temporary floor of 3 ft. wide. This, he understood, was generally recognised in the building trade.

In cross-examination, plaintiff said that Proctor was a joiner like himself; but, at the same time, he had to obey Proctor's orders; and it was in accordance with the latter's orders that he was working below the two men at the roof. It was true that, since the accident, the defendants had offered him 2*l*. per week; but it was not a fact that he declined to take this money; he merely refused to sign any receipt or document whatever.

Re-examined: Smith took him to Proctor, and said that whatever Proctor told him to do he was to do.

John Henry Neal, a carpenter and joiner, working with the plaintiff at the time of the accident, corroborated as to the plaintiff and himself having to obey the orders of Proctor. Witness had been in the building trade for some fifteen years, and he maintained that the space to be occupied by the ceiling should have been temporarily "sheeted over" when men were working above and others beneath. He had complained to Proctor, before the accident occurred, about "the insufficiency of the scaffolding."

Cross-examined: He meant that the whole of the space between the principals where men were working should be sheeted in, under such circumstances as those in question. The usual way was to use scaffold boards to form the protection.

The Judge: Have you ever seen that done?—Witness: Yes, sir, on several jobs.

Counsel for the defence: I think one's common sense will say that cannot be so.

Charles Damerell, one of the carpenters who was working above, said that before he could catch hold of one end of the plank for the purpose of assisting in moving it, the man at the other end drew the plank along, so that witness's end slipped off the tie beam upon which it had been resting. The plank then fell and caused the accident. Witness had been in the trade for about forty-five years, and he considered that, on such a job, half of the ceiling should be temporarily sheeted in, or a floor, of four 9 in. boards laid side by side, provided for the men to work upon.

Cross-examined: The man who drew the plank and caused it to fall was a labourer, and the accident must have been due to that man's negligence.

Re-examined: If the ceiling had been sheeted in the accident could not have happened, even though the labourer had been negligent, as witness mentioned.

Mr. Christopher Richard Griffiths, surveyor, said he had had over thirty years' experience in the building trade. In his opinion, as an expert, it was not a reasonable and proper protection for the men working below for only two 7 in. planks to be provided for the men above to work upon. The staging for the men to stand upon ought to be, under such circumstances, 3 ft. wide at least, and the space occupied by the ceiling joists should be boarded over at the spot where the men worked. That was the usual way of carrying out such work.

Cross-examined: He did not mean that the whole of the ceiling should be temporarily boarded in, but only that portion over which men were working. He was not aware that on the job in question men were working upon all parts of the floor; but, if it were so, he maintained that all the ceiling should have been temporarily covered in.

The Judge: But I understand that these boards were required to be moved about from time to time, and in carrying them about a careless workman might let one fall.

Witness: I say that they should not be moved about if men are working underneath.

Medical evidence having been given regarding the plaintiff's injuries,

Counsel for the defence said that, although he had several witnesses, he did not consider it necessary to call any evidence after the admission of the witness Damerell that the accident was caused through the negligence of the labourer, in pulling the plank away from the tie beam before the other man had time to catch hold of the end.

The Judge: That is not the point at all, and has nothing to do with the issue before us. Their case is that the ceiling should be boarded in when men are working beneath, and that the boards should not be shifted when the men are immediately below. The question is whether the whole mode of working in this instance was safe and proper.

Counsel for the defence: I submit that, if the whole of the ceiling had to be boarded in, and the men below told to go away whenever a board was being moved, work of this kind could not possibly be carried on. The men working below would constantly have to be told to knock off for five minutes or so; and if employers have to foresee, and provide against, carelessness like this labourer's—well, Heaven help them.

The Judge said there was only one question

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for him to put to the jury, namely, whether the mode of working, as described, was a safe mode of working or not.

The jury found that the mode of working was not safe, and they assessed the damages in the plaintiff's favour at 150*l.*

His Honour gave judgment accordingly, and allowed full costs. His Honour added that it appeared to him very doubtful whether the plaintiff would not have done better by accepting 1*l.* per week during such time as he might be incapacitated.

BUILDING BY-LAWS.

Summonses under the Levenshulme Urban District Council by-laws were heard at the Manchester County Police-court on the 27th ult. In the first case the defendant was Mrs. Guthrie, who was summoned for occupying a house in Marshall-road, Levenshulme, before obtaining the surveyor's certificate as to its fitness for habitation.

The Clerk to the Council, Mr. J. Ogden Hardicker, explained that building in the district was going on so rapidly that there was a tendency on the part of the builders to allow their houses to be occupied before they were inspected.

Mr. Clayton, on behalf of the defendant, admitted a technical offence, and the Stipendiary, remarking that she had broken a very important by-law, imposed a fine of 40s. and costs.

A similar penalty was imposed upon Fanny Radcliffe for "letting" three cottages, Nos. 5, 7, and 9, Lostock-street, Levenshulme, without having first received the necessary certificate. In this case, when the inspector visited the houses he found that the tenants had not then received a water supply.

The Stipendiary remarked that the bench had had great hesitation as to whether they ought not to have inflicted the full penalty in each of the cases. In future they would do so.—*Manchester Courier.*

ACTION ON A COVENANT.

In the King's Bench Division, on Friday, the 30th ult., Mr. Justice Darling and a Common Jury had before them the case of Hearne *v.* Havinden,—an action by Mr. J. F. Hearne, of 55, Kenilworth Road, St. Leonards-on-Sea, against Mr. Gustavus Edward Havinden, of 75, Tonbridge Road, Maidstone, to recover 58*l.* 19s. 9d., as damages in respect of an alleged breach of agreement. The defendant denied liability.

Mr. Humphreys appeared for the plaintiff, and Mr. Redmond for the defendant.

It appeared that on November 1st, 1901, the plaintiff agreed to let, and the defendant to take, No. 75, Tonbridge Road, Maidstone, for a period of 8 years, subject to the condition that the defendant should pay all "charges and impositions" except the landlord's property tax. On July 3rd, 1902, plaintiff was served with a notice by the Maidstone Urban District Council, under the Public Health Act, informing him that a nuisance existed on the Tonbridge Road premises, and requiring him to abate it within three days. For that purpose the drains had to be cleaned; thereupon the plaintiff requested the Maidstone Urban District Council to do the work for which he paid the sum now claimed. His contention was that under his agreement he was entitled to look to the defendant for repayment of the amount.

The defendant denied that he was liable to pay for the repairs, contending that the landlord had covenanted to repair all the outside parts of the premises. He further stated that the expenditure necessary to comply with the order of the Urban District Council should not have exceeded 10*l.*, but in order permanently to improve the property the plaintiff voluntarily instructed the Sanitary Authority to execute expensive alterations beyond what were required.

In reply it was argued by the plaintiff's Counsel that the expense incurred was in the nature of an imposition which defendant had contracted to pay.

His Lordship said that on his construction of the agreement it was the duty of the landlord to keep the drain in repair, it being an outside matter. His decision was in favour of the defendant, and there was no question to leave to the jury.

The action was accordingly dismissed, with costs.

BUILDER'S LIBEL ACTION.

In the King's Bench Division, on the 30th ult., the hearing of the case of Day *v.* May and Wife was concluded before Mr. Justice Jelf and a Common Jury.—an action by the plaintiff, a builder, carrying on business in Finchley, to recover from the defendants' damages for alleged libel.

Mr. George Elliott and Mr. Finch appeared for the plaintiff, and Mr. Bonsey for the defendants.

Mr. Finch, in opening the case, said plaintiff had built several houses in Ballard's Lane, North Finchley, and in May, 1902, Mrs. May, one of the defendants, bought from the plaintiff a house called "Greystones." Prior to the sale, viz., in March, 1902, the plaintiff wrote to the defendants that the drainage had been carried out in accordance with the requirement of the Local Board. The defendants having gone into possession in May, in the following October exhibited a board in the garden on which was as follows: "The drains of this house have been condemned, and are being entirely reconstructed by H. Plumber, of 36, Litchfield Grove." This was the libel complained of, the plaintiff alleging that the statement was entirely untrue, the drains not having been condemned, but passed by the Sanitary Authority. The plaintiff said that the only thing wrong with the drains was that a little cement had bulged in the insides of some of the joints, which was easily remedied, and the drain worked well. He alleged that the putting up the board caused him great injury.

Mr. Bonsey, on behalf of the defendants, contended that there was no libel, the word "condemned" meaning merely that the drains had been disapproved of, which was the fact. When Mrs. May bought the house she did so upon the plaintiff's warranty that the drains had been carried out in every detail in accordance with the requirements of the Local Board. The drains had not been laid in accordance with the by-laws and were defective, and defendants counter-claimed the expenses of putting them in order.

In the result the Jury, in answer to questions left to them by the learned Judge, found that the words complained of were a libel, and were untrue, and assessed the damages at 10*l.* They also found that the letters written by the plaintiff to the defendants on March 11th and 26th, 1902, were not intended to be a warranty.

On these findings judgment was entered for the plaintiff as against Mr. May on the claim and for the plaintiff on the counter-claim as against both defendants, with costs.

Judgment was entered for the female defendant on the claim.

SETTLEMENT OF THE STRAND ANCIENT LIGHT CASE.

The case of the Hotel Cecil, Ltd., *v.* the Savoy Hotel, Ltd., was in the list for hearing before Mr. Justice Farwell in the Chancery Division on the 3rd inst., the action brought by the plaintiffs for an injunction to restrain defendants from erecting their new buildings to such a height as to materially obstruct the plaintiffs' ancient lights.

When the case was called on, however, counsel stated that the parties had come to terms.

His Lordship said, that being so, he would make an order restraining all further proceedings in the action, upon terms to be agreed upon and signed by the parties.

PAVING APPORTIONMENT DISPUTE.

The hearing of the case of Kendal *v.* Mayor, etc., of Lewisham, concluded in the Court of Appeal, composed of Lords Justices Vaughan Williams, Romer, and Stirling, on the 4th inst., on the appeal of the plaintiff from an order of Mr. Justice Kekewich in the Chancery Division.

The action was brought by the plaintiff for a declaration that an order dated July 3, 1901, made by the defendants, charging and assessing the occupiers of houses belonging to the plaintiff situate in Montem-road, Forest Hill, with a proportionate part of the estimated cost or expenses of paving of part of the road, was invalid, and an injunction to restrain the defendants from continuing to require the tenants of the plaintiff in the road to pay the rents of their tenements respectively to the defendants in respect of such charge, an account of all moneys received by the defendants from such tenants, payment of the sum so received by the defendants, and damages.

The plaintiff's case was that he owned seventeen houses in the Montem-road. On May 8, 1901, the Council passed a resolution that the office of Surveyor to the late Lewisham District Board of Works should be abolished as from the prior March 25. On May 15 an estimate and apportionment of the cost of paving Mortem-road was prepared by Mr. Van Putten, the Assistant Surveyor to the Board. He estimated the cost at 805*l.* 15s., and his apportionment in respect of plaintiff's houses was 485*l.* 7s. The Council resolved that the road should be paved and the expenses apportioned, and that proceedings should be taken for collecting and receiving the amount. The work was put out to tender, and a tender of 646*l.* was accepted, and the work duly executed. In July, 1901, the Council served on the plaintiff's agent a notice requiring payment of the sum of 485*l.* 7s., and on November 30, 1901, the Town Clerk of the Council served on the plaintiff's tenants notices under Section 96 of the Metropolis Management Act, 1862, requiring the tenants to pay to the Council the amount so apportioned, and not to pay their landlord any rent without first deducting the said sums respectively. Down to October, 1902, the Council had collected from the tenants nearly the whole of the amount so apportioned, but no proceedings were instituted by the Council against the tenants. Plaintiff contended that the Order of July 3, 1901, was invalid, (1) because the estimated expenses of paving Montem-road were determined at a time when Mr. Van Putten was not Surveyor to the Council within the meaning of Section 105 of the Metropolis Management Act, 1855; and (2) because the amount apportioned included not only the expenses of paving, but also the expenses of drains and gullies, and of paving work in the Brockley Park-road, which were not ordered to be done by the Council. Plaintiff further contended that the Council had no right to collect the cost and expenses from his tenants, and alternatively that even if the order of July was valid, defendants could not require the payment of the costs apportioned from the tenants until the same had been recovered by legal proceedings.

The defendants denied that they had acted wrongfully in collecting the costs and expenses of the work, or that any of their acts in respect of the matters complained of had been wrongful or invalid. Mr. Justice Kekewich decided the case in favour of the defendants, and gave judgment for them with costs. Hence the present appeal of the plaintiff.

Mr. Arthur Powell, K.C., and Mr. Woods appeared as counsel for the appellant; and Mr. Macmorran, K.C., Mr. Hoare Avory, K.C., and Mr. Poyen for the respondents.

After the arguments had proceeded some time, Lord Justice Vaughan Williams suggested that the parties should endeavour to come to terms. He said it was a pity that so much money should be spent in fighting such a point, the amount involved being a small one. His Lordship asked if the defendants were willing to account to the plaintiff for all moneys received from the tenants?

Mr. Macmorran replied that defendants had always been ready and willing to do that.

After a long consultation between the counsel engaged, it was stated that the parties had come to terms on every point except as to the costs.

Lord Justice Vaughan Williams suggested that the parties should leave the question of costs to the Court, after the Court had heard arguments from the learned counsel on both sides on the point.

Mr. Powell and Mr. Macmorran then addressed their Lordships on the question of costs on behalf of their respective clients.

In the result, Lord Justice Vaughan Williams said that in the opinion of the Court no order ought to be made as to costs, except that the local authority should pay 75*l.* The previous order would be discharged on the terms initiated by counsel, liberty being given to either side to apply.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

26,543 of 1902.—J. C. W. Herschel: *Hinges.* The object of this invention is to construct hinges for cabinets, furniture, etc., in such a manner that the strain due to the weight of the door, etc., is met, and the tendency of the screws to loosen is overcome. According to the invention the hinge is formed with four plates which are pivoted upon a common pin, either all independently or in the form of two angle plates. The screw holes in the said plates are arranged so that the screws will miss each other, crossing at right angles or thereabouts, the plates being fastened in place in pairs on the two faces of the corners of the standing and swinging parts of the structure. It will thus be seen that in every position of the swinging part there are always a sufficient number of screws which sustain the strain transversely through one pair of opposite plates, in addition to and aided by the screws in the other pair of plates, which receive the longitudinal strain, thereby securing the greatest possible fixity of attachment and resistance to the leverage and rocking strain of the door, lid, valve, bookshelf, or the like as it swings.

17,330 of 1903.—T. V. Hampton: *Tool for Use in Gauging and Marking-off Carpenters' Work.*

This relates to a compound baffle and square, the object being to provide a tool particularly adapted for use for carpenters, ship builders, and millwrights, by means of which they can accurately gauge the length of a piece of timber or spouting to be cut, and also gauge the angle upon which the ends are to be cut, thereby making accurate joints and avoiding misfits. The tool consists of four bevel squares or bevel

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

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blades, each carried by a stock. The stocks are arranged in pairs hinged together, and each pair connected by means of adjustable or extensible connecting rods.

28,494 of 1903.—J. BRODIE and F. PRIOR: *Kitchen or Cooking Ranges.*

This relates to kitchen or cooking ranges, and consists in making the bottom of the firebox with separate firebars, to obviate the necessity for renewing the bottom when the bars wear out. Improved means are provided for lifting or lowering the bottom when required to regulate the capacity of the firebox, and also for changing the range into a slow combustion grate by means of a hinged plate fitting under the box. There is also provided an ash sifter, and at each side of the fire toast plates. The invention also consists of an improved oven, constructed in several parts or divisions, and so arranged that one or more parts can be opened without interfering with the remainder.

27,334 of 1902.—H. T. STEPHENS: *Gates and the like.*

In a gate or the like, the combination with a gate post of a shoe with a closed base to receive the end of such post, and one or more projecting collars on such shoe to receive the end of the horizontal rail and the diagonal rails, if any.

27,528 of 1902.—THE GUNN CASTOR CO., Ltd., and L. R. PIERCY: *Swing Looking-glasses, Fanlights, and the like.*

Pivot fittings for swing looking-glasses, fanlights, and the like, in which opposed friction elements of the pivot are drawn together laterally, for automatically stiffening the joint and taking up wear, by the relative movement of a surface on one of the parts of the fitting and inclines or tapering or wedge-like surfaces on another part, under the influence of the weight of the suspended glass or the like to which one of the said parts is attached.

27,834 of 1902.—A. BEX: *Brackets and Supports for Shop Window and like Fittings.*

In brackets or supports for shop window and like fittings, a standard or support provided with a series of half round holes or notches, in one of which rests a pin carried by one arm of a bracket, a second arm on said bracket embracing the other side of the standard and being provided with a locking device, so that when placed on said standard the bracket may be fixed thereto, so as to prevent the accidental displacement of the bracket.

16,763 of 1903.—G. H. STOUT and L. A. TURNER: *Gravity Locks.*

A lock, consisting in the combination with a bottom pivoted gravitating bolt, two independently movable tumblers therefor both accessible to a key from opposite sides of the lock, a central partition separating said tumblers and perforated to give access to a key from either side of the lock at the place of the division of said tumblers, and an independently movable latch for said bolt, accessible to a key from only one side of the lock.

25,525 of 1902.—A. P. TOWL: *Adjustable Bracket for Shelves or other Purposes.*

This relates to a frictional device for attaching a bracket or shelf to a standard in which the bracket or shelf is supported on the overhanging end of a grip-plate which is so shaped as to embrace a part or the whole of the section of the standard with an approximate fit, and which is so connected to the bracket or shelf that it can tilt relatively thereto.

25,557 of 1902.—O. RUHL: *Method of or Means for Producing an Initial Tension in Metal Skeletons for Building Purposes.*

This relates to a method for producing an initial tension in wire skeletons for strengthened concrete constructions, etc., characterised by intermediate supports placed in a lying-down position, whilst a webbing of metal wires is wound thereon or arranged also in a lying-down position and guided upon one side of the aforesaid webbing, and afterwards turned up endwise, thus giving to the metal wires the required tension and direction.

26,102 of 1902.—J. H. BUTTERWORTH: *Apparatus for Humidifying Air.*

This relates to an apparatus for humidifying air, comprising essentially a ventilating tube through which a current of air is mechanically propelled, a chamber into which air is forced or drawn through an adjustable inlet, a water pulveriser or similar apparatus situated in said chamber for dividing a jet of water into minute particles and spreading these, a vaporiser consisting of a coil or vessel heated by steam or other means and situated in the said chamber, and means for spreading the humidified air and causing it to unite with propelled dry air which does not pass through the said chamber, so that dry and humidified air pass together outwards into the room.

23,272 of 1902.—T. W. JOHNSON: *Casks, Barrels, and the like Vessels.*

This relates to casks, barrels, and the like vessels, and consists in the combination with a head abutting against the stave for the whole or greater part of the width of the head, of a jointing fillet or ring inserted between the abutting faces and projecting into the surfaces thereof.

21,315 of 1902.—E. JACK: *Appliances for enabling Sash Windows to be Opened Inwards.*

This relates to the arrangement or application of appliances consisting of divided hinges with slots in the socket part to permit of its being moved so as to engage with the pivot part and support the sash, and of its being withdrawn after being disengaged from the pivot, so as not to prevent or interfere with the raising or lowering of the sash in the ordinary way.

9,261 of 1903.—C. T. SMITH: *Register and other Stoves.*

This relates to register and other stoves, consisting in the employment of the front bar so arranged in combination with the side cheeks and sole plate or stove bottom that said front bar can be turned up into a vertical position at the front of the stove breast to be turned into a horizontal or nearly horizontal position to form a shelf or trivet, or be slided back underneath the sole plate or bottom of the stove breast, means being provided for supporting the front bar in any of the said three positions.

26,495 of 1902.—J. PLACE AND SON and W. H. PLACE: *Waste Water-closet.*

This relates to a waste water-closet, a tipper-box, and outlet or down shaft made in one piece, continued to the surface by a double or combined rising pipe.

13,231 of 1903.—F. LAMING: *Arrangement for Locking or Unlocking a Number of Doors Simultaneously.*

This relates to an arrangement for locking or unlocking a number of doors simultaneously, comprising a number of electro-magnets, each of which is secured upon the frame of a door or the like, and which may be energised in any suitable manner from a more or less remote point, and a bolt adapted to be acted upon by the magnet and withdrawn from a socket, permitting the door to be opened.

18,923 of 1903.—T. FRANKE: *Iron or the like Girders for Insertion in Concrete Constructions.*

This relates to girders for concrete constructions, in which the web or vertical middle part is formed with corrugations or indulations perpendicularly to the longitudinal direction of the girder, and the corrugations or indulations increase in diameter from the bottom to the upper edge of the web.

18,947 of 1903.—C. E. LINCOLN: *Planes.*

This relates to bench planes, and has for its object a plane which upon its return or idle stroke will automatically lift the cutting blade sufficiently above the under surface of the plane so that the cutting blade will not scrape along the wood being planed, which, as is well known, dulls the edge of the cutting blade. A further object is the provision of means whereby the cutting blade and its support may be held in a raised position for the purpose of fixedly securing the cutting edge of the blade sufficiently above the under face of the plane in order that the latter may be stored away either in a chest or in a tool cabinet, thereby preventing any damage being done to the cutting edge of the blade should the blade be in contact with any other object. The invention may be said to broadly consist of a supporting medium for a cutting blade, which supporting medium at its one end is suitably pivoted to the plane stock and its other end supports the cutting blade, a spring being interposed between the underside of the supporting medium and the plane bottom, this spring normally retaining the supporting medium in an elevated position, but possessing sufficient resiliency to enable it to be readily depressed, whereby the cutting edge of the blade may be projected sufficiently within the plane mouth to enable a shaving to be taken off the object planed, when sufficient force or pressure is applied to the handle in order to propel the plane during its cutting stroke.

19,218 of 1903.—W. J. GIBSON: *Grate or Fireplace.*

This relates to a grate or fireplace, consisting of a horizontal adjustable ventilator arranged immediately at the front edge of the fire over a casing or pan built into or resting on the hearth.

18,805 of 1903.—H. V. BAILEY: *Cupboard and like Turns.*

This relates to cupboard and like turns or fasteners, and consists in locking the adjustable tongue to the spindle through the medium of a washer or plate which is capable of sliding without relative rotation upon the spindle and is provided with a tooth or projection adapted to engage with the screwed-on tongue and prevent same from rotating; the said parts being retained in such engagement by a lock nut.

25,075 of 1902.—W. INGHAM, B. LANGTON, and L. INGHAM: *Kiln for Burning Pipes, Bricks, and the like.*

A kiln, comprising a chamber with a combustion flue at each side thereof, fitted with grate bars arranged the length of such flues within the said chamber, and walls abutting to keep the fuel on the grate bars, and to form the combustion flues.

26,627 of 1902.—J. GORDON and D. B. DOBSON: *Method of Constructing Stairs, Staircases, and Landings, for Mixed Schools.*

An arrangement of stairs, staircases, landings, and gangways, for boys and girls, which in mixed schools will enable them to ascend and descend, and to enter the same classrooms on upper floors, without mixing, or coming in contact, the one with the other.

26,683 of 1902.—R. W. JAMES (Dr. H. Passow): *Manufacture of Cement.*

A cement consisting of a mixture of artificial or furnace slag, containing not less than 38 per cent. of lime, granulated and dried or air granulated so as to be quickly cooled, with from 5 per cent. to 15 per cent. of clinkered Portland cement.

26,045 of 1902.—A. W. COOKSEY: *Sound and Fire-proof Flooring.*

This invention relates to that description of flooring which usually consists of steel or iron joists supporting arches or slabs of concrete or other fireproof material on or in which wooden joists or fillets are laid or embedded to receive the floor boards. The object of this invention is to cheapen and simplify the construction of such floors, to improve the ventilation thereof, to render them less conductive of sound and less liable to decay. According to the invention, the floor joists or fillets are constructed of concrete, which may consist of a mixture of coke-breeze, sawdust, and lime or cement, for example. They may be moulded in one with the before-mentioned arches or slabs, or in some cases they may be made in separate lengths and laid or bedded on the said arches or slabs, or may be nailed or spiked thereto. They may be of any convenient section, but it is preferred to form them of a trapezoidal section, their bases being broader than their top surfaces, which receive the floor boards. They may be made continuous, with transverse openings or holes at intervals for the purpose of ventilation and for the passage of pipes, wires, or the like. Or they may be made plain and discontinuous and of any convenient length, the gaps between the ends of every two such lengths being filled in by a separate short length of similar section with a hole or recess of semi-circular or other shape formed therein for the above-described purposes. The adjacent ends of the lengths of joist may be made of any convenient shape, so that they fit or lock together, or they may be made at a similar angle to that of their sides and so that they may be nailed or spiked to one another. The floor boards are nailed or otherwise fixed to the top surfaces of the concrete joists, with or without the intervention of strips of felt or the like to form a bed and to further assist in deadening sound.

9,508 of 1903.—G. LILIENTHAL: *Artificial Marble for Covering Walls, Floors, and the like.*

A process for the production of a surface resembling marble, consisting in applying to a wall or floor a mass of cement mortar of dough-like consistency, mixed with the requisite colouring additions, and spreading the mass by rolling, thereby expressing any air which may have become enclosed in the mortar.

9,509 of 1903.—G. LILIENTHAL: *Method of Securing Wooden Flooring Boards to a Concrete or Stone Foundation.*

A process for securing wooden boards on to stone-like bases in which the boards are roughened or grooved on the lower surface, and cemented to the stone-like basis by a cement material in which cords are embedded at intervals.

MEETINGS.

MONDAY, NOVEMBER 9.

Surveyors' Institution.—The President, Mr. Albert Buck, will deliver the opening address of the new session. 8 p.m.

Incorporated Clerks of Works' Association (Carpenters' Hall).—Paper by Mr. John Davies on "The Carpenter: His Tools and His Work in the Past and Present." 8 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. E. Worth on "Scavenging—Disposal of House Refuse." 7 p.m.

TUESDAY, NOVEMBER 10.

Institution of Civil Engineers.—Professor W. C. Unwin, B.Sc., F.R.S., on "Tensile Tests of Mild Steel, and

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the Relation of Elongation to the Size of the Test-Bar.' 5 p.m.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Sanitary Science).—Mr. J. T. Griffin on "Sewerage." 7 p.m.

Architectural Association Camera and Cycling Club.—Mr. F. R. Taylor will deliver his Presidential Address, after which Mr. C. H. Oakden, F.R.P.S., will deliver a lecture on "Little Known Irish Abbeys," illustrated with numerous lantern slides (deferred from October 14th). 7.30 p.m.

WEDNESDAY, NOVEMBER 11.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

Edinburgh Architectural Association (Associates' Section).—Mr. Ramsay Traquair on "Later Scotch Gothic."

Northern Architectural Association.—Opening meeting of the winter session. The President, Mr. J. Walton Taylor, will deliver his inaugural address.

FRIDAY, NOVEMBER 13.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

October 22.—LONG & SONS (at Feltham).

Feltham, Middlesex.—Victoria-rd., a freehold building estate, 4 a. 0 r. 12 p. £1,000

G. NICHOLS, HOWES & CO. (at Bristol).

Warmley, Glos.—Mound's Court Farm, 102 a. 3 r. 23 p., f. (in lots) 3,350
Two freehold enclosures, 15 a. 2 r. 6 p. 800
Pucklechurch, Glos.—Dodd's Farm, 64 a. 1 r. 38 p., f. 2,760
Two freehold enclosures 35 a. 1 r. 1 p. 2,000

BAXTER, PAYNE & LEPPER (at Bromley).

Bromley, Kent.—London-rd., Leyland House and building site adjoining, part f. and part u. t., 88 yrs., g.r. 15*l.* 15s., y.r. 90*l.* 950

October 23.—FRANKLIN, GALE & NEWTON (at Wallingford).

Sotwell, Berks.—Two freehold orchards with farm buildings, 16 a. 1 r. 16 p. 1,600
Gore Furlong, &c., enclosures, 53 a. 2 r. 1 p., f. 1,200
White Post Field, allotment, 9 a. 2 r. 28 p., f. 150
Four freehold enclosures, 15 a. 1 r. 18 p. 260
New Meadow, 5 a. 3 r. 13 p., f. 120

October 26.—BRODIE, TIMBS & CO.

Finchley.—Crescent-rd., Ashleigh, and 1 a., f., p. 1,600

DYER, SON & HILTON.

Blackheath.—Westcombe Park-rd., Parkhurst, f., y.r. 65*l.* 850

MAY & PHILPOT.

Streatham.—28, Streatham Hill-rd., u.t. 29 yrs., g.r. 42*l.* 10s., p. 1,250

R. & J. R. MITCHELL (at Cockermouth).

Uldale, Cumberland.—Uldale Hall Estate, 200 a. 2 r. 30 p., f. 7,000
Seven freehold messuages 335
Three freehold closes, 9 a. 3 r. 15 p. 655
Gate Farm, 81 a. 0 r. 3 p., f. 2,000

PROTHEROE & MORRIS (on the estate).

Shenfield, Essex.—Hutton-rd., two freehold building sites 500
Hutton-rd., a freehold building site with enclosure of woodland, 33 a. 875

October 27.—C. RAWLEY CROSS & CO.

Acton.—High-st., a freehold corner site 450
Kensington.—110 and 112, Princes-rd. (S.), f., e.r. 113*l.* 1,150
Shepherd's Bush.—57 and 71, Wood-la., u.t. 71 yrs., g.r. 16*l.*, y.r. 95*l.* 930

DEBENHAM, TEWSON & CO.

Euston-rd.—Nos. 370 and 372; also 9, 10, 11, and 12, Diana-pl. (manufacturing premises, &c.), area 39,000 ft., f., y.r. 930*l.* 26,000

FIELD & SONS.

Fleet Street.—Johnson's-ct., f.g.r. 15*l.*, reversion in 50 yrs. 910
Hampstead.—Iverson-rd., f.g.r. 24*l.*, reversion in 76 yrs. 600
Battersea.—Queen's-rd., f.g.r. 10*l.* 10s., reversion in 71 yrs. 265
Robertson-st., f.g.r. 21*l.*, reversion in 71 yrs. ... 555

MAPLE & CO.

Regent's Park.—3, Gloucester-rd., and 3, Queen's-mews, f., y.r. 121*l.* 2,000

FREDERICK WARMAN.

Camden Town.—10, Eversholt-st. (S.), u.t. 39½ yrs., g.r. 7*l.*, e.r. 70*l.* 530
Stamford Hill.—76c, Amhurst-pk., u.t. 89 yrs., g.r. 10*l.*, e.r. 70*l.* 500
Stroud Green.—31, Mount View-rd., u.t. 78 yrs., g.r. 9*l.* 10s., e.r. 65*l.* 570

ALFRED RICHARDS (at Enfield).

Enfield.—2, Essex-rd., f., p. 800

October 28.—JOHN DAVEY & CO.

Old Charlton, Kent.—21 and 23, Delafield-rd., u.t. 64 yrs., g.r. 6*l.*, y.r. 75*l.* 8s. 590

DRYSDALE, NURSE & CO.

Stoke Newington.—31, Cazenove-rd., u.t. 70 yrs., g.r. 9*l.*, e.r. 60*l.* 670
Clapton.—15, Southwold-rd., u.t. 50 yrs., g.r. 6*l.* 10s., e.r. 38*l.* 300

MARK LIELL & SON.

Barking, Essex.—1 to 16, Barking-pl., f., w.r. 197*l.* 12s. 980
Poplar.—38, St. Leonard's-rd. (S.), f., y.r. 59*l.* 5s. 530
Plaistow.—2 and 4, Ethel-rd., u.t. 74 yrs., g.r. 8*l.*, w.r. 55*l.* 18s. 300
Bromley.—240 and 242, St. Leonard's-rd. (S.), u.t. 62 yrs., g.r. 9*l.*, w.r. 89*l.* 11s. 375
St. George's, East.—33, Cable-st., and 2, Back Church-la., u.t. 56 yrs., g.r. 15*l.*, y.r. 75*l.* 730
Wanstead.—Blake Hall-rd., Lake Cottage, u.t. 35 yrs., g.r. 2*l.* 13s. 4d., y.r. 35*l.* 295

NICHOLAS, DENYER & CO.

Ifield, Sussex.—The Ifield Court Estate, 286 a. 3 r. 10 p., f. 10,000

Great Missenden, Bucks.—Springfield Lodge and Stud Farm, 45 a. 3 r. 29 p., f., p. 3,250

NOKES & NOKES.

Walthamstow.—St. Mary's-rd., f.g.r. 12*l.*, reversion in 83½ yrs. 238
Canning Town.—89 to 109 (odd), Garvery-rd., u.t. 71 yrs., g.r. 57*l.* 15s., w.r. 214*l.* 10s. 590

J. S. RICHARDSON.

Bermondsey.—11 and 12, Frean-st., u.t. 12½ yrs., g.r. 6*l.*, w.r. 61*l.* 2s. 200
Rotherhithe.—11, Union-rd., u.t. 42½ yrs., g.r. 6*l.*, y.r. 40*l.* 390

R. TIDEY & SON.

De Beauvoir Town.—104, 106, 108, 118 and 120, Southgate-rd., u.t. 16 yrs., g.r. 20*l.*, y.r. 194*l.* 36 and 38, Culford-rd., u.t. 28 yrs., g.r. 8*l.* 15s., y.r. 66*l.* 1,215
Haggerston.—80, Phillipp-st., f., w.r. 36*l.* 8s. 550

F. G. WHEATLEY & SON.

Bromley-by-Bow.—1 to 8, Thomas-pl., f., w.r. 155*l.* 7s. 385
38, 40 and 42, Byron-st., f., w.r. 74*l.* 2s. 1,500
Manor Park.—Romford-rd., f.g.r. 7*l.*, reversion in 87 yrs. 840
Brixton.—Crawshay-rd., f.g.r. 10*l.*, reversion in 60 yrs. 220
Stratford.—Vicarage-la., f.g.r. 40*l.*, reversion in 73 yrs 255
Ealing.—6 and 8, Northfield-la. (S.), u.t. 97½ yrs., g.r. 13*l.* 16s., y.r. 80*l.* 990

October 29.—BRACKETT & SONS.

Tunbridge Wells, Kent.—Sandrock-rd., Shrublands, and 2 a. 0 r. 20 p., f., y.r. 210*l.* 810

BROWETT & TAYLOR.

Tottenham.—70, 72 and 74, Greyhound-rd., f., w.r. 101*l.* 8s. 5,500

A. & G. GUIVER.

Edmonton.—Hertford-rd., a freehold house with blacksmith's shop, yards, and 3 cottages in rear, w.r. 71*l.* 10s. 960
Ponders End.—Orchard-rd., The Eureka Refreshment House, with stabling, &c., f., y.r. 60*l.* 755

HUNTER & HUNTER.

Paddington.—13, Chichester-rd., u.t. 45 yrs., g.r. 8*l.* 10s., y.r. 45*l.* 1,150
45, Westbourne Park Cres., u.t. 55½ yrs., g.r. 8*l.*, y.r. 45*l.* 350
Notting Hill.—11, St. George's-rd. (S.), u.t. 57½ yrs., g.r. 7*l.*, y.r. 30*l.* 415

MABBETT & EDGE.

Shoreditch.—10, Church-st. (S.), f., y.r. 45*l.* 225

NORTON, TRIST & GILBERT.

Willesden.—Hazel-rd., f.g.r. 18*l.*, reversion in 80 yrs. 900

ROBINS, GORE & MERCER.

Westminster.—59 and 60, York-st., area 1,170 ft., f., w.r. 161*l.* 4s. 2,000

STIMSON & SONS.

Brixton.—14 and 15, Pope's-rd., u.t. 64½ yrs., g.r. 10*l.*, y.r. 72*l.* 450
Herne Hill.—46, Spenser-rd., u.t. 63 yrs., g.r. 6*l.*, y.r. 30*l.* 585
Forest Gate.—135, Sebert-rd., u.t. 81 yrs., g.r. 5*l.* 10s., e.r. 32*l.* 315
Hackney.—10 and 12, Pigwell-path, u.t., 73½ yrs., g.r. 11*l.*, w.r. 70*l.* 4s. 305
New Cross.—17 and 18, Eckington-gdns., u.t. 72 yrs., g.r. 8*l.*, w.r. 62*l.* 8s. 420
Norwood.—1a, Apsley-rd., f., w.r. 46*l.* 16s. 550
Paddington.—22, Victoria-st., u.t. 48 yrs., g.r. 6*l.* 10s., y.r. 37*l.* 400
4 and 6, Hethpool-st., u.t. 35 yrs., g.r. 14*l.* 14s., y.r. 70*l.* 185
Regent's Park.—41, Redhill-st., with blacksmith's shop, &c., u.t. 21½ yrs., g.r. 3*l.* 7s. 4d., y.r. 70*l.* 620
South Kensington.—25, 27 and 29, Rutland-st., f., w.r. 89*l.* 14s. 520

TRESIDDER & CO.

Norwood.—239, 241 and 243, Gipsy-rd. (S.), f., y.r. 117*l.* 10s. 760

VARLEY & LOCKING.

Stoke Newington.—57, Palatine-rd., u.t. 70 yrs., g.r. 6*l.*, y.r. 32*l.* 1,750
Highbury.—32, Canning-rd., u.t. 67 yrs., g.r. 5*l.* 5s., w.r. 46*l.* 10s. 3 0
265

WESTON & SONS.

Westminster.—28½, Marsham-st. (S.), f., y.r. 40*l.* 1,170
Camberwell.—44, Benhill-rd., f., e.r. 65*l.* 870
46 and 48, Benhill-rd., f., y.r. 66*l.* 1,140
16, Benhill-rd., u.t. 69 yrs., g.r. 5*l.*, w.r. 39*l.* 310

October 30.—ABERCROMBIE & EDMUNDS.

Brondesbury.—13, Burton-rd., u.t. 82 yrs., g.r. 10*l.*, y.r. 52*l.* 10s. 550

ALDRIDGES'.

Tottenham.—Hartington-ter., f.g.r. 42*l.*, reversion in 98 yrs. 940

H. H. COLLIER.

Tolworth, Surrey.—Ewell-rd., Woodside Cottages, (two), and Broadway House, f., e.r. 110*l.* 1,500

CRONKS'.

Hampstead.—76, Messina-av., u.t. 80 yrs., g.r. 8*l.*, y.r. 45*l.* 495
Lewisham.—High-st., Sion House, and 0 a. 2 r. 8 p., f., p. 2,200

DOLMAN & PEARCE.

Haverstock Hill.—44, 48, 50 and 93, Queen's-cres., u.t. 46 yrs., g.r. 32*l.*, y.r. 180*l.* 1,675

OGDEN, SONS & OLLEY.

Wimbledon.—Vineyard Hill-rd., Wye Lodge, f., p. 1,600

D. SMITH, SON & OAKLEY.

Enfield.—Ridgway-rd., a freehold building estate, with three cottages thereon, 31 a. 3 r. 23 p.... 4,100
Old Kent Road.—Nos. 704, 706, &c., f.g.r. 170*l.*, u.t. 18 yrs., g.r. 60*l.* 940

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks.....	1 16 6	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks ...	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons.....	1 11 0	" at railway depôt
Red wire Cuts ...	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	3 0 0	" " "
Best Blue Pressed Staffordshire ...	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "

GLAZED BRICKS.

Best White and Ivory Glazed Stretchers.....	13 0 0	
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers...	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	per 1,000 at railway depot.
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers...	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed.....	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime ...	20 6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	12s. 0d.	per yard, delivered.
Stourbridge Fire Clay in sacks	27s. 6d.	per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt.....	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	" "

Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt
Beer in blocks	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks ...	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2 3	per foot super.
6 in. Rubbed two sides Ditto, Ditto.....	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes).....	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1 2½	" " "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly. dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green.....	15 2 6	" "
20×12 best Eureka unfading green.....	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16×8 " "	6 10 0	" "

[See also next page

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CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Additions to Schools, Nantyglo, Wales	Aberystruth School Board	R. L. Roberts, Architect, Aberdare	Nov. 9
Alterations to Laundry at Workhouse	Norwich Guardians	Morgan & Buckingham, Architects, Norwich	do.
Footbridge, East Field and Low Buston	Alnwick R.D.C.	H. W. Walton, Council Offices, Alnwick	do.
Paving Works, Holbeck	Leeds Corporation	City Engineer, Municipal Offices, Leeds	Nov. 10
Street Works, Kimberley-road, Liscard, Cheshire	Wallasey U.D.C.	Engineer, Public Offices, Egremont, Cheshire	do.
Paving Works, &c., Lister-road and others	Keighley Corporation	W. H. Hopkinson, Civil Engineer, Town Hall, Keighley	do.
Hospital	Wallingford & Crowmarsh Hos. Bd.	S. Couch-Johns, Civil Engineer, Reading	do.
Cast-iron Water Storage Tank (15,000 gallons)	Gravesend Town Council	C. F. McInnes, Engineer, Electricity Works, Gravesend	do.
Fire Station	Moss Side (Lancs) U.D.C.	H. B. Longley, Civil Engineer, Council Offices, Moss Side	Nov. 11
Additions to Offices, Stockport-road	Levenshulme (Lancs) U.D.C.	J. Jepson, Architect, Tiviot Dale, Stockport	do.
Twelve Houses, Penycoedcae, Wales	Building Club	A. Bryant, Architect, Midland Bank Buildings, Pontypridd	do.
Street Works	Barrow-in-Furness Corporation	Borough Engineer, Town Hall, Barrow-in-Furness	do.
Reconstructing Workhouse Infirmary	St. Columb (Cornwall) Guardians	J. Ednor & Sons, Architects, Newquay	do.
Organ Chamber, &c., Pembroke Chapel, Cardiff	Welsh Calvinistic Methodists	T. Thomas, 29, Queen-street, Cardiff	do.
Trench Works (3,077 yards Trench)	Winsford (Cheshire) U.D.C.	J. Wilkinson, Engineer, Market-place, Winsford, Cheshire	do.
Reparation River Bank (2¼ miles) Nocton Delph, Lincs	Trustees	Thropp & Harding, Engineers, 29, Broadgate, Lincoln	do.
Retorts, Firebricks, &c.	Bradford (Yorks) Corporation	F. Stevens, Town Clerk, Town Hall, Bradford	Nov. 12
Dispensary, &c.	Antrim (Ireland) Guardians	N. Fitzsimons, Architect, 82, Royal Avenue, Belfast	do.
Quartzite Macadam (1,350 tons)	Bexhill Corporation	Borough Engineer, Town Hall, Bexhill	Nov. 13
Street Works, Denmark and other streets	Lancaster Corporation	J. C. Mount, Borough Surveyor, Town Hall, Lancaster	Nov. 14
Stone Wall, Bowerham	do.	do.	do.
Cloak Room at Schools, Darfield, Yorks	.....	A. B. Linford, Architect, Carlton Villa, Wombwell	do.
Street Works	Blackpool Corporation	J. S. Brodie, Borough Surveyor, Blackpool	do.
Road Works, Cliveden-road and others	Wimbledon U.D.C.	C. H. Cooper, Civil Engineer, Council Offices, Wimbledon	do.
*Terra Cotta for New Council School	Salford Education Committee	H. Lord, Architect, 42, Deansgate, Manchester	Nov. 16
Water Supply Works, Bannock Burn	Grangemouth Town Council	Warren & Stuart, Civil Engineers, 94, Hope-street, Glasgow	do.
Cast-Iron Pipes (3,165 tons)	do.	do.	do.
Library, Middleton-road, near Oldham	Chadderton U.D.C.	Groome & Grant, Architects, 2, St. Peter's-square, Manchester	do.
Street Works, Nursery and Camp Streets	Wolverhampton Corporation	Borough Engineer, Town Hall, Wolverhampton	do.
Caretaker's House, Boundary Walls, &c.	Ebbw Vale U.D.C.	T. J. Thomas, Surveyor, Council Offices, Ebbw Vale, Mon.	do.
Sinking Trial Holes, Cwm Carne, Beaufort	do.	do.	do.
Road, &c., Stramshall	Uttoxeter R.D.C.	J. Preston, Surveyor, Woodlands, Uttoxeter	do.
Additions to Offices, Manor-road	Bradford Guardians	Empsall & Clarkson, Architects, 7, Exchange, Bradford	do.
Alterations to Police Station, Normanton	West Riding County Council	J. Vickers Edwards, County Offices, Wakefield	do.
Iron Fencing and Gates at Workhouse	Warwick Guardians	F. P. Trepess, Architect, 1, Church-street, Warwick	do.
Additions to Premises, Castletownbere, Ireland	.....	P. F. Hynes, Architect, 71, South Mall, Cork	do.
Railings, Conveniences, &c.	Middleton (Lancs) Corporation	W. Welburn, Borough Surveyor, Town Hall, Middleton	do.
Granite Road Metal	Sevenoaks R.D.C.	S. Towlson, Civil Engineer, Argyle-road, Sevenoaks	do.
Terra Cotta for Council School, West Liverpool-street	Seedley Education Committee	H. Lord, Architect, 42, Deansgate, Manchester	do.
Bridge Works over River Avon	Bristol Docks Committee	W. W. Squire, Engineer, Cumberland-road, Bristol	do.
Brick Wall, Stanley-road	Bootle (Lancs) Corporation	B. J. Wolfenden, Civil Engineer, Town Hall, Bootle	Nov. 18
*Additional House at Felixstowe Coast Guard Station	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C	Nov. 20
School, Reginald-road, Eastney	Portsmouth School Board	G. E. Smith, Architect, 145, Victoria-road, North Southsea	do.
*Water Supply Works	Rochford R.D.C.	Council's Engineer, Rochford, Essex	Nov. 23
*Making-up Streets	West Ham Council	Borough Engineer, Town Hall, West Ham, E.	Nov. 24
Storage Reservoir, Marklands	Horwich (Lancs) Guardians	P. Taberner, Council Offices, Horwich	Nov. 25
*Works of Sewerage	Lichfield Corporation	Elliott & Brown, Burton-buildings, Parliament-street, Nottingham	Nov. 27
Rebuilding Shop and Premises, Victoria-rd., Ebbw Vale	Mr. Stephen Lewis	B. J. Francis, Architect, Abergavenny	No date.
Arcade Premises, High-street, Newport, Mon.	.....	Habershon, Fawckner, & Co., 41, High-street, Newport	do.
Road Works, Surbiton Hill	.....	W. E. Hewitt, Surveyor, 22, Buckingham-street, W.C.	do.
Detached Cottages, Adel, Leeds	.....	G. W. Atkinson, Architect, 1, Mark-lane, Leeds	do.
Brickwork, Acton	.....	Barnett & Co., 68, Salisbury-road, West Kilburn	do.
Gas Mains, &c., at Schools	Cudworth (Yorks) School Board	G. Moxon, Architect, 26, Church-street, Barnsley	do.
Pavilion, Rhyl, Wales	Executive Com., R. Nat., Elsteddfod	Tilby & Jones, Town Hall, Rhyl	do.
Offices & Stabling, Victoria Wks., Pitt-st., Horley Hill	Mr. Peter Blyth	Burton & Percival, Archts, 15a, Stamford-st., Ashton-under-Lyne	do.
*Heating Main Block of Union House	Stow Union	J. S. Corder, Architect, Tower-street, Ipswich	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Required.	Salary.	Applications to be in
*Clerk of the Works	Chelmsford Corporation	3*l.* 3*s.* per week	Nov. 12
*Architectural Assistant	Rochdale Corporation	2*l.* 10*s.* per week	Nov. 14
*Chair of Architecture	Liverpool University	See advertisement	Dec. 31

Those marked with an asterisk (*) are advertised in this Number. **Contracts, iv. vi. viii. & x.** *Public Appointments,* xvi.

PRICES CURRENT *(continued)*.

TILES.

	s.	d.		
Best plain red roofing tiles	42	0	per 1,000	at rly. depot.
Hip and valley tiles	3	7	per doz.	" "
Best Broseley tiles	50	0	per 1,000	" "
Do. Ornamental Tiles	52	6	"	" "
Hip and Valley tiles	4	0	per doz.	" "
Best Ruabon Red, brown or brindled Do. (Edwards)	57	6	per 1,000	" "
Do. Ornamental Do.	60	0	"	" "
Hip tiles	4	0	per doz.	" "
Valley tiles	3	0	"	" "
Best Red or Mottled Staffordshire Do. (Peakes)	51	9	per 1,000	" "
Do. Ornamental Do.	54	6	"	" "
Hip tiles	4	1	per doz.	" "
Valley tiles	3	8	"	" "
Best "Rosemary" brand plain tiles	48	0	per 1,000	" "
Do. Ornamental Do	50	0	"	" "
Hip tiles	4	0	per doz.	" "
Valley tiles	3	8	"	" "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0

PRICES CURRENT—*(continued)*.

WOOD.

	At per standard. £ s. d.	£ s. d.
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more that battens.
⅞ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0

PRICES CURRENT *(continued)*.

WOOD.

	At per standard. £ s. d.	£ s. d.
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in, 3 in. by 9 in.	13 10 0	14 10 0
" " battens	12 10 0	13 10 0
Pitch-pine: deals	9 10 0	10 10 0
Under 2 in. thick extra	16 0 0	18 0 0
Yellow Pine—First, regular sizes	0 10 0	1 0 0
Oddments	33 0 0	upwards.
Seconds, regular sizes	22 0 0	24 0 0
Yellow Pine Oddments	21 10 0	26 10 0
Kauri Pine—Planks, per ft. cube	20 0 0	22 0 0
Danzig and Stettin Oak Logs—	0 3 6	0 4 6
Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6

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PRICES CURRENT (*continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
½ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube	0 4 0	—
Prepared Flooring—	Per square.	
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
⅞ in. by 7 in. yellow, matched and beaded or V-jointed boards	0 11 0	0 13 6
¶ in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0 ...	7 5 0
Compound Girders, „ „	8 2 6 ...	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6 ...	8 17 6
Flitch Plates	8 5 0 ...	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6 ...	8 5 6

METALS.

	Per ton, in London £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0 ...	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0 ...	8 10 0
Staffordshire "Marked Bars"	10 10 0 ...	—
Mild Steel Bars	8 15 0 ...	9 5 0
Hoop Iron, basis price	9 5 0 ...	9 10 0
„ „ galvanised	17 10 0 ...	—
("And upwards, according to size and gauge.)		
Sheet Iron (Black)—		
Ordinary sizes to 20 g.	9 15 0 ...	—
„ „ 24 g.	10 15 0 ...	—
„ „ 26 g.	12 5 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0 ...	—
„ „ 26 g.	14 5 0 ...	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0 ...	—
„ „ 22 g. and 24 g.	16 10 0 ...	—
„ „ 26 g.	18 0 0 ...	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0 ...	—
„ „ 22 g. and 24 g.	13 5 0 ...	—
„ „ 26 g.	14 0 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0 ...	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0 ...	—
„ „ 26 g.	14 0 0 ...	—
Cut nails, 3 in. to 6 in.	9 5 0 ...	9 15 0
(Under 3 in., usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	14 0 0 ...	—
Pipe in coils	14 10 0 ...	—
Soil pipe	17 0 0 ...	—
Compo Pipe	17 0 0 ...	—
ZINC—Sheet—		
Vieille Montagne ton	26 0 0 ...	—
Silesian	25 15 0 ...	—
COPPER—		
Strong Sheet per lb.	0 0 10½ ...	—
Thin „	0 0 11½ ...	—
Copper nails „	0 0 11 ...	—
BRASS—		
Strong Sheet per lb.	0 0 10 ...	—
Thin „	0 0 11 ...	—
TIN—English Ingots „	0 1 4 ...	—
SOLDER—Plumbers' „	0 0 6 ...	—
Tinmen's „	0 0 8 ...	—
Blowpipe „	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
„ fourths	1¾d. „ „
21 oz. thirds	3¼d. „ „
„ fourths	2½d. „ „
26 oz. thirds	3¾d. „ „
„ fourths	3d. „ „
32 oz. thirds	4⅛d. „ „
„ fourths	4½d. „ „
Fluted sheet, 15 oz.	2½d. „ „
„ 21 oz.	3¼d. „ „
½ Hartley's Rolled Plate	1¾d. „ „
⅜ „ „ „	2d. „ „
¼ „ „ „	2½d. „ „

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 9
„ „ in drums	„	0 2 1
Boiled „ „ in pipes or barrels	„	0 2 0
„ „ in drums	„	0 2 4
Turpentine, in barrels	„	0 3 8
„ in drums	„	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	„	19 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

PRICES CURRENT (*continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

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Advertisements for the current week's issue are received up to TEN o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

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* Denotes *accepted.* † Denotes *provisionally accepted.*

ABERDEEN (N.B.).—For the supply of 1,000 tons Portland cement, for the Harbour Commissioners. Mr. R. Gordon Nichol, Engineer, Aberdeen:—
W. H. Turcan, Glasgow ..... £1 10 6 per ton.

ASHINGTON (Northumberland).—For additions to bakery, &c., for the Industrial Co-operative Society, Ltd. Mr. Wm. J. Charlton, architect, Ashington:—

Hunn & McGregor	£552 11	Cocks Bros, Waterloo, Blyth	£538 10
Mackenzie & Doble	540 0		

BECKENHAM.—For the execution of road works, Oakhill and Kelsey Park roads, for the Urban District Council. Mr. John A. Angell, Surveyor, Council Offices, Beckenham:—

Fry	£1,479 5	Pearce	£1,293 19
Woodhams	1,301 0	Mowlem & Co.	1,242 17

BEXHILL (Sussex).—For the execution of road works, &c., Cantelupe and other roads, for the Corporation. Mr. Geo. Ball, C.E., Borough Surveyor, Town Hall, Bexhill:—

A. C. Soan	£3,773 17 11	Peerless, Dennis, & Co.	£2,219 0 0
Wimpey & Co.	2,870 0 0	Peters & Co.	2,016 14 9
G. T. Jenkins	2,797 0 0	Stephen Carey, Bexhill*	1,870 13 0
Thos. Adams	2,229 5 10		

CARLISLE.—For the erection of four houses, Eldred-street, for Messrs. R. Black & Son. Mr. H. H. Hodgkinson, architect, 9, Lowther-street, Carlisle:—

Building.—Gordon & Logan, Lamplugh-street*	£405 12 0
Joinery.—Black & Son, West Walls*	(owners)
Plumbing.—J. W. Smith, Globe-lane*	90 0 0
Plastering.—Ferguson & Son, Denton-street*	104 0 0
Slating.—J. Hewitson, St. Nicholas*	65 10 0
Painting.—S. Allan, Globe-lane*	46 2 6
Ironwork.—J. & J. Wharton, Mary-street*	18 0 0

[Estimated value of joiners' work, £290.]

DORCHESTER.—For building The New Compasses Inn, for Messrs. Jno. Groves & Sons, Ltd., Weymouth. Mr. A. L. T. Tilley, architect, 23, South-street, Dorchester:—
C. E. Slade, Dorchester* £1,773

DORCHESTER.—For alterations and additions at The Castle Inn, for Messrs. Eldridge, Pope, & Co., Ltd., Dorchester. Mr. A. L. T. Tilley, architect, 26, South-street, Dorchester:—

C. E. Slade	£960 0 0
Davis & Son, Dorchester*	922 17 8

DURHAM.—For the execution of sewerage works, &c., High Pittington, for the Rural District Council. Mr. Geo. Gregson, Surveyor, 38, Saddler-street, Durham:—

J. T. Short	£194 0 0	T. H. Skelton	£107 16 7
John Thompson	168 14 3	Robert Oliver, Durham*	102 17 5
John Carrick	144 16 11		
J. G. Bradley	130 0 0		

[Surveyor's estimate, £112.]

EXMOUTH.—For execution of road works, Park-road and other roads, for the Town Council. Mr. Samuel Hutton, Surveyor, Council Offices, Exmouth. Quantities by the Surveyor:—

—	Park-rd.	Back-rd. to Park-rd.	Back-rd. to Sutton Villas.	—
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Grounds & Newton Bournemouth*	630 16 1	329 12 10	70 9 9	1,030 18 8
Hooper & Stooke	691 12 8	391 4 9	83 6 2½	1,166 13 7½
E. P. Dukes	816 17 8	411 18 6	86 4 5	1,317 0 5
J. H. Dickson	1,033 14 6	561 10 0	123 7 6	1,723 12 0

GRIMSTONE (Dorset).—For building a farm house, for Mr. Alfred Pope, J.P. Mr. A. L. T. Tilley, architect, 26, South-street, Dorchester:—
Davis & Son, Dorchester* £1,258 12

HULL.—For the erection of thirty-two artisans' dwellings, Steynburg-street, for the Corporation. Mr. Joseph H. Hirst, C.E., Town Hall, Hull:—

H. Kaye	£7,377 0 0	Bowman & Sons	£6,798 0 0
Simpson & Sons	7,375 0 0	Jackson & Sons	6,734 8 0
F. Arnott	7,242 7 8	F. Singleton	6,563 17 8
T. Goates	6,950 0 0	J. H. Fenwick	6,510 9 0
Hill & Stevenson	6,909 11 5	J. R. Woods	6,438 0 0
Good & Sons	6,800 17 4	G. F. Blackburn*	6,364 0 0
G. H. Scorer	6,775 0 0		

[All of Hull.]

[*See also next page.*

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LONDON.—For extension of the new infirmary in Acton-lane, Willesden Junction, N.W., for the Guardians of the Poor of Willesden Parish. Mr. Alfred Saxon Snell, architect. Quantities by Messrs. Northcroft, Son, & Nicholson :—

Somerford & Son	£5,629	Ferguson & Co.	£5,120
A. & B. Hanson	5,278	W. Reason	4,997
Kerridge & Shaw	5,263	E. Chamberlain	4,965
C. Gray Hill	5,230	Appleby & Sons	4,947
Cowley & Drake	5,221	Godson & Sons, Pembroke Works, Kilburn-lane, W.*	4,930
Leslie & Co.	5,153		
Lawrence & Son	5,149		

LONDON.—For the erection of blocks D and E Campden Hill Court, Kensington, W. Messrs. Palgrave & Co., architects, Westminster, S.W. :—
C. Gray, Hampstead and Shepherd's Bush* ... £58,100

LONDON.—For the supply of four 5,000-h.-p. engines required for the electricity generating station now being established at Greenwich, for the London County Council electric tramways :—

Willans & Robinson, Ltd.	£131,857	0
Stewart & Co. (1902), Ltd.	109,068	0
" (alternative)	105,492	0
Gourlay Bros., & Co.	107,168	0
Aktieselskabet Burmeister & Wains	105,683	0
Yates & Thom	100,680	0
The Allis Chalmers Co.	99,750	0
Ferranti, Ltd.	99,250	0
Musgrave & Sons, Ltd., Bolton*	96,713	0
Davey, Paxman, & Co., Ltd.	96,693	0
A. Borsig (incomplete)	92,995	0
The Wallsend Slipway and Engineering Co., Ltd. (English steel)	92,525	0
Do. do. (German steel)	88,525	0
Cole, Marchent, & Morley, Ltd.	84,921	10
Maschinenfabrik Buckau Aktien-Gesellschaft (not to specification)	58,871	3
Fullerton, Hodgart, & Barclay, Ltd. (incomplete)	36,817	0

MARYBOROUGH (Ireland).—For the erection of a reservoir (in concrete) and laying pipes at asylum, for the Lunacy Commissioners :—
Wm. Carroll, Maryborough ... £350
[With 5s. per yard for 4-in. piping, and 4s. per yard for 3-in. piping.]

PENARTH (Wales). — For the execution of street works, &c., Stanwell-road, for the Urban District Council. Mr. E. J. Evans, C.E., Council Offices, Penarth :—

A. Sims	£201 15 6	E. Osmond, Great House, Ely, near Cardiff*	£162 3 0
Rich & Co.	201 4 11		
Thos. Edwards	194 15 7		
Chas. Davies	176 17 6		

PIDDLETOWN (Dorset). — For building The Blue Vinny Hotel, for Messrs. Jno. Groves & Sons, Ltd., Weymouth. Mr. A. L. T. Tilley, architect, 26, South-street, Dorchester :—
James Selby, Broadmayne, Dorchester* ... £1,936

POOLE (Dorset).—For the execution of sewerage works, &c., for the Town Council. Mr. John Elford, Borough Surveyor, Poole :—

Sewerage Works, Edward-lane.
Gates & Gulliver, Newtown, Poole* ... £49 6 0

Sewerage Works, St. Aldhelms.
G. Maidment, Newtown, Poole* ... £29

Road Works.
T. Budden, Newtown, Poole* ... £238 7 6

PORTSMOUTH.—For the erection of schools, Milton-road, for the Corporation. Messrs. Rake & Cogswell, architects, Prudential Buildings, Landport :—

Cook & Son	£21,995	Clark & Sons	£18,940
Smith & Sons	21,662	Coltherup	18,825
Stephens & Bastow	20,978	Perkins & Durant	18,793
Haslemere Builders	19,682	Salter	18,764
W. Evans	19,600	F. Corke	18,700
F. Privett	19,432	J. Crockerell, Southsea	18,436
G. J. Davis	19,300		
Sweetland	19,065		

STANNINGLEY (Yorks).—For the erection of a workshop. Mr. Percy Fox, architect, 14, Manchester-road, Bradford :—

Masonry.—J. H. Knight, Farsley	£512	0	0
Joinery.—R. Greenwood, Bingley	253	0	0
Slating.—Hillam Bros., Bradford	144	11	4
Plumbing.—E. Pearson, Farsley	103	10	0
Iron and Steel Work.—R. Hird, Shipley	245	0	0

THURSTONLAND (Yorks).—For the execution of sewage-disposal works, Farnley Tyas, near Huddersfield, for the Urban District Council. Messrs. Haller & Machell, architects, Corporation Chambers, Dewsbury :—

Still & White	£824	1	8
Graham & Sons	812	7	1
Marshall & Sons, Ltd., Ashton-under-Lyne*	£740	19	5

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The emoluments of the Chair are derived partly from a fixed endowment of 375*l.* a year, partly from a share of students' fees.
The election will be for five years and the Professor will be eligible for re-election. He will not be debarred from engaging in private practice, so far as it does not conflict with the duties of the Chair.
Applications and testimonials must be forwarded to the Registrar of the University on or before DECEMBER 31.
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Applications, stating age and experience, and accompanied by copies of not more than three recent testimonials, to be sent to the undersigned, endorsed "Architectural Assistant," not later than the 14th inst.
S. S. PLATT, M.Inst.C.E.
Borough Engineer.
Town Hall, Rochdale,
6th November, 1903.

CHELMSFORD CORPORATION.
MAIN DRAINAGE WORKS.
CLERK OF WORKS.
WANTED at once, a CLERK OF WORKS for the above. Salary, 3*l.* 3*s.* per week.
Probable duration of contract, four months.
Applications, endorsed "Clerk of Works," in candidate's own handwriting, stating age and experience, with copies of two recent testimonials, to be sent in to the undersigned not later than TWELVE o'clock at noon on THURSDAY, 12th NOVEMBER, 1903.
CUTHBERT BROWN, A.M.Inst.C.E.
Engineer.

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Refer also to "TOO LATE" *column, page xix.*

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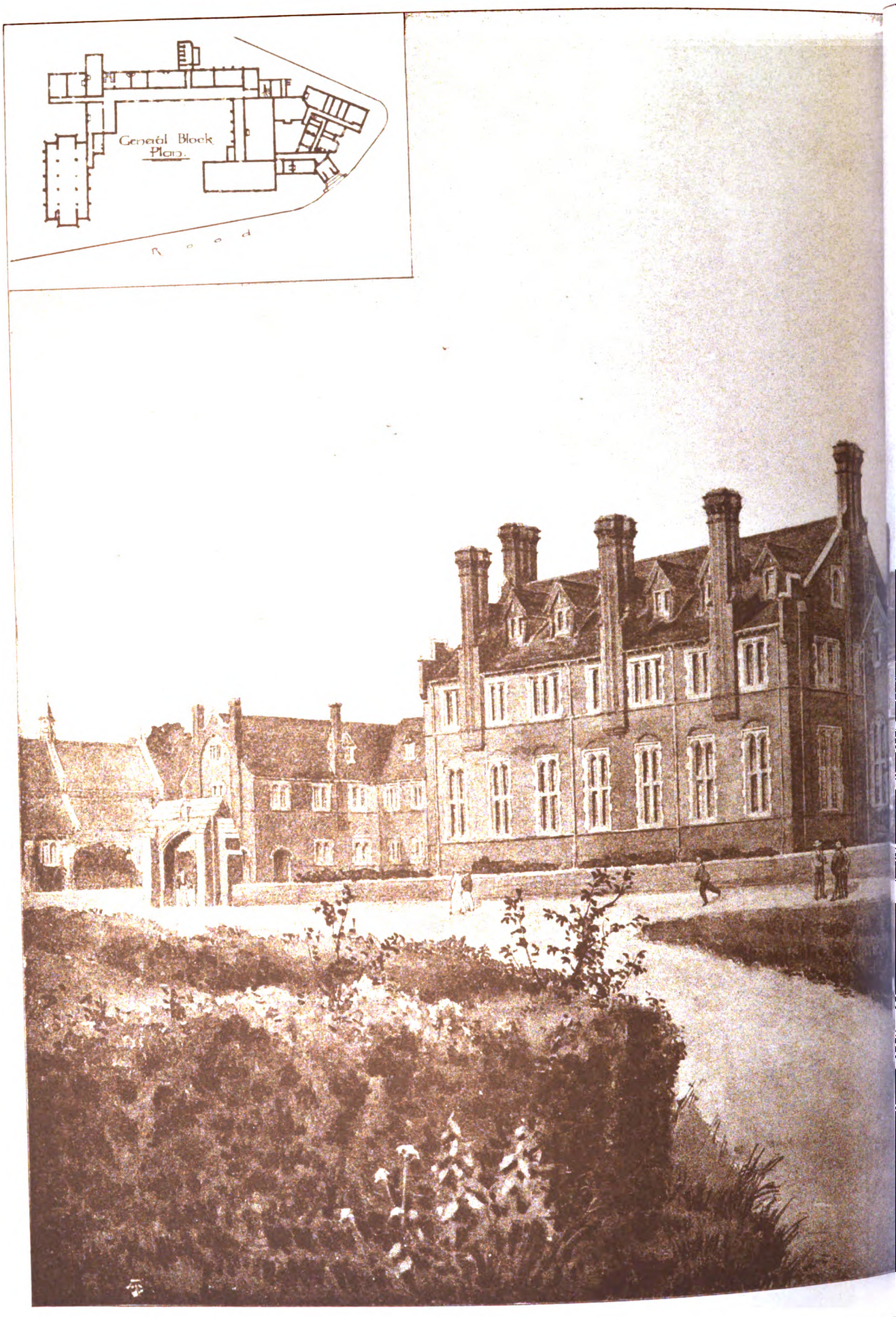

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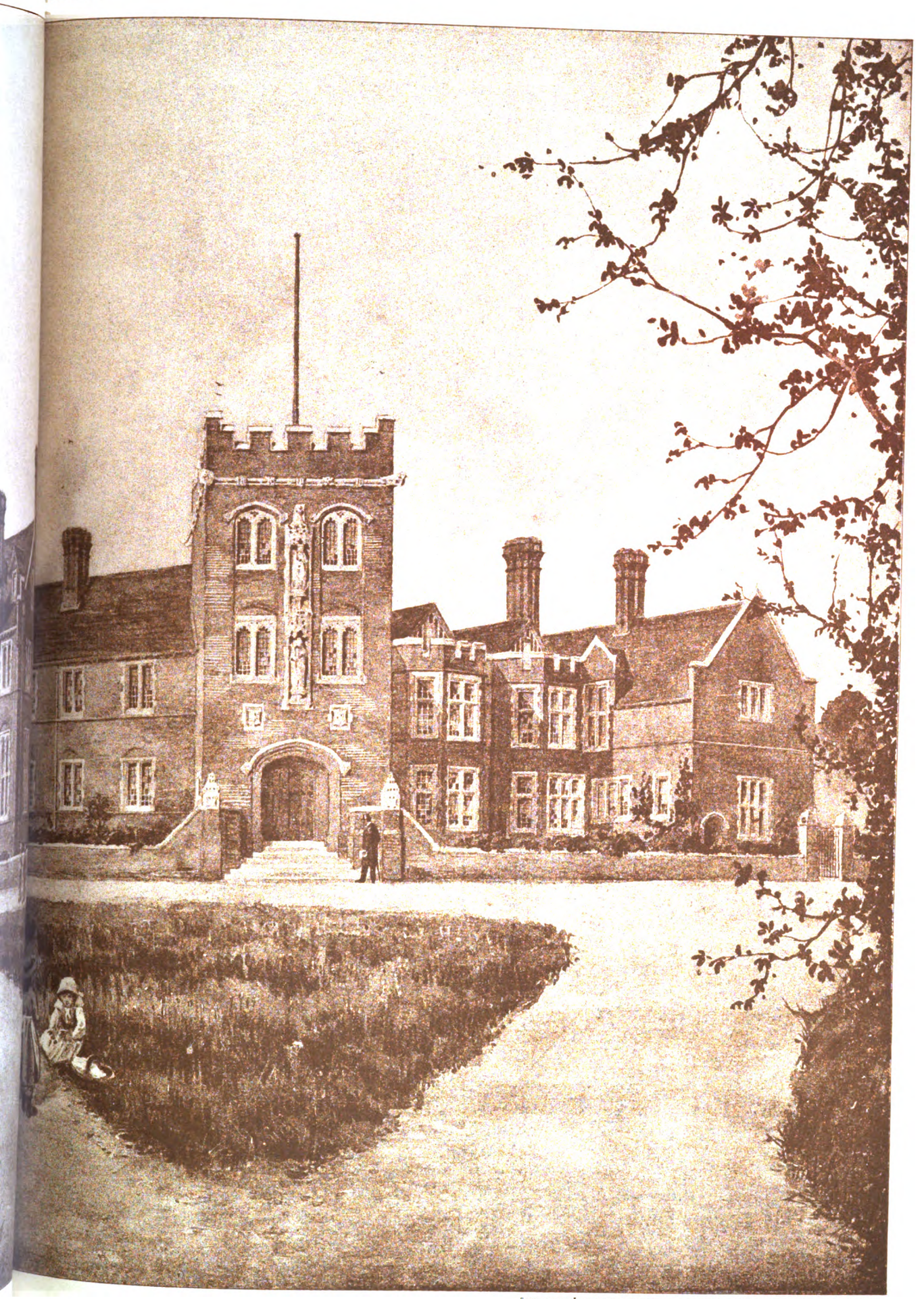

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KS.—Mr. Frederick Walters, F.S.A., Architect.

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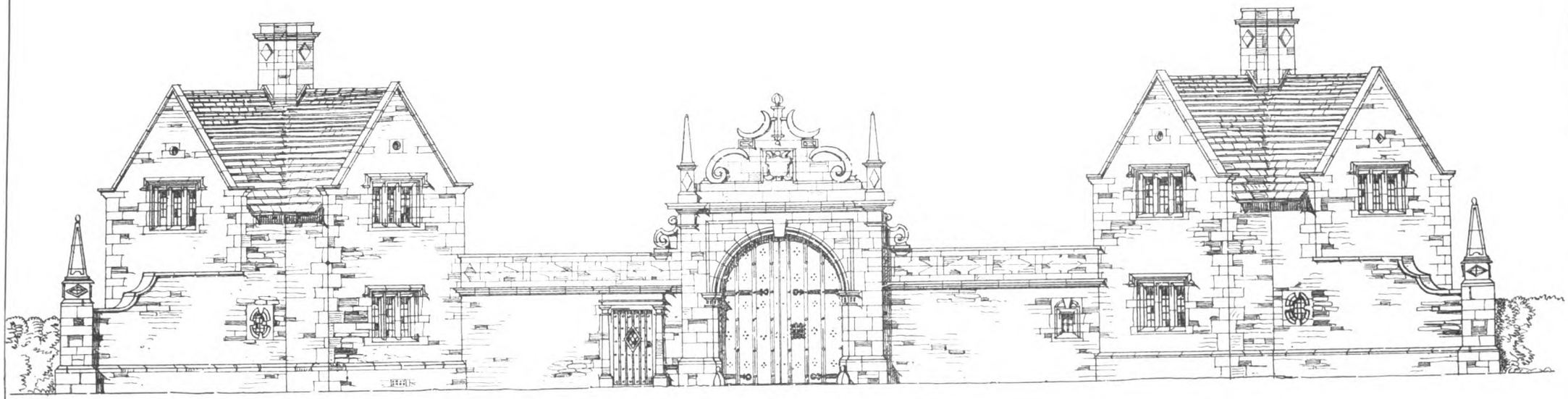

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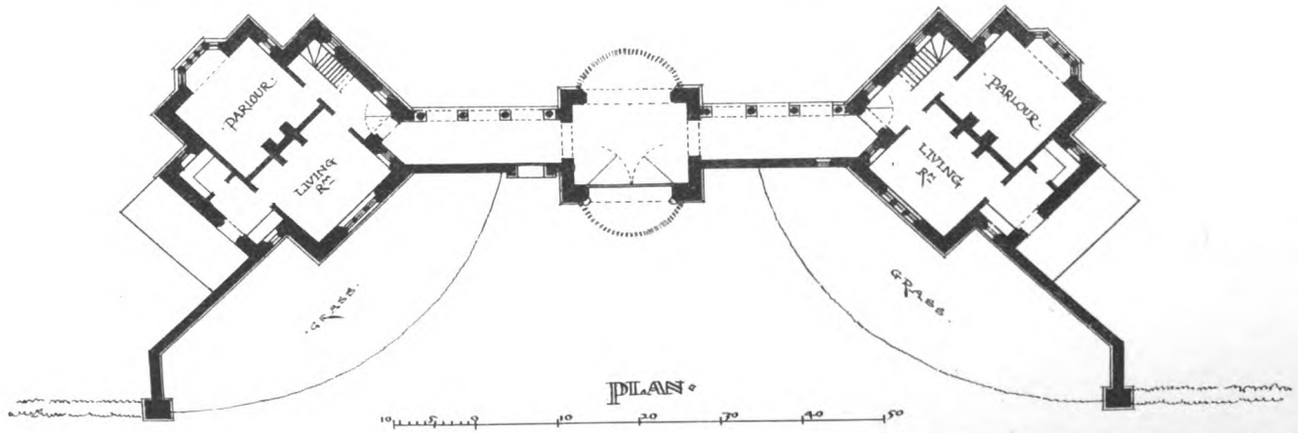

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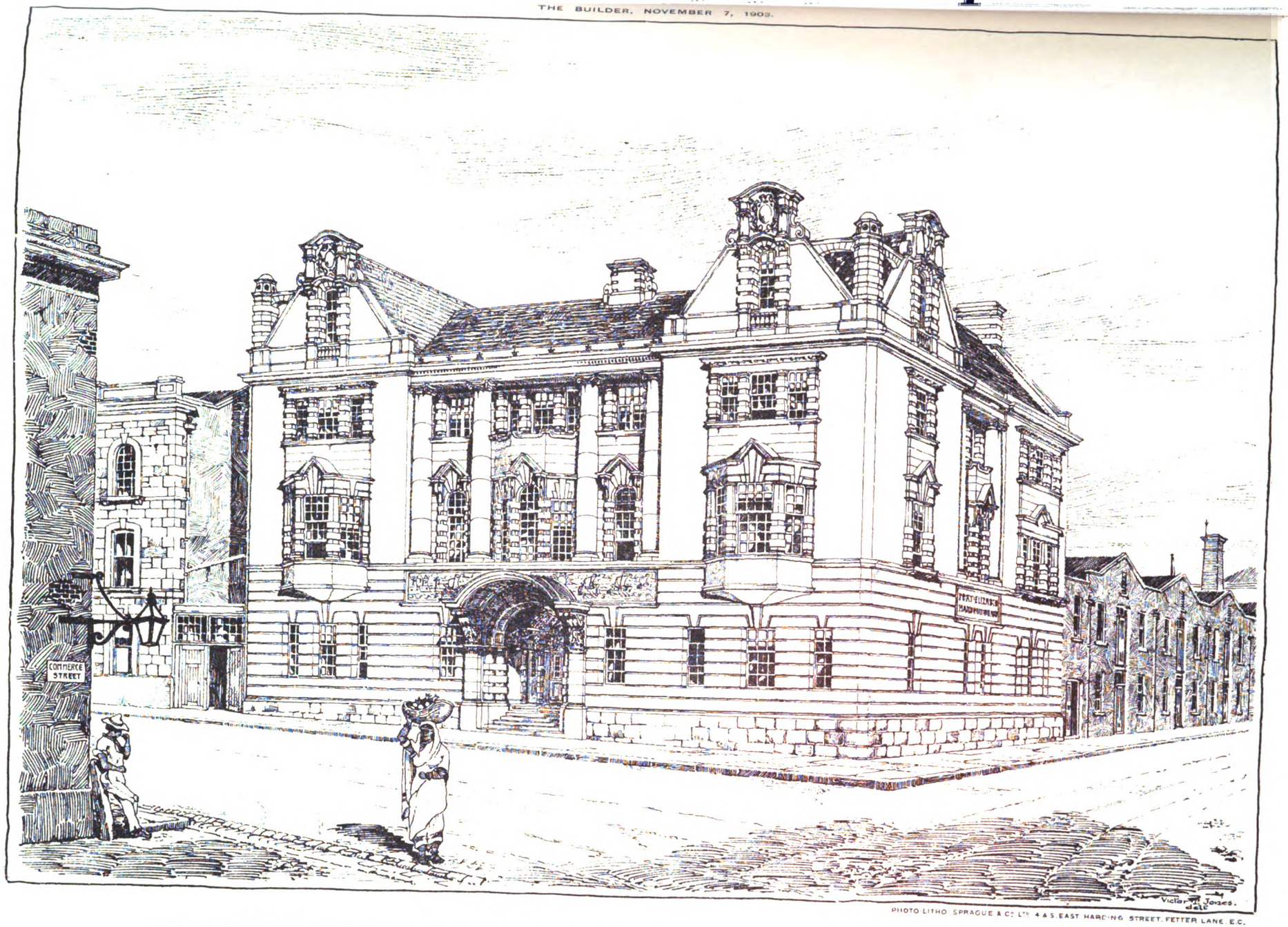

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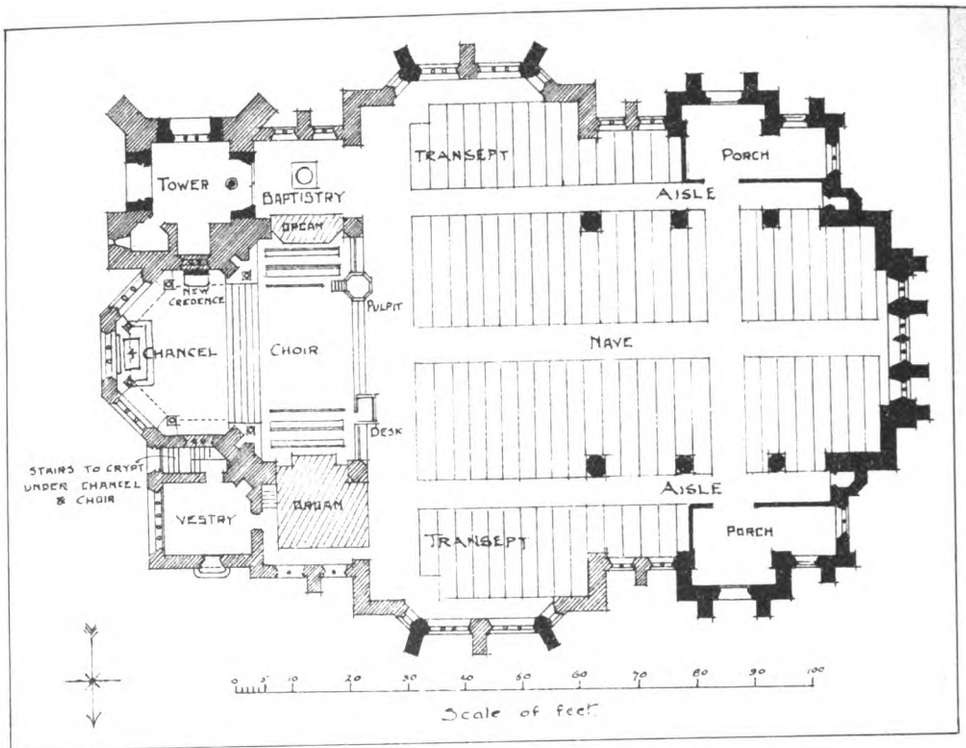

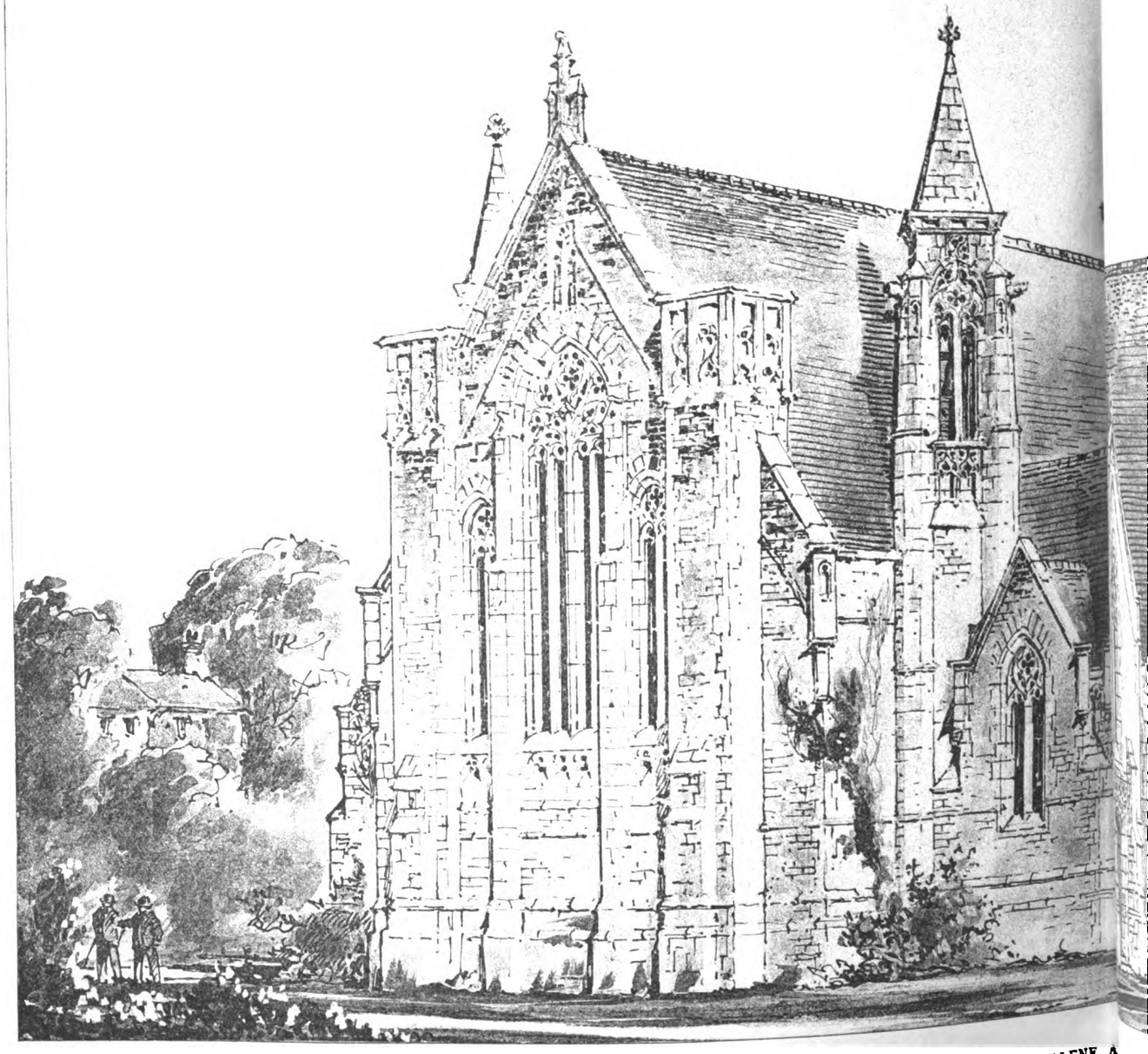

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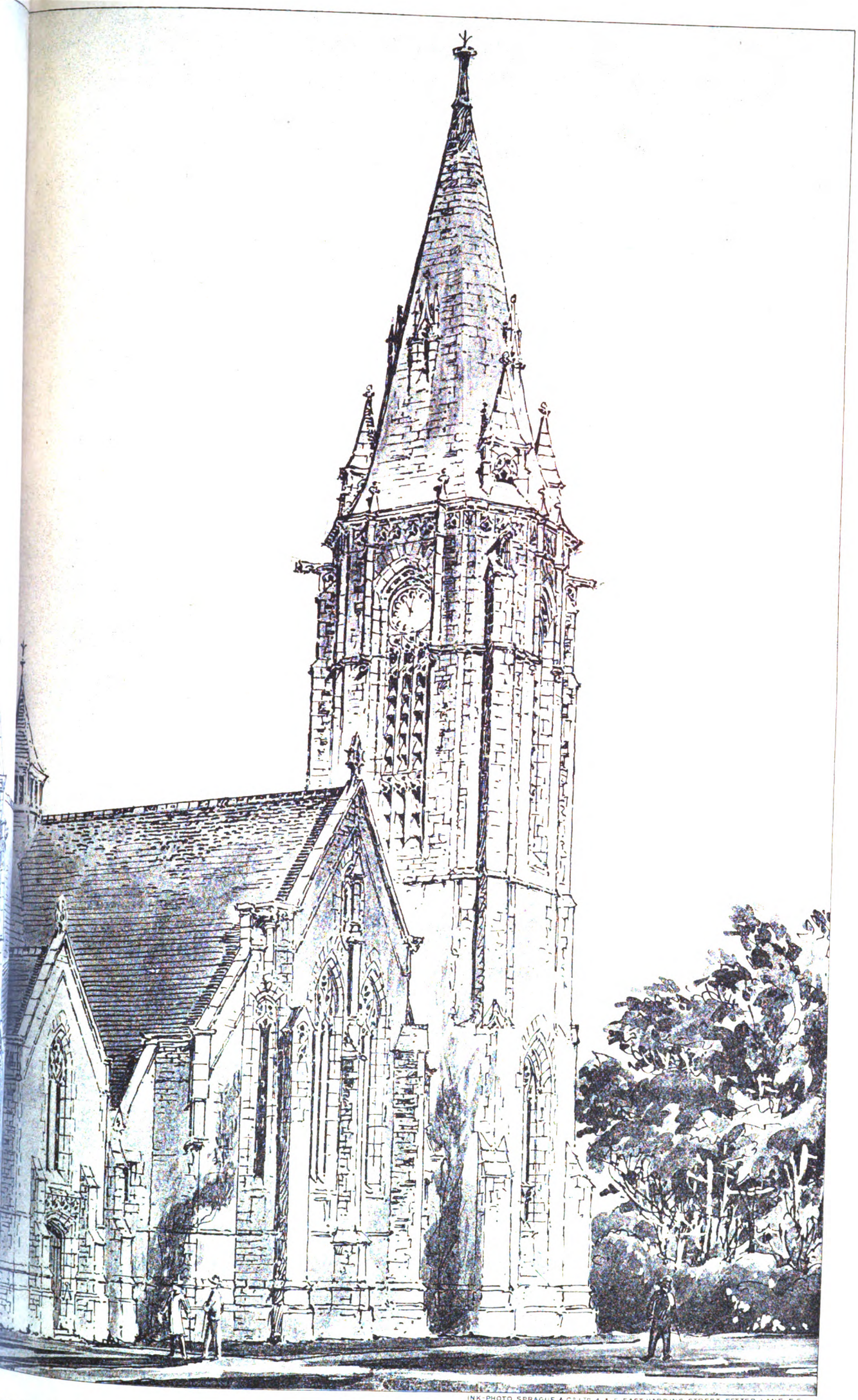

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SCOMBE.—MR. E. B. LAMB, ARCHITECT.

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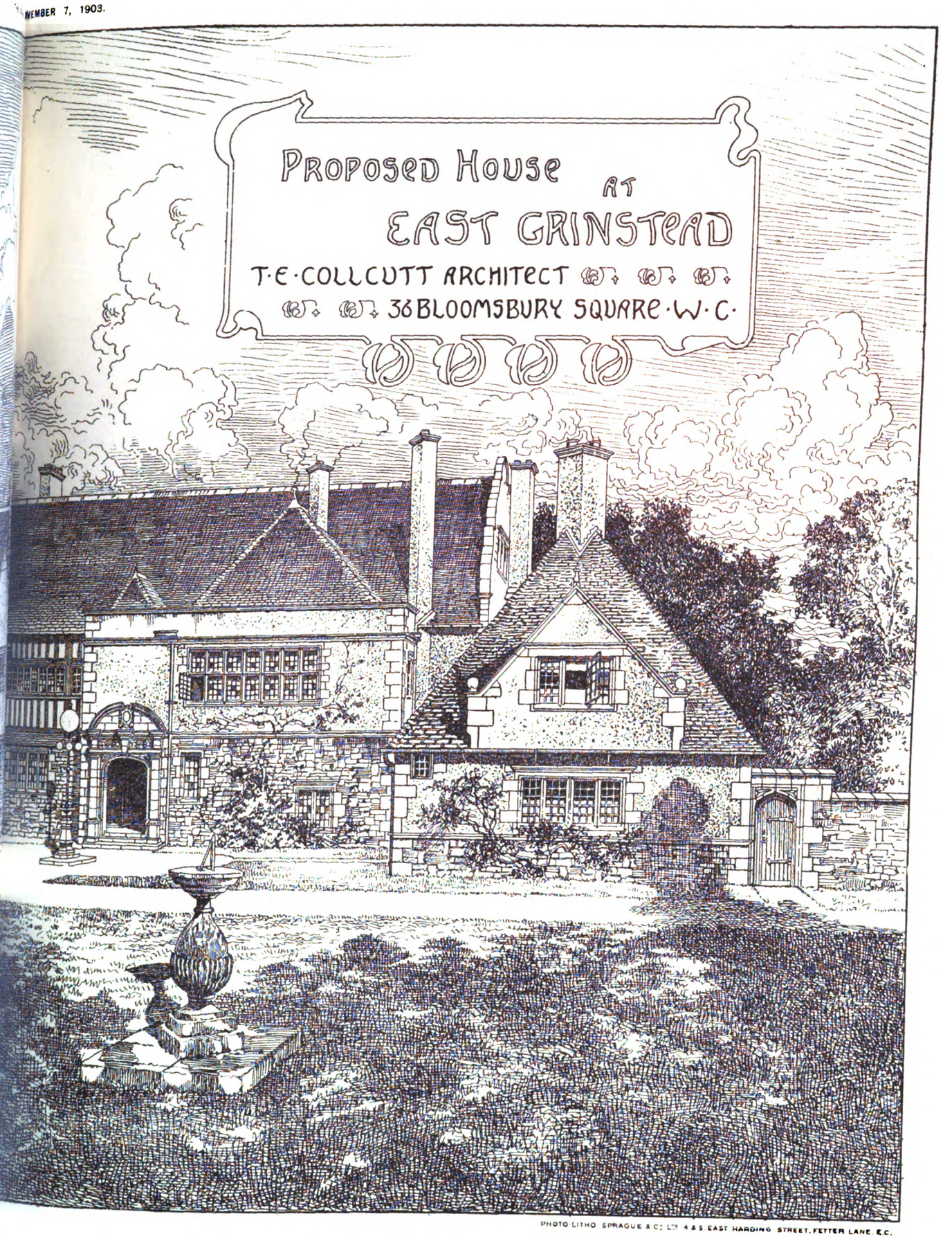

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Perth, Western Australia.

PERTH, both politically and commercially the capital city of West Australia, can only date its existence as a modern city back to the time of the discovery of the great inland goldfields about Coolgardie and Kalgoorlie. These lie from 350 to 400 miles inland to the east of Perth. The Colony received self-governing powers in 1890, but this did not affect the growth of the city to any marked degree. It was the inrush of foreign capital to develop the fields in about 1892 which brought in its train further capital seeking investments in other directions. Combined with the phenomenal influx of population, pouring in from all quarters, which had all practically to pass through Perth before distributing itself elsewhere, this regenerated the capital. It lifted it above its earlier provincial existence. A brief period of six or seven years has since sped, during which a new city, handsome and well ordered, has arisen on the north bank of the Swan River, about twelve miles from its mouth, where lies its port, Fremantle.

Few cities can boast of being more happily situated, as far as the picturesque is concerned. Southward over the Swan is a noble outlook of water and forest, which can be surpassed in natural beauty by few inland towns of any country. Every prospect pleases, and only the sand is vile, to paraphrase the old hymnologist. The West Coast of Western Australia, for many miles north and south, consists of a sandy tract extending back towards the Darling Ranges, lying about fifteen miles inland. Amidst this belt Perth is planted, and until a few years back most of its streets were in the native state of unmitigated sand. In the course of municipal progress strips of macadamised roadway were laid down in the centre of the street, with footpaths at the sides in the usual place, leaving sand strips intervening. Following at a later—a very much later—date came the completion of the road to the full width, a process still going on in the more outlying parts of the city.

It is only lately that any provision for surface drainage has been made. The rainy season, during the winter months, of say July, August, and September, is violent while it lasts. Six summer months may be practically said to be rainless. Large drains will be necessary for the rapid removal of storm water. During the transition stage of road formation, the sand strips on either side of the macadam served for drainage, where the storm water got itself away by disappearing. A similar casual method prevailed with house drainage; the sand swallowed up everything. The eye seeing not, so was the heart not afflicted; but the vengeance of the gods descended with the inflowing population. For some time there was much overcrowding, with the most rudimentary sanitary methods—or none—in vogue. Typhoid fever increased rapidly, and revelled in the rich pastures provided for it; the locality naturally got a bad reputation. Now, however, under the better prevailing conditions, after strenuous agitation has energised the municipal authorities, the health of the city has once more steadily improved. The ratio of typhoid to other diseases is now little, if any, higher than it should be.

Perth lies on the north bank of the Swan, which here, roughly speaking, runs east and west; then, taking a sharp bend north, it again forms the eastern boundary of the city. The north and west sides are not determined by any natural features. The city lies on a high terrace overlooking the river, which originally came up to the foot of the terrace. A large area of land has been reclaimed from the shallow waters, principally by dredging channels; the greater portion of this reclamation has been reserved for recreation grounds. Still more reclamation is reserved for the future.

The streets of the city, which is laid out regularly, run approximately north, south, east, and west. The finest of these, St. George's-terrace, with its continuation, Adelaide-terrace, run east and west at nearly the top of the terrace. St George's-terrace would rank as a handsome thoroughfare anywhere. It is broad, well laid out, quite a boulevard, with trees, principally Cape lilacs, on either side. Adelaide-terrace, a continuation to the eastward, and similar, is purely a residential locality, where many of the best private houses and gardens, on one side of the street overlooking the river, may be found.

Government House lies ensconced in trees, with its garden and grounds, off St. George's-terrace; on the river side are the prettily-laid-out Public Gardens. Opposite these two are the Anglican Cathedral, standing on an elevation but rather shut in, and the Post Office, which forms part of a large block of civil service, to be referred to later on. Westward is the business portion of St. George's-terrace, where all the banks, insurance offices, together with other large commercial undertakings, are to be found. On either side the street, not a few handsome and dignified fronts may be seen, principally designed in a free classical style. Lately a fine block of offices, called "Moir's Chambers," had been completed at the corner of the terrace and Barrack-street, one of the principal streets running north. It is built in red brick, the sky-line broken by gables, and handsome chimney-stacks rising from a deep-pitched green slate roof. The Bank of New South Wales has also recently been housed in a worthy manner. The front of the building is principally pressed red bricks imported from Melbourne. All the leading banks have been forced to greatly enlarge their premises to provide for increase of business. From the business portion St. George's-terrace ascends gradually westward, and ends in a steep incline at the so-called "Barracks." This is an old landmark reminiscent of the Crown Colony days. It is an old red-brick building of a military cut, three stories high, occupying a fine site, commanding as it

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does an extensive view of the river terrace, and a large portion of the city eastward. It is proposed to demolish these old buildings to erect on their site the new Houses of Legislature. No finer or fitter site could be obtained for the like purpose, and the edifice would both give and receive effect in the position. The west end of the terrace *is* the "West-end." It is one of the best residential quarters, where some very good private houses, lately erected, are set off by good gardens.

To finish with this end of the town, the Park and Observatory may be alluded to. The latter lies on the edge of the Park at an altitude of about 190 ft. above sea-level; the position, it may interest some readers to know, is long. 150 deg., 52 min. E., lat. 31 deg., 37 min. S. The Observatory has a most modern equipment under the charge of a very capable astronomer. Some of the refinements are not to be found in any other observatory. The Perth Park, forming part of the western bounds of the city, is a noble reserve of nearly 1,000 acres, in which the natural bush and the wild flowers have been preserved. It occupies the most elevated position in the neighbourhood. A fine winding drive has been laid out along the edge of the cliff a couple of hundred feet high, along the foot of which flow the deep waters of the Swan. From a promontory on this cliff a very extended prospect is obtained. The eye roves over the lake-like expanses of the river, called Perth Water and Melville Water, with their bush-clad slopes. Beyond, over the intervening bush landscape, are to be seen in the distance the blue ridges and purple slopes of the Darling Ranges, which form the background to a lovely picture.

Coming back to the centre of the town, the principal business street is Hay-street, running parallel to St. George's-terrace and north of it. This is the longest but not the widest thoroughfare in the city. Originally of the same width as others, by a most short-sighted blunder and want of prevision, it was deliberately reduced in width to save expenditure in formation and upkeep in the penurious days of the city's finances. This was accomplished by allowing owners to encroach on the street and push forward the line of frontage. Now the street is too narrow really to comfortably permit of the growing traffic, in addition to the double line of electric trams which have lately been established. The roadway for above a distance of half a mile, in the busy central portion of its length, has at the same time as putting down the permanent-way of the tram line, been laid with Jarrah wood-blocking for its full width. The tramway itself has been very solidly laid down. In this portion of Hay-street good and substantial shops and stores of all descriptions have taken the place of the old-style wooden structures.

The Town Hall and Municipal Offices occupy one corner of the intersection of Hay-street and Barrack-street, beforementioned as being the principal north and south thoroughfares. At the angle, and seen from four directions, rises a lofty square clock-tower and spire. The upper story is emphasised by circular angle turrets. The outlines of the tower, from a distance, are by no means bad, but the details are of the poorest, which is not to be wondered at, as the building was erected by convict labour long since. The interior arrangement and accommodation has become quite unsuited to the present needs of the Corporation, consequently a proposal is on foot to sell the site to the Government, who require the space for the extension of the public service offices. The City will then build elsewhere.

Brick is the principal building material used about the city, but the quality is poor. Formerly a pale red brick was produced, running to almost yellow, and a great fashion came in at one time of picking the lighter colour for headers. The wall was built in Flemish bond with the yellowish headers used all through. It does not seem to have occurred to the designers to carry the effect further by any variations in bonds or diapers. The "streaky bacon" style does not reach this far off shore. The old brick was rough, but fair in quality; during the late period of extreme activity a very inferior article has been made use of, as bricks could not be turned out fast enough; they were broken out of the kiln as soon as cool enough to handle. By means of much pointing, staining, and tuck pointing a fair exterior was presented. Repentance will come later. Most of the ornamental features in the newer buildings are moulded in cement, with applied ornament in pressed cement; these features are coloured yellow or cream-colour to represent stone. Some of this moulded work is not without merit. Mason's work is very expensive, and no good local stone easily worked for ornamental features is conveniently to be found. For rubble walling there is an ample supply of a rough limestone, and also a sandstone found close together. Some attempt has been made to work these up for effect; but such old stone buildings as exist show that both the lime and sandstone have weathered badly and become honeycombed. They are not homogeneous in quality all through. The Darling Ranges contain limitless quantities of a grey granite, and a hard blue stone which is used for road metal.

The local branch of the Royal Mint has been established some distance down Hay-street. It is a large block, solid and substantial in design, containing, besides offices, residences for the Deputy Master and the Superintendent. The cost has been about 45,000*l*. The material is principally carried out in a cream-coloured sandstone, and roofed with red French tiles, a good many of which are used locally, and make a good roof. The chimney-tops finish with tiled gable roofs, some exits are provided at the sides. The result is rather North Italian in effect.

One of the principal undertakings of the Government has been to house the Public Library and part of the Museum under one roof. Half the building has been erected at a cost of about 20,000*l*. The ground floor is partly sunk below the ground level. Local Meekering granite has been used for this story, and for the semicircular-arched open colonnade which is carried along the front at the first-floor level. A dull red brick is the material in which the building is carried out, with a high-pitched roof of green slate. The centre portion, containing the entrance and staircases, is thrown forward, and finished with a gable. The library proper is installed on the first floor, and is approached by a broad external flight of steps. It is for reference purposes only, and contains a very well-selected stock numbering about 20,000 volumes. It is arranged on the alcove system. The top floor is assigned to the museum, which has other galleries at the rear of the building.

The railway station, for the size of the city, is a large and roomy building, with an arcaded front. The administrative department of the railways is housed here in the upper story, to which a third can be added if required, as the building has been built with a view to future needs.

The Public Services are housed principally in a large block of offices, built at different periods, facing, as before mentioned, St. George's-terrace, Hay-street, and Barrack-street. There is also a long frontage on a lane connecting Hay-street and the terrace on the east side of the block. The west end of the cathedral also faces this lane. These buildings show different designs, though all are of a modified Classic type. The St. George's-terrace façade, the oldest portion, principally devoted to the Postal and Telegraph Departments, is a neat, quiet design of somewhat French Renaissance feeling, which is helped by a high-pitched slate roof, pierced by lucarnes. The long eastern façade is broken up by two designs more Classical in idea. The newest northern portion, which returns along Hay-street, will be further extended if the Town Hall is taken over by the Government. This portion is a lofty three-storied building in red brick, with largely projecting eaves above a Florentine cornice. The effect in this portion is gained by rather a doubtful expedient of meaningless ornament. A Classical colonnade of two superimposed orders is carried all along the front at the first and second floor levels. This is built out on iron cantilevers cased in concrete, and finished as moulded trusses. The columns themselves are composed of a skeleton iron framework enclosed in cement, with cement Corinthian caps and cornice. It must be admitted that this appendage has a bold effect. The architect responsible for all works here and scattered over the Colony, lately erected by the Government, is Mr. Grainger.

Coming to the churches, it may be said that the principal religious bodies have good and commodious edifices. Nearly all those of the Dissenting bodies are disfigured with large galleries. The Anglican Cathedral is a large, plain, red-brick building of simple Gothic design, having a light flèche over the crossing. The interior is plain and cold, the red-brick work rough and untouched. Three lofty lancet windows, filled with indifferent stained glass, occupy the east end. The church is fairly lofty, and has a dark open timber roof. The Catholics have undoubtedly obtained the finest site in the city proper for a great fane. The emplacement was originally a public square in one of the highest situations, through which ran one of the main thoroughfares —Murray-street. The authorities offered the site first to the Anglicans, who refused it, and then to the Roman

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Catholics, who, with their usual perspicacity, accepted the splendid gift. Their present edifice is an old, gaunt, weather-stained building, which might stand in a foreign village. The only redeeming picturesque feature is an old square tower, in one of the open arches of which, in the upper story, hangs the bell. In the neighbourhood the same religious body gradually acquired a large amount of land, on which stand various institutions connected with their religion, such as the Bishop's palace, school, convent, orphanage, etc. Those buildings, lately erected, are of a very good stamp.

The hospital, standing near the Roman Catholic Cathedral, calls for mention, as lately two extended additions have been made to it—the administrative block, and a large two-storied ward, each floor containing twenty-eight beds, the lower being a surgical ward. A well-appointed operating theatre is part of the addition. These two blocks have cost respectively about 9,000*l.* and 13,000*l.* The total accommodation of the hospital is 196 beds, which number, however, can be raised to fifty more by using temporary buildings in time of epidemic.

An extensive addition has been made to Government House to provide for large receptions and functions. The old building was erected some time back in a nondescript Tudor style. This was in the days of the Crown Colony, when it was less important than now, and the accommodation had become cramped. Large dining and billiard rooms, together with a ball and supper rooms, their necessary subsidiary apartments, have been added. The ballroom, one of the largest in the Colonies, is novel in idea. The dancing floor is surrounded by an open arcade connecting it with crush spaces beyond, so that the floor is kept free for the dancers. A musicians' gallery projects over a portion of one side. The ceiling of the ballroom is elliptical in shape, broken up into bays by flat surface mouldings and ornament.

The water supply of Perth is under the control of an independent board nominated by the Government; the Mayor of Perth, by virtue of his office, is also a member of this body. The service was instituted by a private company, which was bought out by the Government in 1896 for 220,000*l.* The City Council wished to obtain control of the supply, but could not make satisfactory arrangements with the Government as regards the loan account. Water also had been supplied outside the city limits to districts whose interests had to be safeguarded. The storage reservoir lies in the Darling Ranges, seventeen miles from the city. This reservoir is 500 ft. above sea level, and has a capacity of 240 millions of gallons. The average rainfall is about 37 in. of the catchment area, which embraces 10,000 acres of hill country. As remarked before, the rain falls almost entirely during the short winter, six months of the year being quite rainless. Adjacent to this area is that reserved to the great Coolgardie water supply scheme The water is brought into Perth by a 21-in. main, lately doubled, to the distributing reservoir on Mount Eliza, in the Perth Park, before referred to. This is about 200 ft. above sea level. Owing to rapidly-increasing demands the power of supply is taxed, and has been augmented by the flow from two large artesian bores, which has been turned into the main.

The present demand in summer is about a million gallons daily. The distributing reservoir has a capacity of 750,000 gallons. An enlargement is in course of construction, which will raise the holding up to 2,000,000 gallons. To this a filtration and aeration process will shortly be added to improve the quality of the supply. Experiments have been carried out with various filter cloths; one, a variety used in sugar refineries, has given very encouraging results. A peculiarity of the water obtained in the hills is the presence of free ammonia in it. In the deep bores about Perth it is observed in a more marked degree. These bores go down to a depth of over 800 ft. The phenomenon is not yet satisfactorily accounted for. An explanation put forward to account for the condition of the water of the bores is that in these deep strata the water is impregnated with nitrates, which, acting chemically on the iron pipes, set free ammonia.

The Coolgardie water supply scheme, of which most engineers will have heard, can only be briefly referred to in outline. Water is to be conveyed in iron pipes laid on the surface of the ground to convey water to the goldfields at Kalgoorlie and Coolgardie, 350 to 400 miles inland to the east. No fresh water can be found in those districts, and all the salt underground water has to be condensed for use. In the Darling Ranges a great dam is to be erected to store the water of the Helena River at Mundaring. The country rises steadily inland, necessitating the use of pumping stations. Of these there will be eight (two being in the vicinity of the dam) to lift the water to the highest point in the hills. Thence it will flow by gravity for some distance, when the pumping will recommence. The average lift of the pumps will be about 340 ft., and at each station the machinery will be in duplicate. The particular point of novelty, however, may be said to lie in the pipes to be used, which will be of various sizes up to 31 in. in diameter, and capable of resisting great pressure. Five million gallons a day are to be delivered at Coolgardie. The pipe decided on is the invention of Mr. Mepham Fergusson, of Melbourne, who is the contractor of half the supply of the pipes. Much time and thought has been expended in perfecting this pipe. Shortly, the process is as follows:—Flat sheets of steel, after the edges are planed and trimmed to exact dimensions, pass under heavy rollers, and are bent into semi-circular forms lengthwise of the sheet of metal. The planed edges are then inserted in the grooves of steel "locking bars," exactly the same length as the sheets. Under immense hydraulic pressure the bars are clenched on to the edges of the curved sheets. To increase the strength of the joint a slight dove-tail shape is given to it. The tests undergone have proved this joint to be equal to any possible strain likely to be incurred. The germ of the idea may be said to be very old, as it can be seen in the grooved lead cames used for quarry glazing. It is very improbable that the inventor, however, ever saw this. The joint runs lengthways of the pipe.

No system of sewage has yet been carried out of Perth. The movable plan method is in vogue, and though this was very badly and imperfectly organised some time ago, the system has been much improved. It is also more efficiently carried out, and greater attention paid to cleanliness. The pans are cleansed by steam, and disinfected before reusing them.

An elaborate scheme of sewage was prepared some little time ago by Mr. Napier Bell, an engineer whose name is well known throughout these Colonies. This plan embraced two alternatives. The main extended idea included Perth and its suburbs, with the districts adjacent to the course of the main outfall, which was to be taken to the ocean. This idea embraced Fremantle also, which is distant about twelve miles from Perth.

A modified plan restricted the scheme to Perth and its suburbs, with a sewage farm to utilise and deal with the matter. This is the only way of dealing with the products practically, as it has been rightly decided that the river shall not be used as a carrier and polluted. The Swan, with its bays and coves, is the great holiday resort for the townsfolk; its shores are a bright, clean sand, which ought not to be submitted to any deteriorating influences. The farm would have to be established on the far side of the river from the town, where the nearest suitable land is to be found. The sewage would, therefore, necessarily have to be carried through a siphon lying on the bottom of the river, which is about half a mile wide, though very shallow; or as an alternative the pipes would be slung underneath the "Causeway," as the bridge crossing the river here is called. The natural conformation of the ground in the neighbourhood of Perth will always cause difficulties in sewering. Deep depressions, quite unconnected with each other, are scattered about, and there is no well-defined fall in any one direction. A large amount of deep tunnelling, and expensive sewer construction, would be entailed. Elaborate contour surveys have been made in connexion with the extended scheme. Up to the present no move has been made in the direction of carrying out either or any scheme, nor is it probable that anything will be undertaken in the immediate future, as it will entail further borrowing.

NOTES.

Birthday Honours. As usual, art receives little attention in the Birthday Honours list. A knighthood to Mr. August Manns is a well deserved recognition of his long services to music in this country. A similar honour to Mr. Charles Holroyd, the keeper of the Tate Gallery, will be recognised as suitable. Among the architectural profession the only name is that of Mr. David Ewart, the chief architect to the Public Works Department of Canada, who receives a Companionship in the Imperial Service Order. Of English architects apparently none are considered worth taking into account for public honours. It is curious to contrast with this the regular way in which architects in France are decorated on official anniversaries.

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Street Traffic Commission. At the first meeting of this Commission, after the return of the Sub-commission from the United States, Mr. Riley, the architect of the London County Council, propounded an ideal scheme for London traffic. It is comparatively easy to evolve plans of this character, but principally impossible to secure their complete realisation. Mr. Riley suggested circumferential railway lines at various distances apart, and radial lines joining the circumferential lines with each other and with points near the centre of the county; the existing and authorised electrical systems to be modified so as to bring them into approximate unification. Further, he proposed broad avenues converging towards the central areas of the county, providing for underground as well as for surface locomotion. Something might certainly be done in the directions indicated. For instance, with the aid of suitable legislation all future deep-level subways could be constructed along circumferential routes instead of having to follow the devious lines of existing thoroughfares as at present. And the preparation of a complete prospective plan of electric railways by a central technical board would be of great use for guiding the energy of promoters in proper directions, especially if it were understood that no new lines would be permitted unless conforming with the general plan. Mr. Riley was quite right in emphasising the noticeable lack of communications between north and south, and his scheme for linking up the various railway termini is one that is well worth serious consideration. The broad avenues suggested are also desirable, and if they can be formed through comparatively inexpensive property their construction would certainly be justifiable.

The Spoliation of Clifton. We deeply regret to hear that the beauty of Clifton, or of one portion of it, is in danger of being permanently destroyed through the prosecution of quarrying operations on a large scale in Leigh Woods, on the Somersetshire side of the Avon. There is not in England a more beautiful and romantic scene than that from the high down near the head of the suspension bridge, looking across the river and the gorge to Leigh Woods, with the distant city of Bristol in the low ground on the left. Leigh Woods have been almost proverbial for beauty for generations; those who would know how the whole scene about there affected the feelings of a man of culture and imagination may gain some idea of this from the late Mr. Addington Symonds's impassioned chapter on Clifton in the volume of Essays under the title—"In the Key of Blue." To those who know and love Clifton the idea of Leigh Woods being destroyed for quarrying seems really almost a kind of blasphemy. Can people quarry stone nowhere but in the most beautiful corners of England? We understand that a committee has been formed of Bristol people to try to arrest this destruction; we hope they may succeed.

The Old Bridge, Ayr. It appears that the "Auld Brig of Ayr," as it is known in the northern tongue, is in rather imminent danger, not of the usual kind, resulting from a desire on the part of local authorities to remove and rebuild an ancient structure, but from the mere neglect of the authorities to keep it in proper repair. Mr. James A. Morris, a Fellow of the Institute, practising in Ayr, has done what he could to press upon the municipality the necessity of doing something without delay, unless they want the bridge to fall to pieces, and it seems that their own Burgh Surveyor has more than once reported on the subject, but no action has been taken. Mr Morris, in a letter to us, states that the bridge "is believed to date from the thirteenth century"; that may be the case with part of the masonry of the piers, but certainly not, as far as one can judge by a photograph, with the arches, which are not thirteenth century arches. However, it is a most interesting old bridge, not only in itself as a structural monument, but also as figuring in Burns's poem, "The Twa Brigs of Ayr." We may congratulate the Ayr municipality on not proposing to pull it down, according to the usual course of municipal authorities; but if they let it down, the result will be as bad.

The Glasgow Fire. The fire which broke out last week in Buchanan-street, Glasgow, serves to demonstrate the advantages of fire-resisting construction, and at the same time to make clear one or two weak points in connexion with the design and equipment of the buildings attacked. It appears that the fire originated in the third story of a warehouse occupied by a firm of wholesale milliners. Breaking through the windows at the sides, the flames crossed a narrow lane and ignited the contents of another warehouse stocked with woollen goods. We do not gather from published reports that either establishment was equipped with automatic sprinklers, which are certainly necessary details in the equipment of every building in which inflammable goods are kept. If such appliances had been provided it is highly probable that the fire would have been extinguished without any great damage, and it is tolerably certain that the use of fire-resisting window shutters and external sprinklers would have prevented the spread of the fire to the second building affected. As it was, the fire brigade were unable to check the flames, or to give any attention to saving the buildings until their contents had been reduced to ashes. Here again we find evidence that proper means of isolating the different floors were not provided, or if provided were not used. It is satisfactory to find that with the exception of a tower, supported by unprotected steel members, the framework of the first building was not destroyed. As for the tower, the supporting girders became red-hot, and yielded to the superimposed weight, the collapse fortunately causing no serious damage. The use of unprotected steel ought certainly to be prohibited in all future building construction in large cities, and it is clear that building regulations should compel the application of the most modern methods of resisting fire to all premises containing readily inflammable articles.

Drains *v.* Sewers. The principle adopted by the Legislature of defining the word "drain" for the purposes of the Public Health Act, and their defining the word "sewer" as including everything not a drain, has again led to legislation, carried to the Court of Appeal in the case of Wilkinson *v.* Llandaff and Dinas Powis Rural District Council (*Times*, November 9th). The channel in question was an open one at the side of the road, and it carried off the rain-water from several houses and the surface from three curtilages. In the channel were gratings carrying off the water into a deeper underground sewer or drain. Some foul matter had got into the channel, and the plaintiff sued for an injunction restraining the defendants from permitting it to remain there, and also for damages on account of the illness of a child. The plaintiff was successful on both heads, and the judgment has now been affirmed by the Court of Appeal. The Court held that the fact that there was no clearly-defined edge to the channel near the road made no difference, the fact that it took the surface water from the road and also the rain-water from the roofs of several houses constituting it not a drain, which must be used for the "drainage of one building only or premises within the same curtilage." The case of an agricultural drain carrying off surface water from different premises was, however, left open by the Court.

Lights on Motor Cars. Now the evenings are drawing in public attention is being increasingly directed to the lights carried by motor-cars, which are causing serious risk to other traffic on the roads. Horses which are perfectly trained to pass motor-cars in the daylight will not face the terrible bright lights which are now exhibited on some cars. Frequently four lights of intense brilliancy are exhibited in the front of cars, being either electric or acetylene, and on dark country roads the sudden and rapid appearance of lights of such intensity is almost as startling to drivers as to their horses, and there is this further disadvantage that the eyes of all persons meeting the cars are so blinded by the glare that they cannot see objects in the road after the cars have passed, and considerable danger is incurred from other vehicles following the cars closely. This subject calls for immediate attention on the part of the Local Government Board, and the lights carried by many bicycles also give rise to similar inconvenience, and require regulations.

"Time" under Statutory Powers. A decision of the Court of Appeal, given on October 29 in the case of Goldsmiths' Company *v.* West Metropolitan Railway Company, is of importance to those exercising compulsory powers under statute. The statute under which the defendant company acted contained a provision that "the powers of the company for the compulsory purchase of lands shall cease after the expiration of three years from the passing of this Act." The Act received the Royal Assent on August 9, 1899, and the notice of the company to treat for the purchase of certain lands was served on the plaintiffs on August 9, 1902. The

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plaintiffs contended that since August 9, 1899, the day on which the Royal Assent was given, was to be reckoned in the time, the defendants' compulsory powers ceased on August 8, 1902; but the Court of Appeal have held, affirming the Court below, that the portion of a day was not to be computed, and that the time commenced to run from midnight after the Royal Assent was given, and hence that the notice was in time.

Society of Portrait Painters.

THE exhibition of the Society of Portrait Painters at the New Gallery is a rather mixed one, and owes its attractions mainly to the works of a few eminent artists, several of them deceased, but who we presume were members during life. Thus the first central position on the wall of the west gallery is occupied by a full-length portrait, or rather the artistic treatment of a costume, by Whistler, which is stated to be "unfinished," but is more finished than many of his pictures which have been exhibited. It is called "Rouge et Noir" (4), and is, as the title implies, a study in black and red, very fine as such; but, as in others of his portraits, the face is the least interesting portion of the work and the one which seems of least importance. Mr. Orchardson occupies a very large space in the same room, with a fine set of paintings most of which, we think, are not new or painted for this exhibition, unless the half-length of "the late Marquess of Lothian" (22) may be; we do not remember it; it is a very fine work, as remarkable for its vigorous human character as a portrait; as for its fine effect of colour in this how different from the Whistler opposite, which has hardly human character at all. It is seldom that we find the balance between portraiture and pictorial effect so well kept as in this portrait of Mr. Orchardson's. Mr. Watts's "Mrs. Robert Crawshay" (3), a bust portrait in which a quantity of flowers are introduced, is beautiful as a piece of colour, but at once gives the impression that the face is not really a likeness; it is merely an idealised type. Mr Jack's charming picture of a lady seated in the open air, called a "Portrait Study" (12), has the appearance of an oil painting executed with the lightness and brightness of touch of a water-colour; there is a distinctive style about this. Among portraits which are simply portraits—presentations of a living subject with more or less intensity of likeness and expression, Mr. Collier's "Richard Gunstone" (30) is excellent, and so in a less degree is Mr. Riviere's "Sir Henry Cotton." Mr. Henry J Hudson's pictures in the north gallery are interesting for individuality of style and colour effect, especially "The Fortune-teller" (51). In the same room are M. Besnard's portrait of "Madame Besnard" (40) with a sensational effect an dlighting; Benjamin-Constant's more sober and satisfactory portrait of "Lord Savile" (42: the artist's name is wrongly inserted in the index under "C.," as "Constant, Benjamin"—an absurd mistake); Mr. Lavery's "Lady in Brown" (69), a colour study with a very pretty face attached to it, but grey rather than brown; Mrs. Jopling's portrait of a boy with a model locomotive (75), in which the boy's eager face of interest is admirable; and M. Boldini's full-length portrait of a gentleman (74), which may be a good, even what is called a "speaking" likeness, but which in style and manner touches the lowest level of artistic vulgarity. In the South Room Millais' fine portrait of Lord Salisbury reigns over a mixed collection, ranging from a beautiful little painting by Sir L. Alma-Tadema to the two grotesque works in which Signor Mancini endeavours to show how unattractive an object a painted (or splashed) portrait may be made.

Whistler's Etchings.

AT the Leicester Galleries there is on view the collection of etchings by Whistler belonging to Mr. Mortimer Menpes. To the collector this must be a specially interesting exhibition, as there are a good many examples of different states of the same etching, each of which has its own special features. One print of Speke Hall is of value because it has the figure in the foreground, another because it has not got it; one because it has not the artist's monogram, another because it has; another, one of the impressions of "Irving as Philip of Spain" is noted in the catalogue as "described by Wedmore," as if that fact added a special value to it. All that is merely an appeal to the class of persons who purchase a work not for the sake of art, but in order to possess something that others have not got. From the artistic point of view the collection is a remarkable but unequal one, including many things which are the perfection of etching, and others which are mere scrawls totally valueless except, in a commercial sense, for the artist's name attached to them; the little sketch elevation of a house, for instance 189), solemnly inserted in a very wide mount; a thing that a child might have drawn. The various Venice etchings (22, 25, 26, 29, 52) show to perfection exactly what etching can best do—the water left an untouched space except where the boats rest on it; the work concentrated on the distant buildings. No. 52 stands alone as a peculiarly delicate bit of work in which the buildings are silhouetted in a shading of thin vertical lines. "Battersea Bridge" (64), a well-known work, is another perfect example of etching; and "Putney Bridge" (121), "Battersea (dawn)" (109), and "Wych Street" (102), a capital architectural sketch of the upper portion of some of the old houses now destroyed. There are one or two powerful things showing dark effects got with heavy line shading, such as "The Kitchen" (134) and "Street at Saverne" (178)—it is difficult to say, however, whether the last-named is or is not intended for a night effect. The figure subjects are curiously unequal. Whistler seems to have had an unaccountable objection to draw the feet. In the several examples of "Irving as Philip of Spain," in the "Elinor Leyland" (66) and in the "Sketch of a Girl" (104), the feet are evaded or merely indicated as shapeless pointed projections. The figures seem mostly studied merely for general pose and for the lines of costume, the expression of the face being left quite vague. Exceptions are "The Muff" (88) which is piquant in expression, and "The Scotch Widow" (89; why "Scotch?"), which is pathetic; but in general the face seems to have been the last thing Whistler cared about in etching a figure. Among the few lithographs exhibited are some admirable rapidly executed figure sketches; No. 190, a seated figure of a girl; also 198, 199, and 205.

The Water-Colour Society Art Club.

THE Royal Water-Colour Society Art-Club, which appears to be a club principally composed of amateur artists in connexion with the society, has enough members to fill the room with a collection, which includes a great many good and interesting drawings, mostly sketches rather than finished works. Among these we may mention Mr. Butler Cato's "Rye" and other sketches; Miss McCracken's architectural subjects from Gubbio and Viterbo; Miss Percival's sketches at Clovelly and Mr. Harding Smith's at Lyme Regis; Mr. Marcus Huish's sketches of coast scenery (No. 93 especially); Miss Tinling's "Ponte Vecchio, Florence"; Miss Madeline Lewis's "Warm sea-scented beach" and Miss Boothby's "Poole Harbour"; and Miss Emery's studies of a "Mill House," exterior and interior. There is a whole group of architectural subjects by Mr. Spiers, who however cannot be classed as an amateur; also two fine sketches at Angers and Verona, by Mr. S. J. Hodson; and at Rochelle and Chinon by Mr. Herbert Marshall. We should not omit either, Mr. Russell Dowson's careful drawing of "The Greek Theatre, Syracuse." The exhibition includes a special collection of drawings by the late W. L. Leitch, in a style which had its day, but seems somewhat out of date now, except the fine "Study of a Windmill," which is of more interest than the quasi-classical studies of Italian landscape.

The Birmingham Loan Exhibition.

THE loan collection of portraits by some of the great English painters of the eighteenth and early nineteenth century, now on view at the Birmingham Art Gallery, is well worth going out of the way to see. It includes works by Reynolds, Gainsborough, Romney, Raeburn, Hoppner, Opie, and others. Among the Reynolds's is that most beautiful of all his child portraits, both in expression and colour, "Lady Gertrude Fitzpatrick," the little grave figure standing on the top of a hill, and thence sometimes called "Collina." Among less known but very fine works is Raeburn's group of "James Harrower of Inzievar, with his wife and son." Romney and Gainsborough are also well represented, and the exhibition affords a very good opportunity for comparing the manner and characteristics of the three in portrait painting. Among the more rare class of exhibits are two of John Russell's pastel portraits, "John Musters" (the future husband of Miss Chaworth) as a boy, and his sister Sophia Musters—both admirable examples of execution in pastel, a medium little used in England in those days. The exhibition has a historic value, too, not only for the artists but for some of the subjects of the portraits. We find, for instance, the likenesses of Warren Hastings (Hoppner), Haydn (Hoppner), James Quin

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(Gainsborough), Mrs. Jordan as "Hyppolita" (Hoppner), Amelia Opie, the now forgotten novelist (Opie), and Gifford (Hoppner), once the rather too notorious editor of the *Quarterly*. The catalogue is prefaced by a short but well-written critical article on the art of the period represented, and at the end are appended short biographical notices of the artists represented. The getting together of the exhibition, and the make-up of the catalogue are highly creditable to Mr. Wallis, the learned and efficent Curator of the Art-Gallery; and the exhibition ought to be very valuable in an educational sense as well as for its intrinsic artistic interest.

Messrs. Agnew's Gallery.

In the collection of works by eighteenth-century painters, on view in the galleries at 39, Old Bond Street, Messrs. Agnew have again succeeded in getting together a good many fine pictures which are not familiar to us in loan exhibitions. At the top of the room the beautiful portrait of Mrs. Denison, by Hoppner, in a black dress and bare-headed, standing in the middle of a landscape, raises Hoppner higher in our estimation than before, and the treatment seems exactly to suit the character of the figure. Gainsborough's "Mushroom Girl," a kind of Cymon and Iphigenia in modern life, is another fine and little known work. There is a controversy as to whether the "Mrs. Drummond Smith," called a Romney, is not a Reynolds; the predominance of white and the treatment of the dress are like Romney, the position of the hands and the shadow of the hat over the face are like Reynolds: but we are inclined to accept the attribution to Romney. Turner's "Harbour of Dieppe," rather too yellow in tone, shows how carefully he would paint street architecture, as exhibited in the houses on the quay; his "Dutch Fishing Boats," more powerful as a whole, is spoiled both by the bad shipping and the conventional reflections in the water; rough sea-water, in a breeze, does not show such reflections, as one would have thought that Turner, supposed to be such a conscientious student of nature, would have noted. Among the other contents of the gallery are two or three fine portraits by Raeburn; Opie's curiously modern-looking picture, "The Pet Goldfinch"; Reynolds's portrait of the Twelfth Earl of Suffolk, with his careful descending scale of colour from the crimson chair through the brown coat to the buff waistcoat; and a good example of Stark's hard but powerful landscape painting.

THE ARCHITECTURAL ASSOCIATION.

An ordinary fortnightly meeting of the Architectural Association was held on Friday evening last week in the Meeting-room of the Royal Institute of British Architects, No. 9, Conduit-street, W., the President, Mr. H. T. Hare in the chair.

The minutes having been read and confirmed and some nominations read,

The following gentlemen were elected members of the Association:—Messrs. H. Dennis, C. W. Reeves, E. J. Kelly, S. Greig, H. A. Bower, A. J. L. Leman, E. E. Beaumont, A. C. Caudwell, F. W. Commin, D. G. Round, F. G. W. Dudley, H. G. Burgess, E. D. Brown, F. R. Foster, and H. Morley.

The following gentlemen were reinstated:—Messrs. H. A. Woodington, W. S. Huxley, A. C. Lee, H. P. Burke Downing, and John P. Seddon. The Chairman mentioned that Mr. Seddon was first elected in 1847, being one of the original members of the Association, and he had acted as honorary secretary in 1850 and 1851. The Association could congratulate itself itself on the fact that Mr. Seddon had been reinstated as a member of the Association.

The New Premises Fund.

The President said that the following additional donations had been made to the New Premises Fund:—Messrs. T. E. Collcutt, 25*l.*; A. H. Tiltman, 25*l.*; Proprietors of the *Builder*, 10*l.* 10s.; Proprietors of the *Building News*, 10*l.* 10s.; Leonard J. Williams, 10*l.* 10s.; Keith D. Young, 10*l.*; H. O. Cresswell, 5*l.* 5s.; F. M. Elgood, 5*l.* 5s.; F. W. Lane, 5*l.* 5s.; A. C. Martin, 5*l.* 5s.; J. W. Penfold, 5*l.* 5s.; J. A. Reeve, 5*l.* 5s.; Hugh Stannus, 5*l.* 5s.; Cecil C. Brewer, 5*l.*; Henry Tanner, sen., 5*l.*; S. H. Hamp, 3*l.* 3s.; E. W. Allfrey, 2*l.* 2s.; F. R. Betenson, 2*l.* 2s.; Walter Cave, 2*l.* 2s.; T. P. Clarkson, 2*l.* 2s.; R. L. Hesketh, 2*l.* 2s.; J. C. T. Murray, 2*l.* 2s.; H. Whiteman Rising, 2*l.* 2s.; C. H. Brodie, 1*l.* 1s.; and Henry Tanner, jun., 1*l.* 1s.

On the motion of the President, a hearty vote of thanks was accorded to the donors.

The President also announced that a number of members have, in accordance with the Committee's suggestion, doubled their subscription; a complete list of these will be published in the December issue of the *Notes*. He hoped that this example would be followed.

The late Mr. Brewer's Drawings.

The President said that an exhibition of the drawings by the late Mr. H. W. Brewer was being held at the office of the *Builder*, and it would remain open for another week, until Friday, November 13. Those gentlemen who had not already seen the drawings would be well repaid for the trouble of going to Catherine-street for the purpose.

The Report and Balance-sheet.

Mr. Francis Hooper, Hon. Treasurer, said he had to move the adoption of the Report and balance-sheet for session 1902-03, which business had been deferred from the opening night of the new session. He did not thnk it was necessary to comment on the figures or facts already published in the Brown Book. The Committee had done its best to expend the money placed at their disposal to the advantage of the Association. Year by year the responsibilities were increasing, and the work in connexion with the Day School and the new premises involved the handling of sums which a short time ago would have seemed very large. The accounts had been carefully prepared by the Secretary, and had been audited by Messrs. Saffery, Sons, and Co., chartered accountants.

Mr. Needham Wilson seconded the motion, which was then agreed to.

The Committee in their Report state that the fifty-sixth session of the Association which ended on May 31, 1903, was one of successful progress in every respect. The membership again showed an increase, and at the close of the session numbered 1,512; 136 new members were elected, 15 rejoined, and the number of losses by death, resignations, and other causes amounted in all to 29. In regard to the new premises at the Royal Architectural Museum, Tufton-street, Westminster, the Committee say:—"It was with much regret that the Committee found it quite impossible to arrange for the Westminster School of Art to continue its valuable work at the museum, as the Architectural Association would require all the accommodation for its own needs. . . . The lease of the present premises at 56, Great Marlborough-street, terminated on Midsummer-day, 1903, but arrangements have been made for occupation to be continued until Lady-day, 1904, by which date it is hoped the Architectural Association will have removed to Westminster. Negotiations are in progress for a lease of 999 years in place of the existing leases of 73 and 23 years respectively. Important alterations were found to be necessary to adapt the premises and obtain the full advantage of the site. Mr. Leonard Stokes has been appointed architect, and the tender of Messrs. Holloway Brothers (8,440*l.*) has been accepted. The Committee trusts that every member will contribute towards the building fund, as a large amount is still required in order to carry out the alterations and provide the necessary equipment. . . . The progress of the Day School has been very encouraging both in regard to numbers and work. The term of Mr. Arthur Bolton's appointment having expired, the Committee have appointed Mr. H. P. G. Maule as his successor. General regret was felt that Mr. Bolton was unable to continue to fill this post, which he had held for two years with the best possible results, but private practice compelled him to relinquish the work. The same reason was responsible for Mr. E. F. Reynolds' resignation, and the Committee wishes to take this opportunity of expressing its indebtedness to both these gentlemen for their interest and work in the school. The immense value of the Day School has now been acknowledged by many leading architects, and no efforts have been spared to ensure its continued success, the work of the students showing remarkable progress. Reference to the balance-sheet and general income and expenditure account will show that the past session has been a satisfactory one financially; in no single instance have the receipts shown a decrease compared with those of the previous session. . . . 214 individual students attended the studio and evening classes, the number showing an increase over the previous year."

Mr. Louis Ambler, Hon. Secretary, announced the following meeting:—November 18.—Discussion Section Meeting.—Paper by Mr. M. G. Pechell on "Travelling on the Continent."

Modern Churches.

The President said he regretted to announce that Mr. C. A. Nicholson, who was to have read a paper to them on "Modern Churches," was unable to be present on account of the serious illness of his father. Mr. F. C. Eden, however, would read the paper, and they would be indebted to that gentleman for doing so.

Mr. Eden then read the paper, as follows:—

Modern church design may be said to have been evolved during the century which has just ended. Owing to a variety of causes, church building was at a standstill in England between the death of Queen Anne and the end of the eighteenth century. It is conceded, even by those who disagree with Thackeray's opinion of the Georges, that the influence of the Hanoverian Court was not such as to foster an enthusiastic churchmanship. Moreover, during the greater part of the eighteenth century, the nation was engaged in a life and death struggle with the French monarchy, the American colonists, and afterwards with Napoleon. The population was almost stationary, the old churches sufficed for all requirements, if they fell into disrepair they were patched up, if they were considered draughty and cold ceilings were made, and partitions, pews, and galleries were built; if they fell or were burnt down, they were either left in ruins or else rebuilt in the plainest possible fashion. In London, and some other large towns, a few new churches were built; generally these were proprietary chapels, financed by the ground landlords and supported by means of pew rents.

St. Peter's Church in Vere-street, and Berkeley Chapel, Mayfair, may be taken as typical of the ecclesiological ideas of the middle of the eighteenth century, plain, substantial, brick buildings, with round-headed windows and ugly belfries; their interiors reminiscent of St. James', Piccadilly, or St. Martin's-in-the-Fields.

The Church of England was roused to activity by the preaching of the Wesleys and the influence of the Tractarians, and, since the final overthrow of Napoleon, the prosperity of the nation has steadily increased. The growth of cosmopolitanism has led to the toleration of all forms of religion. The Pope is no longer looked upon as an ecclesiastical Guy Fawkes; Dissenters and Freethinkers are no longer treated as anarchists; and, consequently, an immense amount of building has been undertaken by the Church and other religious bodies during the past century.

The few churches that were built or enlarged between the Reformation and the Great Rebellion were generally of debased Gothic character, such as is met with in many Oxford colleges. Even Inigo Jones, who introduced Italian models after his travels on the Continent, built the church of St. Katherine Cree and the chapel at Lincoln's Inn somewhat after the old Gothic manner. After the Restoration, however, Charles the Second and his Court had grown accustomed to foreign fashions during their long exile abroad, and the wits and critics of the period satirised Gothic architecture as a barbarous anachronism. The fashionable style of the end of the seventeenth century became that of the school of Wren. Side by side with this, however, there lingered on the remains of the old Gothic tradition, which had never entirely died out in the remoter country districts, and which was in

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some few instances revived under the patronage of the old-fashioned divines of the school of Laud and Andrewes. Thus we find Bishop Hackett restoring the ruined cathedral of Lichfield, and rebuilding its central steeple upon Gothic lines. Again, two of Wren's city churches and four of his steeples are of Gothic character; so, too, is his work at Westminster Abbey. At Oxford, Tom Tower and Hawksmoor's work at All Soul's, are certainly more Gothic than Classic, and so are the nave and tower of the church at Warwick, built in Queen Anne's reign by one Sir William Wilson. The churches at Dartmouth and Falmouth, the spires at Higham Ferrars and at Stratford-on-Avon are familiar examples of Gothic work executed during the seventeenth and eighteenth centuries.

The closing years of the eighteenth century, the period which may be taken as the starting point of modern church history, was the age of the Greek revival in architecture. The last lineal descendant of the school of Wren was Sir William Chambers, who was also one of the earliest of revivalists, for, on his return from his travels in China, he built the Pagoda and other structures at Kew in imitation of Chinese work. The latticed balconies remaining in front of several houses about Bloomsbury, some summer houses in suburban gardens, and a few lacquered grandfather's clocks, are almost the only evidences of the once popular craze that was introduced by him. The style of the Adam brothers was the vernacular architecture of the day. Based to a certain extent upon Anglo-Classical traditions. The Adam school had introduced a certain playfulness into the design of domestic buildings, united with a perhaps excessive degree of refinement in architectural and decorative details, these details, though of classical origin, being treated in a novel and thoroughly artistic manner.

The publications of the Adams themselves, and of Stuart and other writers, brought into fashion the more literal reproduction of classical architecture, both of Greek and Roman character. But, meanwhile, other influences were making way among a large class of people. In the first quarter of the eighteenth century the *Gentleman's Magazine* was established. This publication soon became the recognised chronicle of matters of antiquarian interest. Even the earlier numbers contain occasional descriptions of mediæval buildings, the later volumes of the eighteenth century, and the earlier ones of the nineteenth, are full of entertaining criticisms of contemporary architecture, and the publication continued to treat of similar subjects until 1865, or thereabouts. The influence of the *Gentleman's Magazine* was distinctly in favour of a revival of Gothic architecture.

The first person who had seriously attempted this was probably the architect Essex, since Horace Walpole's performances can hardly be taken seriously. Essex was employed at Ely, where he refitted the choir of the cathedral; at Lincoln, where he rebuilt one of the north-eastern transept chapels in a very correct imitation of thirteenth century work, and also set up the canopied reredos to the high altar; and at Cambridge, where he designed the reredos of King's College Chapel.

At the end of the eighteenth century there also flourished a certain clever Italian modeller, one Bernasconi, whose attention was turned to the study of Gothic ornament. He was employed in refitting the choir of Southwell Minster, where he set up stone canopies to the stalls, the details being carried out in a hard cement or stucco. Both the design and the workmanship were admirable, and, since these fittings were unique of their kind, it seems a pity that they were destroyed in the recent restoration of the cathedral. The canopies of the return stalls have been preserved; they are partly fourteenth century work, but were extensively restored by Bernasconi. The same artist restored the former reredos at Westminster Abbey, and made that in the Beauchamp Chapel at Warwick. He may also have worked under Wyatt at Oxford and elsewhere. The Wyatts, father and son, had a large practice at the beginning of the last century. Their name has become a by-word on account of the sins they committed in the name of restoration, but much of their work is effective, if somewhat theatrical in character, as at Fonthill and Windsor, and in the remodelling of New College Chapel.

The early Gothic revivalists were not, however, numerous nor influential, the style which most commended itself to the critics of the Regency and the reign of George IV. being that of literal classical revival. Soane, Decimus Burton, and Wilkins were leaders in this movement, while the Wyatts and Nash frequently worked in the same style, which was adopted in most of the numerous London churches that were built in the years immediately following the battle of Waterloo.

In the year 1818 Parliament unanimously voted a million of money for church building in London and other growing cities. A favourite ecclesiastical architect of the day was a certain F. Bedford, who designed many churches in the south of London, of which St. John's, Waterloo-road, may be taken as a typical example; a large, plain, square room fitted up with pews and galleries, with a portico at one end, and a belfry on the ridge. Merciless criticisms of some of the churches appeared in the *Gentleman's Magazine* over the signature E. I. C. This critic was, however, generous enough in his remarks on some of the better work that was being done at this time by Cockerell, Barry, and Savage. Three churches were built at the expense of the ratepayers in St. Pancras by Henry Inwood. The new parish church is too well known to need description. It was designed in 1819 after the model of the Erectheum, the steeple being adapted from the Tower of the Winds. In spite of the absurdity of the general design, the church is well worth studying for its excellent workmanship and the refinement of some of its details. The interior of the apse is decidedly fine and original. The two other churches in St. Pancras by the same architect are inferior to the parish church; that in Regent-square is a rather ornate Greek Ionic building, somewhat on the same lines as the last; the other, in Somers Town, is a dismal piece of Gothic work in white brick.

The most remarkable classical church of this period was Cockerell's Hanover Chapel in Regent-street, which stood on the site of Salviati's shop. The recent destruction of this charming building seems most deplorable, although the new church in Davies-street, which was to replace it, is one of our best and most interesting modern buildings. The design recalled that of Hawksmoor's church in Lombard-street; it was a square church with twin belfries. Hawksmoor's square nave had, however, a square lantern and flat roof; Cockerell's was covered with a dome. It also possessed a portico projecting across the pavement of Regent-street and an annexe at the west end. The entrances were under the portico, at the east end of the church right and left of the altar, which was backed with a high reredos forming the front of the organ loft. The supports of the dome were arranged like those at St. Mary's, Woolnoth, but the interior of Cockerell's building was disfigured by a double tier of galleries. In later years the liturgical arrangement of the church had been altered, and a chancel formed at the west end opposite the entrance. The exterior was very effective, with its dome and two towers, and the portico was not spoiled with an ugly pepper-pot steeple set astride its pediment.

Marylebone Church, completed in the year 1818, from designs by Thomas Hardwick, at a cost of 60,000*l.*, has a pretty steeple bestriding the ridge of a rather fine portico, the combination of these two features is incongrous, but the effect of the building is good, owing to the weathering of the Portland stone of which it is built. The original arrangements of the interior were quite unprecedented, two tiers of galleries, and the altar backed with a divided organ, the centre of which enclosed a large transparency by Benjamin West. John Nash's well-known church in Langham-place is an oblong basilica arranged more or less in accordance with eighteenth century traditions; the west end has a round tower, with an effective Roman Ionic peristyle and Corinthian columns round the belfry. It is finished with a tall, sharp spire, 146 ft. high, a striking, if peculiar, feature, and the church is most admirably placed at a turn of the street.

Soane's churches at Walworth and Marylebone, St. Peter's, Eaton-square, by Hakewill, and a church in Bermondsey by Savage, are all of Revived Greek character, and better than the general run of the work done at the time, each of them showing some attempt to evolve a type of building suited to the needs of the age, instead of a blind reproduction of temple forms.

The Gothic tradition, as we have seen, had hardly become totally extinct before attempts began to be made to apply mediæval details to modern buildings. Churches more or less Gothic in character were built in London and elsewhere. Such are St. Dunstan's-in-the-East, designed by Lang, the architect of the Custom House, about the year 1820; and St. Dunstan's, Fleet-street, by Shaw, the architect of Christ's Hospital, about 1825—an octagonal nave with an effective tower and openwork lantern.

Amongst the Commissioner's Churches, two—by Sir Charles Barry and James Savage, at Islington—were singled out for special praise by E. I. C., the critic who has been mentioned in connexion with the *Gentleman's Magazine*. These are large brick buildings of Perpendicular character, pewed and galleried like the Classic churches of the period, built with embattled parapets and square towers or octagonal belfries. Similar churches were built at Edinburgh and in several provincial towns, such as Liverpool and Brighton, and places in the Potteries district. The best of this class of churches was that of St. Luke, at Chelsea, by James Savage, a building of considerable size, with a pinnacled west tower. The nave of this church is groined in Bath stone, and has flying buttresses very scientifically designed; and, though the building is not at all massive, it appears to have stood very well. Taking into account the difficulties which its designer must have had to face, it cannot be denied that his work does him great credit.

The liturgical arrangements of all these churches were bad, and their architectural detail was generally tame, when it was not altogether ungraceful. Yet, as a general rule, they were honestly and soundly constructed, and sometimes they have an appearance of size and stateliness which is lacking in much of the work of succeeding generations.

The Tractarian movement, the writings of Pugin, and the rebuilding of the Palace of Westminster, combined in the encouragement of the Gothic revival in the second quarter of the nineteenth century. Owing to the growth of religious toleration testified to by the repeal of various laws directed against the Roman Catholics and Protestant dissenters, perhaps also owing to the rise of an easy-going latitudinarianism in the National Church, Gothic architecture ceased to be looked upon with suspicion, or regarded as a badge of Popery. The Tractarians taught the importance of the sacraments, and their successors restored the observance of many ceremonies which had fallen into disuse in previous generations. As a natural consequence, the preaching places which had hitherto sufficed for them, ceased to satisfy the requirements of the majority of Churchmen. The modern type of church arrangement was thus gradually evolved during the reign of Queen Victoria, and, with very few exceptions, existing buildings were altered in such a way as to make them conform to the prevailing fashion.

The churches built at the beginning of the nineteenth century are mostly to be found in populous towns, but, after the year 1837, numbers of new churches were built in country places, and many of the old village churches were restored; the attention of architects was thus diverted to the picturesque qualities which belong especially to this class of building.

A prominent early Victorian architect was Edward Blore, who restored Lambeth Palace and refitted the choir of Westminster and Peterborough. There exist several churches from his hand, some of them in a starved Early English style, others imitated from the Romanesque churches of the Rhine provinces. Christ Church, Watney-street, Stepney, and the chapel of St. Mark's College, Chelsea, are examples belonging to the last-mentioned class. These buildings are, as a rule, built of white brick, with cement or Bath stone dressings, and they are characterised by a singular combination of pretentiousness and meanness. The style, fortunately, found few admirers, and, after isolated attempts to reproduce Norman work, or, as in the case of Wilton Church, basilican arrangements, the fashionable church architects of the middle of the last century settled down to a style imitated from English Decorated work, using Early English, which was supposed to bear being starved, for cheap jobs.

Considerable improvements were at this period introduced in the liturgical arrangements of churches—galleries and pews were generally abolished, chancels were formed, and more space was provided about the altars. Like most good people who are very much

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in earnest, the Gothic Revivalists often went too far. They built too hastily and too cheaply; they restored too energetically. Some of their work is already ruinous after only half a century's wear and tear; yet it is hardly fair to blame the individual architects for this, since they were obliged to supply a growing demand at a very low cost, and, if one man declined a commission, a rival would always be found ready to step into his shoes. It is instructive in this connexion to compare the cost of a few churches built at different periods during the last century:—

Date.	Church.	Architect.	Cost.	Per Sitting.
Begun 1813	Marylebone Church.....	Hardwick	£60,000	£25
Consec. ... 1822	St. Pancras Church	Inwood	76,000	30
1824	St. Luke's, Chelsea	Savage	20,000	10 } Bath
1825	Hanover Chapel	Cockerell	16,000	11 } stone.
1846	Trinity, Paddington.....	Cundy	14,000	7
1846	St. Saviour's, Leeds.....	Derick	20,000	15
1854	Newport, I W.	Dawkes	11,000	8 with tower
1854	Doncaster Church	Scott	40,000	20
1870	Cork Cathedral.....	Burges	100,000	—
1890	Trinity, Chelsea	Sedding	20,000 (shell)	16

And it must be remembered that the older examples generally had galleries, a fact which makes the discrepancy between them and the later buildings in respect of cost and accommodation the more remarkable.

The cheapness of churches built in the fifties may be partly accounted for by the growth of the railways, and partly by the fact that church designs were then generally based upon rural and parochial models. The choice of this type minimised constructive difficulties, and made it possible to cover a considerable space in a very economical fashion. As a result, the churches of this age are seldom of a really imposing or dignified character.

Pugin set the fashion of spires and open timber roofs, neither of which features can be made effective in a cheap church. Pugin's own works invariably possess distinction and character, notably his churches at Birmingham and Cheadle, the convent at Alton, the churches at Rugby and Ramsgate, and his work at the Houses of Parliament.

The first of these, St. Chad's, Birmingham, built at the very commencement of the reign of Victoria, is a masterly design, exceedingly bold in conception. Its tall nave and aisles are covered with a great unbroken slant roof, carried on graceful arcades. The transepts are shallow, and the choir has an apse, and is flanked with chapels. Its stained glass, its woodwork, and much of its metal work, are both rich and dainty in effect. Externally, it is very severe and simple, with red brick walls and slate roof. The hipped roofs of the transept somewhat recall Flemish work. The western spires are rather small in scale, neither turrets nor steeples, but the sculpture on the west doorway is charming. The frontispiece of Pugin's "Apology" shows this church with a central spire, which was never carried out.

The style which Pugin could handle impressively was less successful when imitated by his contemporaries. Innumerable churches were built in large towns and their suburbs in the forties, fifties, and sixties, as well as in country places. The ideal materials of this age were Kentish rag, with Bath stone dressings. The style was generally Decorated, the roofs very steep open ones, with plaster between skimpy varnished rafters; floors were laid in red and black tiles; pews were of varnished deal; organs were at first placed in west galleries, and later on in chancel aisles or organ chambers. Their pipes were gaily illuminated. Arcaded dadoes under the east windows did duty for reredos, and the fashionable glaziers were Hardman and Wailes, though a few enamel transparencies were imported from abroad. It is needless to quote examples to illustrate this dismal, though perhaps inevitable, chapter in the annals of modern ecclesiology. It must not, however, be forgotten that some good work was done at this time. Scott's church at Camberwell, for instance, with its fine central steeple and its long chancel, is solidly built and of good outline, though internally the effect is spoiled by the galleries. A very fine Roman Catholic church in Stepney was built about this time from the designs of one Wardell; and away in Australia, the cathedral, the university buildings, and numerous churches in the city of Sydney were being carried out under the care of Blackett in a bold and vigorous Perpendicular manner, somewhat reminiscent of the work of Wykeham.

Meanwhile, the Ecclesiological Society, the moving spirit of which was Beresford Hope, was steadily influencing the architects of the day. Beginning by insisting upon a literal reproduction of old forms as a necessary preparatory process, the ideal of these enthusiasts was to bring about the development of a new and living vernacular architecture based upon Gothic models.

Since the Ecclesiological Society and its individual members possessed considerable influence in the selection of architects to carry out church work, their opinions naturally carried great weight. Scott, and Brandon the architect of the Irvingite Church in St. Pancras, were to a certain degree in sympathy with the views of this Society, but less so than Carpenter, Butterfield, and Street. Carpenter's opportunities were few, but his fine church in Munster square is sufficient evidence of his ability, and an unexecuted design of his for a cathedral at Colombo is quite remarkable as an original attempt to adapt Gothic to a hot climate. Slater, who had been partner with Carpenter, Ferrey, Withers, Dawkes, Buckler, Brandon, Teulon, and Christian were all popular church builders in the fifties and sixties. But the work of Butterfield and Street was far ahead of that of their contemporaries, and its superiority quite justifies the patronage they received from the Ecclesiological Society. All Saints, Margaret-street, Butterfield's first great work, was designed so long ago as 1849, and is a marvellous production for its date. The fine outlines of this church, and the completeness and thoughtfulness of its details, stamp its designer as an artist of real genius.

Whatever may be thought of some of the details of Butterfield's work, there can be nothing but admiration felt for his strict insistence upon principles, and for the thoroughness with which he worked. When he built All Saints, Margaret-street, he laid down certain rules of his own, and from those rules he never deviated at any period of his long career. Although no two of his works are alike, every one of them exhibits the same leading peculiarities, a complete mastery of proportion and scale, a rigid insistence upon sound construction and accurate workmanship, and upon a certain definite standard of liturgical arrangement. His architectural detail was invariably based upon purely English models. He made a frank use of modern materials and modern constructive expedients, and always insisted upon the inclusion of every detail of ornament and furniture as part and parcel of the architect's scheme, determined by him at the very outset of an undertaking. Perhaps Butterfield's greatest success was his re-modelling of the school chapel at Rugby; where, with most unpromising materials, and upon a cramped site, he succeeded in producing a more original and dignified chapel than is possessed by any of the great English schools, hardly excepting even Eton or Winchester. The mention of the last-named building, however, recalls the fact that Butterfield's restoration work is less commendable than his original designs, at any rate if it be considered an axiom that the restorer should efface his own personality in his work. Butterfield had few followers, but the work of George Edmund Street had a very strong influence upon his contemporaries. Like Butterfield, Street remained faithful to Gothic motives, though in the middle of his career he was very much influenced by the beauties of French and Italian models. His constructive ability was hardly equal to that of Butterfield, but, like him, he insisted upon sound building and upon adherence to a standard of liturgical arrangement in all his works.

Sir Gilbert Scott, in his career of forty years' duration, did as much as any architect to influence the taste of the nation. Working at first in correct English Decorated style, his later buildings are often somewhat French in character, though he never went to the same length as Street or Burges in these matters. Posterity will perhaps judge him upon the merits of the numerous restorations which he carried out. This is hardly fair to his memory, he may have made mistakes sometimes; but, when we look at St. Albans, at Chichester, and at Southwell cathedrals, and at many Continental churches we may well be thankful that he was at any rate more conservative and modest than most of the architects of his time.

Burges did not carry out very much important church work besides Cork Cathedral and the excellent restorations at Waltham Abbey. His church of St. Faith, at Stoke Newington, is, however, interesting as being arranged upon distinctly modern lines. It consists of a wide nave with an apse and a coved ceiling and broad lancet windows, below which runs an arcaded passage aisle, the general disposition recalling the Bishop's Chapel at Rheims, and the detail being French in character. Burges' fine church at Limehouse, with its simple saddleback tower, is less well known.

The churches built by James Brooks in North London are designed in an early and severe manner, solidly built, and of fine proportion. Two of these, St. Chad's and St. Columba's, at Haggerstone, are cruciform buildings, the latter with a low tower over its chancel, and are distinctly impressive, although, like much of this architect's work, rather cold and uninteresting in detail. Brook's churches are roomy and well arranged for modern requirements, and their architect frequently introduced vaulting over the whole or a part of the buildings carried out by him.

The late John L. Pearson's large town churches are a class by themselves. Beginning with the pretty but rather tame building in Bessborough-gardens, in correct middle-pointed style, he was next employed at St. Peter's, Vauxhall: an apsidal brick church of French character, vaulted throughout. He afterwards settled down into a distinct manner of his own, which is exemplified at Kilburn and Red Lion-square, at Croydon, Norwood, Liverpool, and Bournemouth, and which culminated in the cathedral at Truro. These churches are all vaulted throughout, and designed with great constructive skill, the area of the supports being reduced to the least possible limits. Their plans are often ingeniously arranged to fit an irregular site, their detail is severe and of strictly English origin, but they vary considerably in general design. Perhaps the individual features of these churches may be considered unduly small in scale, and their effect is rather toy-like in consequence of this, yet the various parts are always in agreeable proportion with one another, and are refined in themselves. In later life both Brooks and Pearson carried out work of Decorated and Perpendicular character, but their chief successes were attained when they were working in earlier styles.

A contemporary of these was the late Sir Arthur Blomfield, some of whose earlier churches deserve attention on account of their frank modernity, iron columns and galleries being freely introduced. The re-modelling of Quebec Chapel, near the Marble Arch, was carried out from Blomfield's designs, and St. Barnabas, Oxford, was built by him in a plain round arched style, mainly of concrete. His later work was usually of Perpendicular character.

Little important church work was done at the end of the nineteenth century, and most of it was entrusted either to the architects just mentioned or to living artists of unquestioned ability. The younger Gilbert Scott and John Sedding, though their opportunities were few, certainly founded a school of imitators, if not of followers. The former, with Messrs. Bodley and Garner, and others, evolved a refined modification of late Gothic work which is seen at its best in large town churches. Sedding, with an intimate knowledge of old work, was, nevertheless, frankly modern in his ideals. Each of his buildings marks a fresh phase of his versatile powers. The earliest and most complete of his churches, that at Bournemouth, has a nave and chancel with very slender arches opening into a north aisle, a stone rood screen and reredos, and a western tower, the detail being late Decorated, and all the accessories of the church very complete. Cardiff, Hayle, Falmouth, and Highgate are great, simple, hall-like churches, with narrow

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aisles and no chancel arches, their detail based upon early models; and their interiors invariably characterised by a remarkable sense of spaciousness. At Truro Sedding followed the old Cornish type. At Clerkenwell the work is Renaissance, steel stanchions and girders being enclosed in concrete columns and entablatures. Holy Trinity, Chelsea, is a wide, hall-like church, with widely-spaced and massive piers, and, as is well known, it was intended to give eminent painters and sculptors a free hand in its internal decoration under the general guidance of the architect. The last church which Sedding designed was built after his death at Ealing by his successor, Mr. H. Wilson. Here the supports are unusually far apart, and the piers carry wide and low segmental arches. There is no clerestory, but galleries are formed over the flat ceilings of the aisles, with three triforium arches in each bay of the nave. The nave is lighted by a huge west window with traceried buttresses, suggested, perhaps, by those at Gloucester. Sedding, like Pugin, was a most versatile designer. His woodwork is unrivalled in fancy and refinement; his embroidery, glasswork, and metal work are full of interest, and always designed in strict accordance with the nature of the material used.

To some extent J. Bentley's work resembled that of Sedding, though it was founded more strictly upon precedent. In his last and most important church, he was compelled to follow archaic and foreign models, and he attained a result which bids fair to be honoured with the sincerest form of flattery.

During recent years, many good, bad, and indifferent churches have been built, many styles have been imitated, and many mannerisms developed only to be forgotten. One is therefore led to the conclusion that architectural style is no longer a question of mouldings and traceries in these days of cosmopolitanism and railways.

A building may be unmistakeably modern whatever may be the shape of its windows or its pillars, the disposition of its parts, or the materials of which it is constructed.

Hence there is little advantage in discussing questions of style, which, after all, must be left to the discretion of the individual designer.

Unintelligent plagiarism of eccentricities should, however, be deprecated. Thus, a fashion has lately arisen for bisecting traceried windows with clumsy mullions running up to the arch apex, a device calculated to cause the stonework to be fractured in the event of any settlement. Another latter-day freak is the boldly buttressed tower, abruptly cut off at the top without any cornice or other architectural finish, and sometimes capped with a temporary looking shed-like roof, or with a stunted dome.

As regards ornament, it goes without saying that it should not be used unless it is the best of its kind. This means that good diaper work is better than bad figure work; whitewash is better than commonplace decoration: and plain windows to be preferred to tinted cathedral glazing, and, indeed, to most stained glass. Brick and stone are better than tawdry polished granite, and good woven work than ordinary church embroideries.

Architecturally, the great invention of recent years is the cheap church. The cheap church of fifty years ago was ornate, but shoddily built. Twenty years ago economy was effected by building substantial and fairly complex churches of the cheapest and ugliest materials, red and yellow brick, fitting them up with varnished deal furniture, and stunting their general proportions. Where funds are limited it seems better to adopt an economical plan from the outset, discarding chancel arches and complexities of roofing, and spending the available funds upon sound building, and some degree of finish in the details. Sedding's churches at Falmouth and Ealing are capital examples of economical planning. Though solidly built, and of good scale and proportion and interesting detail, the cost of these churches worked out at about 6d. a foot, and 9*l*., or less, per sitting. Economy may be effected by avoiding undue multiplication of parts, and by disposing the section of the church in such fashion as to secure an agreeable proportion in each of its alleys without undue expenditure of material.

The unit by which the eye measures the size of a church is the width of the nave bays. If these are unduly wide, and the scale is not restored by some device such as a subdivision of the bays, the church looks shorter than it really is. We must all have noticed how the adoption of sexpartite vaulting shortens an interior. On the other hand, if the features are too small, the church will look toy-like. The best dimensions seem to vary between 15 and 25 ft. according to the size of the church. An agreeable proportion between height and width can generally be secured, whatever the size of the church, by the adjustment of the relative widths of nave and aisles. Thus, if a church be 60 ft. across, and its nave 30 ft. wide, the wall plates must be, let us say, 40 ft. from the floor, in order to secure agreeable proportions. If, however, the nave be reduced to 21 ft. in width and the aisles proportionately increased, the wall plates need only be 28 ft. from the floor in order to obtain the same proportion as before. Unless ample funds are available it seems a mistake to attempt a clerestory, because a one-story building looks much higher in proportion than one in which the height is subdivided into pier arch and clerestory. It is generally possible to obtain a sufficiently tall arcade to give dignity to the interior of a one-storied church, and if the aisle roofs are flat or span ones like the old west country churches, a dignified range of windows can be contrived in the aisle walls. Where clerestories are attempted in small churches, it is desirable that there should be a considerable difference in scale between aisle and clerestory. Thus the clerestory may be subordinated to the aisle, as was commonly done in fifteenth century parish churches, or on the other hand, the clerestory may dominate the design like that at Malvern Abbey. The cheapest known form of church is that in which a single large slant roof covers both the nave and the aisles. If this plan must be adopted for the sake of economy, it is still possible to secure good scale in the central alley by using bold arcades and large end windows. In these cases the aisles must, of course, be sacrificed, and their windows must be small, perhaps square-headed. Good hints for the treatment of such churches may be gathered from the village churches in the timber districts of England, and from some French work. The detail of such buildings should, of course, be simple; and the extent to which simplicity may be carried without sacrifice of dignity may best be learned from a study of old work.

A small and cheap, but most successful, village church was built some years ago by Mr. Harrison Townsend in a Surrey hamlet. Its plan is without aisles, a simple nave and sanctuary with shallow transepts and a small chancel enclosed with screen work. The roof is low-pitched, and covered with pantiles, the eaves project boldly, a simple bell cot stands over the sanctuary arch. The ceiling is a Welsh groin, springing some 5 ft. from the floor, and there are a range of plain round-headed windows on each side, a large western doorway, and a recessed sanctuary cleverly lighted from the roof. There is a boldness and distinction about this little church which it is quite unusual to find in the generality of modern work, and its cost worked out, I believe, at not more than 3*l*. or 4*l*. a sitting.

Although, as has been indicated, it is possible, and often legitimate, to exercise parsimony in adjusting the proportion of the cross section of a church, it must not be forgotten that actual height is a thing in itself most desirable. Although lack of height can be neutralised by skilful disposition of the resources at the architect's disposal, it is a very false economy to attempt to save money by crowding the floor space of a church. The planning of altar, font, seats, and so forth are determined by the average sizes of the human body, and the requirements of the Incorporated Church Building Society may be taken as defining an irreducible minimum in these respects. A sanctuary should be roomy, not less than one, or, in large churches, two bays in length. Unless there is ample space steps should not be multiplied, narrow and crowded steps being both dangerous and undignified, especially at the altar. Altar rails should be placed upon a single step, and the approaches and return gangways should be broad and direct.

The wider that pews can be spaced the better. If the site is cramped it is better to introduce galleries than to crowd the floor space. Pews seem preferable to fixed rows of chairs, which are ugly and rickety, but there seems no good reason why a part of the church should not be pewed, and the rest of the floor left open and used only for movable chairs, as is often the case abroad. The usual English system is possibly answerable for keeping the very poor away from church from a feeling of shyness at having to sit alongside of well-dressed people in a public place.

Roomy vestibules, screened off from the body of a church and fitted with swing doors, greatly add to its convenience and comfort, and may be advantageously introduced, even though they may necessitate the building of western galleries. Vestries, and accessory buildings, are too generally cramped in modern churches, but a detailed discussion of these matters is unnecessary, since they have been dealt with in a thoroughly practical and sensible fashion in Mr. Micklethwaite's excellent little book upon modern parish churches.

As regards the position for the choir and the organ, it is important that these should not be placed too far apart, nor be at a long distance from the altar in an English church, because large portions of the prayer book services take the form of verse and response between priest and people. The continental plan of treating the musical parts of the service as independent of the ritual—for instance, the performance of organ solos or anthems during the canon of the mass—does not seem likely to commend itself to English ideas. Except, therefore, in a very short church, there are objections to placing the organ and choir in a west gallery; though, if there can be two organs, the larger instrument should certainly be placed at the end of the nave or of one of the transepts, where sufficient height is available to allow the larger pipes to speak properly. The common custom of placing the choir in the chancel generally works fairly well, and it seems a pity to abandon it for the mere sake of novelty. But in some very large and long churches, and in cases where there is a low and narrow chancel arch, the singers are best placed in the nave or in galleries facing each other, like those at Milan and St. Anastasia, Verona, and Exeter Cathedral. These minstrel galleries may be used with a west end organ. The best arrangement must, however, be determined by so many circumstances, that it is not possible to lay down a general rule for the placing of the organ and choir. The Italian plan of putting them behind the altar would not commend itself to English ideas, although it is a suitable arrangement where, as in monastic churches, the choir is entirely composed of clergy. A choir of laymen and boys placed facing the communicants at the altar rails would be a cause of distraction to many people, and this, therefore, would be an objectionable arrangement in a modern parish church.

Chapels are convenient, indeed, almost necessary adjuncts to parish churches of any size. A chapel should be conveniently placed with regard to the entrance doors of the church, or it should have an entrance of its own, and its heating and lighting arrangements should, if possible, be self-contained. Only two steps are necessary at a side altar, the footpace and the communion step, as side altars are only used for plain celebrations.

The traditional position of an English church tower is upon the main axis of the church, either at the west end or upon the crossing. But there may often be circumstances that suggest some other position as best for the tower, such as the side of the nave or the chancel; and in such cases it is often possible to obtain fine internal effects by a judicious contrast of the massive supports of the tower with the lighter piers and arches of the rest of the church, as is done in the fifteenth century church of St. Mary Steps, at Exeter. The internal treatment of the tower is one of the great chances open to the church architect, and this feature has been handled in a remarkably masterly way by Butterfield at St. Alban's, Holborn, at Stoke Newington, and at Rugby. Some suggestive tower interiors are occasionally met with in small ancient churches, such as Woodeaton and Minster Lovell, near Oxford. And the seventeenth century Brittany steeples, which are structurally towers turned inside out, deserve study as being less costly than ordinary towers, and far more effective than mere bell cots.

Should it fall to our lot to design cathedrals or large collegiate churches, we should, I think, unless we have very good reasons to the contrary, place the towers and dispose the main lines of the building in a regular and monumental fashion, and it is very doubtful whether a happier grouping can be desired than the traditional English combination of a large central lantern with smaller belfries at the west end. The requisites of a modern cathedral are a nave sufficiently spacious for a large congregation, and a choir roomy enough for the

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cathedral staff and the senior clergy of the diocese. The cathedral must contain the official chair of the bishop, and it should dominate a group of diocesan buildings such as the chapter house, the congress hall, the diocesan offices, the music schools, and so forth. Many mediæval cathedrals and abbeys have been more or less successfully adapted for modern use, but it will be admitted that a new cathedral should not follow old monastic models in too literal a fashion. The ideals of the French cathedral builders of the thirteenth century as exemplified at Paris and Bourges, have more in common with modern requirements than the monastic churches of our own forefathers. The plans of the French cathedrals are unbroken rectangles, with apses and double aisles, and galleries all round; the choir and altar being in the middle and in full view of the laity, who were admitted to the nave, the aisles, the ambulatories, and the galleries. This appears to be an ideal arrangement for a great national church, and possesses advantages that are lacking in the later French cathedrals, with their innumerable private chapels, and in our own minsters with their long, narrow plans and closely-screened choirs. The cathedral builders of the future should surely make the fullest use of modern constructive facilities and engineering skill in order to enclose great unbroken floor spaces with structures that shall be stable, fireproof, durable, and rust proof. The great crossing space at St. Paul's has enabled the Chapter to make their church in a certain sense the religious centre of the British Empire. An ordinary Gothic church is not suitable for great national or civic functions; witness the makeshift expedients that are necessary when Westminster Abbey is used for coronations or thanksgiving services.

It has not been possible in this paper to discuss the special constructional problems that have to be faced by the church builder, nor to treat of the details of architectural ornament, of sculpture, of painting, or of stained glass. A knowledge of all these matters is especially necessary for the church architect, since shoddiness and commercialism are more offensive, if not more immoral, in church work than they are in buildings designed to gratify the luxurious tastes of individuals, or the vanity of secular corporations. Thirty or forty years ago the average architect, imitating the mannerisms of the leaders of the Gothic revival, tricked out his wall surfaces in party-coloured brickwork, or left them in rough rubblework pointed with black mortar; set up columns of polished granite, and laid floors with shiny tiles; designed gabled screens and reredoses; and filled our churches with garish and ill-drawn glass, and with clerical tailor's metal work. All this was supposed to constitute a vigorous school of architecture. We, who are ready enough to laugh at the work of the sixties and seventies, must take care lest, in our craving for originality, we should turn the ridicule of future critics against ourselves. And since originality is not to be obtained by a mere jumbling together of several old features of different origins in a new building, the surest way to architectural progress would seem to be that we should acquire a thorough knowledge of construction and of design, that we should study nature and avoid conscious copyism either of old or of contemporary work, and that we should thoroughly master the conditions of every problem presented for our solution, and endeavour to work out that problem in the simplest and the most unostentatious fashion that we can discover.

Mr. E. P. Warren, in proposing a vote of thanks to Mr. Nicholson for his admirable paper, said he had listened, as he was sure they all had done, with the greatest interest, and the only regrets possible were that Mr. Nicholson was absent and the cause of that absence. The paper was of great interest, both on account of the subject and the extremely scholarly and thoughtful manner in which it had been handled. It was quite evident that Mr. Nicholson had been for many years a keen student of the subject, and that he had mastered the details from the practical, constructional, and also from the emotional and artistic points of view. In dealing with a church it was true that an architect was, in many respects, dealing with problems which differed from those relating to other buildings; but the constructional problems were, of course, affairs of commonsense, and the same as in other buildings, for there was no distinctive difference in a church roof or arch from any other roof or arch. That was to say, they had to bridge or cover a space in the case of the roof, which was just what they had to do in another and different building. But this common-sense aspect in regard to church building had frequently been very much lost sight of, and designers of churches had felt that in these edifices, dedicated to a special end, and calling up special feelings, it was necessary to have certain features, whether they were constructionally required or not—that those features must be put there for the sake of having them. For instance, dividing the chancel from the nave by an arch, which generally implied that the chancel in old work was lower, and sometimes, but not often, that it was higher than the nave. There was this constructive reason for such a division in old work, but one frequently saw in modern churches the arch introduced without any constructive reason, and just out of a feeling that this division was proper between chancel and nave. The arch, in the minds of some architects, seemed to represent a necessary frontier line between chancel and nave. In modern days there was no necessity for this division. In old churches that division frequently arose from the fact that a parish church grew up from a chantry served by some neighbouring abbey or monastery, and a nave was subsequently added for the use of parishioners. This being so, it was intelligible that there should be this constructive division. Mr. Nicholson had said that in building a church where economy was a necessary point—and that was nearly always the case—that they would be wise to avoid the chancel arch, not only because it was obviously more economical to build a great parallelogram without this division, but especially because, if they were restricted in length, they could get a far more dignified effect by having a continuous span from end to end than by having this drop or dip caused by the chancel arch. It was a curious fact, from the economical point of view, that when one got beyond a certain size in a church building—say for more than 300 people—it became easier as the size of the church increased to build economically. They would see that that was so if they remembered that the greater the church the greater was the void contained. A church was, relatively, in itself a cheaper thing to build than a civil building, such as a school, a house, or factory, because it did not contain various floors, partitions, etc. It was one big void, with the addition of sacristies, chapels, and so on. In cubing out a church, they would find that if they first of all cubed the church and then took the cube of the walls separately, that the cube of the void inside cost more than the walls. It seemed an absurdity, but that was the result. In regard to materials, he thought that Mr. Nicholson was again perfectly right, that they should seek as far as possible to get perfectly simple materials. In the interior of a church, for instance, they should not think it necessary, as it was thought necessary in the sixties, seventies, and eighties, to have a lot of stone. If they could not have stone in the interior of a church they could have brick, and if they had brick they would be wise to keep to brick almost entirely, making the arches as well as the walls of brick, and, in short, try and get a great brick interior. There were many fine examples of such treatment, and he remembered one in particular, at Pavia, where there was a great church with clustered columns and arches in brick, and the effect was stately and magnificent. The treatment one often saw in England was that of red brick mixed with freestone—probably Bath stone. This treatment extended to the columns, arches, screens, and in minor details, but generally the result was patchy and unfortunate. It would be better to omit the stone and have a greater use of brick, which would also be an economy. Then, again, they were not tied even to brick. Excellent results could be got in plaster as long as the proportions and masses were right. In many an old church they would find, particularly in the Southern countries—in Italy, Spain, and South of France—that the arches were nothing but souare soffits plainly rendered in plaster. Possibly there was stone in the piers, but frequently they were plastered, though they had a high stone base. Some such treatment seemed reasonable and economical, and especially suitable for a cheap modern church. Architects should, where economy was so important, rely on the effect of line, proportion, disposition of light and shade in the interior, and not upon the expense of material. Of course, one naturally wanted a stone interior when expense was unimportant, for it was the finest material, and better than brick, of course; but where the cost had to be kept low brick could be used with advantage, and plaster, too, so long as the plaster was not too smoothly rendered, as it was apt to be by the modern plasterer. As long as plaster could be got with a certain play of surface—not with an affected inequality of surface—and with a certain feeling in the handling, they could get a good result in the simplest manner, especially if they were permitted to whitewash the plaster. He was heartily in agreement in saying, "Avoid all unnecessary features." One frequently saw faults of this kind. They were to be seen in the work of a great many architects of whom one spoke with respect, as they were pioneers in the revival of church building. Those architects were so much impressed by the quality and picturesque character of certain features that appertain to Gothic architecture, and which they thought were peculiar to it, and were so absorbed in their intention to revive these forms that they lost sight of the fact that they no longer served their original purpose. For instance, such features as buttresses and flying buttresses were sometimes put where they were not needed for constructional purposes, and where they did not correspond with any internal thrust. The buttresses should be placed, of course, as a prop to resist the pressure from inside; and so with many other features. To all young designers of churches, as of other buildings, he would say: "Be careful that you know why you put in any feature. Know exactly what those features are for." Mr. Nicholson had referred to the disposition of the sanctuary, and young architects might well ask themselves, when designing a church, what those steps were for. They should not introduce this or that number of steps because they had seen that number somewhere else; but they should provide the number that would serve the purpose—whatever it might be—to take people up to the altar, for instance. He was pleased to notice that Mr. Nicholson, in referring to architects not long passed away, and whose names were so familiar to us, had taken up a sympathetic attitude, and had noticed the excellence in their work. What had been said about the excellence of the work of Sir Gilbert Scott might have been even more strongly said. They were all conscious of the faults in Sir Gilbert Scott's work, and they knew that those faults arose from the fact that Sir Gilbert had too much to do. He had on hand at one time more than one man could conceivably do, and the work had to be delegated to assistants, and many things were done which ought not to have been done, and there was an evidence of haste about some of Scott's buildings. Still, with all this—and they should not forget the time when the work was done and the amount of prejudice and preconception of people in favour of other manners and other ideas—a great deal of Scott's work showed a grasp of a distinct style and a distinct conception of what he wanted, which in themselves were excellent things. Where a man was determined to arrive at a certain result, and did arrive at that result by legitimate means, the result was worthy of respect. Men like Street, Bodley, and Sedding were in a sense Scott's pupils. Mr. Bodley was actually Scott's first pupil, and he served the curious, old-fashioned pupilage of five years, he believed, and lived under his master's own roof. Street was not articled to Scott, but he went into his office and was directly under his influence. Sedding was never in actual personal contact with Scott, but he came under his influence through George Gilbert Scott, jun., and Mr. Bodley, and got some of the effects of Scott's clearance of the ground. In regard to church building generally, we are very apt in England to perpetuate a quality which one sees in old English churches, *i.e.*, an extreme pokiness and smallness. Why English parish churches were generally smaller, on the whole, than those of European countries—particularly those of France, Italy, and Spain—would take too long to inquire into. One saw at once some of the reasons. In the Middle Ages, when these churches were built, England was a poor country, and not in close contact with Continental towns, and had to depend on rustic ideas. England was not a country of great mountains and rivers, and it had, relatively to more Southern countries, a low sky, and all these things may have conduced to a smaller order of building. In modern churches we are apt to sacrifice possible scale for other

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considerations—that was to say, to spend money which might have been devoted to expanding the area of the church on features inside the building which were not, perhaps, essentially necessary constructionally. There was too great a tendency, which was not the architect's fault so much as the parson's, to fit a church exactly to a given congregation. An architect was asked to design a church for 500, 600, or 800 sittings. Those sittings and the gangways, space for organ, vestries, and possibly chapels, had to be provided, and the cost was calculated upon a setting out of the area to provide space for the stipulated number of people. This was a pity, because spaciousness in itself was a fine thing, and a well-proportioned, simple building, which was spacious and in which there was plenty of room, secured a dignity of its own which no crowded, over-pewed church could have. He agreed with Mr. Nicholson in advocating height. If one had ability one could make something of a church which was kept low, but it was almost impossible to get that effect—an inspiring effect—of dignity which came from loftiness. In that respect, again, he thought we were behind builders of modern churches on the Continent. He knew of one instance of this in Holland, but it was the same in many other places, which were much less rich than many of our county towns, where were to be found poky little buildings. In England we seemed to have too much of that practical sense of exactly suiting the church to its seating requirements, and allowed nothing for poetry, dignity, and such qualities. These were qualities which were essentially desirable in a church. He would like to refer to a matter which he did not think Mr. Nicholson had referred to—of an ancient plan which had been adopted and had become a modern plan for building a great church, and which seemed to answer better than the mediæval plan for modern uses, *i.e.*, a church with a single span but with internal passages—that was to say, with the internal buttresses pierced to form aisles. That was a plan most admirably adopted by Messrs. Bodley and Garner in their Church of St. Augustine at Pendlebury. The plan gave a view of the altar to every one in the church, and the aisles in the buttresses could be used by people going to and from their seats. There always seemed something uncomfortable about the plan of nave and side aisles terminating against a dead wall. In old churches there was almost invariably an altar at the east end of each aisle, which gave interest and purpose to the aisle; but now, if one provided an aisle for seating, it was not only not a good arrangement for that purpose, because the piers of the nave arcade divided it from the nave and spoilt the view of the chancel for a good many people and prevented a good many people from hearing, but the blank wall at the end of the aisle seemed purposeless. If the aisle was broad, and was terminated by a morning chapel, it then became a sitting space which upon occasions of festivals, when the church was crowded, was most useful, but in other circumstances it was not a reasonable arrangement. A prevalent vice amongst architects of modern domestic work seemed to be what he would call "cottaginess," and the attempt to tickle the fancy by odd little bits of quaintness. That was, to an extent, balanced in ecclesiastical work by a certain childish playfulness which was extremely unpleasant. He thought that the archaic, archæological severity of some of the architects referred to was preferable to anything like this frivolity—this desiring to be original in a church. There was a tendency, also, which was to some extent balanced in domestic work, to be provincial and parochial in dealing with a church in a big town. If they had to deal with a church in a large town the building should be made a civic building, and they were doomed to disappointment and non-success if they attempted to give to such a building the effect of a country building. They must have observed that a great many churches in the fifties, sixties, and seventies erected in the suburbs of London were made to look as much as possible like country churches, built in Kentish rag rubble and materials of that sort, which were quite unsuited to the atmosphere of London. He knew of such buildings at Kensington. These buildings, erected in city squares, and with grimy houses around them, had an uncomfortable and unreal effect. If a mere blank, plain effect suitable to the atmosphere and surroundings of London had been substituted, and money wasted on crockets, etc., had been spent on the interior, the results would have been much happier.

Mr. A. Needham Wilson, in seconding the vote of thanks, said he would like to endorse what Mr. Warren had said about this valuable and instructive paper, and on the admirable manner in which it had been read. The historical references Mr. Nicholson made, showing how the various schools in the revival of Gothic architecture were raised, had added considerably to the value of the address. It was most interesting to see how the rise of modern ecclesiastical architecture had followed the flow of English church life. When English church life was at its lowest, the plainest, squarest, ugliest building seemed to have suited the requirements of the day, but with the church revival and the demand for a more ornate ritual there certainly seemed to come the demand for a much more elaborate setting. He thought they ought to ask themselves what was the purpose of a church. Was it merely to provide a cover for an act of worship? Or was it for some further purpose? All of them, he thought, felt on entering a mediæval church a sensation of awe, frequently a sense of mystery, a creation of emotion—and that sense must to a great extent influence the act of worship. He felt that in a great many modern churches that spirit or effect was absent. Mr. Nicholson had touched in a very lenient manner on the architecture of the bygone masters, and no doubt he was right in doing so; at the same time, possibly, there were matters which might have been referred to as warnings to the young architect. Mr. Nicholson had mentioned Butterfield's insistence on certain principles. He (the speaker) did not think he would be going too far if he suggested that Butterfield's architecture suffered frequently from his insistence on those principles, and that he produced churches which—he did not want to use a harsh word—were somewhat cast-iron in appearance; and the lesson might be carried further if one remembered what Viollet-de-Duc, with all his profound knowledge, did in France, where he was able to carry his principles to a most alarming degree of "cast-ironness." At the same time, he thought we might congratulate English architects on the fact that we produce immeasurably superior church architecture to what our French brethren do at the present time. In reference to Sedding's work, beautiful and grand as it is in many respects—and he often thought that Sedding, almost more than any of his contemporaries, managed by his buildings to influence the worshippers with a sense of reverence—he could not help feeling that it was a little disappointing. In the concrete, the work of Sedding was, as compared with his work as shown by his drawings, somewhat disappointing. The drawings were infinitely beautiful, but when they were carried into execution some of the charm was lost. Church architecture had developed at a great rate. We seemed to have left behind—and it was a good thing, too—most of the traditional methods, and to have handed those methods over to our Dissenting brethren. That was certainly so in the matter of aisles, which, as the last speaker said, should be practically abandoned. It was to be hoped that the modern tendency of ecclesiastical architecture was towards vastness, breadth, and severity in the actual carcass of the building. We should trust more to the work of the artist—the glazier, the carver, the weaver, or the metal worker—to give our churches that embellishment which would conduce to that spirit of worship he had referred to. In how many modern churches did one get that sense of an aid to devotion—that indefinable sense which one could not help feeling in the ancient buildings? How many modern churches impress the worshipper in that way? He should like to endorse the remarks of the last speaker as to the chancel, and having one roof from end to end of a church. That would enable them to get an increased width for the chancel, many modern churches being extremely small in that respect, and excessively bare and cold and much overlighted. He was not sure that a great east window was the best finish to a church. The treatment one saw in some churches of a large dossal with side lights north and south was much more effective. There had been a great change in ideas in church matters, and the pulpit could no longer be said to be the central feature of a church, and it was a mistake to apply the principles which had probably passed away. We had passed the time when church architects could express their ideas in mere archæology. There was another matter he would like to touch upon, and that was Mr. Nicholson's suggestion for only partially filling the church with pews or benches. In many of the mediæval churches in the Eastern counties the porch in some instances was in the middle of the nave, and the buildings were not seated west of the porch. Originally, except in certain cases round the pillars, none of these buildings were seated at all, and when done so early in the fifteenth century not west of the porch. There was one feature which was overlooked in modern town churches, and that was a cloakroom. Why that should not be provided he did not know. It was most inconvenient to carry a wet mackintosh and umbrella into a narrow seat—the limit of width allowed by the Incorporated Church Building Society was about 2 ft. 9 in., he believed. Such accommodation did not allow for umbrella, mackintosh, and that nuisance, the silk hat.

Mr. G. H. Fellowes Prynne said that Mr. Nicholson had very rightly begun a short *résumé* of the church architecture of the past century with a little insight into the deadness of religious art—a deadness which one could hardly conceive. When one went into some of these churches—some of the unrestored churches—and found them pewed and furnished in the way they were, one could not feel surprise at meeting that sentence: "How dreadful is this place!"—a sentence which he had seen on three churches which he had been called in to restore. Surely when one looked back to the beginning of last century and saw some of these imitation pagan temples, one could not be surprised that educated people felt the need of something better, and that the revivalists, who were men stirred up by Rickman and afterwards by Pugin, should try to get some of the beauty, even though it was mere copyism, of the beautiful mediæval churches and cathedrals they saw throughout the land. That was an excuse for them if one were needed. The mere copyism which seemed to have taken place at the beginning of the revival was often terribly bad, but the movement gradually took shape under good men like Scott, whose work was incomparably better than that of his immediate predecessors. Though one could not say that one liked the hard and fast lines of many of his works, yet Scott seemed to lay the foundation, as Mr. Warren said, of modern church work. We were too apt not to read history as it is written—not to see the great, though gradual, progress which had taken place. There was another school which said, "Build *de novo*," but he did not think that poetry, music, or literature had ever developed in that way. Those arts had been trying to find the good points in other work, and building on that. He admired the proportions of the beautiful church by Butterfield in St. Margaret-street, especially when he remembered the time when it was built; and he greatly admired the spirit which Butterfield showed in his earlier work. He agreed with Mr. Wilson in saying that the fault of Butterfield was his consistency in pursuing one straight line and never deviating from it; and that tendency was carried out to the end of Butterfield's life. It almost seemed—he would say it reverently, for he knew and respected the man—that Butterfield worked almost selfishly in the work he did and in the accumulation of his sketches and studies for the use of no one but himself; for all were destroyed on his death by directions left in his will. The work of Street, Pearson, Brooks, was not mere copyism—we were so fond of that word; at least, our Classic friends were—for there surely was an individualism in these buildings. Much of the detail was purely mediæval, but in such a church as Sedding's at Sloane-square there was individualism, and again at St. Augustine's, Kilburn. That was a grand modern church, which was greatly to be admired. Such buildings as these could not be called the work of mere copyists. If there was one disappointment about the paper it was as to the practical part of it. Architects had to deal with a very practical side of church building at the present day—with such matters as heat and ventilation, which were essentially necessary, however uninteresting, and were a constant subject of complaint with so many people. Of course, spaciousness helped in regard to ventilation, and it prevented churches getting overheated with poisonous gases. But

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surely there was a great need for treating these points in a practical manner. All public buildings were now being ventilated and heated properly and scientifically, and much as we loved the traditions of the past, we must not forget such practical issues, which were ignored by too many church builders. As to the smallness of our churches, that was certainly almost a national characteristic, and it was not peculiar only to our churches. There was a smallness about our public buildings which, compared with other nations—Belgium, for instance—was a disgrace to us as a nation. As to the double aisles—the processional aisles, he did not suppose that Mr. Nicholson or the previous speakers would wish to do away with the cruciform shape of the church. That being so, the transepts seemed to be extremely useful in conjunction with processional aisles—first, as forming a junction with aisle and chancel; and secondly, as forming a nave to the morning chapel. A transept also gave a better opportunity for allowing an organ to be heard properly, and not to be utterly boxed away. But when they came to the question of the organ space there was scope enough for a separate discussion. Many of our churches were over-organed rather than under-organed, and one felt that organs in the seventeenth and eighteenth centuries had been made too much of, often taking up too much space and too prominent a place, sometimes even taking the place of the rood. One could not be surprised at our former architects saying of church architecture:—

> Taste and Art, rejecting Heathen mould,
> Shall draw their types from Europe's middle night,
> Well pleased if such good darkness be their light.

He warmly sympathised with the remark made by Mr. Wilson, *i.e.*, that in the Middle Ages something seemed to lift men's minds to a higher plane, and that the men who designed did so with a feeling of and for symbolism. Symbolism entered into almost every detail they drew—even into the steps of a church and in the position of windows. The influence of that work was felt by those who worshipped, and the more of that spirit we could get back amongst us the better for our churches. He could not help thinking of Keble's words—

> Three solemn parts together twine
> In harmony's mysterious line;
> Three solemn aisles approach the shrine.
>
> Yet all are one.

The Chairman said that the paper and discussion had both been very interesting, and they were indebted to Mr. Nicholson for his careful and instructive paper. The problem of building churches stood entirely by itself amongst the problems with which an architect had to deal, and it was one which called for quite different qualifications from those necessary in more practical every-day matters. A church could not be successfully erected by any architect unless he had an exceptional feeling of devotion and religious feeling, and also a strain of poetry too. As to the style of a church—whether it was in the Gothic or the Classic, or Greek or Roman—that did not matter much really. There was nothing, so far as he knew, to prevent a man thinking finely in Gothic, Classic, or any other style: if the essential qualities were there in the building it would appeal to one quite as eloquently, whatever the style it was designed in. A great deal had been said about Sedding's churches. Almost all Sedding's churches were Gothic, but there was one, a very simple one, which was in Clerkenwell, which was not Gothic. Although it was very simple it appealed to him quite as much as the more elaborate Gothic churches by Sedding. A much larger church, and an extremely fine building—an example of what a modern church should be—was St. Stephen's, Walbrook. One of the essentials of a church, but one of the things almost always lost sight of in modern churches, was that it should be designed in such a manner that it would conduce to a sense of reverence and devotion. One of the first means of producing this was an absence of strong light. Almost every church was too light; so much light was quite unnecessary. One did not want to see in a church, but to hear. In nearly all churches where the light was obscure he had felt a greater sense of mystery and devotion than in the modern churches where there was so much light. He sympathised with Mr. Wilson's remarks as to the dark sanctuary. The large east window of the English church did not seem to be necessary, and in most Roman churches there was a dark blank east end, which seemed to be a finer effect than a great mass of light. He would almost say, Don't have any windows in the sanctuary at all, not even on the south or north walls. Much had been said as to copyism and following tradition. It seemed to him that in designing modern churches tradition must be followed, but where it became an evil was when it became copyism. One must go forward; tradition, if observed and followed intelligently, would lead to progress, and that was much more solid and substantial than straining after originality. One of the great difficulties in designing modern churches was the demand for a large, unbroken space for congregational purposes. If one followed the Gothic tradition this was especially a difficulty—in the way of getting proportions which were necessary to that particular manner. As to great height, that was another essential which presented less difficulty in Renaissance buildings.

The Chairman announced that the next meeting will be held on the 20th inst., when Mr. H. M. Cautley will read a paper on "Farm Buildings."

The meeting then terminated.

THE ARCHITECTURAL ASSOCIATION DISCUSSION SECTION.

The second meeting of this section of the Architectural Association was held at 56, Great Marlborough-street, W., on Wednesday, November 4, Mr. J. H. Pearson in the chair, when a most interesting paper on "Cast Iron," with special regard to its decorative possibilities, was read by Mr. Henry Longden, who dealt with his subject in a thoroughly practical manner. Attention was chiefly directed to the possibilities in the way of the more general use of decoratively treated castings for grates and fireplaces. Several examples of such fireplaces were exhibited, alongside of their models in wood and in gesso on wood which had been used in their production. Old examples of fire backs and dogs, chiefly from the Sussex foundries of the sixteenth and seventeenth centuries, were also shown. From these examples Mr. Longden took his text, pointing out the nature of the processes employed in the several instances. The modern castings were shown to be of lower relief and finer finish than the old ones; more perfect, certainly, and, as the author claimed, more beautiful, although there was not a unanimity of opinion among members on the latter point. But, as the author pointed out, the old fire-backs were in deep cavernous recesses, and might well be coarse in finish and bold in design, whereas the modern hob grate, with its cheeks and wings, is all in the light, and therefore the flat and finer treatment was more appropriate. Reference was made to the examples of hob grates, lattices, etc., of the beginning of the nineteenth century. These were always designed with a knowledge of the shrinkage of the metal. Various examples of cast-iron railings, such as those to St. Paul's Cathedral, and elsewhere in London and the provinces, were referred to, and their merits or otherwise pointed out. For modern work, the railings designed by Butterfield at All Saints', Margaret-street, were noted as being particularly worthy of study.

In the discussion which followed, and in the remarks of the Special Visitor (Professor W. R. Lethaby) especially, much interesting and valuable information was brought out, and suggestions made for consideration in regard to the possibilities of a new future for cast iron. But, as Mr. Lethaby pointed out, more exact knowledge on the behaviour of iron under various out-of-door conditions and comparatively as regards protective treatment, ought to be obtained experimentally, and duly tabulated for our guidance. It was also thought we might learn much from the methods of the East. A plea was put in by more than one speaker for a better mutual understanding as between the architect and the founder, and lamentations were heard as to the artistic failure in so many instances of the ironwork by our public bodies.

Hotel Cecil v. Savoy Hotel.—The dispute as to ancient lights between these two hotels has been, we understand, settled on the eve of the hearing, and the case will not now be brought before the Courts. The chief architect experts engaged were:—For the Hotel Cecil, Mr. I'Anson and Mr. Pilditch, with Mr. Sawyer; and for the Savoy Hotel, Mr. Gruning and Mr. Collcutt.

MAGAZINES AND REVIEWS.

In the *Quarterly Review* the title "The Reign of the Engineer," applied to an article by Professor Armstrong, is rather misleading, as he includes under the term "all who apply science to practical uses." The article is really one on the importance of a higher standard of technical education in England. In saying that many important industries in this country have failed or are failing owing to lack of scientific training on the part of manufacturers, Professor Armstrong limits himself to indicating that what the leaders of industry require is not to be themselves scientific experts, but to have sufficient acquaintance with scientific principles and methods to be aware of the value of science in industry. Much in Professor Armstrong's article is wise and forcibly put, but it is spoiled, and its effect on some minds will be weakened, by the implied want of recognition of any value in University training except of a technical kind. Technical education is most important for national prosperity in a commercial sense, but it would not atone for neglect of higher intellectual culture. The other articles in the number, some of them of great interest, do not come within our province for reference or criticism.

The *Art Journal* contains an illustrated article on the work, as a painter-etcher, of Mr. W. Monk, some of whose works in another medium—washed drawings in black and white, will be remembered by our readers as having appeared in this journal—among others an excellent drawing of old Kew Bridge, and one of "Somerset House before the Embankment." An article by Mr. Lewis Luck, under the rather vague title "The Counsel of Philip Gilbert Hamerton," seems really to be written to accompany some views of Hamerton's surroundings at Loch Awe and Pré-Charmoy, which it is interesting to have, since everything in connexion with Hamerton is interesting. The moral intended in the article seems to be that Hamerton wrote criticism for artistic truth and not in view of his own personal likings or dislikings, which is no doubt perfectly true—Hamerton was in every sense a noble character, affording a lesson which, if necessary, ought not to be so. The article is illustrated at the close by a print from one of those curiously unsatisfactory etchings of Hamerton's which showed that a man may have the clearest and sanest perception about an art, and yet be unable to illustrate his own ideal. The history of these efforts in etching, and of the disappointment they caused to his devoted wife, who saw that he was striving after something he could not accomplish, is pathetically told in Hamerton's biography. Mr. Leslie and Mr. Eaton's joint essay on the Royal Academy in the *Nineteenth Century* recalls this month the name and work of Bailey the sculptor, who seems to have been unfortunate in his life and unhappy in his temperament, but whose two statues of "Eve at the Fountain" and "Eve Listening to the Voice" are certainly among the very best things which English sculpture of that period produced, and ought to keep his name alive. The other artists commemorated are Richard Cook, W. Daniell, R. Reniagle, and Sir Jeffrey Wyatville; none of them any longer names to conjure with. Wyatville's design for a mansion for the Earl of Yarborough, of which an illustration is given, is for all its best points indebted to Inigo Jones' Whitehall Palace design, a fact which ought to have been mentioned, but neither of the writers of the essay are architects. An article on Stevens, by Mr. T. Morris-Moore, with some personal traits and facsimiles of letters and sketches, throws some interesting light on a great figure in modern English art.

The *Christmas Art Annual* published in connexion with the *Art Journal*, and usually devoted to the illustration of the life and work of one particular artist, takes for its subject this year Mr. McWhirter. The letterpress is by Archdeacon Sinclair, who treats his subject very well, combining the special notice of the artist with some very good remarks on landscape painting generally, arising naturally from the consideration of the expression of the art in Mr. McWhirter's paintings. The illustrations are well selected to give an idea of this artist's really wide range of subject; this was desirable, because there is no doubt that he has repeated rather often the scheme of a quiet landscape with a birch tree in the foreground, so that this foreground tree has become rather associated with his name; the

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number might easily have been filled with illustrations of this class of subject; but as it is, there is enough in the collected illustrations to show that their author is a much more all-round creator in landscape than has been quite realised. The colour-printed illustration which forms the frontispiece shows, however, the birch-tree picture in its best form—"A Winter Fairy" in a snow landscape.

Perhaps the most interesting article in the *Magazine of Art* is that of Professor Herkomer on "Portrait Painting," in which he goes into what may be called the philosophy of the art—the different possible methods and points of view of the painter in regard to his art, his relation to his sitters, etc. Those who think of having their portraits painted by an eminent artist should read this article; it will give them a better notion than many sitters possess of the methods and the difficulties of portrait painting, of what the artist looks for from his sitters, how they may help him to a good result, and what they have a right to look for in the result—for expectations are sometimes unreasonable. The Editor's article on Whistler is both very interesting, for its personal traits, and very fair and well balanced. We gather from it (though not expressed in so many words) the opinion that Whistler was potentially a very great artist, who failed to make the most of his genius, through waywardness and a certain eccentricity of aim. We do not feel quite sure, however, whether the kind of art which he did produce was not really what he was best fitted for; whether he would not have failed comparatively if he had tried to paint highly-finished works instead of confining himself to the broad and suggestive treatment of a simple idea. The number contains an anonymous article on the recently-contested subject of the Academy and the Chantrey bequest, apparently written to put the matter from the Academy point of view. The writer certainly succeeds in showing that the Academy was left a very wide liberty of action by the terms of the bequest, and that it would be very difficult for the law to touch them in any way as to their past action, since everything was left to their "opinion," and they would only have to say that in their opinion the works they had purchased were the best available. The fact that the opinion of many persons outside the Academy does not coincide with theirs would after all only be a matter of opinion, on which the law could hardly pronounce. Our conviction is not at all altered—viz., that they have not bought all the best works they might have bought, and that they have shown far too great a disposition to buy the works of their own members. The writer of the article throws a new light on Chantrey's intention in stipulating that the works should be "executed in England," in suggesting that art in England was languishing at that time through the fact of the residence abroad of the ablest artists, and that he wished to counteract this absentee-ism. Mr. Aymer Vallance commences a series of articles on the subject of "Good Furnishing and the Decoration of the House," the first article being occupied with "The Hall." We quite agree with him in thinking that "one of the aims of the reformer should be the restoration of the hall to somewhat of its past dignity and importance." The suggestions made are in general what we should coincide with.

In the *Architectural Record* (New York) Mr. Kenyon Cox's article, "New Light on Michelangelo" is really a review of Mr. Berenson's "The Drawings of the Florentine Painters," considered more especially with reference to the existing drawings of Michelangelo's design for the tomb of Pope Julius, which, Mr. Berenson argues, represent only a late attempt to realise the design from Vasari's and Condivi's descriptions. We should prefer to think so, for it is not a good design considered as a whole. It is pretty certain that the "Moses" was to have formed part of it, but the figure sketched on the drawing differs very much in proportion and design from the actual statue. The author remarks, and we think with truth, at the close of the article, that the fragmentary character of Michelangelo's sculpture designs was in great measure owing to his own change of ideas, and that these works could not be carried out within reasonable time except by the collaboration of other hands, and no one could collaborate with him. Had not the Pope commissioned the Sistine ceiling to be executed by the shorter method of painting, the writer adds, we should not have had one complete decorative scheme by Michelangelo. Signor Melani contributes an article on "Modern Architecture in Italy," and poor stuff it seems to be; the most satisfactory thing in the illustrations is the sculptured figure of a monument to the dead, by Signor Pogliani. Professor Goodyear has an article to show, as he has endeavoured to show before, that all the variations from the perpendicular in St. Mark's, Venice, resulting, as the average architect must suppose, from settlement in the building, were consciously and deliberately contrived; in which he is supported with great and admiring enthusiasm by Signor Saccardo, engineering architect to St. Mark's. Those who compare the theory with the illustrations will probably come to the conclusion that this is a kind of architectural fallacy on a par with the marvellous discovery of Street, that the pavement of the church was out of level by intention. Lucubrations of this kind may amuse both the writers and (in another sense) the readers of them, but they will hardly commend themselves to sane critics. Messrs. Balfour and Turner's church in Davies-street is the subject of an article by Mr. Herbert Mansford, who thinks, and we agree with him, that so original a building deserves to be more widely known. The technical appendix at the end of the number contains the results of some interesting inquiries and experiments on the preservation of materials, extracted from the Proceedings of the American Society of Civil Engineers.

In the *Berliner Architekturwelt* the most interesting thing is a very unusual design for a country house, by Herr Emil Schaudt (Berlin); a country house treated on rather Classic lines, with a semi-circular loggia on doric columns at one end of it, flanked by masses of wall, each bearing a statue at its termination; but it is all treated with a certain modernity of feeling and character. We have often thought that a country house might be thus treated on quasi-Greek lines, and it is something at all events far superior to the contorted half-timbered erection which forms the usual ideal both of French and German country houses.

The *Architektonische Rundschau* contains a curious collection of eccentricities, of which the only one worth special attention is the Villa Stollwerck at Cologne, by Herr Bruno Schmitz, of Charlottenburg (Berlin). This is a rather remarkable and original production in what may be called *rococo* Classic. Some of the detail is odd and rather grotesque, but as a whole it is a remarkable architectural conception.

The *Art Workers' Quarterly* contains a valuable article by Mr. Silvester Sparrow on "The Stained Glass of the Future," which however, is largely concerned in the making of the stained glass of the present. There is a good deal of information in regard to practical methods, and the artistic principles propounded are sound and true.

In the *World's Work* are articles on "Cold Storage and Ice-making" and on "The Scottish Granite Industry," only however of a popular kind; the first named one, though giving a view of the new Cold Stores at Southampton, gives no information as to what is required in the planning and construction of such a building. "The Story of Irish Lace" sums up the history of a national industry, illustrated by three or four beautiful specimens of work.

Very different are the articles in *Public Works*, which are not written for the million but for technical readers who want technical information. The article on the "Profit Side of Refuse Destruction," by Mr. W. Naylor, A.M.Inst.C.E., is an essay going fully into the subject, illustrated by a number of diagrams, and crowded with statistics and figures. "Cheap Dwellings in Paris," by M. Paul Strauss, Member of the French Senate, gives a great deal of information as to what is being done in Paris in this class of house, including among the illustrations plans and view of the Rue Jeanne D'Arc houses, by M. Guyon. The plans are better than the elevation, which has the same formal and uninteresting character as the usual type of French Lycée, with ornament which does not interest one and does not make the building attractive. A much more home-like and attractive looking exterior might have been produced at the same cost; but modern French architecture is much more at home in the palace than in the cottage. Mr. E. Vicars, of the British Legation at Athens, gives an excellent account, very fully illustrated, of the restorations and repairs on the Acropolis at Athens. Other articles are, on the "Ponts et Chaussées" Department at Paris, by Mr. Henry Chabel, a French engineer; and on the Hôtel de Ville of Tours, by M. Henri Mazet.

In the *Pall Mall Magazine* Mr. Wilfred Meynell's article on Whistler is a very good and acute one, and should be read by some of those people who want us to regard Whistler as a great and down-trodden genius. Mr. Meynell, while he evidently has full appreciation of Whistler as an artist, indicates plainly enough his conviction that in his rubs and quarrels with the Philistines of the day, including (in the artist's estimation) the Royal Academy, Whistler was in many if not in most of the cases the person chiefly to blame. Among the illustrations to the article are two from *Once a Week* (1862), interiors with figures, which we suppose are Whistler's or they would not have been inserted here; but no one would guess the authorship in the light of his more recent works.

The *Monthly Review* contains an article written in a very earnest tone, by Mr. Ralph Neville, on "Garden Cities." The keynote of the article is that town life is degenerating our race physically, and that we have to provide means for enabling the artisan to share with the agriculturist the hygienic advantages of country life. This movement is only in its infancy; we hope something may really come of it; it is at present an experiment, but one well worth trying.

Scribner devotes a good many pages to "John S. Sargent," an article by Mr. Royal Cortissoz, pitched, as all these American articles on American-born artists are (Mr. Sargent can hardly be called an American artist—he is a French one), in a vein of rather tumultuous admiration, in this case justifiable. It is rather curious to be reminded that Mr. Sargent is a pupil of M. Carolus-Duran; we can hardly imagine two names in art that call forth more different associations.

The *Century* contains an article on the fascinating subject of "Italian Villas and their Gardens," which we gather is to be continued as a series, this first number dealing specially with Florentine gardens. The first point in the introduction is that Italian gardens do not exist for flowers; there may indeed be no flowers in one which is nevertheless a very effective specimen of its type. It is a laying out of ground in reference to the architectural lines of the house. We quote the following from the summary of the subject:—

"Any one who studies the old Italian gardens will be struck with the way in which the architect broadened and simplified his plan if it faced a grandiose landscape. Intricacy of detail, complicated groupings of terraces, fountains, labyrinths, and porticos, are found in sites where there is no great sweep of landscape attuning the eye to larger impressions. The farther north one goes, the less grand the landscape becomes and the more elaborate the garden. The great pleasure-grounds overlooking the Roman Campagna are laid out on severe and majestic lines; the parts are few; the total effect is one of breadth and simplicity.

It is because, in the modern revival of gardening, so little attention has been paid to these first principles of the art that the garden-lover should not content himself with a vague enjoyment of old Italian gardens, but should try to extract from them principles which may be applied at home. He should observe, for instance, that the old Italian garden was meant to be lived in—a use to which, at least in America, the modern garden is seldom put. He should note that, to this end, the grounds were as carefully and conveniently planned as the house, with broad paths (in which two or three could go abreast) leading from one division to another; with shade easily accessible from the house, as well as a sunny, sheltered walk for winter; and with effective transitions from the dusk of wooded alleys to open flowery spaces or to the level sward of the bowling-green. He should remember that the terraces and formal gardens adjoining the house, that the ilex or laurel-walks beyond were clipped into shape to effect a transition between the straight lines of masonry and the untrimmed growth of the woodland to which they led, and that each step away from architecture was a nearer approach to nature."

Harper contains an article by Professor Flinders Petrie on "The Ten Temples of Abydos." The main information contained in it has already been before the public in other forms, but the article is a very graphic one, with some illustrations which add greatly to its interest. "London from a 'Bus-top," by

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Mr. Sydney Brooks, may interest those who like to know how others see us.

Knowledge is interesting for two articles on Mars and the much-vexed question of the real meaning of the markings on his surface; one by Mr. Antoniadi, the other by Mr. Walter Maunder. Both of them tend towards the conclusion that the canal-like straight lines are mainly an optical delusion from various causes. To which one may reply—why then do we not see similar lines on the disc of the moon or of Venus?

The *Cornhill* contains an article by the Rev. John M. Bacon—"Midnight in Cloudland: an Experiment." The object of the nocturnal balloon ascent described was to study the subject of the distance at which sounds could be heard, and the apparent direction of their source. Some of the results were curious and unexpected, but we must refer the reader to the article for particulars.

We have received the *Antiquary*, the *Revue Générale*, and the *Gentleman's Magazine*.

THE ARCHITECTURAL CONGRESS AT MADRID.

The International Congress of Architects at Madrid is to be held from April 6 to April 13 next year. The programme of the proceedings is in course of preparation, and those who wish to contribute papers are requested to send, as soon as possible, the titles and subjects of their papers to the General Secretary at Madrid, accompanied by a brief *résumé* of the purport and conclusions of their papers (preferably in French); such *résumés*, if they arrive in time, will be printed in the programme.

The Spanish railway companies will grant a 50 per cent. reduction on ordinary fares to all members of the Congress; the Portugese companies the same; and the "Compagnie de Navigation de la Transatlantique" a reduction of 33 per cent.

Every member of the Congress will receive, with his card of membership, a list of the principal hotels and pensions at Madrid, a guide-book to the principal monuments of Spain, and a copy of the programme.

Communications are to be made to the Secretary, Señor Luis Mª Cabello y Lapiedra, architecte, Madrid.

A FRENCH TRIBUTE TO H. W. BREWER.

The issue of *Construction Moderne* for the 7th inst. contains the following paragraph in reference to the late H. W. Brewer, under the head "Nécrologie." It is signed "Ch. L.":—

"M. H. W. Brewer, architecte anglais.—L'art anglais vient de faire une grande perte en la personne de M. H. W. Brewer, associé honoraire de l'Institut Royal des Architectes Britanniques, qui fut, pendant plus d'un quart de siècle, dans ses dessins, à la plume d'une rare intensité d'expression, le plus remarquable évocateur des ensembles d'architecture du moyen âge, qu'il s'agisse de restitutions de quartiers de Londres, d'Oxford, de Paris, ou encore et surtout, qu'il s'agisse de compositions architecturales tenant à la fois du rêve et de la critique, mais toujours empreintes d'une grande saveur artistique et d'un réel sentiment archéologique.

Tous les architectes qui lisent le *Builder* ont présentes à la mémoire les belles pages que M. H. Brewer donnait à ce journal au moins une fois par an, dans le premier numéro de janvier et s'associeront aux regrets en même temps qu'au juste tribut d'éloges payés à cet artiste par la rédaction du *Builder* et par le *Journal de l'Institut Royal des Architectes Britanniques*."

School for Boys, Cambridge.—A new schoolhouse in connexion with the Cambridge and County School for Boys has just been opened. The building is of red Suffolk brick, and Bath stone dressings. The architects are Messrs. MacAlister and Tench, of Cambridge, and the building has been erected under contract by Messrs. Coulson and Lofts. The buildings cost about 7,500*l*. The fireproof floors are by the Fireproof Partition Syndicate; the granitic stone pavings and stairs, etc., by Mr. Royall, Cambridge; the carving by Messrs. Bradford; the tarpaving and asphalting by Mr. Josiah Smart; and the fittings by Messrs. Prime and Sons, Cambridge.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A meeting of the Metropolitan District of the Association of Municipal and County Engineers was held at the Municipal and County Club, Whitehall Court, on Friday, November 6, to consider the new by-laws made by the London County Council in regard to depositing drainage plans with the Sanitary Authority. Mr. W. Weaver, C.E., of Kensington, President, was in the chair, and among those present were Messrs. J. Rush Dixon, Shoreditch, Honorary District Secretary; W. Nisbet Blair, St. Pancras; N. Scorgie, Hackney; R. H. Gloyne, London County Council; C. H. Cooper, Wimbledon; W. R. Manning, Chelsea; E. E. Finch, Bethnal Green; O. C. Winter, Hampstead; W. T. Creswick, Westminster; C. Chambers Smith, Sutton; G. T. Lakin, Finchley; F. Sumner, Woolwich; R. G. Killick, Finsbury; S. N. Glass, Chiswick; W. Harpur, Cardiff; E. Van Putten, Lewisham; H. A. Giles, Westminster; and others.

The President said the object of the meeting was to consider the new by-laws relating to the deposit of plans, sections, and particulars of drainage work. The by-laws were now in force, having been approved by the Local Government Board on August 20, 1903. In considering this subject, the borough engineers of the Metropolis, being public servants, should endeavour to facilitate the work and remove attendant difficulties, and advance in this direction would be made if some of the divergencies of practice now existing in different boroughs could be abolished, and a general system adopted for working these by-laws throughout the Metropolis, to the great convenience of builders and contractors, who at present were somewhat perplexed by the rules and procedure varying in different boroughs. In a Report which he submitted a short time back to the Kensington Council, he pointed out various points in the by-laws upon which he considered he required direction, and a committee, after careful consideration, submitted a Report which was adopted by the Borough Council, and upon the resolutions and directions contained in that Report the work connected with the new by-laws was now carried out. The Report was as follows:—

Report of the Public Health Committee.

October 20, 1903.

We have had before us a letter from the London County Council, forwarding copies of by-laws made by them under Section 202 of the Metropolis Management Act, 1855, and the Metropolis Management Acts Amendment (By-Laws) Act, 1899, requiring the deposit of plans and sections of drainage works, and intimating that the same have been approved by the Local Government Board, and are now in force.

We have also had before us a Report which has been prepared by the Borough Engineer, requesting instructions as to the procedure to be adopted in carrying out the new by-laws, and having referred the matter to a subcommittee for consideration, we have now received the following Report from such subcommittee, viz.:—

"October 16, 1903.

We beg to report that we have had before us, pursuant to the reference by your committee of the 6th inst., the Report of the Borough Engineer upon the by-laws made by the London County Council under Section 202 of the Metropolis Management Act, 1855, and the Metropolis Management Act Amendment (By-Laws) Act, 1899, as to the deposit of drain plans.

In this Report the Borough Engineer requests the instruction of your committee as to the procedure to be adopted in carrying out the new by-laws which have been approved by the Local Government Board and are in force.

The first point upon which the committee are asked to give a decision is as to whether the Borough Engineer shall have similar power vested in him with regard to the granting to applicants of permission to proceed with drainage works as that hitherto exercised by him under Sections 75 and 76 of the Metropolis Management Act, 1855. We are of opinion that this power should continue to be exercised by the Borough Engineer, and we recommend accordingly.

A further question which has arisen is as to how a distinction shall be drawn between cases where By-law 1 applies, and those coming within the definition laid down by By-law 2, the former by-law dealing with cases of construction, while the latter deals with partial construction, additions, entire or partial reconstructions and alterations of drainage systems, and this point must, we think, be left to the discretion of the Borough Engineer.

With regard to By-law 3, which provides that, in any case in which an alteration of the drains must be carried out at once, a notice in writing of any such proposed alteration may be given to the Sanitary Authority in lieu of the deposit of plans, etc. (the plans and sections being deposited within two weeks of the commencement of the work), we are of opinion that a definite rule should be laid down for the guidance of the Borough Engineer as to what shall be taken to constitute urgency.

We recommend:—That urgency be admitted in the following cases, viz.:—(*a*) where the work is required by sanitary notice, and (*b*) where a case of illness is known to exist in the house, or where a case of infectious disease has been traced to the premises; and that in all other cases the Borough Engineer be instructed, where urgency is claimed, to require the deposit of a sum of 2*l*. under licence prior to carrying out the work, such sum to be returned upon plans, etc., being duly deposited.

We further recommend:—That in the event of failure to deposit the plans, sections, and particulars required by the by-laws, previous sanction having been given to the carrying out of the work as a matter of urgency, the Borough Engineer be instructed to have the necessary plans, etc., prepared, and to charge the cost of the same against the amount deposited by the applicant.

It being essential that the records kept by the Borough Engineer should be accurate and complete, we recommend:—That in view of the provisions contained in the by-laws under consideration the sanitary inspectors be instructed to report to the Borough Engineer the service of any written intimation or statutory notice immediately after such service, where any alteration, repair, or addition is required to any part of the drainage system of any premises of any of the adjuncts connected with the drainage system, and that the Borough Engineer notify in return to the Public Health Department which (if any) of such notices so received by him, can or may be left entirely in the hands of the officers of that department.

We have instructed the Borough Engineer to prepare and submit to your committee draft forms for the reception of drain plans, sections, and particulars as required by the by-laws.

(Signed) W. W. Thompson,
Chairman."

In obedience to the foregoing orders he required in all cases of the construction of a drainage system as a whole, and also in cases of addition to partial construction, entire or partial reconstruction, or alteration of a drainage system, all the plans, sections, and particulars required by the by-laws to be furnished. On this form he had attached a footnote, that in the event of the space allotted for the plans and sections being inadequate they might be drawn on tracing linen and attached to the form. He had also had a scale of 8 ft. to 1 in. printed, with a view of inducing persons to furnish the plans and sections to that scale. The by-laws allowed the plans and sections to be drawn to a scale of 16 ft. to 1 in., and therefore drawings submitted to that scale must be accepted, but he was strongly of opinion that all the details required by the by-laws could not be properly and clearly shown on drawings to such a small scale. With the object of indicating to the applicants the nature of the particulars required in the detailed descriptions in writing, he had printed on the form a schedule of the principal items upon which information would be required. This schedule was not considered as exhaustive, and other information supplemental thereto might be required in addition. On page 4 of the form he had had the by-laws printed, in order that the applicants might be informed of the exact nature of the requirements, and thereby obviate waste of time in the office in entering into explanations. With regard to By-law 3 dealing with alterations of drains in cases of urgency, the Council would only admit urgency in the following cases:—(*a*) where the work is required by sanitary notice; (*b*) where a case of illness is known to exist in the house, or where a case of infectious disease is traced to the premises, and in order to prevent claims of urgency being made for trivial reasons, the Council had ordered

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that in all other cases claiming urgency, beyond those enumerated, a deposit of 2*l.* should be made, and if the drawings, etc., required by the by-laws are not made within the time specified he was to prepare the necessary plans, etc., and charge the cost thereof against the 2*l.*

In order that a complete record of all drainage work executed in the Borough be kept by the Borough Engineer having charge of the sewerage and drainage work of the Borough, the sanitary inspectors through the Public Health Department furnish lists of all notices served by them involving the execution of drainage work, and any of such notices, such as fixing new flush cisterns, repairing guttering, etc., which he considered unnecessary to record on his plans, he marked and returned to the Public Health Department, and leave in their hands, retaining the others for supervision by his department.

If the procedure in Kensington as set forth or improved upon commended itself to this meeting, he would recommend that the Council of the Association should be requested to address a circular communication to each of the London Borough Councils recommending the adoption of such procedure in each Borough in the interests of public convenience and economy.

On the proposition of Mr. W. Harpur, Cardiff, seconded by Mr. C. H. Cooper, Wimbledon, a vote of thanks was accorded to the President for his address.

The President said he had no wish to thrust his views down their throats, and if they could improve upon the scheme so much the better.

Mr. W. Nisbet Blair, St. Pancras, said there was one vital point which prevented the complete adoption of the suggestions put forward. The supervision of the drainage work was not in every case under the direction of the surveyor. It was successfully contended in some cases that as the sanitary inspector was the officer who discovered the nuisance, he should see to the abatement of it, and if the nuisance arose from a defective drain, he should see it put right, whether it involved the making of a joint or the relaying of a drain. In St. Pancras these matters were carried out by the sanitary inspectors under the supervision of the Medical Officer of Health. There were some paragraphs in the by-laws essential to the clear explanation of any drainage plan and to the right understanding of what was to be done; but there were some things included which could not be considered vital. For instance, in nine cases out of ten the drainage was on the basement or the ground-floor level, and there was nothing more than a bath or water-closet upstairs. That gave room for doubt whether there was any real necessity that a person should comply with Sub-section 3 of Section 1, "He shall also show thereon the position of all windows and other openings into the building, and the height and position of all chimneys belonging to the building within a distance of 20 ft. from the open end of a soil pipe or ventilating pipe." To comply with that really made it an architect's job, and he did not think such elaboration necessary. They were content with a plan such as a builder's draughtsman could prepare. If they insisted on the full and complete compliance with the by-laws as they were worded, they certainly made it almost a penalty upon the owners of small property. In the same way, the sub-section, which required the deposit in duplicate of a detailed description in writing of the intended mode of constructing, jointing, and fixing of any drain, manhole, gully, pipe, bath, water-closet, etc., was altogether unnecessary for the proper execution of the job. In the laying of a drain they did not want to describe how that was going to be laid. The fifth sub-section provided for the production in duplicate of a block plan of the premises drawn to a scale of not less than 1 in. to every 22 ft. He thought every requirement could be put on the 8 ft. to 1 in. scale plan, and that they should not require the production of a block plan. If under By-law 2 an owner was going to partially reconstruct a drain, and it could not be found that there was any plan of the actual construction, he would have to deposit the same plan as if he were working under By-law 1. If there should be a previous plan showing the drain, then a reference to the original plan would be sufficient for the purpose. In the proviso at the end of Clause 2 he saw a difficulty. It read: "Provided that this by-law shall not require a deposit of any plans, sections, or particulars in the case of any repair which does not involve the alteration or entire reconstruction of any pipe, drain, or other means of communication with sewers, or the traps or apparatus connected therewith." He could not understand the meaning of that proviso. It might be read to mean that unless the drain was reconstructed they should not do anything under By-law 2. That was nonsense, and he was unable to understand its meaning.

Mr. J. Rush Dixon, Shoreditch, thought the by-law ought to have set out that the depositor had a right to a formal notice of approval, so that he should have a record of what was before the Borough Council, and what was approved. He thought, on the whole, the by-laws could be easily administered, and he agreed it would be best if they could come to some common form of agreement as to how they should be administered, so that a builder in going to Kensington would not have to conform to one interpretation of the by-laws, and in going to Shoreditch to conform to some other interpretation. Much of the difficulty which would arise in carrying out these by-laws would be in connexion with the arrangements the Borough Councils made as to supervision. If the Borough Councils would themselves bring about some common form of supervision, so that the borough surveyors or the sanitary inspectors should supervise them, he thought it would be an easy thing. In Shoreditch the plans for new drains and reconstruction of drains were sent in to the surveyor. He put them before the Works Committee, and after they were approved the Sanitary Department were given the duty of seeing that they were carried out. He was one of those surveyors who thought that everything should be under the borough surveyor, and he should have the necessary staff in the way of drainage inspectors to see the work carried out. The owner ought to have some acknowledgment that he had complied with the by-laws and his plans had been approved, and some protection by the possession of the duplicate record in the same way as the Borough Council would have a record of it.

Mr. Van Putten, Lewisham, said the practice in his Borough was for the surveyor to have charge of the whole of the drainage work underground, and the medical officer everything above ground. He was of opinion that the plans should be drawn on some durable material, and if a uniform system could be adopted by which the whole of the surveyors in London would refuse photo prints, it would be a step in the right direction. He contended that the requirement for fifteen days' notice was in direct contravention of the Act of Parliament which said seven days. Then, he asked, was it possible to enforce the payment of 2*l.* by an applicant? In nine cases out of ten they would get it, but in the tenth case they would get a man who would refuse, and if they could not enforce it, it would be made ridiculous.

Mr. O. Winter, Hampstead, said the practice in Hampstead was that the Surveyor's Department had the supervision of all new drainage work; the plan was also seen by the Medical Officer of Health. The Medical Officer of Health's Department received the plan for alterations of drainage work of existing property. That plan was also seen by himself, and he submitted it to the committee, but the work was supervised by the sanitary inspectors, and he had no further control over it. It seemed to him, if they were to protect themselves, they must insist upon pretty full plans being provided. They had recently had a case where, acting upon the advice of the Town Clerk, they had executed extensive drainage work to carry the rain water of two houses. Then it seemed to him it was an advantage that the Local Authority should have an idea of the character of the buildings which were to be erected. They had some people of an aesthetic frame of mind, who were much upset by certain buildings which destroyed the amenities of a district. If they could get some idea of the character and extent of the building before it was constructed, it would be useful to them as a Council, and might lead to negotiations by which the pleasant features of a district might not be seriously interfered with.

Mr. Gloyne, London County Council, said that being a London County Council official it might be thought he was interested more on one side than the other, but having had to do with the execution and carrying out of by-laws in the provinces for a considerable period, he might be entitled to offer some remarks. First of all with regard to Mr. Blair's objection to Clause 3. That clause read:—"He shall also show thereon the position of all windows and other openings into the building, and the height and position of all chimneys belonging to the building within a distance of 20 ft. from the open end of a soil pipe or ventilating pipe." He took it that did not mean every window, every door, every fireplace was to be shown, but simply the position of those openings within the specified distance of that ventilating soil pipe. If that was so, he thought the clause was a very reasonable one. He also could see no objection to Clause 4. With regard to Clause 5, that, he took it, had to be read with the proviso, which had been overlooked. That proviso was intended to mean that there was no necessity for a duplicate block plan if that block plan showed everything necessary according to Section 2. This by-law also had a proviso, which read:—"Provided that this by-law shall not be deemed to require the deposit of any plans, sections, or particulars in the case of any repair which does not involve the alteration or the entire reconstruction of any pipe, drain, or other means of communicating with sewers or the traps and apparatus connected therewith." He suggested that proviso was intended to refer to Sub-section 4 of Clause 1. Mr. Dixon had said that these by-laws were too stringent. Well, judging from his own experience as a borough engineer of some ten years' standing, he did not think they could make these by-laws much too stringent. It was necessary, especially in the case of London, that the health of the people should be looked after in the strictest manner. Where they had an aggregation of people piled together in a small area, it was necessary those districts should be looked after in the most stringent manner. The jerry builder did not care whether the roof fell in or the floors collapsed so long as he got his rent. Mr. Van Putten said that Sub-section 6 of Clause 1 contravened the present statutory law that seven days should be given, but Sub-section 6 did not refer to notice at all, but to the deposit of plans; those were two distinct things. A man might give seven days' notice, but he had to deposit, fifteen days before the work was carried out, plans of the work. Therefore there was no conflict between the statutory law and this sub-section.

Mr. Norman Scorgie, Hackney, said if there was anything they should be thankful for, it was these by-laws. Any one who had had experience of working under provincial by-laws could not but wonder how they had got on so long with the material at their disposal. He was surprised members had got up and called the by-laws too stringent. He agreed with Mr. Gloyne that they wanted stringent by-laws, and they ought to carry out these by-laws not only in spirit but to the letter. The deposit of a duplicate copy was absolutely necessary. It enabled the man who had to inspect the work to carry the tracings in his pocket and see whether the work was being carried out properly. The practice at St. Pancras of the Medical Officer carrying out the supervision of drainage work was contrary to the spirit of the Metropolis Management Act, which said the Surveyor should have the supervision of the whole of the drainage. He declined to allow the Medical Officer to supervise work he had to do, and he hoped every surveyor would do the same.

The President said the differences of practice in the Metropolitan Boroughs would require much time to adjust and bring into a uniform line. He had no idea that in some Boroughs it had gone to the extent it had. The sanitary inspectors were under the Medical Officer of Health, and it was absurd to merge in the Medical Officer the carrying out of practical work with which he had not the slightest acquaintance. If, as had been said, the Medical Officer had in different Boroughs ousted the surveyor from his proper position, there might be difficulty in getting a uniform procedure, but it would be well, with the backing up of their Association, to try for that uniform procedure.

A desultory discussion followed as to the form of procedure to be adopted, and it was resolved that the meeting stand adjourned, and in the meanwhile a circular letter be addressed to each metropolitan surveyor informing him of the adjournment, and enclosing the forms submitted to the meeting for suggested amendment.

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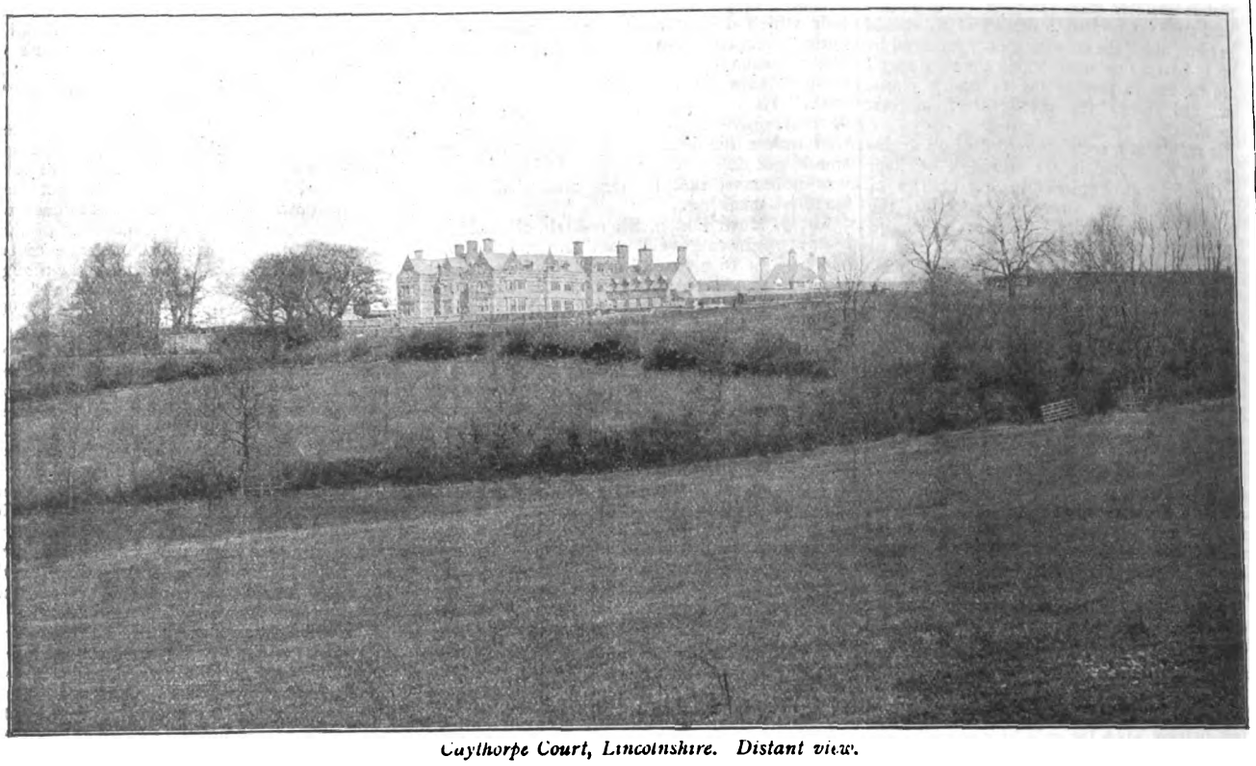
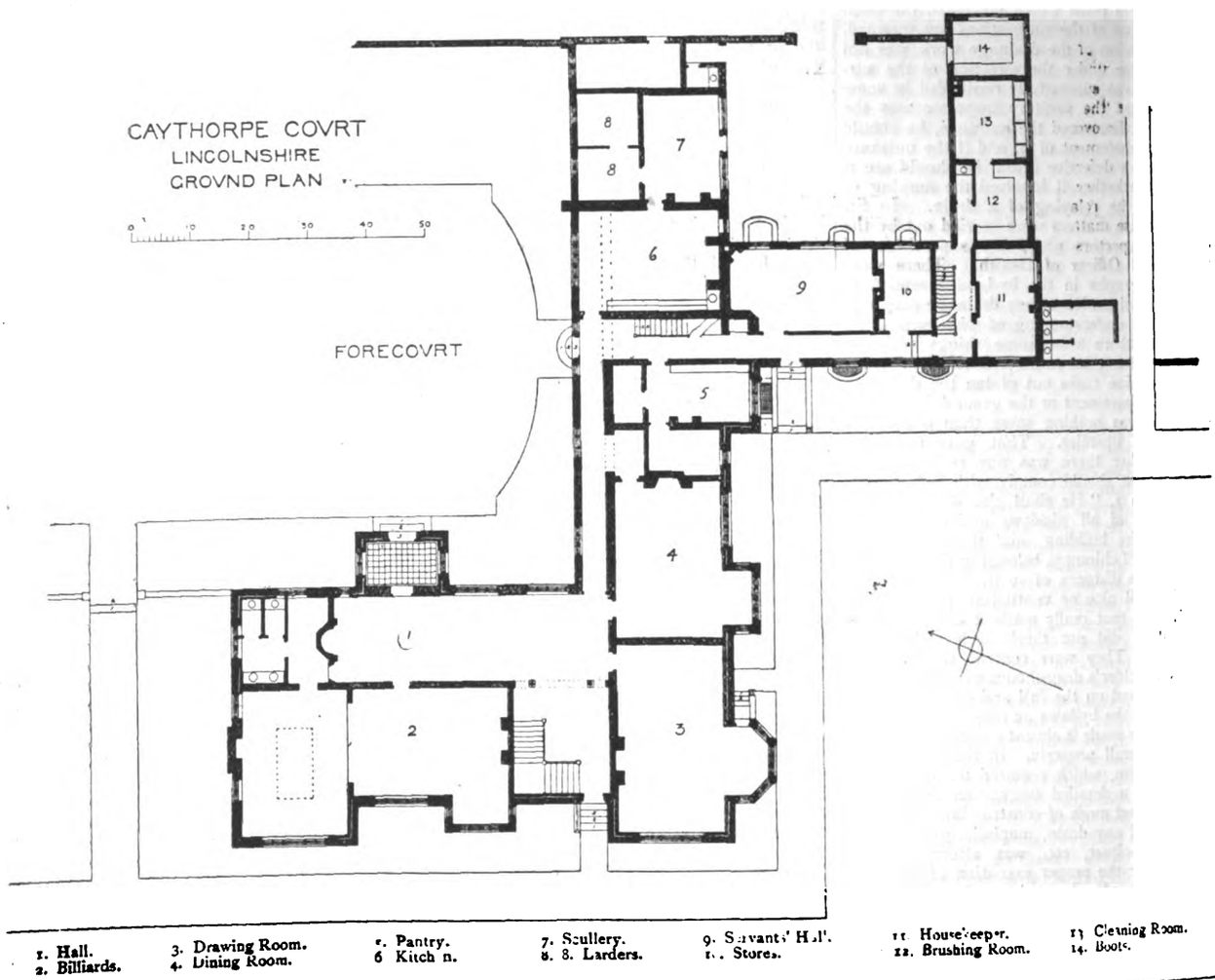


Caythorpe Court, Lincolnshire. Distant view.



Illustrations.

COMPETITION DESIGN FOR HULL TOWN HALL.

THIS is the design submitted by Professor Pite in the important competition for the Hull Town Hall, the particulars of which will be in the memory of our readers. The following is the author's description of his intention in the design:—

"The old Town Hall building is retained and adapted, without serious alteration, for offices. New kitchens are provided on the attic. The whole site is centred by a new block containing on the Alfred Gelder-street front the large hall and anteroom and council chamber on the main floor, and on the ground-floor two large open courts covered with glass roofs, around which the various sets of municipal offices open on the ground, and on a mezzanine floor.

The mezzanine scheme permits of the two large offices in the Finance and Engineer's Departments having a sufficient height without unduly enlarging that of the smaller rooms in the same suites.

A grand staircase leads from the centre of the open courts, and is surmounted by a dome, and auxiliary staircases are placed at each end.

The law courts are placed in a self-contained block corresponding with the old Town Hall block, and having a tower of similar height, though different in detailed design.

The author considered that the great length of the site demanded a central grouping, and the arrangement of towers adopted in order

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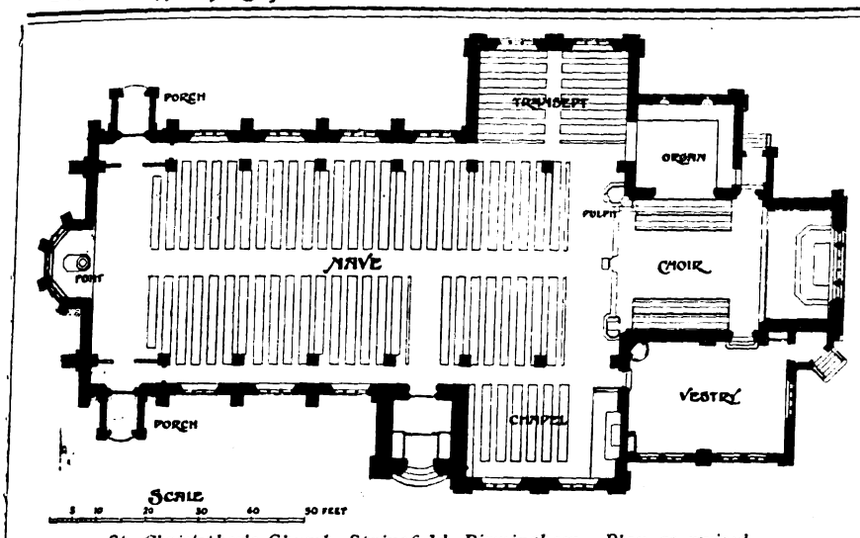

St. Christopher's Church, Springfield, Birmingham. Plan as revised.

to combine with the existing building, the design of which, though not appealing to him as beautiful, has character and history that it would be a pity to destroy on that account. The building, also, is easily and conveniently adapted to the requirements.

A. B. P."

CAYTHORPE COURT, LINCOLNSHIRE.

This house has been built on high ground overlooking the valley that runs from Grantham to Lincoln. The design was, by desire, based on plain seventeenth century work as practised in Lincolnshire.

On opening the site, it was found that instead of rock, as was expected, the hill-side consisted of small and large blocks of rock loose in the clay—it was, in fact, a morain—and in order to avoid the great expense of deep, continuous footings, shafts were sunk with arches between, with perfectly satisfactory results.

The walls are faced with Ancaster stone, with bands of local iron-stone; the roofs are covered with Colyweston slates. The wing to the right has a deep frieze of stamped plaster, with modelled bands of a grape vine dividing the panels.

The hall is panelled in oak, with a frieze of pheasants and partridges, by Mr. Murphy, running along one side.

Somewhat extensive terrace grounds have been laid out below the house and above it, and to the north-west are stables containing thirty loose boxes, coach-houses, harness-rooms, men's quarters, etc. Owing to the boundaries of the property and the position of the road, these had to be placed at an angle to the house.

The works were carried out by Messrs. Cubitt and Co. from the designs and under the superintendence of Mr. Reginald Blomfield, of London.

CHURCH OF ST. CHRISTOPHER, SPRINGFIELD, BIRMINGHAM.

This church will be situated in the centre of a new district, about a mile from St. John's Church, Sparkhill. It is intended to accommodate 700 people. The plan is arranged so as to obstruct the view of the preacher as little as possible—a condition in the instructions to the architect. The nave will be 100 ft. long by 44 ft. wide, the chancel 36 ft. by 25 ft.

The building throughout will be of brick and stone—thin sand stocks of local production, and Pillough stone. The roof will be covered with green slates or Cotswold stone tiles. The floor of the church will be paved with wood blocks, and the chancel with Hopton Wood stone quarries.

Over the principal entrance will be carved stone panels representing incidents in the legend of St. Christopher. These have been modelled by Mr. Benjamin Creswick.

The architect is Mr. Arthur Harrison, of Birmingham.

TOWER, THURGARTON PRIORY.

The Austin Priory of Thurgarton, Notts., was founded by Ralph de Ayncourt about the year 1130. The present church of Thurgarton consists of nave of three bays, north aisle, north porch, handsome, lofty, embattled tower at the north-west angle, and chancel. The church was restored and enlarged in 1853, to which date belong the chancel, north aisle, and north porch. The nave and tower are the only remaining parts of the once fine priory church. Thurgarton Priory was a house of some importance and wealth. At the dissolution its gross annual value was declared at 359*l.* 15s. 10d., and the clear value at about 100*l.* less. There can be no doubt that this noble thirteenth century tower was built soon after the priory's first foundation. The battlements, of course, represent later work.

The illustration is from a drawing by Mr. H. Harrington.

ST. LEONARD'S, MIDDLETON.

The old Church of St. Leonard, Middleton, is of much interest. The oldest part is the remains of the Norman archway into the tower from the road, *circa* 1100. Other parts of the basement of the tower are early, though it was a good deal rebuilt in the fifteenth century. The tower is remarkable among the churches of the North of England in being crowned with a wooden belfry; a feature which would excite no surprise in Hampshire or Essex, but which is quite unusual in Lancashire. The main body of the church and the chancel were rebuilt at the beginning of the fifteenth century, the church being reconsecrated by Thomas Langley, Bishop of Durham, who was a native of this parish, in the year 1412. The south aisle was enlarged by Sir Richard Assheton in 1524. The church contains some interesting woodwork of various dates, some good brasses, as well as noteworthy sixteenth century memorial glass.

The illustration is from a drawing by Mr. Edgar Hartley.

SANITARY INSPECTORS' ASSOCIATION:

CHAIRMAN'S ANNUAL ADDRESS.

On Saturday evening last, at Carpenters' Hall, London-wall, Mr. I. Young, the Chairman of this Association, delivered his annual address to the members. After thanking the Association for having re-elected him as Chairman for a second year, and congratulating it on having Sir James Crichton-Browne as President for the year, he passed on to a consideration of the training of candidates for inspectors. For many years past the question had engaged the attention of the Association, but without satisfactory results. It was true that they had approached the existing examining bodies to institute practical instruction, and perhaps as far as those bodies were able, without the co-operation of that Association or of the inspectors in general, they had done what they could by arranging visits to sewage farms, waterworks, disinfecting stations, etc, but as yet nothing had been done to inculcate in the would-be sanitary inspector a sound practical training. Was it not possible for the Association to consider the question seriously? Its powers, as contained in the memorandum of association, were all sufficient, viz., "The promotion and interchange among our members and others of such knowledge of sanitary science as falls within the department of a sanitary inspector. . . . The organising of classes in London and elsewhere for the study of sanitary science and the laws relating to public health. To establish and maintain libraries, laboratories, to institute courses of lectures, etc., and to hold examinations." He saw no reason why examinations should not be held. In July last, at the Sanitary Institutes Congress at Bradford, he advocated the necessity of practical training, and suggested that the only satisfactory remedy for the present state of affairs was the recognition by the Local Government Board of the appointment of assistant inspectors. That suggestion was adopted by the conference of inspectors. On further consideration of the question, although he was still of the same opinion, it appeared to him that there remained an excellent opportunity for the Association to show its interest in promoting the cause of public health, and improving the status of inspectors, either by instituting on its own account a system of technical and practical training or by associating itself for that purpose with the present recognised teaching bodies. The percentage of persons appointed to the office of inspector who entered upon their duties only partly fitted for the work was considerable. The Association had appealed in vain for representation upon the Examination Board for inspectors and also upon that of the Sanitary Institute, but so far as he was aware they had never asked the first-named body to appoint a member of their Association as one of its examiners. There could be no doubt that an inspector should be appointed an examiner in connexion with the two bodies he had named; in fact, he considered it of much greater importance than representation on the Board. Proceeding, he said that the sanitary legislation of London was far in advance of that of the provinces, and he thought they must see that at no very distant date an amendment of the Public Health Act, 1875, must result from the diffusion of sanitary knowledge and practice, and in such amendment there would doubtless be some similar provision for the qualification of inspectors as obtained in the London Act. That being so, it was hardly probable that the Local Government Board would approve several examining authorities. If he remembered correctly, when they approached the Local Government Board to grant them representation upon the Examination Board it was intimated that there should be but one authority, and probably they would agree with that. He did not advocate any surrender of the principles they held dear and had for many years striven to obtain; but the time had arrived when, with an amalgamation of all their forces, they should seriously consider what could be done to accomplish for their profession so desirable an object. Referring to the Public Health Bill, he said that he understood that it was again to be introduced in the next Session of Parliament through the direct influence of the British Medical Association, and he appealed to the members to use their individual efforts in support of the measure by securing the co-operation of members of Parliament. During the past year the Association presented to the Local Government Board a petition asking that it would issue an instruction, under the Sanitary Officers' (London) Order, that the duty of supervising the construction of drainage work should be one for which the sanitary inspector should be held directly responsible. As one of the representatives of the Battersea Borough Council, he attended the conference convened in July last by the Borough of Camberwell to consider the question. At the conference a resolution to that effect was passed, and the Local Government Board had replied that it adhered to the view already expressed to several of the Borough Councils, that in any case where a sanitary inspector appointed by the Borough Council may be performing the work referred to, and the Council wished him to continue to perform it, he should be separately appointed for that purpose, and separate remuneration assigned to him, no portion of which to be repayable by the L.C.C., the salary to be equitably apportioned according to the amount of work devolving upon the inspector in each capacity. A further conference of representatives was therefore called on the 20th ultimo, when it was resolved that each Borough Council should arrange with the L.C.C. as to the amount of salary to be apportioned in respect of the work of supervising the construction of

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drains to newly-erected buildings by the inspectors. He considered that, under all the circumstances, that was the best way out of the difficulty. In conclusion he asked for the continued support of each member of the Association to the Council during the present year.

On the motion of Mr. S. Legg, seconded by Mr. Henley, a vote of thanks was accorded the Chairman for his address.

THE SURVEYORS' INSTITUTION.

OPENING MEETING OF SESSION 1903-4.

THE opening meeting of the new session of the Surveyors' Institution was held on Monday evening at No. 12, Great George-street, Westminster, Mr. H. T. Steward, vice-president, in the chair.

The Chairman said it was with great regret that he had to announce that the President, Mr. A. Buck, was unable to be present through illness. They would be glad to know that Mr. Buck was getting better, and that he hoped soon to be amongst them again, and in that hope they would all concur.

The minutes of the last meeting having been read and confirmed,

Mr. J. W. Penfold, hon. secretary, read a long list of donations to the library and the library fund, and a vote of thanks was accorded to the donors.

Mr. Julian C. Rogers, secretary, then read Mr. Buck's presidential address. In the course of his remarks Mr. Buck said that the surveyor had borne no inconsiderable part, during the last fifty years, in the development of that great system of public works which had transformed the face of our towns and cities. It was within his (the president's) time that society first awoke to the duties which it owes to the health and comfort of all classes of its members in the provision of a good supply of potable water, the sewerage of towns, the improvement and widening of our roads and streets, the demolition and reconstruction of insanitary dwellings, and in the provision of parks and open spaces. Nor was there any reason for fearing that the surveyor's services would be less in demand in the future than in the past, if he kept himself abreast of modern knowledge. There were still problems enough ahead to give scope to all the surveyor's resources of skill and knowledge. Among these problems was the dealing with congested areas in our large towns. Hundreds of thousands of pounds had been already spent in rehousing schemes, but the remedy, so far, showed no signs of overtaking the spread of the disease, nor was it likely to do so as long as we continue to allow an immense alien population to pour, without restraint, into our already over-crowded industrial centres. There was a good deal of talk about the decentralisation of factories, which would of course have the effect of a wider dispersal of the population dependent on them for their means of livelihood. There were signs that this process was commencing as the result of dear land and the ever increasing burdens of local taxation—an increase apparently without limit. Whether the process could be hastened by legislation, he was not prepared to say, for he was no advocate of state interference where it could be avoided. In this, as in so many other matters, the natural operation of economic causes might be trusted to provide the solution, but this at any rate was clear, that the migration of factories on any large scale must have an enormous influence on the value of suburban land, and would be fruitful of employment for the rising race of surveyors. If we ever succeeded in getting the labourers back to the land, it would only be by a very slow process, and would be brought about, if at all, by economic pressure. If we are to keep on the land those who still remain, their lot would have to be improved in some way. What was wanted was better cottages, with the increased comfort which results: but, above all, better gardens, with fruit trees, and, where possible, as much land as would satisfy the universal craving for a fixed interest in the soil. If the better housing of the working classes (many of them mechanics and high wage earners) in the towns was a matter of national concern, on what principle of equity would it be asserted that the agricultural labourer had no corresponding claim upon society at large. The London County Council showed in a recent report that they had spent on capital account, under the Housing of the Working Classes Acts, no less a sum than 3,555,480*l*. Did our country villages, in which, in some counties, such a large proportion of our agricultural population reside, contain no miserable, insanitary cottages, the property not of well-to-do landlords, but of the small owners, shopkeepers and others, who had neither the means nor the inclination to improve them? If this were so what were our county councils doing that they took no action of the kind taken by our large town corporations? On the estates of private owners, the cottages had, with few exceptions, been greatly improved in recent years. But the fact was the labourer did not love these isolated estate cottages. He wanted, like others, to associate with his kind, and if he found some attraction in village society, who should blame him? They were doing their best in Worcestershire to give effect to the provisions of the Small Holdings Act. Near Bromsgrove there were a large number of persons interested in making nails by hand. The trade went from the place owing to nails being made by machinery, and large numbers of men were thrown out of employment. Allotments were started under the Acts of 1887 and 1890, and when the Small Holdings Act 1892 was passed, it was put into operation. The County Council purchased a property of about 146 acres at a price of about 33*l*. per acre including timber. The land was very suitable, and a scheme was prepared dividing the land into 32 small holdings. The land was registered under the Act at the Land Registry, Lincoln's Inn, London, W., and the scheme was advertised. The Act and its working were explained to the men and lectures were given affording all necessary information. There was no trouble in getting applicants: the land could have been let three or four times over. The difficulty was to select suitable men. The men selected were nearly all resident in the district or had been in the district previously but had left it for the towns on account of the scarcity of work. About half the men paid down one-fifth of the purchase money before completion, the remainder had to be given time which extended over about three years. Those who completed the purchase by paying down one-fifth had the land transferred to them at the Land Registry. The remainder entered into an agreement by which they were tenants until the one-fifth was paid, and then they completed their purchases as the others had done. The result was that men pay, on a four per cent. basis, rather more than the ordinary rent of the land, but this payment was sufficient in 40 years to repay the County Council the whole of the money advanced, and was worked out to leave a very fair profit. A building scheme had also been arranged under which a small holder could obtain an advance to enable him to build. He forwarded plans, specifications, etc., and the same were submitted to the County Surveyor and the County Medical Officer. If the building was to be erected on a proper site approved by the County Surveyor, and the building was in accordance with the building by-laws of the Local Authority, and met with the approval of two officers mentioned, the County Council informed the applicant that they would advance up to three-fourths of the actual contract price of the proposed building. A tender was then obtained and a formal contract and bond were entered into, the Clerk of the County Council preparing all the necessary documents, and so safeguarding the county ratepayers. The Council then formally agree to pay three-fourths of the contract price, leaving the small holder to find the remaining one-fourth and to pay the architect's fees. The money was advanced from time to time on the County Surveyor's certificate. Very good houses, consisting of a good kitchen—living-room, with back kitchen and larder, and three good bedrooms had been erected, with the necessary outbuildings, including stable, toolhouse, copper for boiling pig food, and generally two pigstys, and the contract price had usually been about 350*l*. All repairs were done by the County Council, and the county insure the property, thus protecting their own interests. In addition to the land above mentioned, the County Council have acquired, close to the same, about 300 acres as a site for a new lunatic asylum, and until the asylum is built the land has been let off.

Turning to another subject, he said our system of local taxation could not wait much longer for radical reform. It was becoming a grievous burden, uncertain and unjust in its incidence and full of the most absurd anomalies. Like our political system, it had grown by accretion and rested on no rational foundation or intelligible principle. It had got away from the much vaunted basis of self taxation, owing to the fact that a large portion of it was raised by precepts issued by bodies out of touch with popular control, which sit serenely indifferent while the wrath of the ratepayers was vented on the locally-elected bodies, who act as mere collectors. Nothing more vicious could well be conceived, and the evil was intensified by the system of state subventions which simply masked the growth of the burden by doles from revenues ostensibly raised for other purposes.

Speaking generally, it was impossible to doubt that the growth of local taxation must come, in course of time, to have a serious influence on the letting and selling value of property. About 1891 the rates of increase had closely approximated. From that year onward the rate curve had mounted rapidly above the population curve, and now threatened to leave it far behind.

Behind, and strictly allied to this, was the serious growth of local indebtedness in recent years. No one who had observed the palatial asylums and isolation hospitals which were springing up all over the country, some of them only partly used, and some not used at all, would be at a loss to discover where a great deal of the money had been wasted. He also noticed in this connection a growing tendency on the part of government authorities to insist on schemes of sewerage in small villages, involving an outlay quite incommensurate with any advantages obtained. A check to this extravagance would ultimately be found in the increasing difficulty in obtaining loans at low rates for interest and re-payment.

Municipal trading, another branch of the same subject, should be narrowly watched by the legislature. It represents, in its extreme forms, an attempt to lighten the burdens on the ratepayers resulting from crude legislation on such subjects as rivers pollution, sewage treatment, and what not—legislation in many cases far in advance of sound knowledge and practical possibilities. His own town (Worcester) was compelled fifty years ago to turn its sewage into the Severn. They were now peremptorily ordered to take it out again, despite the fact that no trace of organic impurity was discoverable five miles below the city. There could not be a doubt that many modern phases of municipal trading were quite indefensible from a business point of view. The control of the water supply was clearly a matter which should rest with a public body. As much might perhaps be said for tramways, but he doubted the policy of going further. Gas supply and electric lighting were, in his opinion, better in the hands of private companies, who were free from the kind of pressure on the part of employees which had such a tendency to increase the cost of production. But these were matters which lay on the borderland between legitimate and illegitimate forms of public trading, and diverse views might very well be held with regard to them. It was a very different thing when public bodies betook themselves to such forms of commercial enterprise as telephones, hydraulic power supply, cold air storage, and ice supply, laundries, etc., while, to make matters worse, there was, except in one or two places where special Acts existed, no effective audit of the accounts of the large corporations, the supervision amounting to little more than a verification of totals, by a person appointed under the Municipal Corporation Act, 1882, (who must himself be a member of the Town Council and be nominated by the mayor), and two elective auditors, neither of whom need be a professional accountant.

On the subject of our roads he could not help thinking that we were on the eve of great changes which would have a considerable effect upon them throughout the country. For the purposes of haulage, the horse seemed doomed to disappear, as in the early railway times when his days were held to be numbered. Whether we like it or not, the motor and the traction engine were about to take possession of our highways, most of which, suitable enough for traffic of ordinary speed or weight, were very ill adapted for the swifter and heavier form of locomotion which were apparently imminent. Many of our roads would have to be increased in width. Awkward corners would have to be rounded off, gradients made easier, and road surfaces improved. This, if his forecast be true, would involve extensive dealings with contiguous property and much re-adjustment of boundaries, providing ample work for surveyors. The total mileage of main roads in

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this country (exclusive of those comprised in the County Boroughs) was 26,598 miles, of which there were 3,819 miles in the urban districts, and consequently under sole control of the Urban Authorities, and 22,779 miles in the rural districts under the control of rural District Councils. As a consequence, there was no uniformity of administration and no probability of conjoint action. Take an example:—It appeared that the great North Road, from London to Edinburgh, was divided for administrative purposes among seventy-two authorities who on no possible assumption would be likely to co-operate for the purpose of widening or improving that great artery of traffic. This was only one instance. Cases might be cited all over the country, and if, as seemed likely, the widening of the existing main roads and the provision of new trunk roads was rapidly becoming necessary for proper intercommunication, one was forced to the conclusion that the great highways should be removed from the control of the present subordinate authorities and placed under the jurisdiction of county highway boards, and that certain highways which were of more than county importance, should be declared to be "national" roads, maintainable out of Imperial funds. One proposal before the Departmental Committee on "Highway Authorities and Administration," was that the provision of new trunk roads might be left to private enterprise, and that the inducement to the undertakers to invest their money would be found in permitting them to acquire, by compulsory powers, a strip of land (modestly put at a quarter of a mile wide) on each side of the road, which they could sell for building purposes. He did not know how the adjoining owners would relish the prospect of this alienation of their frontages. Except by the re-introduction of the system of tolls, which would be intolerable, there seemed no way of meeting a demand for new trunk roads but by the expenditure of Imperial funds or by the imposition of the abandoned "van and wheel tax," to which so much exception was taken when it was proposed as a feature of the Budget some years ago. We were told that there are already 10,000 motor cars on the roads (to say nothing of traction engines), and that 10,000 more are in course of construction in this country. If this be so, the improvement and widening of the roads must soon form the subject of comprehensive legislation, for the problem had already become acute in suburban districts, and would rapidly become so all over the country.

As to the Institution, it would soon number 4,000 of all classes from every part of the United Kingdom, but there were abundant signs that they were about to have a considerable influx of members from our colonies. The Council were considering the desirability of holding branch examinations in South Africa for building and quantity surveyors, many of whom had expressed a wish to be connected with the Institution. The Institution had lately introduced certain modifications in the by-laws. Some of these were aimed at unworthy practices, happily limited to a few, but from which any self-respecting profession must purge itself if it was to stand well in the public esteem. The introduction of an alternative title was a measure of protection against those who without warrant arrogate to themselves professional descriptions which did not belong to them. Whether the new title of "Chartered Surveyor" would or would not commend itself to the majority of the members remained to be seen, but of this he felt certain, that no one who had once adopted it would willingly divest himself of it again.

The Chairman proposed a hearty vote of thanks to the President for his excellent address, which contained many points of value to them. In moving that resolution, he desired once more to express his and their sympathy with the President in his illness, coupled with the hope that he would soon be able to preside at the meetings. It was a great advantage to have as President one who was so justly and universally esteemed, and who possessed such an extended experience as did Mr. Buck.

Mr. C. Bidwell seconded the motion, and, in doing so, briefly referred to the question of labourers leaving the land. He thought that the cause of this was partly owing to the condition of the houses of the people; there was a great need of better cottages.

The motion having been heartily agreed to,

The Chairman announced that the next meeting will be held on November 23, when Mr. H. T. Scoble will read a paper entitled "Industrial Decentralisation: an Important Factor in the Solution of the Housing Problem."

The meeting then terminated.

ARCHITECTURAL SOCIETIES.

The Royal Institute of the Architects of Ireland.—A General Meeting of the members of the Royal Institute of the Architects of Ireland was held at Lincoln-place, Dublin, on the 6th inst., Mr. G. C. Ashlin (President) in the chair. The ballot papers for the election of Honorary Secretary and Honorary Treasurer were examined, and the President announced that Mr. R. Caulfield Orpen had been elected Honorary Secretary, and Mr. Charles Ashworth Honorary Treasurer of the Institute for the ensuing three years. Mr. J. Rawson Carroll and Mr. William Mitchell seconded the following resolution, which was carried unanimously:—"That the Institute, at its General meeting, take the opportunity of placing on record its hearty appreciation of the indefatigable energy and tactful skill which Mr. Kaye Parry has displayed in carrying out the duties of Honorary Secretary to the Royal Institute of the Architects of Ireland during his term of office." A cordial vote of thanks to the out-going honorary treasurer (Mr. C. A. Owen) was moved by Mr. W. Kaye Parry, seconded by Mr. R. Caulfield Orpen, and carried unanimously.

Leeds Architectural Society.—At the annual meeting of the Leeds and Yorkshire Architectural Society on the 5th inst., Mr. Butler Wilson, the President, in the chair, Mr. H. S. Chorley (Hon. Secretary) presented the twenty-eighth Report, which is a detailed account of the proceedings of the Society for the past eighteen months. The aggregate membership, it appears, is 141, namely, 31 honorary members, 61 members, and 44 associates, as against a membership of 137 at the date of the last Report. The Council express regret that Mr. C. R. Chorley, one of the oldest members of the Society, and a past President, has resigned his membership on account of his leaving Yorkshire on his retirement from business. Regret is also expressed at the resignation of Mr. J. Tweedale, and at the death of Mr. E. Birchall, also a past President. At the Preliminary and Intermediate R.I.B.A. examinations for the north-eastern division of the county, in June and November, twenty-one candidates presented themselves. The competition among the Associates for the prizes offered by the Society was keener and more enthusiastic than in the immediate previous years, and the work submitted was judged to be of a better and more even quality than had been the case in the three previous years. The silver medal and prize of five guineas given by the President, for the best measured drawing of any ecclesiastical or domestic building erected anterior to 1800 A.D., was awarded to Mr. Martin Shaw Briggs, for measured drawings of Swinsty Hall, Yorkshire. A special prize of three guineas was awarded to Mr. P. A. Horrocks, for measured drawings of Hall i' the Wood, Bolton; the prize of three guineas, for the best design of an entrance lodge and gateway, to Mr. Ralph Thorp; the prize of two guineas, for the best essay on "Modern Street Façades in Leeds," to Mr. Martin Shaw Briggs; and the sketching prize of three guineas to Mr. J. C. Procter. The Council report that no further steps have been taken to create a chair of architecture at the Yorkshire College. Mention is made in the Report of the Council's active interest in the proposed laying out of Victoria-square, and also in the improvement of City-square. In regard to the former, it is pointed out that the first essential is the enlargement of the square on its southern side, the present area being totally inadequate to receive any architectural treatment which would be in scale with the Town Hall. In regard to City-square, the President formed one of a deputation from the Society to the Improvements Committee, and asked that a new frontage line at the south-west corner between Wellington-street and Quebec-street should be adopted, corresponding to and exactly repeating the building line of the Standard Assurance buildings on the opposite side of the square, and also that the building to be erected on the vacant ground should harmonise, and as far as possible correspond in outline and skyline, with the Standard Assurance buildings. This suggestion has been adopted. The Council express their gratitude for the valuable collection of architectural work bequeathed to the Society by the late Mr. E. Birchall, and notify that steps are being taken to deposit the Society's library with the City Library Authorities for better security and supervision.—The Report was adopted on the motion of Mr. G. F. Bowman, seconded by Mr. R. P. Oglesby. Mr. W. H. Thorp (Hon. Treasurer) read the statement of accounts, which showed a balance in hand at the end of the financial year of 95*l.* 5s. 2d., as compared with 96*l.* 8s. 1d. the previous year. The balance-sheet was adopted on the motion of Mr. H. Perkin.

Glasgow Architectural Association.—The Second Ordinary Meeting of the Glasgow Architectural Association was held at 187, Pitt-street, on Wednesday, the 4th instant, when a paper was read by Mr. C. Ernest Elcock, entitled "Through York with a Camera." The audience was taken on an extensive tour through the old city, original slides being used, showing in some detail the points of interest to an architectural society. The cathedral, or minster, came in for a large share of attention, the lecturer rapidly sketching its rise from about the middle of the seventh century to the present day. Some good slides of portions of the streets and houses not usually photographed were also shown, not omitting the "Bars" or ancient gates of the city which are in a remarkably good state of preservation. In the course of the paper the lecturer made several pointed allusions to the imitative and "slavish copying of antique detail" which is unfortunately the prevailing style of much of present-day architecture. In closing, he strongly encouraged all his hearers to endeavour to express in their work the customs and requirements of modern life; not cloaking their buildings with an architecture which belonged to other climatic conditions and needs, but erecting buildings instinct with the life and vigour of our own times, yet free from the outrageous torturing of material, which is supposed by some eccentric persons to be the acme of architectural design.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday, in the County Hall, Spring Gardens, S.W., Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Camberwell Borough Council 5,000*l.* for erection of buildings at depot; Hackney Borough Council 47,012*l.* for contributions to street improvements; and Lewisham Borough Council 1,325*l.* for various purposes. Sanction was also given to the borrowing by Islington Borough Council of 3,753*l.* for electricity meters, and by Westminster City Council of 63,000*l.* for the erection of working-class dwellings.

Proposed New Fire Stations.—The following recommendations of the Fire Brigade Committee were agreed to, after discussion:—

"That the estimate of 62,450*l.* submitted by the Finance Committee in respect of a new fire station in substitution of the Watling-street station be approved, and that the Fire Brigade Committee be authorised to make the necessary preliminary arrangements for the erection of such a station on the site of Nos. 86 and 88, Queen Victoria-street, and Nos. 30 and 32, Cannon-street.

That the Parliamentary Committee be instructed to insert in a Bill to be promoted by the Council in the next Session of Parliament a clause authorising the Council to acquire compulsorily the remaining interests in the premises Nos. 86 and 88, Queen Victoria-street, and Nos. 30 and 32, Cannon-street, with a view to the erection on the site of such premises of a new fire station in place of the Watling-street station.

That the Parliamentary Committee be instructed to insert in a Bill to be promoted by the Council in the next Session of Parliament a clause authorising the Council to acquire compulsorily a piece of vacant ground at the junction of Hooper's-court with Basil-street, immediately opposite Pavilion-road, with a view to the erection thereon of a new fire station in place of the existing Knightsbridge station.

That the Parliamentary Committee be instructed to insert in a Bill to be promoted by the Council in the next Session of Parliament a clause authorising the Council to acquire compulsorily a plot of vacant ground at the junction of Shrewsbury-lane and Eaglesfield-road with a view to the erection thereon of a new fire station in substitution of the Shooter's hill station."

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The following recommendation in regard to each proposal was agreed to:—

"That the Parliamentary Committee be instructed to arrange for the insertion in the Bill of a clause providing that compensation shall not be paid in respect of new interests created or improvements made in the above property after October 31, 1903, the date on which the Council's intention to acquire the property was made public."

Improvement.—The following recommendation of the Improvements Committee was agreed to:—

"That the estimate of 21,500*l.* submitted by the Finance Committee be approved; and that expenditure on capital account not exceeding that amount be authorised in respect of the purchase of property needed for the widening of Brook Green-road and Scrubs-lane authorised by the London County Council (Tramways and Improvements) Act, 1903."

Main Drainage Extension—Southern Outfall Sewer Enlargement.—The Main Drainage Committee reported as follows:—

"On December 5, 1899, we submitted to the Council a scheme for the general enlargement of the main drainage system, and, as a first instalment of the work required on the south side of the river Thames, we recommended the construction of an additional sewer, 11 ft. 6 in. in diameter, between the Crossness outfall and the Deptford pumping-station at an approximate cost of 500,000*l.* The scheme further provides for the ultimate construction of a high-level sewer, 11 ft. 6 in. in diameter, from the Crossness outfall to Catford, at a cost of about 520,000*l.*, but as this sewer should be placed on the top of the new outfall sewer as far as the Plumstead railway station, we advised that the two sewers should for that distance be put in hand simultaneously, as the cost of excavation and other work would thereby be considerably lessened, the cost of such length of the high-level sewer being roughly estimated at 150,000*l.* Our recommendations, involving a capital outlay of 650,000*l.*, were adopted by the Council, and one section of the new sewers at the Crossness end is approaching completion. The drawings, specification, and bill of quantities of another section (B), with a total length of 10,200 ft., have now been prepared, and the engineer estimates the total cost of the operations at 291,000*l.* We think that the work should be carried out without the intervention of a contractor, and the Works Committee have expressed their willingness to undertake it at the amount of the engineer's estimate. The cost of the new sewers is covered by the votes already passed, and we accordingly recommend—That the expenditure of a sum not exceeding 291,000*l.* be sanctioned in respect of the construction of section B of the proposed new sewers between the Crossness outfall and the Plumstead railway station; that the work be carried out without the intervention of a contractor; and that the drawings, specification, and estimate of 291,000*l.* be referred to the Works Committee for that purpose."

Colonel Rotton moved to refer the recommendation back for further consideration. He understood that a contractor was prepared to carry out the work for 50,000*l.* less than the Engineer's estimate.

Mr. Squires seconded. He said that a circular had been sent round saying that a contractor was prepared to do the work for a much lower sum, and he would like to know how the contractor had got access to the plans and specification.

Mr. Torrance said that the contractor could not have seen the plans and specification, and that, consequently, his estimate was of no value.

Mr. Goodwin said that as a contractor he could say that it was impossible to give a proper estimate for such work without seeing the plans and specification.

The motion on being put was lost, and the Committee's recommendation was then agreed to.

District Surveyors.—The Building Act Committee reported as follows, the recommendation being agreed to:—

"We have received a request from Mr. O. C. Hills, District Surveyor for East Hackney (North), to be furnished with a sealed copy of the Council's by-laws made under the Metropolis Management and Building Acts Amendment Act, 1878, and the London Council (General Powers) Act, 1890. The Council on November 3, 1891, decided to supply sealed copies of these by-laws to all the District Surveyors then holding appointments. Since that date, however, ten new District Surveyors have been appointed, and it is desirable that these gentlemen should be provided with sealed copies of the by-laws. We also consider that ten further copies should be sealed for future use. We recommend that the seal of the Council be affixed to 20 copies of the by-laws made under the Metropolis Management and Building Acts Amendment Act, 1878, and the London Council (General Powers) Act, 1890."

Hainault Forest.—The Parks Committee reported that satisfactory progress is being made with the acquisition of the various properties required for the Hainault Forest scheme. Mr. E. North Buxton had been actively employed on the work of re-afforesting the farmed land, the result of which would be very apparent by the time the land is thrown open for public use. The Committee recommended that the thanks of the Council be given to Mr. Buxton for the assistance he has rendered in securing Hainault Forest as a public open space.

Mr. Cleland, the Chairman of the Committee, referred in warm terms to the indefatigable industry which Mr. Buxton had brought to bear on the matter.

The recommendation was adopted and the Council adjourned at seven o'clock.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

The London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Marylebone, East.—An oriel window to a new building adjoining No. 17, Union-street, St. Marylebone (Messrs. Clark and Boulting for Mr. T. J. Boulting).—Consent.

Holborn.—An iron sign in front of No. 34, Eagle-street, Holborn (Messrs. H. Cooper and Co.).—Consent.

Islington, East.†—Bay windows to a block of residential flats on the site of No. 14, Highbury-crescent, Islington (Mr. F. J. Garlick for Messrs. C. W. Matthews and A. E. Bailey).—Refused.

Kensington, North.†—An iron and glass covered way in front of No. 13, Pembridge-crescent, Kensington (Messrs. Davis and Emanuel for Mr. I. Davis).—Refused.

Deptford.—The retention of a wood and iron one-story shop on the forecourt of No. 7, Evelyn-street, Deptford (Messrs. Witherington and Hogwood for Mr. F. Podbury).—Refused.

Width of Way.

Hammersmith.—Forecourt fences in front of Nos. 119, 121, and 123, St. Ann's-road, Nottinghill (Mr. H. T. C. Newton-Mason for Mr. W. Hayes).—Consent.

Westminster.†—A two-story building adjoining, to the westward, No. 57, Upper Garden-street, Westminster (Mr. E. D. Clarke for Mr. W. Price).—Refused.

Width of Way and Space at Rear.

Fulham.—Buildings on the south side of Effie-road and east side of Effie-place, Fulham (Mr. G. Pestall for the Metropolitan District Railway Company).—Consent.

Formation of Streets, etc.

Clapham.—That an order be issued to Mr. A. E. Balls sanctioning the widening of a portion of Wix's-lane, North-side, Clapham Common.—Agreed.

Wandsworth.—The retention of barriers across Ellerton-road, Burntwood-lane, Wandsworth (Messrs. Holloway Bros.).—Consent.

Wandsworth.—That an order be issued to Mr. J. C. Radford, sanctioning the formation or laying out of a new street for carriage traffic, to lead out of the west side of Larpent-street, Howard's-lane, Putney (Lord Westbury).—Consent.

Woolwich.—A deviation from the plans previously approved for the formation of new streets upon the Eltham Park Estate, High-street, Eltham, so far as relates to an alteration in the gradients of part of Crookston-road, Gleneskroad, Dairsie-road, Deansfield-road, and Dumbreck-road (Mr. R. Stewart for Mr. A. Cameron Corbett, M.P.).—Refused.

Woolwich.—That an order be issued to Messrs. Tapp and Jones refusing to sanction the formation or laying out of new streets in continuation of Fernhill-street, Silverland-street, and Brixham-street, North Woolwich.—Refused.

Artisans' Dwellings.

Islington, North.—That the amended block plan submitted by Mr. R. Robertson for the Housing of the Working Classes Committee of the Council, be substituted for the block plan approved by the Council on the 11th day of February, 1902, for the erection of blocks of intended dwelling-houses to be inhabited by persons of the working-classes, and proposed to be erected not abutting upon a street on a site on the western side of Wedmore-street, Islington, southward of Wedmore-mews.—Agreed.

Buildings for the Supply of Electricity.

Hackney, South.—Additions to a generating station and works on the north side of Millfields-road, Hackney (Messrs. R. Hammond and Son for the Council of the Metropolitan Borough of Hackney).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

ROYAL COMMISSION ON LONDON TRAFFIC.

The Royal Commission appointed to inquire into the matter of improving the conditions of locomotion in London resumed its sittings on Friday last week at the Westminster Palace Hotel, S.W., under the presidency of Sir David Barbour.

Mr. W. E. Riley, the Architect to the London County Council, was called. He said that when the Municipality of Paris began to scheme a system of direct communication for that city, they adopted as a basis of consideration the underground railways of the County of London. A unified and complete system had been evolved and was being worked out in detail. Roughly, it was an ellipse formed of three irregular curves surrounding the city, but within the line of the old Ceinture Railway. One of the enclosing sections was carried across the city north and south, and there were in addition one other short diametrical length running north and south and two east and west. Thus there were six distinct lines, all worked on the shuttle system, with looped ends to facilitate the return of trains, and minimise the dislocations which would take place owing to a section being blocked by a breakdown. There was a difficulty in the way of adopting such a scheme in London. An ideal scheme would be one giving circumferential lines at various distances apart, and crossing these diametrically by other lines running across the county, and joining the circumferential lines with the centre parts. The existing London tubes did not constitute a unified system. Witness then spoke of the necessity of having "locomotive centre points" and exchanges. There was a great need for rapid locomotion between many of the railway termini and the various centres of traffic within the central area of London, but he would not suggest that such communication could best be afforded by tube railways, though in some cases shallow tramways might be adopted. He then went on to describe how the existing services between the several railway termini might be connected and extended, so as to include them in one system of inter-communication. The City and South London Railway might be extended from its present terminus at the Angel, via King's Cross, St. Pancras, and Euston, to form an interchange station with the Baker-street and Waterloo Railway near the top of Portland-place, and having also interchange stations with the Great Northern and Strand Railway and the Charing Cross, Euston, and Hampstead line. A line which was much needed was one from Piccadilly-circus to Charing Cross, the Law Courts, Ludgate-circus, and the City. Referring to the tramways south of the river, witness advised the abolition of the dangerous termini at Westminster Bridge and Blackfriars Bridge, but continuing the tramway over the bridges and along the Embankment. Dealing with the construction of new streets and routes for broad avenues, witness said that under the London Building Act, 1894, the design in regard to streets was that "provision should be made and powers conferred in order to secure a proper width and direction of streets, and generally with respect to the control and regulation of streets." With a view to providing further relief to rapidly-increasing street traffic in and around the central business area, to provide for the probable increase of traffic in outlying districts, and also for convenience of locomotion designed for special speed, he suggested that broad avenues should have consideration. The lines of such thoroughfares might be chosen to pass through inexpensive property, so as to avoid the purchase of costly interests, such as would be required for the widening of existing thoroughfares. The necessarily heavy outlay might be compensated for by purchasing sufficient property on both frontages and providing for surface tramways and shallow tubes. He suggested that one such route might be on the line of the projected City and Crystal Palace Railway, through Camberwell and Peckham. Owing to the nature of the sub-soil the construction of the line as a tube would probably be very expensive, but if it were constructed in connexion with such an avenue, the additional advantage of shallow subways could be provided. Another suggested route was one running almost directly north and south. Commencing at Southampton-row near the north end of Kings-

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way, it would pass in a northerly direction to the junction of Caledonian-road and Pentonville-road at King's Cross. Thence it would continue parallel with Caledonian-road for a short distance, when it would take a north-easterly direction to the county boundary slightly to the east of Finsbury Park. That route could be extended to Muswell Hill. Southward from Kingsway the route would be via Waterloo Bridge, east of Waterloo station, north of St. George's-circus, crossing New Kent-road east of Elephant and Castle, and thence to Camberwell parallel to the Walworth-road. Peckham Rye would be skirted on the west side, and the county boundary reached at a point near Sydenham station. As an alternative on the south side of the river the route might commence near Southwark Bridge, and from that point would join the route as proposed at the Elephant and Castle. Then routes north-east and south-east might be made, and they could be connected by the Tower Bridge. The north-east route would be 4¼ miles in length, and would commence near the Tower of London; crossing Commercial-street, it would take a north-easterly direction to the south end of Hackney Marsh, at which point the county boundary would be reached. Leytonstone might easily be connected by this route. On the southern side the direction taken would be across Spa-road and Southwark Park-road. Passing to the west of New Cross station, the route would proceed to Blackheath by way of Lewisham, reaching the county boundary, after passing Eltham, at West Wood. He suggested that the south-west route should commence at the western end of the Victoria Embankment, and if possible should cross Victoria-street near Great Chapel-street. Passing to the south of the new Roman Catholic Cathedral, the route would be through the poorer part of Pimlico. King's-road, Chelsea, which would be widened, would then be joined, and the northern part of Eelbrook Common would be passed. The Thames would be crossed westward of Fulham Palace, and at Barnes Common the boundary would be reached. That route could be continued to Richmond. The shortest of the routes would be that to the west. It would commence at the Uxbridge-road, west of Ladbroke-grove, and after passing Wormwood Scrubbs, it would reach the county boundary at East Acton. Beyond the boundary the route might be continued to join the Uxbridge-road near Ealing station. In connexion with this route witness said that Jermyn-street might be widened, with a prolongation to Kingsway. The north-west route would, it was suggested, commence at the north end of Portland-place, skirting the west side of Regent's Park, crossing Maida Vale at a point near Elgin-avenue and reaching the county boundary to the north of Paddington Recreation Ground. Willesden and Sudbury could be reached by an extension of the route. These suggestions were not put forward by him as definite proposals of the London County Council. Their usefulness would depend on the connexion made across the central area of London. Such extension would, of course, require very careful consideration. The areas particularly in need of additional locomotive service were in the south-east, but there were other areas in the districts of Camberwell, Dulwich, Brixton, and Tooting which could be opened up for building if served adequately. There was a great difficulty in securing land within the central area for the erection, economically, for dwellings for the working classes.

Replying to Sir G. C. T. Bartley, witness said that he was authorised by the Locomotion Committee of the London County Council to give evidence, but he did not think that the Council would care to be hampered by his views in their policy. As to the width of the avenues, he suggested that the minimum should be fixed at 100 ft. However, he would like to see them 160 ft.

By Lord Cobham: His opinion was that the width of the main thoroughfares of London compared unfavourably with those of foreign countries, despite the street improvements which had been carried out of late years.

THE LONDON BUILDING ACT, 1894:

A LINE OF FRONTAGE DISPUTE.

THE Tribunal of Appeal under the London Building Act, 1894, sat at the Surveyors' Institution, Great George-street, Westminster, on Tuesday, to hear an appeal by Mr. Charles Botterill, surveyor, on behalf of Mr. Robert Roy, under Section 25 of the Act, against the certificate of the Superintending Architect of Metropolitan Buildings, defining the general line of buildings on the southern side of Fulham-road, Fulham, between Munster-road and Landridge-road, in which part of Fulham-road he further certifies the building site in question to be situate.

The members of the Tribunal sitting were Messrs. J. W. Penfold (Chairman), A. A. Hudson, and E. A. Gruning.

The case for the appellant was conducted by Mr. Botterill, while Mr. Andrews, from the Solicitor's Department of the London County Council, appeared for the respondents.

It was explained that Mr. Roy is the freeholder of land upon which it is proposed to build, and Mr. Botterill argued that the line of frontage should be drawn east so far as Whittingstall-road. In cross-examination he admitted that he had accepted consent from the County Council in respect of the houses in a portion of the road adopted by the Superintending Architect, and had made application in respect of the site under appeal for consent to build in advance of the general line.

Mr. Andrews contended that there was a well-defined line between Munster-road and Landridge-road, and that that line should be adopted, and the certificate of the Superintending Architect upheld. He also drew attention to Section 27 of the Act, under which consent granted by the Council was not to be deemed to alter the general line in that part of the street. In the present instance, to bring out the line of Fulham-road would seriously affect the value of property between the points named. It was, moreover, open for the appellant, when he had a complete scheme, to put it again before the Council. No hardship would thus arise.

Mr. Prescott, the Town Clerk of Fulham, said he was instructed, from the point of view of one with local knowledge, to support the view taken by the Superintending Architect. His Council desired to emphasise the fact that between Munster and Landridge-roads there was already a well-defined line. To deviate from that would seriously interfere with the public interest.

The Chairman intimated that the Tribunal intended to define the line themselves.

Mr. Andrews: Do you propose to follow the lined defined by the Superintending Architect?

The Chairman: We may do it. (To Mr. Botterill): Do you wish our decision to be given to-day, or allow us further time to deliberate?

Mr. Botterill: I would prefer you deferred your decision for a week.

The Chairman: You know there are two or three points of view we want to discuss, and we should prefer to have time to do it.

The decision will therefore be given later.

BOOKS RECEIVED.

GRAPHIC STATICS. By Jerome Sondericker, B.S., C.E. (Chapman and Hall.)

GAS AND OIL ENGINE MANAGEMENT. By M. Powis Bale. (Crosby Lockwood and Son.)

AN ELEMENTARY TREATISE ON HOISTING MACHINERY. By Joseph Horner, A.-M.I.M.E., (Crosby Lockwood and Son.)

RATING: PRINCIPLES — PRACTICE — PROCEDURE. By P. Michael Faraday. Second Edition. (Sweet and Maxwell. 20s.)

THE "PRACTICAL ENGINEER" ELECTRICAL POCKET-BOOK, 1904. (Technical Publishing Co.)

THE "PRACTICAL ENGINEER" POCKET-BOOK, 1904. (Technical Publishing Co.)

Correspondence.

THE LATE MR. BREWER.

SIR,—I think the thanks of the profession are due to you for affording us an opportunity of studying the original drawings of the late Mr. H. W. Brewer, now on view at the *Builder* office.

Referring to Mr. Hayward's letter in your issue for October 31, I trust you will be able to carry into effect his suggestion as to publishing again in a complete and collected form the architectural drawings of this talented artist, whose death we so much deplore.

During past years I have gathered together what reproductions I could find of Mr. Brewer's work, and there must be many more architects who, like myself, would be glad to possess a complete set of his sketches and restorations of ancient architecture.

CYRIL E. POWER.

TINTERN ABBEY.

SIR,—The work the Office of Woods has done is praiseworthy, but I venture to think some suggestions may not be out of place.

The removal of the ivy is quite right, but it has destroyed the picturesque appearance of the ruin, and the Abbey stands now as a gaunt skeleton. A less destructive creeper, that would not destroy the masonry, would, if planted, restore the original artistic appearance.

The arch between the choir and transept is in a dangerous state. A reverse curve is set up near the apex, and the mortar of the arch stones has fallen out. I think they could be pinned up now without centres. If left alone it may fall at any time.

The gable over the East window should be stayed in some way, and the centre mullion rebuilt. It is very difficult to do this without spoiling the effect of the ruin.

There is a perfect mine of detail in the stones that have fallen, but these are stacked in heaps like road stone. I should like to see a low building, oak and shingle roofed, erected adjoining the Abbey, and all these stones laid out, photographed, and catalogued.

The descriptive notice boards erected by the Office of Woods deserve praise, but it would assist visitors if a large plan naming the different parts were added to these

The Abbey is so unique, and the proportion of every part so good, that every care should be taken to preserve it, and architects should be thankful that at last a Government Department is doing good work at this interesting ruin.

ROBERT PHILLIPS.

Gloucester, November 2.

THE STRANGERS' HALL, NORWICH.

SIR,—In the interesting paragraph in your issue of the 31st ult. mention is made that the Strangers' Hall, recently acquired, was not used by the Walloons and other refugees in that city. On referring to the critical essay "The Walloon Church of Norwich" (Huguenot Society of London), and edited by W. J. Möens, F.S.A., I find mention of more than one hall. The Church of St. Mary-the Less, or St. Mary at Tombland was granted for a time to the Strangers as their hall. "In 1631," says Mr. Möens, 'the hall (*i.e.*, the church) being found too small, the market was removed to the new hall, and in 1637 the church was assigned to the Walloons for divine worship."

Mention is also made of a sale-hall. The Dutch and Walloons had separate halls for the different kinds of drapery to keep them apart, and I cannot but think that this newly-purchased building must have been one of their halls, to which the name "Strangers" was afterwards applied.

The influx of the refugees was so great—especially after the immigration from France, in 1572—that one or two buildings for trade could scarcely suffice. It is, however, most valuable that such a structure has been saved to the benefit of local, and, I may say, English history. At Canterbury, a somewhat similar step was lately taken, in the acquisition of one of the houses of the master weavers now used as a school for modern weaving and art fabrics. Preservation of such historic houses helps to illustrate the annals of our past industries, and, in a word, the progress of a nation. I may add that the first printing press was established at Norwich in 1567, by one Anthony de Solem, who came from Brabant, and printed the Psalms in Dutch.

S. W. KERSHAW, F.S.A.

RAISING THE LEVEL OF ROADS.

SIR,—I should be glad if you will kindly give me a reply to the following questions:—

A Rural District Council, in re-constructing a number of roads in their district, have raised the level of these roads above that of the original roads, the consequence being that the foot-walks are now higher than the sills of the gateways of the garden paths leading from them to the houses. Owing to this, during times of rain, the pathways and gardens are flooded, and the occupiers cannot reach the foot-walks of the street without having to lay down planks. There is also inconvenience and danger arising from the foot-walk being higher than the gate sills.

Will you kindly say if the Rural District Council, acting as highway authority, had any legal right to raise the roads and cause this condition of things, and whether or not the owners affected have any remedy against the Council? SUFFERER.

*** There is no doubt that a public authority is bound to do work without negligence, and if, in consequence of negligence, injury is caused to a person the latter has the usual remedies. But there must be negligence to found any legal right of action, and care must be taken to differentiate between a substantial injury and an inconvenience. The facts of each case must be minutely considered, in order to enable a person to gauge the state of affairs. The highway authority would clearly be entitled to raise the roadways for the purpose of public convenience, subject to the principles stated above. Are not the inhabitants of this road ratepayers? If they are, they have a right to prevent their representatives from inconveniencing them. They can, by expostulation if necessary, turn them out of office.—ED.

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RATS.

SIR,—I should be greatly obliged if you could, through the columns of your valuable journal, give me advice as to ridding my premises of a plague of rats. We have caught hundreds the last two years, and "still they come." I have been recommended to have the whole of the ground floor concreted (I may say we have no cellarage). Perhaps some of your readers will give me the benefit of their experience.

C. W. LEAKE.

The Student's Column.

CONCRETE-STEEL.—XX.

WORKING STRESSES AND BUILDING RULES FOR BEAMS AND FLOORS.

THE permissible unit stresses on concrete and steel should be determined on a basis providing that the loads coming on any given structure shall not cause stresses likely to endanger its prolonged existence. Considered alone, the static load does not afford a sufficient indication as to the required strength, which must be determined with due regard to the greatest stresses that, even if frequently repeated, will not endanger the safety of the structure.

Recent investigations by M. Considère have shown that such stresses are caused by repetitions of load equal to about two-thirds of the greatest static load. His results, therefore, are in substantial agreement with those obtained by Wöhler's well-known experiments on wrought iron and steel. The consideration of frequent repetitions of load is the more important because it is probable that the adhesion between the concrete and the steel may become weakened in course of time by frequently repeated loads, especially in structures liable to severe shocks and vibrations.

Another point for attention is the possibility of danger from cracks in the concrete, as the weakening of a section where cracks have occurred is necessarily followed by displacement of the neutral axis, as well as by sudden changes of stress. Under the action of live loads, the deformation induced at such points may lead to unexpectedly high unit stress on the steel reinforcement. Further, the existence of cracks in a structure facilitates the admission of moisture, and, in exposed positions, frost may have a tendency to disintegrate the construction.

For these reasons it is very desirable that the proportions of concrete-steel beams should be such as to preclude the establishment of stresses likely to cause cracks of any kind.

A very general rule in practice is to adopt the following permissible unit stresses:—

Concrete in compression...	500 lb. per sq. in.
Concrete in tension	50 lb. per sq. in.
Steel in tension.....	15,000 lb. per sq. in.

These stresses, however, are only applicable to materials of such qualities as provide for an ample factor of safety, and they would not be justifiable in the cases of poor concrete and steel of low tensile strength.

Professor Brik recommends that the allowable unit stresses should be fixed on the following basis:—

Concrete in compression	One-seventh the ultimate compressive strength.
Concrete in tension due to bending	One-half the ultimate bending strength.
Steel in tension... ...	14,200 lbs. per sq. in.

Professor Brik further advises that the tensile bending stresses should first be determined, and that in no case should they be allowed to exceed the permissible unit stresses. For the computation of the reinforcement he proposes that the tensile resistance of the concrete should be neglected, and that the area of steel should be computed on the basis of assumed cracks in the section under consideration.

In all calculations he considers that an addition of from 20 to 50 per cent. should be made to the estimated value of the load to provide for shocks and vibrations.

M. Christophe* recommends that the ratio of the coefficients of elasticity of the concrete and the steel should be taken at 1 : 10, and proposes two standards for the unit stresses:—

	Safety of 1st Degree. lbs. per sq. in.	Safety of 2nd Degree. lbs. per sq. in.
Concrete in compression	427	711
Steel in tension	12,800	21,400

In each case the tensile resistance of the concrete is to be neglected. The allowable shearing stress on concrete is to be taken at 21 lb. to 35 lb. per square inch.

Extract from the Building Code of Berlin.

In the design of floors the static computation must prove that concrete-steel structures are capable of carrying ten times the specified load, including their own weight, and that the steel is able to resist the entire tensile stresses.

Extract from the Building Code of Dresden.

Calculations must be based upon the following maximum working stresses:—

Concrete in compression...	356 lb. per sq. in.
Steel in tension	12,500 lb. per sq. in.
Steel in shear	10,000 lb. per sq. in.

Extract from the Building Code of Dusseldorf.

The proportions of the concrete must be such as to provide for a compressive resistance of 2,140 lbs. per square inch at the age of twenty-eight days. The permissible compressive stress on concrete is fixed at 427 lb. per square inch.

If a higher compressive resistance is proved to be possessed by the concrete a proportionate of the working stress is permitted.

The ultimate tensile resistance of the concrete is taken at 570 lbs. per square inch, but this is not taken into account in settling the reinforcement.

The maximum working stresses on the reinforcement are as follows:—

Steel bars in compression	12,500lbs. per sq. in.
Steel bars in tension.....	12,500lbs. per sq. in.
Steel bars in shear.....	10,000lbs. per sq. in.
Steel wire in compression	14,200lbs. per sq. in.
Steel wire in tension.....	14,200lbs. per sq. in.
Steel wire in shear.....	11,400lbs. per sq. in.

The reinforcement must be so designed that in addition to taking the calculated tensile stresses it shall also provide for shearing stresses for which no other provision has been made.

Extract from the Building Code of Frankfort.

Concrete-steel floors must be able to carry their own weight and ten times the specified load without perceptible deformation. Compressive stress in the concrete must not exceed 356 lbs. per square inch, and all tensile stresses must be taken by the steel reinforcement.

Extract from the Building Code of Hamburg.

The permissible working stresses for concrete and steel are not to exceed the following intensities.

Concrete in direct compression	427 lbs. per sq. in.
Concrete in compression due to bending	356 lbs. per sq. in.
Concrete in tension ...	0 lbs. per sq. in.
Concrete in shear.....	22 lbs. per sq. in.
Steel in compression...	12,500 lbs. per sq. in.
Steel in tension.....	12,500 lbs. per sq. in.
Steel in shear	10,000 lbs. per sq. in.

The steel must be designed to withstand the shearing stresses. For floors liable to vibration 20 per cent. is to be added to the specified loads.

Extracts from the New York Building Regulations for Concrete-Steel Construction.

The following notes from the regulations issued last month by the Bureau of Buildings of the Borough of Manhattan, New York, will be found generally serviceable in the design of concrete-steel beams and floors.

Concrete-steel is defined as an approved concrete mixture reinforced by steel of any shape, so combined that the steel will take up the tensional stresses and assist in the resistance to shear.

Concrete-steel construction will be approved only for buildings which are not required to be fireproof by the Building Code, unless satisfactory fire and water tests shall have been made under the supervision of the bureau, and in accordance with the regulations fixed by the bureau and conducted as nearly as practicable in the same manner as prescribed for fireproof floor fittings in the Building Code. Any builder offering concrete steel construction for fireproof buildings must submit such construction to a fire and water test.

Before permission to erect any concrete-steel structure is issued, complete drawings and specifications must be filed with the Superintendent of Buildings, showing all details of the construction, the size and position of all reinforcing rods, stirrups, etc., and giving the composition of the concrete.

Gravel or broken stone concrete is to be used, mixed in the proportions of 1:2:4; or the proportions may be such that the resistance of the concrete to crushing shall not be less than 2,000 lbs. per square inch after hardening for 28 days. The tests to determine this value must be made under the direction of the Superintendent of Buildings. The concrete used in concrete-steel construction must be what is usually known as a wet mixture.

Only high-grade Portland cements shall be permitted in concrete-steel construction. Such cements, when tested neat, shall, after one day in air, develop a tensile strength of at least 300 lbs. per square inch; and after one day in air and six days in water shall develop a tensile strength of at least 500 lbs. per square inch; and after one day in air and 27 days in water shall develop a tensile strength of at least 600 lbs. per square inch. Other tests as to fineness, constancy of volume, etc., made in accordance with the standard method prescribed by the American Society of Civil Engineers' Committee may, from time to time, be prescribed by the Superintendent of Buildings.

The sand to be used must be clean, sharp grit sand, free from loam or dirt, and shall not be finer than the standard sample of the Bureau of Buildings.

The stone used in the concrete shall be a clean, broken trap rock, or gravel, of a size that will pass through a ¾-inch ring. In case it is desired to use any other material or other kind of stone than that specified, samples of same must be first submitted to and approved by the Superintendent of Buildings.

Concrete-steel shall be so designed that the stresses in the concrete and the steel shall not exceed the following limits:—Extreme fibre stress on concrete in compression, 500 lb. per square inch; shearing stress in concrete, 50 lb.; concrete in direct compression, 350 lb.; tensile stress in steel, 16,000 lb.; shearing stress in steel, 10,000 lb.

The adhesion of concrete and steel is assumed to be not greater than the shearing strength of the concrete.

The ratio of the co-efficients of elasticity of the concrete and the steel is taken as 1:12.

The following assumptions are to be taken for guidance in the determination of the bending moments due to external forces. Beams and girders shall be considered as simply supported at the ends, no allowance being made for continuous construction over supports. Floor plates, when constructed continuous and when provided with reinforcement at top of plate over the supports may be treated as continuous beams, the bending moment for uniformly distributed loads being taken at not less than $WL \div 10$; the bending moment may be taken at $WL \div 20$ in the case of square floor-plates which are reinforced in both directions and supported on all sides. The floor-plate to the extent of not more than ten times the width of any beam or girder may be taken as part of that beam or girder in computing its moment of resistance.

The moment of resistance of any concrete-steel construction under transverse loads shall be determined by formulæ based on the following assumptions:—

(*a*) The bond between the concrete and steel is sufficient to make the two materials act together as a homogeneous solid.

(*b*) The strain in any fibre is directly proportionate to the distance of that fibre from the neutral axis.

(*c*) The modulus of elasticity of the concrete remains constant within the limits of the working stresses fixed in these regulations.

The tensile strength of the concrete shall not be considered.

When the shearing stresses developed in any part of a concrete-steel construction exceed the safe working strength of concrete, as fixed in these regulations, a sufficient amount of steel shall be introduced in such a position that the deficiency in the resistance to shear is overcome.

When the safe limit of adhesion between the concrete and steel is exceeded, some provision must be made for transmitting the strength of the steel to the concrete.

The contractor must be prepared to make load tests on any portion of a concrete-steel

* "Le béton armé et ses applications." 1902.

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construction within a reasonable time after erection, as often as may be required by the Superintendent of Buildings. The tests must show that the construction will sustain a load of three times that for which it was designed without any sign of failure.

OBITUARY.

MR. SHAW.—We have to announce the death, on November 3, of Mr. Thomas F. Shaw, of Harlesden, Middlesex, architect and surveyor. Mr. Shaw made the plans and designs for the Constitutional Club at Harlesden, some dyeing and cleaning factories at Willesden for Mr. J. Todd, and for various villas, houses, and other buildings at Ashford and Harlesden, and was employed in laying out many of the new roads in the latter locality.

MR. JAMES RHIND.—Liverpool papers announce the death of Mr. James Rhind, a local architect of considerable ability and success. Some thirty years ago he commenced his career in Liverpool as assistant to Messrs. W. and G. Audsley, and afterwards started in practice on his own account.

MR. SYLVANUS TREVAIL.—The death of this architect, under painful circumstances, has on that account attracted some notice in the daily papers, the *Times* committing itself to the absurd statement that he had been President of the Institute of Architects. Mr. Trevail was, however, a man of some ability, and when Chairman of the Sanitary Committee of the Truro Town Council, his monthly reports on the sanitary state of the borough were very ably done, and were frequently quoted in our columns.

GENERAL BUILDING NEWS.

RESTORATION OF CHANCEL, ALPHAMSTONE CHURCH.—Alphamstone Church, Essex, has just been reopened after the restoration of the chancel. The work has entailed the rebuilding of a considerable portion of the fabric and the entire refitting of the chancel, which has been superintended by the architect, Mr. A. Blomfield Jackson.

WESLEYAN CHURCH, ST. ANTHONY'S, NORTHUMBERLAND.—On the 4th inst., the Wesleyan Church at St. Anthony's was reopened after alterations. The work carried out comprises the erection of a new entrance porch and screens, new kitchen, vestry, and lavatories, new rostrum and seating in the church, alterations to the infants' school, and the renovation of the building. The work has been carried out under the direction of Mr. J. Walton Taylor, architect, of Newcastle. The contractor for the general alterations is Mr. John Craven; Mr. D. Robertson has done the decoration and painting; Messrs. Reed, Millican, and Co. the lead glazing for entrance screens and porch; and Mr. Norman Lee the plumbing, heating, and lighting.

METHODIST FREE CHURCH HALL, WHITLEY.—On the 4th inst. the portal-stone of the new Benson Hall in connexion with the United Methodist Free Church at Whitley Bay was laid. Messrs. Mould and Tasker are the architects, and Mr. A. W. Styan the contractor.

WESLEYAN CHURCH, DURHAM.—A new Wesleyan Methodist Church has been erected at Durham in Old Elvet. The new church and the schools which adjoin it are built of stone. The tower and spire at the north-east corner rise to a height of 100ft. The church consists of nave, transepts, and chancel, in which latter the choir stalls are placed. The interior woodwork of pews, open roof, etc., is of pitch pine, and the tracery windows are filled with ornamental leaded lights. The church is estimated to seat about 630 people, including those in the end gallery, and vestry accommodation is provided for the minister and choir. On the ground floor there is also a ladies' parlour, and on the first floor a guild room. Direct access may be gained from the church to the school premises, which comprise an assembly-room 56 ft. by 30 ft., with three classrooms and an infants' room and kitchen. The buildings are lighted throughout by electricity, and heated by a hot-water system. The total cost of the buildings, including furnishings, is about 11,000*l.*, of which the site cost 2,050*l.* The architects were Messrs. W. J. Morley and Son, of Bradford, and the various contracts have been carried out by the following firms:—Masons' work, Mr. H. Worsnop, Durham; joiners' Mr. J. W. Rudd, Harrogate; plumbers', Mr. J. Lindley, Leeds; plasterers', Messrs. Sugden and Sons, Bradford; slaters', Mr. Blakey, Durham; painters', Messrs. Varley and Son, Bradford; heating, Messrs. Laidler and Son, Durham; leaded lights, Messrs. W. Lazenby and Son, Bradford; mosaic work, Mr. C. Lowes, Durham; and electric lighting, Mr. R. Falshaw, Harrogate. Mr. N. Newbould, of New Wortley, Leeds, was the clerk of the works.

CONGREGATIONAL CHURCH, KEYWORTH, NOTTINGHAM.—A new congregational church has been erected at Keyworth, from the designs of the architect, Mr. R. C. Sutton. The church comprises a nave and chancel, with an organ chamber on the north side and vestry on the south. Accommodation is provided for 250 persons. The roof of the nave is open timber, and the chancel is panelled. The external facings of the building are of brick with stone dressings.

CHURCH, BADSHOT LEA, SURREY.—The new Church of St. George, Badshot Lea, was consecrated recently by the Lord Bishop of Winchester. The church, which was designed by Mr. Mileham, of London, and built by Mr. G. Kemp, of Aldershot, is of concrete, faced with local flints. It consists of a nave and north aisle, and has been so built that a south aisle can be conveniently added at some future date, and also a tower to replace the present turret, containing one bell. The dressings, columns, and arches are of Bath stone, which is also used in the font. There is a screen of English oak, which divides the chancel from the nave and north aisle. The church is lighted by acetylene gas.

CHURCH, PLATT BRIDGE, LANCASHIRE.—The foundation-stone was recently laid of the new Church of St. Nathanael's, Platt Bridge. The architects of the building are Messrs. G. Bradbury and Sons, of Liverpool, and the builder is Mr. J. Dilworth. The materials used will be, on the exterior, red Ruabon pressed bricks, with moulded terra-cotta for the more ornamental parts. There will be three entrances through the grounds of the church, the one under the tower being available for the main building, and for the morning chapel. On the south side of the church a tower will be erected 17 ft. square and 95 ft. high from the ground level, in which it is proposed to place a clock and a peal of bells. The total length of the church is 120 ft., with a breadth of 86 ft. in the widest part. The interior of the church will contain a nave 77 ft. 6 in. long and 26 ft. wide, chancel 31 ft. long with a width of 24 ft. On the south side of the chancel there is to be a morning chapel 24 ft. 6 in. long, 18 ft. 6 in. wide, and on the north side an organ chamber, choir vestry, and clergy vestry. On the north and south side of the nave there are to be aisles 12 ft. 6 in. wide, and running the whole length of the nave. The nave is 32 ft. high to the eaves, 51 ft. to the ridge, and over the nave, chancel, side aisles, and morning chapel there will be placed an open timber roof. The whole church will be heated with hot-water pipes. Mr. Joseph Speakman is clerk of works.

WESLEYAN CHAPEL, YNYSYBWL, GLAMORGANSHIRE.—The foundation-stones were laid recently of a new chapel erected for the English Wesleyan denomination at Ynysybwl. The building, which is being erected in Thompson-street, consists of a basement and upper floor, the former to be used as a schoolroom to accommodate 100 persons, while the upper portion will comprise the chapel proper, capable of seating 250 persons, and will be built of native stone. The architect is Mr. Arthur O. Evans, Pontypridd, and the contractors, Messrs. Williams Bros., Ynysybwl.

MISSION CHURCH, MORNINGSIDE, N.B.—A new mission church is now being erected at Morningside by the parish church of Cambusnethan. The seating accommodation is for 240 people, and the estimated cost is 500*l.* The architect is Mr. James Cowie.

HACKNEY UNION CHILDREN'S HOMES, ONGAR.—These buildings, the foundation-stone of which was recently laid, will consist of twelve blocks, each self-contained and under the care of one or more foster-mothers, and will be set out round an ellipse, the entrance and porter's lodge being next the London-road. To the north of the entrance will be the administrative block, arranged round a quadrangle. The front portion, a two-storied building, will contain on the ground floor: superintendent's office, dining-room, kitchen and offices, committee-room, waiting-room, book-room, and committee's lavatory. On the upper floor, superintendent's apartments, and two small bedrooms to be used for girls in training who are about to leave the home for general service. On the north side of the court-yard a one-story building will be used for coal stores and packing cases. This building has been designed to enable it to be utilised at some future time, if required, for a boiler-house. The building on the east side of the courtyard will contain the matron's office, needle-room, clothing store, boot store, and lavatories, also the general laundry, comprising a receiving-room for dirty linen, washhouse, drying-room, ironing-room, and distributing-room for clean linen. On the west side will be the goods receiving-room, general store and delivery-room, various smaller stores for food and hardware, carpenter's and plumber's workshops, with ample lavatory accommodation. To the south of the entrance will be the receiving house, a two-story building for twenty children, so arranged that it can be used for either or both sexes. It will contain kitchen and living-room, two day-rooms, dormitories of various sizes, apartments for foster-mothers, lavatories and spray baths, cloakrooms, stores, and the usual offices. East of the administrative block two pairs of semi-detached cottages, with accommodation for 15 children each (60 in all), will be placed. These are somewhat similarly designed to the receiving house, but have separate living-rooms to each cottage. At a short distance from these cottages will be two detached houses, for 40 children each. These are planned on three floors, and will contain on the ground floor, play and reading-rooms, foster-mother's sitting-room, hat and cloakroom, lavatories, spray baths and stores. In the rear of each house and connected by a short corridor, a one-story building will contain the dining-room, kitchen, scullery, and larder. The upper floors will be arranged as dormitories, clothes and linen stores, lavatories and bathrooms, foster-mother's and spare bedrooms, etc. On the south side of the ellipse will be four similar houses. The general latrines, washhouses, play sheds, and coal stores are to be placed in separate buildings in the rear of each block. To the east of the site, and isolated from other buildings, is planned the infirmary, a one-story building arranged on the pavilion system, with accommodation for 20 beds. There will be two pavilions, each containing a ward for eight beds, and an isolation ward for two beds, with nurses' room and storerooms between. These will be connected by means of a covered corridor to a central block used for administrative purposes, and containing doctor's room and dispensary, kitchen, stores, and nurses' quarters. The bathrooms, slop-sinks, and water-closets are to be provided in separate buildings, having access from the connecting corridor. Externally, a cottage effect has been sought in the design of the elevations generally. The materials used will be red bricks, cream-coloured rough-cast, and red tile roofs with projecting eaves, all the detail being of a simple character. The works are being carried out by Messrs. McCormick and Sons, from the designs and under the superintendence of the Board's architect, Mr. W. A. Finch, of London, the clerk of works being Mr. J. T. Hodgson.

A RESTAURANT FOR WOMEN, LONDON.—A new restaurant and home for women is to be provided at 44, Mortimer-street, and the foundation-stone of the building has just been laid. Included in the building will be a restaurant, dining-hall, "rest-room," and small bedrooms and dormitories, divided into private compartments, to accommodate 120 women. Professor Beresford Pite is the architect.

PARISH ROOM, SHEFFIELD.—A new parish room, which has been erected by the congregation of St. Silas' Church as a memorial to the late vicar, in Hanover-street, Sheffield, was opened recently. The new room provides accommodation for 400 persons, and it is lighted throughout by electricity. The contractors for the building were Messrs. D. O'Neill and Sons, and the architect was Mr. W. J. Taylor.

ALL SAINTS' CHURCH, ELLAND, YORKSHIRE.—This new church, of which the foundation-stone was laid on August 11, 1900, was opened on the 4th inst., by the Archdeacon of Halifax. The site, which was given by Lord Savile, has a considerable fall from west to east, and the architect has taken advantage of this to place a large crypt and vestries under the chancel and chapel, connecting the same with the church by a broad flight of stone steps. The plan of the church consists of a nave, 111 ft. in length and 30 ft. 6 in. in width, with adjoining north and south transepts. The north transept forms a nave to the Lady Chapel, and has accommodation for 100 adults. The south transept has accommodation for 80 adults, and has a double archway opening into the passage and staircase leading to the vestries, and a large archway above opens into the organ chamber. The chancel is 45 ft. in length and 27 ft. 6 in. in width, and is so arranged with arches north and south that a view of the high altar is obtained from the transepts. North and south chancel passages are formed for the use of returning communicants. A sacristy is placed in the south side of the chancel. The nave is designed to have six bays of 18 ft. centres, and a wide-spreading arch at the west end opening into the baptistry, with its sides curving into the main west entrance and porch. The nave arches are comparatively low, rising only to a height of 18 ft., and being separated from the clearstory by an ornamental string course. Each bay of the nave has two clearstory windows, with sills ornamented by open tracery work. The height of the nave walls is 30 ft., and the apex of the roof is 43 ft. from the nave floor. The roof of the chancel and nave is of barrel form, while that of the transepts and chapel is of open timber form. The church is lighted by incandescent gas. The church, which is built of Yorkshire stone, but faced internally with red brick, has been carried out by Messrs. Charnock and Sons,

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of Halifax, the architect being Mr. Geo. H. Fellowes Prynne, architect, Queen Anne's-gate, Westminster. Owing to want of funds, only the chancel, chapel, transepts, and three bays of the nave have been built at present. The present outlay is about 12,000*l.* An illustration of the exterior was given in our issue of August 14, 1897.

CHANCEL, PARISH CHURCH, LOUDWATER, BUCKS.—The foundation-stone for the new chancel designed to be added to the Parish Church, Loudwater, was laid by the Bishop of Oxford on October 29. The old church is a somewhat curious example of the worst type of eighteenth century church design, with a regular three-decker pulpit at the east end and the altar placed under same. The building is not only noted for its extreme ugliness, but is in a sad state of repair, besides being wholly unsuited for modern requirements in worship. The present contract, being carried out by Mr. H. Flint, builder, of High Wycombe, is for a new chancel, which is designed by Mr. Geo. H. Fellowes Prynne, architect, Westminster, with a view to rebuilding the body of the church eventually. The present outlay is about 1,800*l.*

ALL SAINTS' CHURCH, EALING.—The foundation-stone has been laid of this church, which will form a memorial of Spencer Perceval, Prime Minister in 1809-12. The site forms a part—given by Mr. Leopold Rothschild—of the grounds of the house, Elm Grove, occupied by Spencer Perceval at the time of his assassination in the lobby of the House of Commons, by Bellingham, on May 11, 1812. The cost of the fabric, about 12,500*l.*, will be defrayed out of a bequest made in that behalf by Miss Frederica Elizabeth Perceval, the stateman's last surviving daughter, who died at Ealing two or three years ago. The architect of the church is Mr. W. A. Pite, whose designs are based upon a rendering of the Early Perpendicular style. Stamford stone, with rock-faced walling in dropped courses, will be used for the exterior, marble for the floor and chancel walls, and fumed oak for the pulpit, stalls, and screen. All Saints' will form a chapel-of-ease to the parish church of St. Mary.

LIMEHOUSE CHURCH INSTITUTE.—A contract has been entered into for the erection of the Limehouse Church Institute in connexion with St. Anne's Church, Limehouse, and the foundation-stone was laid on the 7th inst. The new building is being erected in Three Colt-street upon a very irregular site, where formerly stood the old church schools. Accommodation will be provided for girls' factory club and girls' friendly society, boys' club and men's club, billiard and games rooms, and gymnasium. The building will be of two stories, and the various rooms on the upper floor will be divided by sliding partitions, which when occasion requires enable this floor to be used as a large hall capable of seating about 400 people; there will be a platform at the end of the hall, with retiring-rooms and kitchen, etc., behind same. Staircases formed of Victoria stone are provided at each end of the building, and there will be three entrances. The façade of the building to Three Colt-street will be faced with deep buff-tinted terra-cotta, and is designed in the Later Renaissance style of English architecture. The cost of the scheme will be about 7,000*l.* Mr. W. Henry White is the architect, and the contract has been taken by Messrs. Watts, Johnson, and Co., of Limehouse. Messrs. Doulton and Co. are supplying the terra-cotta work. The trowel used at the laying of the foundation-stone was specially designed by the architect. It consisted of a dull silver blade with onyx handle enclosed in a strapwork of silver, wrought and chased, and was made by Mr. J. Havenhand.

PICKERING GRAMMAR SCHOOL.—Mr. J. Bilson, of Hull, has been appointed architect of the new buildings for Lady Lumley's Grammar School at Pickering, N.R. Yorkshire. The present premises were erected in 1828. The school was endowed in 1770 with lands in the parish which have since been vested in trustees.

NEW BUILDINGS IN BRADFORD.—The Building Committee of the Bradford Corporation, in their annual report for the year ended the 31st August, state that 587 plans were approved out of a total of 883 submitted. Included in these plans were 1,538 dwelling-houses, 41 houses and shops, 14 warehouses, 6 mills, 23 workshops, 36 lock-up shops, 418 sundry buildings, 74 streets, and 133 back roads—a total of 2,283, as compared with 1,817 last year and 1,780 in 1901. During the twelve months 83 cases of alleged dangerous buildings have been reported. These cases included houses, chimney stacks, and other premises. In 53 cases external walls to houses and other premises and 13 chimney stacks have been rebuilt; and three roofs and one cornice have been repaired.

HOSPITAL, MONMOUTH.—A new hospital and dispensary has just been open at Monmouth. It has cost close upon 8,000*l.* to erect and furnish. The builders were Messrs. Collins and Godfrey, of Tewkesbury, whose acting foreman has been Mr. W. J. Linley. The architect was Mr. Richard Creed, of London.

BAPTIST CHAPEL, TATWORTH.—The foundation stones have just been laid of a new Baptist Chapel at Tatworth. The present building will be erected in the rear portion of the site, and consists of a school-room 36ft. by 18ft., with three class-rooms (each about 10ft. by 12ft.), and another apartment with furnace, etc., behind. The dividing partition between the school-room and class-rooms will be folding doors, so arranged that the whole may be carried into one room for the purpose of a chapel gathering. The building will be carried out in red Pinhoe brick, with Candy's white (or buff) terra-cotta dressings, and slated roof. The floors throughout will be of wood blocks. The contract has been secured by Mr. R. Harris, of Wadeford, and Mr. F. Sidwick, builder, of Chard, will be associated with him in the work, the architects being Messrs. Symes and Madge, of Chard.

DRILL HALL, CRESWELL, NOTTINGHAM.—The new drill hall at Creswell, which has been erected for the Creswell Boys' Brigade, was opened recently.' The building is of brick, with stone dressings, and will serve the purposes of a drill hall during the week, and of a Sunday school for the Wesleyan body on Sundays. The hall itself is 65ft. by 35ft., and is capable of seating 450 persons. The building also contains a stage with ante-rooms, armoury, games room, and kitchen. There is also a turret and clock. A gymnasium apparatus is provided. The interior of the building is lit by electricity. The hall was designed by Mr. P. Houfton, architect, of Chesterfield, and Mr. A. F. Houfton, of Mansfield, was the contractor. The entire cost of erection is 1,550*l.*

CLUB, BOLDON COLLIERY, DURHAM.—The Boldon Colliery Working Men's Club has just been opened. The premises occupy a site on the new road to Brockley Whins Station. They are one story in height, and cover an area of 880 square yards. The building is of red facing bricks, with stone dressings and green slated roof. The interior comprises corridor running the whole length of the building, and terminates with an octagonal hall with glass dome. On each side of the corridor are the various suites of rooms which comprise the building—billiard-room, 42ft. by 22ft.; refreshment-rooms, with cellar in the basement; smoke-room, newspaper and magazine-room, and games-room, along with the usual cloak-room, lavatories, etc. Adjoining the club, and with access to the same, is the steward's house, with cooking kitchen. The contractor was Mr. R. M. Storey, and the architects were Messrs. Vaux and Mark, Sunderland.

SUNDAY SCHOOL, LANCASTER.—Plans for this building have been prepared by Mr. Spencer E. Barrow, architect. The elevation of the building will be of brick, with stone base, and dressed fronts, having a frontage to Fenton Street of 48 ft. There will be an entrance hall with class-rooms 16 ft. by 14 ft. on each side leading into the assembly hall, which is to be 47 ft. by 33 ft., and will accommodate 238 in the body of the hall, and 62 in the gallery, a total of 300. In the basement there will be a kitchen, bath-room, and dressing-room. On the west side of the hall there will be retiring rooms and a workshop for lessons in wood-carving, etc. Then on the first floor there will be a committee-room 27 ft. by 18 ft. and a reading-room 27 ft. by 14 ft.

SCHOOL, FRASERBURGH, ABERDEEN.—The Fraserburgh School Board have now adopted plans for their new Higher Grade School. Competitive designs were advertised for, and in all sixteen different designs were lodged by different architects. After deliberation, the board adjudicated the first place to the designs lodged under the motto "Scholastic," and it was found that Messrs. D. and J. R. M'Millan, architects, of Aberdeen, were the successful competitors. Instructions have now been given to the architects to have the work proceeded with at once. The school is arranged to accommodate 650 scholars, and the estimated cost of the building is 6,000*l.* The plan has been schemed so that only two classrooms in the whole building face the north, namely, the art room and the manual instruction room. There is a gymnasium on the ground floor 50 ft. by 26 ft., together with eight class-rooms and two teachers' rooms, the latter being arranged near the respective front entrances for boys and girls. On the first floor are five ordinary classrooms, also a manual instruction room, an art room, the science department, consisting of chemistry laboratory and physics laboratory, with a balance room adjoining. The large classroom set aside for cookery and laundry work is also placed on this floor, and has a scullery attached. In addition to this, there are arranged on this floor two teachers' rooms, one at each end of the building. The architects have also provided for a library and a stationery store. There are assembly-halls for the girls and boys respectively, each 24 ft. by 22 ft. The respective staircases are arranged in a recess. These assembly-halls are then repeated on the upper floor, a well in each case lighting the ground floor hall, and on each floor there is a corridor 8 ft. wide. The gymnasium is planned in the centre of the block on the ground floor, on the north side, and by means of throwing back glazed folding partitions, the two centre classrooms immediately on the south, together with the intervening corridor, can be thrown into the gymnasium, which would then make a hall 56 ft. by 54 ft. The extended designs are Scotch Baronial in character.

PEOPLE'S PALACE, BELFAST.—In the district of St. George's Ward, Belfast, a scheme which is to cost something like 12,000*l.* is now being developed. It is known by the title of the "People's Palace," and will embrace the following institutions:—(1) Large hall for general social purposes and entertainments; (2) minor hall for similar purposes; (3) the formation and carrying on of a medical mission for assisting the poor, and medical and surgical advice and treatment given; (4) to provide a general rendezvous-room for the people of the neighbourhood under healthy social conditions; (5) swimming bath and gymnasium for the young men of the neighbourhood; (6) playground and covered games' courts for the children; (7) cripple young men and women's Industrial Training Institute for the cripples of Ireland; (8) a residential home for lonely factory and mill girls; (9) the Old Folks' Home, a home for pensioners and those incapable of work, where husbands and wives can live together; (10) free library and reading-room; (11) a lodging-house for women; and (12) a lodging-house for men. The committee are only taking up at present the portion requiring immediate attention. This portion they hope to finish in about a year, and the outlay is roughly put at 6,000*l.* Mr. William J. W. Roome is superintending the work.

PUBLIC LIBRARY, STOKE NEWINGTON.—The foundation-stone of an addition to the Stoke Newington Public Library was laid on the 31st ult. The existing buildings occupy an area of about 4,960 square feet. The extension, which includes a surface area of something like 7,000 square feet, provides for the extension of the lending library, a reference library of about 42 ft. by 34 ft., a children's library of about 42 ft. by 17 ft., a lecture-hall about 36 ft. by 54 ft., together with librarian's room, lavatories, and the necessary appurtenances. The lecture-hall will be finished with a glazed brick dado, red brick walls and an open timbered roof. In the basement will be provided a heating chamber, about 56 ft. by 16 ft., and on the first floor there will be a committee-room about 42 ft. by 16 ft. The architect is Mr. Sidney G. Goss, of Broad Street Buildings, E.C. The builders are Messrs. William Shurmur and Sons, Ltd., of Upper Clapton, N.E.

MISSION HALL, HULL.—On the 29th ult. the foundation-stone was laid of a new mission hall, which is to replace the present old building in George-yard, off Alfred Gelder-street, Hull. The new building, which has a frontage of 130 ft. to Alfred Gelder-street, and a depth of 100 ft. to 120 ft., is arranged with a central main entrance 13 ft. wide, giving direct access to all parts of the building, flanked by six shops, three on each side of the main entrance, each shop having basement storage. At the north and south ends of the frontage additional entrances lead direct to the Sunday school and vestries arranged in a sub-basement, and a further entrance 8 ft. wide is obtained from George-yard. The rooms over the shops are utilised as classrooms, secretary's room, caretaker's house, etc., and the main hall and school are set back from the street for quietness. The most important feature of the scheme is the large hall, 75 ft. 6 in. wide by 103 ft. long, which is arranged in the centre of the site, and is approached from the main entrance vestibule by stair-cases on the right and left hand respectively, and with its gallery round three sides and choir platform provides accommodation for 1,750 people. Retiring-rooms, cloak rooms, and stewards' rooms are arranged in connexion with the hall. A Sunday school 52 ft. wide by 57 ft. long is arranged in a sub-basement at a level of 5ft. 6 in. below the front street, and provides seating accommodation for 600 people. A church parlour, 22 ft. wide by 22 ft. long, and fifteen classrooms of varying dimensions, choir and minister's vestry are also provided. At the boys' side adjoining the entrance from George-yard is arranged a boys clubroom, 25 ft. long by 15 ft. wide, also available, when required, as a waiting-room in connexion with the soup kitchen, which it adjoins. The buildings are late Gothic in style. The main façade to Alfred Gelder-street will be carried out in Ancaster stone. A tower over the main entrance will be in Portland stone, rising to a height of 106 ft. above street level. The external facing of the new buildings to the yards will be in white stock bricks. Inside, the entrance corridors and staircases will be in white glazed bricks, the schoolroom having a dado of golden brown glazed bricks with plastered

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walls above. The roof of the main building will be of wrought iron, with its curved ceiling in decorative plasterwork. The ceilings under the gallery and of the corridors will be groined in plaster. The floors generally will be fireproof, of concrete and iron, and those of the entrance vestibule, corridors, and lavatories will be finished in marble mosaic, and those of the Sunday schools, church parlour, etc., in pitch-pine wood blocks. The warming and ventilating of the buildings will be carried out by low-pressure hot water heating apparatus, with ventilating radiators, and assisted by two electric fans. The erection of the building has been entrusted to Mr. F. Beilby, and the following were the sub-contractors:—Masonry, Messrs. Quibell and Son; carpenter and joiner's work, Messrs. R. Finch and Co.; plumber and glazier's work, Mr. T. G. Padgett; and slater's work, Messrs. Wilde and Son—the whole being under the supervision of Messrs. Gelder and Kitchen, architects, Hull.

WORKMEN'S DWELLINGS, LIVERPOOL.—Workmen's dwellings are being erected at Liverpool to supplant 511 insanitary houses in the neighbourhood of Hornby-street. The new buildings when completed will afford accommodation for 2,246 persons, and will cost in all 150,000*l.* The total area to be dealt with is 26,025 square yards, in the neighbourhood of Hornby-street, Tatlock-street, and Raymond-street. The site is being acquired by the Corporation as an "unhealthy area" under the powers of the Housing of the Working Classes Act, 1890. The main street (Hornby-street) is at present 36 ft. wide, and runs from Vauxhall-road to Scotland-road. In addition to the insanitary property to be demolished there are 23 insanitary houses, making a total of 534. The population of the insanitary houses is 2,431, and by the terms of the Act the Corporation are required to provide accommodation on the area for the number of persons dispossessed. The new dwellings comprise 23 blocks, or 445 dwellings, which, it is estimated will accommodate 2,446 persons. There are 48 four-roomed dwellings, 270 three-roomed dwellings, 90 two-roomed dwellings, and 36 one-roomed dwellings, a keeper's house, seven shops, and a recreation ground containing about 1,755 square yards. In Hornby-street the new dwellings are set back from the present line of street, so that for a considerable portion of the length of this street the width between the main line of the new dwellings will be 70 ft. Each dwelling is provided with separate sanitary accommodation. The buildings as a whole are three stories in height, each living room containing at least 150 superficial ft., the principal bedroom 125 superficial ft., the second bedroom 100 superficial ft., and the third bedroom, where one is provided, between 80 and 90 superficial ft. The average height of the rooms is nine ft. clear. The materials used in the construction are local grey brick with red brick dressings, buff terra cotta being used in the entrances. All the staircases are lined with glazed bricks, the roofs slated, and the floors constructed with small iron joists, with coke breeze concrete, on which the flooring boards are nailed direct. The ashes are discharged into bins by means of shoots at the back, and are collected daily by carts. The first portion of the scheme has involved the demolition of 145 houses, and it is interesting to note that 71 per cent. of these tenants have availed themselves of accommodation provided by the Corporation in the immediate neighbourhood. The new dwellings on the site of this demolished area contain 138 houses; and it is proposed that when the first portion is completed another portion will be demolished, and the dispossessed tenants from such portion will occupy the new houses now in course of erection. In this manner it is thought that the whole scheme can be carried out in three portions. The contractors for the first portion are Messrs. Joshua Henshaw and Sons, the amount of the contract being 23,382*l.* The plans for the whole of the scheme have been approved by the Local Government Board, who are now considering the terms upon which the Corporation shall be allowed to borrow the money, and it is hoped that, having regard to the increased period allowed by the Housing of the Working Classes Act, 1903, the board will allow 80 years for the repayment of the loan for the purchase of the land, and 60 years for the repavment of the loan for the erection of the buildings. With regard to the rent, it is estimated that if the one-roomed dwellings are let at 2s. per week, the two-roomed at 3s. per week, the three-roomed at 4s., and the four-roomed at 5s., and taking the estimated value of the land for dwelling-house purposes, the scheme will return 3 per cent., net. The work has been carried out from the plans of the Deputy-Surveyor, Mr. Turton.

PORCH, ST. HELEN'S, NORTH KENSINGTON.—The wooden porch at the entrance of this church has been removed and a permanent one put in its place. The work has been carried out by Messrs. Barrett and Power, under the direction of the architect of the church, Mr. Percival Currey, London.

SANITARY AND ENGINEERING NEWS.

RAILWAY STATION, JOHANNESBURG.—As we recently announced, a design for the proposed new railway offices and station for Johannesburg has now been chosen. The Government Architect had been asked to report upon the eight designs submitted in competition, each of which bore a number and no name. Mr. Bevan came to the conclusion that two only were worthy, for reasons which he stated, of further consideration, namely, numbers 1 and 5. He considered number 1 the more suitable, this fulfilling all the requirements that he thought proper. "I fear, however," he added, "it cannot be carried out under 420,000*l.* Were the offices reduced in height, the design need not suffer thereby, and I see no reason for its rejection on the score of cost. It is suggestive in its treatment of the late Mr. Brydon's work. It is scholarly and refined, and I am glad to report that so able a design has been submitted. The building, if carried out as designed, would be worthy of its position, and purpose, and would be an ornament to the city." The building comprises all the offices for the management of the railways in addition to the waiting-rooms, retiring-rooms, restaurant, and all the necessary requirements of a modern railway terminus. The main block is bounded on the west by Rissik-street, on the south by De Villiers-street, and on the east by Joubert-street, and is 120 ft. high, 240 ft. long, and 220 ft. wide. In addition, there is the wing 260 ft. long, 50 ft. wide, and 60 ft. high. The total length is, therefore, 500 ft. The principal entrance is in the centre of the main block facing De Villiers-street, and on each side are grouped the stairs and lifts to the upper floors. Passing through the chief entrance the main central hall is reached. This is 120 ft. by 140 ft., and is covered at a height of 30 ft. by a flat roof with a dome 50 ft. in diameter over the centre. The various waiting-rooms, ticket-offices, restaurant, etc., are grouped round this hall, and are lit from it, and also on their other side from the streets on each side of the building. Going through the hall the platforms are reached, a bridge with steps down to each platform connecting the whole. The upper floor will be given over entirely to the general offices, with the exception of the two top floors; these will be planned as chambers. The building will be fireproof throughout. According to intention it will be heated by hot-water radiators in corridors and open fires in offices, with electric fans for extract ventilation. The total cost of the building as designed, including hydraulic, heating, and electric plant, was estimated by the architect at 385,000*l.* The successful architect, Mr. T. A. Moodie, A.R.I.B.A., is 29 years of age, and at the time of the competition was architect to the C.S.A.R. He gained his experience first in Glasgow, and afterwards in London, where he was in the service of the County Council. He was also a silver medallist in the Soane Medallion Competition of the Institute of Architects.

SEWERAGE WORKS, MORPETH.—The new sewerage works at Morpeth were opened on the 30th ult. The new scheme consists of the laying of main outfall sewers along each side of the river to intercept the existing sewers of the town which discharge direct into the River Wansbeck at various points, and which main sewers were laid so as to convey the whole of the sewage of the town to the Low Stanners. This work entailed the crossing of the river by means of three inverted siphons formed of cast-iron pipes embedded in concrete. The whole of the sewers were laid in straight lines with manholes at every angle and change of gradient. In addition to this a complete system of surface water drainage was constructed in the main streets so as to convey the whole of the street water into the river, by this exclusion saving a considerable cost for pumping and treatment. At the Low Stanners an underground storage tank has been constructed having a capacity of 75,000 gallons, adjacent to which is the pumping station, which consists of a brick building in which is placed the pumping machinery. The plant consists of Tangye's gas engines driving centrifugal pumps, all of which are in duplicate. The sewage is pumped at the rate of 50,000 gallons per hour through a 14 in. cast-iron pumping main, to the site of disposal works situated on the Parish Haugh, where it is discharged into a receiving tank. From this tank the sewage flows by means of a floating arm into two open liquefying or septic tanks. From these tanks the sewage is then conveyed to two circular continuous filters, 76 ft. diameter, on to which it is distributed by means of two of Adams' revolving arms at the rate of 200 gallons per square yard per day. These continuous filters are composed of concrete floors sloped to the outer edge, on the circumference of which are brick walls pigeon-holed, enclosing the filtering medium, which is of hard burnt clinker 6 ft. in depth. The sewage in these filters is purified by means of aerobic bacteria, which have a plentiful supply of air given them by means of air pipes carried from the circumference to the centre of the filters, and the effluent or purified sewage flows into wide channels constructed round each filter. The works are capable of dealing with three times the dry weather flow, and any excess over this quantity, and up to six times the dry weather flow, is treated in a storm-water filter adjacent to the works, which is some 3 ft. in depth, filled with large clinkers, and where the rate of purification is not to exceed 500 gallons per square yard per day. The works were designed by Messrs. D. Balfour and Son, of Newcastle-on-Tyne and London, and have been carried out by Mr. J. G. Kirtley, contractor, of Sunderland, with Messrs. Humble and Coulson as clerks of works. The sub-contractors for the pumping plant were Messrs. Tangyes, Ltd., of Newcastle and Birmingham, and for the revolv-distributors Adams' Hydraulics, Ltd., of York, and the whole of the castings were supplied by Messrs. Swinney Bros., of Morpeth, and the fire-clay pipes by the Lambton Collieries, Ltd., of Fence Houses.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—The Sprague Elevator Company, of New York, have arranged with the Metropolitan Engineering Association, of 4, Queen Victoria-street, E.C., to act as their agents for the British Empire and Europe.

REREDOS, ST. GEORGE'S CHURCH, EDGBASTON, BIRMINGHAM.—The new reredos, which has been erected at a cost of over 700*l.*, raised by the subscriptions of the congregation in St. George's Church, was dedicated on the 1st inst. The reredos, which is of oak, and covers the whole of the east wall of the chancel below the window, is divided into five parts, the centre being higher than the sides. The top is 20 ft. above the altar steps. There are a number of niches with canopies, and it is hoped that in due time all will be filled with figures. In the centre niche has been placed a carved figure of our Lord, in the act of blessing. The side niches and canopies will contain figures of the four evangelists. The lower portion of the reredos is filled with tracery in panels. The reredos is the work of Mr. Bridgeman, of Lichfield, and is from designs by Mr. J. A. Chatwin.

THE ABBEYS OF THE CISTERCIAN MONKS.—The illustrated lectures by Professor Capper in connexion with the new School of Architecture at the Manchester Victoria University are attracting considerable interest, and at the one given on the 3rd inst., Professor Capper dealt with the abbeys of the Cistercians. From the Benedictine order, he said, was evolved the Cistercians, who were differentiated from the Benedictines by a desire to withdraw from the world, and so they built their abbeys, as a rule, in the most secluded spots they could find. The Cistercian order spread with great rapidity, and the strictness and ascetism of their practices were reflected in the structure of their abbeys. The abbey of Kirkstall, near Leeds, was a famous and typical Cistercian erection of the middle of the twelfth century, of simple but majestic architecture, with the constructive side emphasised. Furness Abbey was another good illustration, though originally it belonged to another order. Roche Abbey furnished further evidence of simplicity. Away from the haunts of men, in valleys rather than on the heights, did these monks choose their building sites, and invariably was there a stream near. This was generally diverted to serve a drain which ran underneath the abbey. In a sense the Cistercian monks might be termed the pioneers of sanitation—at any rate, so far as the water carriage of sewage was concerned. As the lecturer pointed out, Cistercian architecture only survived in its ruins, but he placed on the screen views of the abbeys mentioned and of several others.—*Manchester Courier.*

A MEMORIAL TO CHARLOTTE YONGE.—A memorial, erected by public subscription, has been set up in the parish church of Otterbourne, Hants, in honour of the late Miss Charlotte Yonge. It consists of a rood beam and chancel entrance, designed by Mr. Kempe.

CLIFTON COLLEGE WAR MEMORIAL.—This memorial will take the form of a statue of St. George clad as a mailed knight, standing upon a pedestal. The figure will be executed by Mr. Drury, A.R.A., and the pedestal will be from the designs of Messrs. W. S. Paul and R. C. James, architects.

VICTORIA STATUE, NEWCASTLE-UNDER-LYME.—On the 5th inst., a statue of the late Queen was unveiled by the Grand Duke Michael of Russia at Newcastle-under-Lyme. The statue was cast by Mr. Burton.

UNDERGROUND ROOMS IN ST. PANCRAS.—The Public Health Committee of the London County Council reported as follows at the meeting on Tuesday:—On October 13 last we re-

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ported that we had been in correspondence with the St. Pancras Borough Council on the subject of the large number of underground rooms illegally occupied in that borough, and we stated that we proposed to report again on the question in a month's time. The result of the inquiry which had been made by the Council's Medical Officer was that over 400 tenements in the borough, affording accommodation for more than 1,000 persons, were found to be occupied separately, although they contravened the provisions of the law relating to underground rooms beginning to be occupied after 1855. Ten of these tenements, accommodating 29 persons, did not even conform to the standard prescribed for underground rooms let antecedent to 1855. When this report was communicated to the borough council, that body caused an inspection to be made of the underground rooms in the borough, and the borough Medical Officer reported that there were 640 rooms in which the conditions were practically irremediable, and suggested that the rooms should be dealt with consecutively and at intervals, "so as to avoid the serious effects of suddenly displacing a large population." The borough council intimated on September 23 last that notices had been served on the owners of 49 of these illegally-occupied underground rooms, requiring them within three months from the date of the service of the notice to discontinue to suffer these rooms to be let or occupied as dwellings contrary to the statute, and that the remaining cases were being dealt with. When the period of three months has expired we propose to make further enquiries as to the result of the action taken by the borough council, and to report again on the subject.

THE CARPENTERS' COMPANY.—The Company will hold their annual examination in Sanitary Building Construction in their Hall, on November 26 and 28. Candidates intending to enter for examination should send in their names without delay.

ARCHITECTURAL CRAFTSMEN'S SOCIETY, GLASGOW.—At the third general meeting of the Architectural Craftsmen's Society, held in the Technical College, 204, George-street, a lecture was delivered on the Church of Santa Sophia, Constantinople, by Mr. Chas. Gourlay, Professor of Architecture at the College. Beginning with a general review of the history of the church, Professor Gourlay proceeded to deal with its architectural design, which he described as the perfection of Byzantine style, combining as it does the beauty of the Basilicas of the Greek church plan with the large dome over the central area, but excelling all these in the dignity of its design and the grandeur of its interior. He then dealt with the materials used, both in the construction and decoration of the church. Many points in the detail of its architectural features were sketched on the blackboard, and interesting features referred to. Finally, the surrounding buildings and present state of the church were dealt with. The lecture was illustrated by large-scale plans and by photographs and prints.

MEMORIAL WINDOW, WESTON-SUPER-MARE.—A memorial window has been unveiled in the parish church, Weston-super-Mare. It is the work of Mr. A. Hemmings, of London.

SAFETY SCAFFOLDS.—Various forms of working stages have been used in this country for some years, in partial substitution for the old-fashioned scaffolding once universal. An American inventor has now moved a step further in the direction of safety and economy, by devising a safety swinging scaffold for use in the facing of high buildings with stone, brick, or other material. The apparatus consists essentially of a platform in sections, suspended by wire cables from cantilever brackets, supported by the walls of the building. The platform is raised or lowered by suitable tackle, and may be held at any convenient height. Each section of the platform has a solid bottom, to prevent danger from falling material, and the sections are generally hung so as to form a continuous staging along one side, or completely around the building, so that work may be completely finished at one level before raising the scaffold. This type of scaffold would seldom be of use for the erection of buildings in our own country, but it might often be applied with advantage for the purposes of repair and decoration.

THE LOEBEN GAS LIGHT CONTROLLER.—The American Gas-light Improver Co. send us a description of their Loeben gas light controller, the object of which is to control the gas pressure at the burner, to mix equal quantities of air with the gas, thus ensuring perfect combustion, and to keep the light steady, irrespective of any changes in the pressure on the mains. They send a testimonial from Mr. M. G. Wilder, an American gas engineer, who states that it performs what it professes, and that there is no detail requiring expert management or attendance. The drawings sent do not explain the *modus operandi*, and there is apparently no installation of the light in London, so that we can only draw attention to it on the statement of the makers and of the gas engineer whose opinion accompanies it. The headquarters of the Gas Light Improver Co. are at Pennsylvania, U.S.A.

SOME DISCOVERIES AT QUEEN'S COLLEGE, OXFORD.—In the course of the works now in progress for new drainage and installation of electrical light have been found, in the crypt beneath the apse of the college chapel, the coffins of some of the earlier Provosts, and a leaden casket inscribed "Reliquiæ Fundatoris." The casket contains the remains of Robert de Egglesfield, rector of Brough, co. Westmorland, and chaplain and confessor to King Edward III.'s consort Philippa, in whose honour and memory he founded Queen's College in 1340. Robert died nine years afterwards, and was buried in the old chapel. The present chapel, having an eastern apse, was built in 1713-9, and forms together with the hall part of the façade of the south quadrangle or principal court, erected after designs by Nicholas Hawksmoor. The general design, bearing some resemblance to that of the Luxembourg at Paris by Salomon de Brosse, is, however, sometimes ascribed to Wren and sometimes to Dr. Lancaster, who was Provost at that time. In 1863 W. C. Bramwell restored the south sides of the hall and chapel in Bath stone. Some other relics of the former chapel have also been found, amongst them, being a brass which bears the rebus of Robert Langton, who built the ante-chapel, in 1518; another brass, much worn, that is identified as the memorial of Nicholas Hyenson, a Fellow in 1477; a stone inscribed "Radulphus Hamisterley, Master of University College"; and the tomb-stones of Provosts Airay (1599-1616), Potter, and Langbaine. Two passages disclosed some feet below the surface in the two quadrangles, respectively, are, it is conjectured, the remains of conduits for carrying off surface-water from the buildings of the college.

WAR MEMORIAL AT LOW FELL.—The memorial erected at Low Fell to perpetuate the memory of five men who died in South Africa during the late war was unveiled recently by Col. J. B. Cookson, C.B., commanding the Northumberland Hussars Imperial Yeomanry. The stone was supplied by Messrs. Boiston, Heworth Burn Quarries, the work being carried out by Messrs. Morrison and McBean, monumental sculptors, Gateshead.

SCREEN, ST. ANDREWS, NEWCASTLE.—A new chancel screen has been erected in St. Andrew's Parish Church, Newcastle. The screen is 11 ft. 2 in. wide by 12 ft. 6 in. high, and is made of Austrian oak. It has been designed by Mr. W. Ellison Fenwicke, of the firm of Messrs. Dunn, Hanson, and Fenwicke, architects, and the work has been carried out by Mr. R. Hedley, both of Newcastle.

OPEN SPACE, ST. GILES, CRIPPLEGATE.—The Ward of Cripplegate has subscribed 1,000*l.*, and the Governors of the Cripplegate Foundation have contributed 500*l.*, towards the fund of 3,500*l.* which is being raised with the object of securing as an open space the recently cleared ground on the north side of the parish church. The design of the statue of Milton, a gift of Mr. Deputy Baddeley, is not yet decided upon; the figure, however, will be of bronze, supported upon a pedestal of Portland stone. The Foundation Governors have agreed to defray the charges of maintaining the open space, provided that it is vested in the official trustee of charity lands, and so held in trust for the Cripplegate Foundation. We learn that the execution of the statue will be entrusted to Mr. Horace Montford, who will model the head after the clay bust of Milton, at Christ's College, Cambridge, which was made in the poet's lifetime. The subject of two bas-reliefs, in bronze, on the pedestal are to be taken from "Comus" and "Paradise Lost," the latter representing the expulsion from the garden of Eden.

ROMFORD URBAN DISTRICT COUNCIL.—The Clerk to the Council writes:—"Referring to the advertisement which appeared in your issue of the 17th ult. for a surveyor for a temporary period, I now beg to inform you that Mr. H. A. Collingwood has been appointed by my Council."

KITCHENS OF RESTAURANTS.—The last Report of the Medical Officer of Health to the City of London states that the inspection of these premises is being continued. During the past five weeks 64 have been inspected for the first time, and re-inspections made in connexion with the work required to place those previously inspected in a sanitary condition. In a number of the 64 kitchens inspected, sanitary defects were discovered, including defective drains and soil-pipes, no separate water-closet accommodation for the different sexes employed, water-closets opening and ventilating directly into the kitchen, water-closets without light or ventilation and in some cases in a very dirty condition, kitchens badly lighted and ventilated, kitchen floors defective, cisterns dirty, sinks dirty and defective, ovens and cooking utensils dirty. Dr. Collingridge adds:—"As this inspection progresses, I am led more and more to estimate the great advantages accruing therefrom to the health of customers using these places, and still more to the workers who are compelled to spend their time underground in badly lighted, ventilated, and insanitary kitchens."

CAPITAL AND LABOUR.

PENRHYN STRIKE.—The Penrhyn strike is now virtually over, and the men are seeking re-admission to the quarry. This means a complete victory for Lord Penrhyn, and the dispute would long ago have been settled but for the interference of outsiders. The loss to the men in wages is put at 100,000*l.*, but it is really over 300,000*l.*, as the quarry was entirely closed for some months, and less than half the full number of men employed the remainder of the time. The principal gainers by the strike were the foreign quarries, their slates having been imported at the rate of 100,000 tons per annum, but these will be gradually displaced by Bangor slates, owing to the superior quality of the latter.

LEGAL.

DOVER LIGHT AND AIR CASE.

THE hearing of the case of Thompson and Son, Ltd., *v.* Lloyd's Bank, Ltd., concluded before Mr. Justice Joyce in the Chancery Division on the 4th inst.—an action by the plaintiffs, the owners of the Garrick's Head, Market-square, Dover, against the defendants, the owners of Nos. 6 and 7, Market-square, for an injunction to restrain the defendants, their servants and agents, from erecting, or permitting to remain erected, any buildings on the site of their premises in such a manner as to interrupt the free access of light to plaintiff's windows as the same had hitherto been enjoyed, and for damages.

The plaintiffs' case was that the defendants' proposed building would materially interfere with the light coming to certain of their windows. The premises of plaintiffs and defendants adjoin, and part of the plaintiffs' consists of an open passage and a tap-room alongside it, which are on the ground floor, and of rooms over them. The rooms were used for the purpose of the plaintiffs' business. The windows of these rooms abut on to an open yard, which is part of the defendants' premises. The highest part of the old buildings of defendants did not exceed 34 ft. from the ground level. Plaintiffs and their predecessors in title had enjoyed without interruption, for more than twenty years prior to the commencement of the action, the free access of lateral light to the windows of these rooms over the defendants' buildings, and the plaintiffs further alleged that the windows were ancient lights. The plaintiffs further pleaded that defendants intended to pull down these buildings and erect new buildings on the site, carrying them to a height of 60 ft., and said that if this were done, the lights to the windows named would be materially obstructed, and it would be necessary to use artificial light.

Defendants in their defence said that no part of their proposed new buildings which could in any way affect the access of light to the plaintiffs' windows was to be as high, or nearly as high, as 60 ft. The proposed main back wall was to be of a height of 31 ft. 6 in. only above ground level, and was to be 3 ft. further south and away from the plaintiffs' windows than the existing back wall. Defendants also said that the ridge of the roof would rise to a height of 49 ft., but would be so sloped and set back from the main wall at the eaves, so as not to interfere with the access of light to plaintiffs' windows. The only part of the proposed buildings which was to approach a height of 60 ft. was a small turret, at the south-eastern corner, which could not have any effect on the access of light to the windows. Defendants further said that if there was any obstruction (which they did not admit), it would be lateral obstruction of an insignificant and immaterial character, and not such as to cause any appreciable damage to the plaintiffs.

Mr. Hughes, K.C., and Mr. McSwinney appeared for the plaintiffs, and Mr. Younger, K.C., and Mr. Sargent for the defendants.

In the result, his Lordship having heard the evidence and the addresses of counsel, in giving judgment, said it appeared that defendants were going to erect a larger building, and it was alleged that it would obstruct the lateral light coming to the plaintiffs' windows. The question was whether the defendants should be allowed to erect their buildings in accordance with the modified plans. The obstruction, if any, would be entirely lateral. Evidence had been given on both sides as to the probable result of the erection of these buildings, and he had been shown various plans and models. The defendants' witnesses admitted that the effect of the defendants' buildings would be to interfere

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with the plaintiffs' lights to some extent, but said it would not cause any appreciable damage to the plaintiffs, and that was the question his lordship had to decide. In this case it appeared to him that all the plaintiffs' windows got their light from a kind of well. He was satisfied that this sort of well would be very much darker after the defendants' buildings were erected than it was now, and there would be obstruction to the direct sunlight to the plaintiffs' windows during a part of the day. On the facts of the case, he was of opinion that the erection of the defendants' buildings would be to darken during part of the day, and injure and obstruct some of the ancient lights of the plaintiffs' premises as the same were now enjoyed, and he was of opinion that the interference would not be trivial, but would be such as would justify the Court in granting an injunction in the Yates and Jack form, the defendants to pay the costs of the action.

Order accordingly.

ACTION AGAINST AN ENGINEER AND ARCHITECT.

THE case of Hodgson *v.* Waugh came before the Court of Appeal, composed of the Master of the Rolls and Lords Justices Mathew and Cozens-Hardy, on the 9th inst., on the appeal of the plaintiff against an order of Mr. Justice Ridley in chambers, reversing an order of Master Chitty, and directing that the case should be tried at the Leeds Assizes before a jury.

Mr. Lush, K.C., for the appellant, said the action was brought against Mr. John Waugh, a West Riding civil engineer and architect. Two or three years ago, when about to go to Japan, plaintiff instructed the defendant to alter a house he had bought in Hertfordshire. Plaintiff alleged that the defendant had not followed out his instructions with regard to the alterations which he made in the house, and that as a consequence the plaintiff had been put to expense amounting to about 9,000*l*. This sum he now claimed from the defendant by way of damages. The defendant counterclaimed for architect's fees amounting to 1,200*l*., and commission. The learned counsel said that the Master had referred the case to Mr. Edward Pollock, the Official Referee, and he submitted that that order ought to be reinstated. He pointed out that there were 18 witnesses for the plaintiff, only one of whom lived in Yorkshire, and he contended that it would be a great injustice to drag the plaintiff up to Yorkshire to have the case tried there, when it did not concern the district. Defendant pleaded that the alterations he had made were reasonable and necessary in order to make a good job of the buildings. The plaintiff was going to call expert witnesses to show that they were not reasonable alterations in accordance with his instructions.

Mr. Tindal Atkinson, K.C., for the defendant, pointed out that in addition to the alleged departure from the instructions by the defendant, there was a distinct charge against him of gross negligence and an attack upon his honour. As the defendant was well known in the West Riding district, it was most important that he should have his character cleared in that locality. If that issue could be tried in Yorkshire, then any points with regard to departure from the instructions as to the alterations could be referred.

Mr. Compston, who appeared with Mr. Lush for the plaintiff, said that all imputations of fraud against the defendant had been withdrawn.

Mr. Atkinson said that the withdrawal was of no value so long as the statement of claim was so framed as to imply that there had been distinct misrepresentation and negligence.

After further arguments, it was arranged that counsel should discuss together as to whether it was not possible to isolate the question of figures from that of negligence, the question of negligence being one for a jury alone.

On the following day, the 10th inst., Mr. Lush stated that it had been agreed that the action should be set down in Middlesex to be tried before a special jury, application to be made to the senior Judge of the Division for him to decide how the figures arising in the case should be dealt with.

The Master of the Rolls assented to this, and directed that the costs of the appeal should be made costs in the case.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

27,305 of 1902.—C. GAUTSCH: *Process of Rendering Wood Uninflammable.*

A process of rendering wood uninflammable by means of ammonium sulphate and boracic acid, whereof the main feature is that the wood is treated at a temperature below 100 degrees Centigrade, but preferably not exceeding 60 degrees, with a solution composed of ammonium sulphate, ammonium borate, and caustic ammonia.

27,365 of 1902.—J. T. WOODCOCK: *Heating Apparatus for Greenhouses, Rooms, and the like.*

A heating apparatus, consisting of a central column surrounded by a boiler adapted to be filled with blocks and balls of a non-combustible nature, inlet holes for fuel and air at the base of said column, a baffle at the top of said column, and a funnel-shaped cover above said baffle.

9,334 of 1903.—V. W. LLOYD: *Fire Escape Apparatus.*

A fire escape apparatus consisting of a collapsible basket suspended by wire ropes from two pulley blocks carried by brackets fixed to the upper coping on the front of a building, one at each end of the latter, and brackets fixed to the lower part of the building and formed with cleats, around which the said ropes are coiled to permit of the suspension and lowering of the basket from any of the windows.

27,518 of 1902.—J. ANDERSON and THE SOUTHBROOK FIRE CLAY CO., LTD.: *Manufacture of Glazed or Enamelled Bricks.*

The manufacture of glazed or enamelled bricks with recesses or depressions along the upper and lower beds at the side or end removed from that which receives the marginal glazing.

27,548 of 1902.—W. BRENTON: *Sliding Bolts.*

A sliding bolt, the pin of which slides through two bridge pieces each having a single abutment, which is provided with a central handle having claws or hooks adapted to engage with one or other of the said abutments, the said handle serving to limit the movement of the pin in either direction and being secured by a lock passed through the eye in one or other of the abutments.

27,572 of 1902.—A. ROBERTSON: *Fanlight.*

Means for tightly closing a pivoted fanlight, comprising differential or other screws arranged to actuate a shaft having on it teeth or projections engaging corresponding teeth or notches on the window slides, and adapted to move these endwise to apply wedge action for effecting a water-tight closure after the window is closed.

19,784 of 1903.—R. KROLL: *Preservation of Timber.*

This consists of a post or beam provided with a longitudinal bore, lateral openings in communication at one end with said bore and extending through the sides of the timber, and a passage about parallel with the longitudinal bore and in communication at one end with one of the aforesaid openings and having its opposite end in communication with the other end of said bore.

13,715 of 1903.—W. EDWARDS: *Ventilators.*

A ventilator consisting of a rectangular box fitted to the outer wall of a building and provided with a vertically hanging mica or light metal valve and a horizontal plate for directing the air inside the building through a perforated plate to the outside of the building, sudden draughts or inrush of air being prevented by the closing of the valve against an inclined seating surrounding an opening at the inner end of the box, and the outer air being directed on to said valve by inclined sides or plates fixed inside the box.

26,085 of 1902.—T. ADCOCK: *Apparatus for Drying and Burning Bricks and the like.*

An apparatus for drying and burning bricks, consisting in the combination with a kiln and a drying shed of a conduit to conduct the waste hot gases of combustion from the main flue or flues of the kiln to suitably disposed flues in the drying shed.

24,492 of 1902.—G. C. DOUGLAS (W. F. Ford): *Drilling and Reamering Machines.*

In drilling and reamering machines, the mode of rotating the spindle by means of spur wheels and pinions and worm and worm wheels, so that, at will, the rate of rotation may be changed.

25,721 of 1902.—S. G. SEABURY: *Tube Compressors or Pinch-cocks.*

A tube compressor comprising a tube encircling member, having a cylindrical bore and a tube compression member formed of a section of a sphere, means for adjusting said compression member, and a rocking connexion between the latter and its adjusting device.

25,423 of 1902.—S. F. RESTALL: *Brushes and like Implements for Cleaning, Painting, and otherwise Treating Surfaces.*

A brush or the like for cleaning, painting, and otherwise treating surfaces, in which the brush is spring connected with the handle in such a manner that the brush is deflected when it comes into contact with any irregularities of surface.

27,128 of 1902.—W. GROOM: *Suspended Staging applicable for Use in Quarrying Chalk, Painting, and other purposes.*

Apparatus for use in quarrying chalk and for other purposes, comprising a pair of tightly-strained guide chains fastened at both ends, a bucket or cradle with guide wheels running on the said chains, and elevating ropes and pulleys.

27,271 of 1902.—J. RUSSEL and the firm of ROSSER AND RUSSEL, LTD.: *Automatic Regulator for Warming Apparatus.*

A thermostatic device for automatically regulating the steam supply to the hot-water cylinder of a warming apparatus, consisting essentially in the combination with the hot-water cylinder of a column of mercury enclosed in a tube, a piston resting upon said column of mercury, and a balanced piston valve for controlling the steam supply to the hot-water cylinder and connected to the piston.

18,413 of 1903.—J. MORRIS: *Portable Roofs for Sheds, Pavilions, Freight Cars, Stacks of Grain, and the like.*

This invention relates to portable roofs, especially of a class adapted for protecting stacks of grain and for outbuildings, awnings, and the like. It consists in providing panels of corrugated galvanised iron, some of which are smaller than the others, the smaller panels having flanges on their edges adapted to interlock with similar flanges on the larger. Means are provided for bolting the panels together and for protecting the bolts from the weather. To prevent leakage at the junction of the panels at the top of the gable, the larger panels are provided with extensions adapted to be turned down upon the surface of the oppositely inclined panel. When the panels are formed into a circular roof, the top is protected by a cone-shaped hood.

23,318 of 1902.—T. HONEYBOURNE: *Ratchet Device or Stay for Looking-glasses, Sashes, and the like.*

This invention relates to a device to be fixed to a looking-glass, window-sash, or the like, to enable the same to be fixed at any angle. It consists in fixing a ratchet to the side of the glass or sash which engages with a pin in the frame.

19,772 of 1903.—H. OLSEN: *Gates.*

This invention has for its objects to produce a gate of simple construction, the forward end of which will be prevented from sagging, and which may be adjusted to vary its height from the ground. It consists of a suitable length of pipe bent to, substantially, "S" or "Z" form, or so disposed that a portion of the pipe corresponding to one end of the latter will form the pivoting bar and the other end will form the latch bar, these bars being connected by an integral diagonal brace. The pivoting bar extends loosely through the tubular heads of tee pieces disposed in vertical alignment on the gate-post, and rests on its lower end on a bearing which is embedded in the ground, and which sustains the wear incident on opening and shutting. Boards or wires may be fixed horizontally across the gate.

26,078 of 1902.—H. K. G. BAMBER: *Manufacture of Portland Cement and an Apparatus therefor.*

The object of the invention is to effect the more speedy evaporation of the water in the slurry and to heat the same and also to cleanse the gases escaping from the rotary kiln, thereby economising fuel. In the rotary kiln several wings are so fixed longitudinally in the interior of the upper or drying end of the kiln by which the slurry is carried upwards, whence it falls from the wings to the bottom of the kiln, the slurry falling from the wings directly the wing rises sufficiently high as the kiln revolves. According to this invention, the pairs of diametrically opposite wings are connected with a series of plates having spaces between them, the plates connecting one pair of wings alternating with those of the adjacent pairs. These plates may be at right angles to the axis of the kiln, but preferably there are arranged diagonal adjacent sets sloping in opposite directions. In order further to ensure the material being lifted to the upper part of the kiln, scoops are fixed on the wings at the ends of the cross-plates. These scoops consist of boxes open at the top, and preferably having their inner ends perforated. Baffle plates may also be fixed to the cross-plates to temporarily catch and retain the material descending along them.

24,201 of 1902.—F. A. WIMBLE: *Window-cleaning Devices.*

This invention has reference to window-cleaning devices, and has for its chief object to enable the glass of a window of any ordinary construction to be conveniently cleaned on its outer side. According to the invention, a transverse cleaner is provided, which may consist of a horizontal roller or the like, having a cleansing surface, and adapted to be moved up and down in contact with the glass. The said roller or similar device is connected by means of cords or other

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

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flexible attachments to the upper and lower portions of the window-frame in such manner that by pulling upon said cords or the like in either direction, the roller or similar device is caused to travel vertically over the surface of the glass. Means are also provided whereby the position of the cleaning device relatively to the window-frame may be adjusted horizontally, in order that every part of the glass may be cleaned.

19,831 of 1903.—J. GREEN, T. GREEN, and J. S. GREEN: *Roofing Tiles.*

This invention relates to roofing tiles, and consists in forming a pan tile with two corrugations or rolls. This enables the tile to rest more firmly on the lath, and also enables a nail hole to be made in the tile out of the water channel, to avoid leakage.

27,538 of 1902.—B. J. B. MILLS (E. Brousse): *Slabs or Blocks for Paving, Flagging, Tiling, and the like.*

Slabs or blocks for paving, flagging, and the like, consisting in the combination of a mass of plastic material with metallic frames, supports, or strengtheners embedded therein, such frames, supports, or strengtheners having solid or hollow bars of any desired form rising through the plastic material flush with the surface of the slab or block, and connected together at their base.

19,630 of 1903.—A. ETTER: *Valves or Gates for Use in Connexion with Sluices and the like.*

An automatic sluice valve in which a floating flap, whose axis of rotation is located in the plane of the highest (desired) water level, is arranged in front of a weighted flap moving about a horizontally-mounted axis, which flap in the perpendicular position protects the weighted valve in its closed position at low water, but is lifted up when the water level reaches it, and thereby exposes the surface of the weighted valve so that it is turned over by the water.

27,501 of 1902.—S. RYAN: *Feed Mechanism for Use in the Manufacture of Asphalt or the like.*

This invention relates to a feed mechanism for use in the manufacture of asphalt, and is specially applicable for use in conjunction with the invention set forth in Patent No. 5,835 of 1902. Its object is to provide means for automatically regulating the amount of tar entering into the composition in proportion to the weight of the stone. The supply is governed by a pair of sluice valves or dampers applied to the feed pipe one above the other, and one being shut when the other is open, after the manner of the well-known shot flask. The stone to be mixed with the tar is dropped intermittently into the mixing chamber by means of a tumbler or double hopper, which is pivotally supported above said chamber in such manner that when one side has received sufficient stone it turns over and discharges it, and at the same time the other side is placed in readiness to receive a charge, and so on. The hopper is connected to the tar escapement mechanism by levers or other suitable means, and it will thus be seen that when one side of the hopper is down the tar is filling the measuring space in the feed pipe, and when the other side is down the charge of tar is allowed to escape and mix with the stone.

MEETINGS.

FRIDAY, NOVEMBER 13.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

MONDAY, NOVEMBER 16.

Royal Institute of British Architects.—Monsieur J. T. Homolle, Director of the French School at Athens, on "Le Trésor de Cnide et les Monuments de l'Art Ionien à Delphes." 8 p.m. (The paper will be illustrated by a collection of drawings, known as the "Dessins Tournaire," lent for the occasion by the French Government.)

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

Liverpool Architectural Society.—Mr. H. Chatfeild Clarke on "The Bill for Altering the Law of Ancient Lights." 6 p.m.

TUESDAY, NOVEMBER 17.

Institute of Sanitary Engineers (Lectures in Practical Sanitary Science).—Mr. W. J. Dibdin, F.I.C., on "Sewage Disposal." 7 p.m.

Institution of Civil Engineers.—Paper to be further discussed: "Tensile Tests of Mild Steel, and the Relation of Elongation to the Size of the Test-Bar." By Professor W. C. Unwin, B.Sc., F.R.S. 8 p.m.

WEDNESDAY, NOVEMBER 18.

Quantity Surveyors' Association.—General meeting, Holborn Restaurant. 4 p.m.

Architectural Association (Discussion Section).—Mr. M. G. Pechell on "Practical Travelling on the Continent." 7.30 p.m.

Society of Arts.—Opening meeting of the 150th Session. Address by Sir W. Abney, K.C.B., Chairman of Council. 8 p.m.

Sanitary Institute (Demonstrations for Sanitary Officers).—Inspection at Harrison & Barber's knacker yard, Winthrop-street, Whitechapel, E. 3 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting of the members. 8 p.m.

St. Paul's Ecclesiological Society.—Dr. J. Wickham Legg, F.S.A., on "The Bledlow Inventory of 1783: Its Genuineness and Curiosities." 8 p.m.

THURSDAY, NOVEMBER 19.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

Leeds and Yorkshire Architectural Society.—Address by President, Mr. Butler Wilson, and distribution of prizes. 7.30 p.m.

FRIDAY, NOVEMBER 20.

Architectural Association.—Mr. H. M. Cautley on "Farm Buildings." 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

Glasgow Architectural Craftsmen's Society.—Mr. J. C. Walker on "Planning and Construction of Burgh Buildings." 8 p.m.

Institution of Mechanical Engineers.—The following Papers will be read and discussed so far as time permits:—(1) "Roofing Existing Shops while Work is Proceeding," by Mr. R. H. Fowler; (2) "Experiments on the Efficiency of Centrifugal Pumps," by Mr. Thomas E. Stanton, D.Sc. 8 p.m.

SATURDAY, NOVEMBER 21.

Junior Institution of Engineers.—Visit to Orchard Dock, Blackwall, to witness a demonstration of fire-extinguishing, &c., by invitation of the Clayton Company. 2.30 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

October 30.—By HAMPTON & SONS (at Exeter).
Beaford, Devon.—The Beaford Estate, 405 a. 3 r. 9 p., f. £4,700
Beaford Wood and allotments, 49 a. 1 r. 14 p., f. 550
By SURRIDGE & SON (at Chelmsford).
Totham, Essex.—Little Totham Hall Farm, 205 a. 3 r. 27 p., f., y.r. 175*l.* 2,250
October 31.—By FLEURET SONS & ADAMS (at Canterbury).
Grove Ferry, Kent.—The Grove Ferry Hotel, 20 a., f. with goodwill 4,300
By THORNBARROW & CO. (at Keswick).
Barrowdale, Westmorland.—Greenbank Estate, 77 a. 2 r. 28 p., f. 3,070
November 2.—By MAY & ROWDEN.
Oxford-st.—Nos. 399, 401, 403 and 405: also 1 and 2, Thomas-st. (S.), u.t. 56½ yrs., g.r. 250*l.*, y.r. 1,250*l.* 20,500
By FIELD & SONS.
Bromley, Kent.—Freeland's-rd., the Freeland's Tavern, f., y.r. 65*l.* 1,850
Park-rd., the Crown and Anchor, p.-h., f.g.r. 50*l.*, reversion in 61½ yrs. 1,320
21, Park-rd. (S.), with blacksmith shop adjoining, f., y.r. 65*l.* 1,155
Clapton.—25 to 33 (odd), Cricketfield-rd., f., y.r. 192*l.* 3,095
Bayswater.—1, Alexander Mews, u.t. 46½ yrs., g.r. 4*l.*, y.r. 22*l.* 230
By FISHER, STANHOPE & DRAKE.
Stoke Newington.—56, Osbaldeston-rd., u.t. 75 yrs., g.r. 8*l.* 10*s.*, e.r. 50*l.* 530
By LONG & SONS.
Hammersmith.—63 and 65, King-st. (S.), u.t. 48 yrs., g.r. 32*l.*, y.r. 220*l.* 5,850
20 and 22, Black's-rd., with slaughter-house, sheep-pen, &c., u.t. 8 yrs., g.r. 8*l.* 15*s.* 250
November 3.—By DAVID BURNETT & CO.
Chiswick.—Bedford-rd., a plot of freehold building land, y.r. 85*l.* 1,000
4, Woodstock-rd., u.t. 72 yrs., g.r. 10*l.*, y.r. 45*l.* 450
By C. W. DAVIES & SON.
Islington.—Cloudesley-rd., f.g.r. 4*l.*, reversion in 19 yrs. 225
Tottenham.—1 to 6, Chalgrove-rd., u.t. 75 yrs., g.r. 30*l.*, w.r. 141*l.* 14*s.* 700
Manor Park.—112 and 114, Herbert-rd., f., w.r. 54*l.* 12*s.* 535
Clapton.—180, Glyn-rd., u.t. 73½ yrs., g.r. 8*l.*, e.r. 60*l.* 450
By LINNETT & LANE.
Harlesden.—101, Drayton-rd., u.t. 97 yrs., g.r. 5*l.* 10*s.*, y.r. 28*l.* 245
By MORETON RICHES.
Chelsea.—51 and 53, Redburn-st., u.t. 49 yrs., g.r. 16*l.*, y.r. 110*l.* 1,200
Wandsworth.—70, Wakehurst-rd., u.t. 81 yrs., g.r. 6*l.* 10*s.*, w.r. 45*l.* 10*s.* 315
Battersea.—64, Henley-st., u.t. 63½ yrs., g.r. 6*l.*, w.r. 33*l.* 16*s.* 175
By WM. WESTON.
Shepherd's Bush.—37, Stowe-rd., u.t. 73 yrs., g.r. 7*l.*, w.r. 40*l.* 6*s.* 310
28, Stowe-rd., u.t. 63 yrs., g.r. 10*l.*, w.r. 30*l.* 270
Acton.—133, Park-rd. North, u.t. 75½ yrs., g.r. 6*l.*, w.r. 35*l.* 2*s.* 200
Dulwich.—2, Allison-gdns., u.t. 70½ yrs., g.r. 10*l.* 10*s.*, e.r. 60*l.* 480
By WILLIS, CROUCH & LEE.
Houndsditch.—18, 19, 20, 21 and 22, Carter-st. (S.), u.t. 36 yrs., g.r. 57*l.* 12*s.*, y.r. 287*l.* 18*s.* 1,680
13 and 14, Exchange-pl. (S.), u.t. 33½ yrs., g.r. 12*l.* 8*s.*, y.r. 60*l.* 600
By WOODS'.
Hackney.—21 and 22, Margaret-st. (S.), u.t. 37 yrs., g.r. 9*l.*, w.r. 53*l.* 6*s.* 325
By ORGILL, MARKS & LAWRENCE (at Masons' Hall Tavern).
Lambeth.—Roupell-st., the King's Arms, p.-h., u.t. 28½ yrs., y.r. 20*l.*, with goodwill 10,500
Camden Town.—Stanhope-st., the Hope p.-h., a profit rental of 51*l.* 18*s.* for 35 years 800
November 4.—DUNCAN & KIMPTON.
Bayswater.—Leinster-sq., l.g.r. 40*l.*, u.t. 49 yrs., g.r. 2*l.* 725
Brompton.—Ifield-rd., l.g.r. 25*l.*, u.t. 59 yrs., g.r. 6*l.* 420
Hampstead.—Adelaide-rd., l.g.r. 20*l.*, u.t. 45 yrs., g.r. 3*l.* 325
Adelaide-rd., l.g.r. 29*l.* 8*s.*, u.t. 49 yrs., g.r. 7*l.* 415
Holloway.—9, 17, and 19, Beversbrook-rd., u.t. 66½ yrs., g.r. 18*l.*, y.r. 92*l.* 1,080
By FOSTER & CRANFIELD.
Brondesbury.—Shoot-up-Hill, Ravens, u.t. 76 yrs., g.r. 3*l.* 3*s.*, y.r. 115*l.* (including mortgage) 1,160
By W. G. HARRIS & CO.
Hendon.—1, The Burroughs (S.), f., y.r. 40*l.* 855
Prince of Wales-rd., f.g.r. 19*l.*, reversion in 61 yrs. 495
1 to 5, Oakleigh-villas, f., w.r. 152*l.* 16*s.* £1,895
6, Oakleigh-villas (with laundry, stables, &c.), f., y.r. 75*l.* 990
By HY. HOLMES & CO.
Regent's Park.—31, Chester-ter. (with stabling), u.t. 12 yrs., g.r. 52*l.* 10*s.*, y.r. 55*l.* 1,060
Oxford-st.—Wells-st., Welbeck House (flats), u.t. 39½ yrs., g.r. 24*l.*, y.r. 264*l.* 6*s.* 1,450
Ealing.—284, Uxbridge-rd., u.t. 89 yrs., g.r. 8*l.*, y.r. 80*l.* 1,650
288, Uxbridge-rd., u.t. 72 yrs., g.r. 8*l.*, y.r. 36*l.* 640
Holloway.—42, Crayford-rd., u.t. 63 yrs., g.r. 7*l.*, e.r. 48*l.* 450
Tottenham.—3, Daleview-rd., u.t. 56 yrs., g.r. 6*l.*, e.r. 34*l.* 280
Twickenham.—2, Twickenham-pl. (S.), c., y.r. 40*l.* 620
By N. EASTON & SON (at Hull).
Sutton, Yorks.—Noddle Hill Farm, 157 a., f. 6,000
Enclosure of grass land, 3 a. 2 r. 0 p., f. 400
November 5.—By B. R. BOSTOCK.
Forest Gate.—75 and 77, Clova-rd., f., y.r. 64*l.* ... 990
By COLES & CO.
Pirbright, Surrey.—Main-rd., a plot of land, 1 a. 0 r. 7 p., f. 120
Woking, Surrey.—Pirbright-rd., a plot of land, 2 a. 2 r. 26 p., f. 290
By J. G. DEAN & CO.
Wimbledon.—204, 206, 208, 216, 218, and 220, Haydon's-rd., u.t. 75 yrs., g.r. 30*l.*, y.r. 156*l.* 1,015
Tooting.—42, Vant-rd., u.t. 74 yrs., g.r. 6*l.*, e.r. 30*l.* 200
By FRANCIS DOD & CO.
Stoke Newington.—47, Lordship-rd., u.t. 60 yrs., g.r. 2*l.*, e.r. 50*l.* 575
By EDWIN EVANS (at Battersea).
Battersea.—86 to 100 (even), Wickersley-rd., u.t. 65 yrs., g.r. 40*l.*, w.r. 297*l.* 14*s.* 1,835
103, Lavender-rd., u.t. 42½ yrs., g.r. 5*l.*, w.r. 31*l.* 4*s.* 165
80, Lavender-sweep, u.t. 76½ yrs., g.r. 7*l.* 10*s.*, e.r. 48*l.* 430
14, Currie-rd., f., w.r. 33*l.* 16*s.* 350
60 and 62, Maysoule-rd., u.t. 75 yrs., g.r. 10*l.*, w.r. 57*l.* 4*s.* 440
31, Millgrove-st., u.t. 70 yrs., g.r. 4*l.* 10*s.*, w.r. 39*l.* 245
12, Patience-rd., u.t. 74 yrs., g.r. 6*l.*, w.r. 39*l.* ... 265
Wandsworth.—14, Milford-st., u.t. 27 yrs., g.r. 6*l.* 6*s.*, w.r. 31*l.* 4*s.* 150
8b, East Hill (S.), u.t. 79 yrs., g.r. 13*l.*, y.r. 50*l.* 515
November 6.—By WM. CLARKSON.
East Ham.—1, 3, and 5, Arragon-rd., f., w.r. 93*l.* 12*s.* 850
Poplar.—81, 83, and 87, Abbott-rd., u.t. 70 yrs., g.r. 15*l.*, w.r. 117*l.* 895
38, Bath-st. (S.), f., y.r. 36*l.* 8*s.* 415

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; h.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.		
Hard Stocks	1 16 6	per 1,000	alongside, in river
Rough Stocks and Grizzles	1 13 0	"	" "
Facing Stocks	2 12 0	"	" "
Shippers	2 5 0	"	" "
Flettons	1 11 0	"	at railway depôt
Red wire Cuts	1 13 0	"	" "
Best Fareham Red	3 12 0	"	" "
Best Red Pressed Ruabon Facing	5 0 0	"	" "
Best Blue Pressed Staffordshire	4 5 0	"	" "
Do. Bullnose	4 11 0	"	" "
Best Stourbridge Fire Bricks	4 8 0	"	" "
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers	13 0 0	"	" "
Headers	12 0 0	"	" "
Quoins, Bullnose, and Flats	17 0 0	"	" "
Double Stretchers	19 0 0	"	" "
Double Headers	16 0 0	"	" "
One Side and two Ends	19 0 0	"	" "
Two Sides and one End	20 0 0	"	" "
Splays, Chamfered, Squints	20 0 0	"	" "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	"	" "
Quoins, Bullnose, and Flats	14 0 0	"	" "
Double Stretchers	15 0 0	"	" "
Double Headers	14 0 0	"	" "
One Side and two Ends	15 0 0	"	" "
Two Sides and one End	15 0 0	"	" "
Splays, Chamfered, Squints	14 0 0	"	" "
Second Quality White and Dipped Salt Glazed	2 0 0	"	less than best.

	s. d.		
Thames and Pit Sand	6 9	per yard, delivered.	
Thames Ballast	6 0	" "	
Best Portland Cement	30 0	per ton, delivered.	
Best Ground Blue Lias Lime	20 6	" "	

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	12s. 0d. per yard, delivered.
Stourbridge Fire Clay in sacks	27s. 6d. per ton at rly. dpt

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PRICES CURRENT (*continued*).

STONE.

BATH STONE—delivered on road waggons, Paddington depôt ..... 1 6½ per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt..... 1 8½ " "
PORTLAND STONE (20 ft. average)—
Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf ..... 2 1 " "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf ..... 2 2½ " "

	s.	d.	
Ancaster in blocks	1	11	per ft. cube, deld. rly. depôt
Beer in blocks	1	6	" "
Greenshill "	1	10	" "
Darley Dale in blocks ...	2	4	" "
Red Corsehill "	2	5	" "
Closeburn Red Freestone	2	0	" "
Red Mansfield "	2	4	" "

YORK STONE—*Robin Hood Quality.*

	s.	d.	
Scappled random blocks	2	10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2	3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto.....	2	6	" "
3 in. Sawn two sides slabs (random sizes) ..	0	11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes).....	0	7½	" "
1½ in. to 2 in. ditto, ditto	0	6	" "
Scappled random blocks	3	0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2	8	per ft. super. "
6 in Rubbed two sides Ditto	—		" "
3 in. sawn two sides slabs (random sizes)	1	2	" "
2 in. self-faced random flags	0	5	" "

Hopton Wood (Hard Bed) in blocks 2 3 per ft. cube.
" " " 6 in. sawn both sides landings 2 7 per ft. super. deld. rly. depôt.
" " " 3 in. do. 1 2½ " "

SLATES.

in. in.	£	s.	d.	
20×10 best blue Bangor	13	2	6	per 1000 of 1200 at rly.dep.
20×12 " "	13	17	6	" "
20×10 best seconds "	12	15	0	" "
20×12 " " "	13	10	0	" "
16×8 best "	7	0	0	" "
20×10 best blue Pertmadoc	12	12	6	" "
16×8 best blue Portmadoc	6	12	6	" "
20×10 best Eureka unfading green.....	15	2	6	" "
20×12 best Eureka unfading green.....	17	2	6	" "
18×10 " "	12	10	0	" "
16× 8 " "	10	5	0	" "
20×10 permanent green	11	10	0	" "
18×10 " "	9	10	0	" "
16× 8 "	6	10	0	" "

TILES.

	s.	d.	
Best plain red roofing tiles...	42	0	per 1,000 at rly. depot.
Hip and valley tiles	3	7	per doz.
Best Broseley tiles.....	50	0	per 1,000 " "
Do. Ornamental Tiles	52	6	" "
Hip and Valley tiles.....	4	0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57	6	per 1,000 " "
Do. Ornamental Do.	60	0	" " "
Hip tiles	4	0	per doz. " "
Valley tiles.....	3	0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51	9	per 1,000 " "
Do. Ornamental Do.	54	6	" " "
Hip tiles	4	1	per doz. " "
Valley tiles	3	8	" " "
Best "Rosemary" brand plain tiles	48	0	per 1,000 " "
Do. Ornamental Do	50	0	" " "
Hip tiles	4	0	per doz. " "
Valley tiles	3	8	" " "

WOOD.

	At per standard. £	s.	d.	£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15	10	0	16	10	0
Deals: best 3 by 9	14	10	0	15	10	0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11	10	0	12	10	0
Battens: best 2½ by 6 and 3 by 6 ...	0	10	0	less than 7 in. and 8 in.		
Deals: seconds.....	1	0	0	less than best		
Battens: seconds	0	10	0	"	"	
2 in. by 4 in. and 2 in. by 6 in.....	9	0	0	"	10	0
2 in. by 4½ in. and 2 in. by 5 in. ...	8	10	0	9	10	0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0	10	0	more than battens.		
¾ in.....	1	0	0	"		
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4	10	0	5	0	0
Seconds	4	5	0	4	10	0
Small timber (8 in. to 10 in.)	3	12	6	3	15	0
Small timber (6 in. to 8 in.).....	3	0	0	3	10	0
Swedish balks	2	15	0	3	0	0
Pitch-pine timber (30 ft. average)...	3	5	0	3	15	0

JOINERS' WOOD.

White Sea:	At per standard.					
First yellow deals, 3 in. by 11 in.	23	0	0	24	0	0
3 in. by 9 in.	21	0	0	22	10	0
Battens, 2½ in. and 3 in. by 7 in.	17	0	0	18	10	0
Second yellow deals, 3 in. by 11 in.	18	10	0	20	0	0
" " 3 in. by 9 in.	17	10	0	19	0	0
Battens, 2½ in. and 3 in. by 7 in.	13	10	0	14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	15	10	0	16	10	0
Battens, 2½ in. and 3 in. by 7 in.	11	10	0	12	10	0

PRICES CURRENT (*continued*).

WOOD.

	At per standard. £	s.	d.	£	s.	d.
Petersburg: first yellow deals, 3 in. by 11 in.	21	0	0	22	10	0
Do. 3 in. by 9 in.	18	0	0	19	10	0
Battens	18	10	0	15	0	0
Second yellow deals, 3 in. by 11 in.	16	0	0	17	0	0
Do. 3 in. by 9 in.	14	10	0	16	0	0
Battens.....	11	0	0	12	10	0
Third yellow deals, 3 in. by 11 in.	13	10	0	14	0	0
Do. 3 in. by 9 in.	13	0	0	14	0	0
Battens	10	0	0	11	0	0
White Sea and Petersburg:—						
First white deals, 3 in. by 11 in....	14	10	0	15	10	0
" " 3 in. by 9 in. ...	13	10	0	14	10	0
Battens	11	0	0	12	0	0
Second white deals, 3 in. by 11 in.	13	10	0	14	10	0
" " 3 in. by 9 in.	12	10	0	13	10	0
" " battens	9	10	0	10	10	0
Pitch-pine: deals	16	0	0	18	0	0
Under 2 in. thick extra	0	10	0	1	0	0
Yellow Pine—First, regular sizes ...	33	0	0	upwards.		
Oddments	22	0	0	24	0	0
Seconds, regular sizes	24	10	0	26	10	0
Yellow Pine Oddments...	20	0	0	22	0	0
Kauri Pine—Planks, per ft. cube ...	0	3	6	0	4	6
Danzig and Stettin Oak Logs—Large, per ft. cube	0	2	6	0	2	6
Small " "	0	2	3	0	2	6
Wainscot Oak Logs, per ft. cube ...	0	5	0	0	5	6
Dry Wainscot Oak, per ft. sup. as inch	0	0	7	0	0	8
¾ in. do. do.	0	0	6½	—		
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0	0	9	0	0	11
Selected, Figury, per ft. sup. as inch	0	1	6	0	2	0
Dry Walnut, American, per ft. sup. as inch.....	0	0	10	0	1	0
Teak, per load	17	0	0	21	0	0
American Whitewood Planks—per ft. cube.....	0	4	0	—		
Prepared Flooring—	Per square.					
1 in. cy 7 in. yellow, planed and shot	0	13	6	0	17	6
1 in. by 7 in. yellow, planed and matched	0	14	0	0	18	0
1¼ in. by 7 in. yellow, planed and matched	0	16	0	1	1	6
1 in. by 7 in. white, planed and shot	0	11	6	0	13	6
1 in. by 7 in. white, planed and matched	0	12	0	0	14	0
1¼ in. by 7 in. white, planed and matched	0	14	6	0	16	6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards ...	0	11	0	0	13	6
¾ in. by 7 in. do. do. do.	0	14	0	0	18	0
1 in. by 7 in. white do. do.	0	10	0	0	11	6
1 in. by 7 in. do. do. do.	0	11	6	0	13	6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £	s.	d.	£	s.	d.
Rolled Steel Joists, ordinary sections	6	5	0 ...	7	5	0
Compound Girders, " "	8	2	6 ...	9	5	0
Angles, Tees and Channels, ordinary sections	7	17	6 ...	8	17	6
Flitch Plates	8	5	0 ...	8	15	0
Cast Iron Columns and Stanchions, including ordinary patterns	7	2	6 ...	8	5	6

METALS.

IRON—	Per ton, in London £	s.	d.	£	s.	d.
Common Bars	7	10	0 ...	8	0	0
Staffordshire Crown Bars, good merchant quality.....	8	0	0 ...	8	10	0
Staffordshire "Marked Bars".....	10	10	0 ...	—		
Mild Steel Bars	8	15	0 ...	9	5	0
Hoop Iron, basis price	9	5	0 ...	9	10	0
" " galvanised	17	10	0 ...	—		
(*And upwards, according to size and gauge.)						
Sheet Iron (Black)—						
Ordinary sizes to 20 g.	9	15	0 ...	—		
" " 24 g.	10	15	0 ...	—		
" " 26 g.	12	5	0 ...	—		
Sheet Iron, Galvanised, flat, ordinary quality—						
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12	15	0 ...	—		
Ordinary sizes to 22 g. and 24 g.	13	5	0 ...	—		
" " 26 g.....	14	5	0 ...	—		
Sheet Iron, Galvanised, flat, best quality—						
Ordinary sizes to 20 g.	16	0	0 ...	—		
" " 22 g. and 24 g.	16	10	0 ...	—		
" " 26 g.	18	0	0 ...	—		
Galvanised Corrugated Sheets—						
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12	15	0 ...	—		
" " 22 g. and 24 g....	13	5	0 ...	—		
" " 26 g.	14	0	0 ...	—		
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker.....	11	15	0 ...	—		
Best Soft Steel Sheets, 22 g. and 24 g.	12	15	0 ...	—		
" " 26 g.....	14	0	0 ...	—		
Cut nails, 3 in. to 6 in.	9	5	0 ...	9	15	0
(Under 3 in., usual trade extras.)						

LEAD, &c.

	Per ton, in London. £	s.	d.	£	s.	d.
LEAD—Sheet, English, 3 lbs. and up	14	0	0 ...	—		
Pipe in coils	14	10	0 ...	—		
Soil pipe	17	0	0 ...	—		
Compo Pipe	17	0	0 ...	—		
ZINC—Sheet—						
Vieille Montagne .....ton	26	0	0 ...	—		
Silesian	25	15	0 ...	—		
COPPER—						
Strong Sheet.....per lb.	0	0	10½...	—		
Thin..... "	0	0	11½...	—		
Copper nails ..... "	0	0	11 ...	—		
BRASS—						
Strong Sheet .....per lb.	0	0	10 ...	—		
Thin " ..... "	0	0	11 ...	—		
TIN—English Ingots..... "	0	1	4 ...	—		
SOLDER—Plumbers'..... "	0	0	6 ...	—		
Tinmen's ..... "	0	0	8 ...	—		
Blowpipe ..... "	0	0	9 ...	—		

PRICES CURRENT (*continued*).

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d.	per ft. delivered
" fourths.....	1¾d.	" "
21 oz. thirds	3¼d.	" "
" fourths.....	2¾d.	" "
26 oz. thirds	3¾d.	" "
" fourths.....	3¼d.	" "
32 oz. thirds	4¼d.	" "
" fourths.....	4d.	" "
Fluted sheet, 15 oz.	2¼d.	" "
" 21 oz.	3d.	" "
⅛ Hartley's Rolled Plate.....	1¾d.	" "
⅛ " " "	2d.	" "
¼ " " "	2¼d.	" "

OILS, &c.

		£	s.	d.
Raw Linseed Oil in pipes or barrels...	per gallon	0	1	9
" " " in drums.....	"	0	2	1
Boiled " " in pipes or barrels...	"	0	2	0
" " " in drums.....	"	0	2	4
Turpentine, in barrels	"	0	3	8
" in drums	"	0	3	10
Genuine Ground English White Lead	per ton	19	0	0
Red Lead, Dry	"	19	0	0
Best Linseed Oil Putty.....	per cwt.	0	8	0
Stockholm Tar	per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for seats of Churches	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal.....	0	18	0
Extra Pale French Oil	1	1	0
Eggshell Flatting Varnish.....	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
French and Brush Polish	0	10	0

TERMS OF SUBSCRIPTION.

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TO CORRESPONDENTS.

C. & W. (Amounts should have been stated.)

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We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

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All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ASHBY-DE-LA-ZOUCHE.—For the execution of street works, &c., Sun and Thorne streets, Woodville, for the Hartshorne Rural District Council:—

Edwin Clarke	£1,047 2 9	Fitzmaurice & Co., Ltd.....	£981 16 2
Bilshaw & Son	1,036 10 6	Lowe & Sons, Burton-on-Trent*	930 0 0
Wm. Hopkins	1,012 8 3		

[*See also page* 507.

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Required.	Premiums.	Designs to be delivered
Public Baths, Selly Oak, near Birmingham	King's Norton U.D.C.	1*l.* 1s.	Dec. 7
*Designs for New Council House & Free Library Bdgs.	Erdington U.D.C.	50*l.*, 30*l.*, 20*l.*	Feb. 1, '04

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Granite Paving Works near Manchester	Stretford U.D.C.	E. Worrall, Surveyor, Old Trafford	Nov. 17
Road Works, &c., Derbyshire-lane and other streets	do.	do.	do.
Brick Culverts, Norbury	Croydon Corporation	Borough Engineer, Town Hall, Croydon	do.
Road Works, Woodville-road	Croydon Town Council	Borough Road Surveyor, Town Hall, Croydon	do.
Wesleyan School Hall, Lidgett Park, Roundhay, Leeds	.....	W. H. Beevers, Architect, 25, Bond-street, Leeds	do.
Pumphouse, Lodge, &c., at Generating Stn., Greenhill	Oldham Corporation	S. W. Newington, Borough Engineer, Electricity Works, Oldham	do.
Sewerage Works, Barlestone	Market Bosworth R.D.C.	W. M. Sykes, Surveyor, Market Bosworth	do.
Heating Works at Town Hall	Bilston U.D.C.	J. P. Wakeford, Civil Engineer, Town Hall, Bilston	do.
Gallery to Chapel, Richmond-rd., Pontnewydd, Wales	Baptists	L. D. Jones, Cromwell-place, Pontnewydd	do.
Shelters, &c., Parc Gwyllt, Bridgend	Asylum Committee	W. E. R. Allen, County Council Offices, Cardiff	do.
Electric Lighting Installation at Library, Anderston	Glasgow Corporation	Paterson & Stewart, Architects, 14, Blythswood-square, Glasgow	do.
Hospital, Bagthorpe	Nottingham Corporation	F. B. Lewis, City Architect, Guildhall, Nottingham	do.
Additions to Mills, Pudsey, Yorks.	.....	Kendall & Bakes, Architects, Victoria-square, Leeds	Nov. 18
Bridge over Wortley Brook, Brook-lane, Leeds	.....	City Engineer, Municipal Buildings, Leeds	do.
Painting Works, &c., at School, Galley's Fields	Hartlepool Education Authority	H. C. Crummack, Civil Engineer, Hartlepool	do.
Retaining Wall, Lower Broughton-road	Salford Corporation	L. C. Evans, Town Hall, Salford	do.
Setts, &c.	New Mills U.D.C.	J. Pollitt, Town Hall, New Mills	do.
Paving Works, British and Poplar Streets	Poplar Borough Council	Borough Surveyor, High-street, Poplar	do.
Street Works, &c., Dumbreck-rd. to Paisley-rd., Glasg.	Ibroxhill Estate Co., Ltd.	J. Cowan, C.E., 179, West George-street, Glasgow	do.
Timber Groynes (nine)	Bridlington Corporation	E. R. Matthews, Civil Engineer, Town Hall, Bridlington	do.
Wrought-Iron Materials and Roofing	East Indian Railway Co.	C. W. Young, Nicholas-lane, London, E.C.	do.
Drainage Works, &c.	Oakham Guardians	J. B. Corby, Surveyor, Stamford	do.
Stone Steps, Copings, &c., Stanley-road	Bootle (Lancs) Corporation	B. J. Wolfenden, C.E., Town Hall, Bootle	do.
Electric Lighting Works at Infirmary	Whitehaven Guardians	G. Boyd, C.E., 33, Queen-street, Whitehaven	do.
Fireclay Goods	Nelson (Lancs) Corporation	A. J. Hope, Engineer, Gasworks, Nelson	do.
Street Works, &c., Hope and other streets, Earlestown	Newton-in-Makerfield U.D.C.	Surveyor, Town Hall, Earlestown, Lancs	do.
Street Works, &c., Markham and other roads	Manchester Corporation	Surveyor, Town Hall, Manchester	Nov. 19
Lodges at Infirmary	do.	City Architect, Town Hall, Manchester	do.
Alterations to Fireproof Room	Houghton-le-Spring Guardians	J. G. Baty, Union Offices, William-street, Houghton-le-Spring	do.
Entrance Gates, &c., Royal Infirmary	Manchester Corporation	City Architect, Town Hall, Manchester	do.
Library, Dennistown	Glasgow Corporation	J. G. Stewart, 42, Bath-street, Glasgow	do.
Infirmary and Nurses' Home	Nantwich Guardians	C. E. Davenport, Architect, 152, Hospital-street, Nantwich	do.
Road Metal, &c., Annan	Dumfries County Council	A. V. Hart, Surveyor, Ashgrove, Dumfries	do.
Branch Library, The Green, Lindal-in-Furness	Dalton-in-Furness U.D.C.	W. Richardson, Surveyor, Station-road, Dalton	do.
Alterations to Council Schools, Arthur's Hill	Newcastle-upon-Tyne Corporation	A. Goddard, Northumberland-road, Newcastle	Nov. 20
Road Works, &c., Nythbran Estate, Rhondda Valley	Lewis Merthyr Cons. Collieries, Ltd.	James & Morgan, Architects, Charles-street Chambers, Cardiff	do.
Drainage Works, &c., Marchiniel, near Wrexham	.....	J. P. Evans, Architect, Argyle Chambers, Wrexham	do.
Granite Setts, &c.	Crompton (near Oldham) U.D.C.	F. Wild, Surveyor, Town Hall, Crompton	do.
Sewers, &c. Penn and Bradmore	Selsdon (Wolverhampton) R.D.C.	R. E. W. Berrington, Civil Engineer, Bank Buildings, Wolverhampton	do.
Parish Church, Blackpool	Building Committee	F. H. Gorst, Architect, 7, Birley-street, Blackpool	do.
Granite Setts, also Broken Granite (500 tons)	Epsom U.D.C.	E. R. Capon, Surveyor, Church-street, Epsom	do.
*Additional House at Felixstowe Coast Guard Station	The Admiralty	Director of Works Department, 21, Northumberland-avenue, W.C.	do.
Sewers, &c., Kingston Hill	Malden and Coombe U.D.C.	T. B. Simmons, Civil Engineer, Cambridge-road, New Malden	Nov. 21
Walling Works, Park-road	Hindley (Lancs) U.D.C.	A. Holden, Civil Engineer, Council Offices, Hindley	do.
Paving Works, Southend-on-Sea	Essex County Council	P. J. Sheldon, Civil Engineer, Town Hall, Chelmsford	do.
Road Works, &c.	Cheriton (Kent) U.D.C.	A. Atkinson, Public Offices, Cheriton	do.
Alterations to Police Station, Normanton	West Riding County Council	County Architect, County Hall, Wakefield	Nov. 22
Sewage Works, West Stow	Bury St. Edmunds Corporation	G. R. Strachan, Civil Engineer, 7, Victoria-street, S.W.	Nov. 23
Water Supply Works, &c., South Benfleet, &c.	Rochford (Essex) R.D.C.	H. T. Sidwell, Engineer, Rochford	do.
Shops and Dwellings, Snig Hill	Sheffield Corporation	Gibbs & Flockton, Architects, 15, St. James'-row, Sheffield	do.
Road Works, The Pavement, Seven Kings	Ilford U.D.C.	H. Shaw, Civil Engineer, Town Hall, Ilford	do.
Villa, Fortheath-avenue, Elgin	.....	R. Pratt, Architect, Elgin	do.
Rebuilding Wall, &c. Bethel Chapel, Glyn-Neath, Wales	.....	J. S. Thomas, Stanley House, Glyn-Neath	do.
Repairs to Master's Office at Workhouse	Droxford (Hants)	F. Clark, Workhouse, Droxford	do.
Additions to Schools, Eastwood	Keighley School Board	Wilson Bailey, Architect, Market-street, Bradford	do.
Cast-Iron Pipes (750 tons)	Buxton U.D.C.	G. H. Hill & Sons, Civil Engineers, 3, Victoria-street, Winchester	do.
Sewers, &c., Norman-road, St. Leonards	Hastings Corporation	P. H. Palmer, Civil Engineer, Town Hall	do.
Schools, Church-road	Tottenham Education Committee	G. E. T. Laurence, Architect, 22, Buckingham-street, Adelphi, W.C.	do.
Bricks and Fireclay Goods	Burton-on-Trent Corporation	F. L. Ramsden, Engineer, Gasworks, Burton-on-Trent	Nov. 24
Phospor Bronze (20 tons)	Southern Mahratta R. Co., Ltd.	E. G. Thornton, 46, Queen Anne's Gate, S.W.	do.
*Making-up Streets	West Ham Council	Borough Engineer, Town Hall, West Ham, E.	do.
*Fire Hydrants, &c., Portland Cement, & Making-up Road	Wood Green U.D.C.	Council's Surveyor, Town Hall, Wood Green	Nov. 25
*New District Post Office, Bootle	Commissioners of H.M. Works, &c.	H.M. Office of Works, Storey's Gate, S.W.	do.
*Small Cottage, Lavatories, &c., at Recreation Ground	Finchley U.D.C.	Council's Surveyor, Finchley	do.
*Iron Band Stand, South Park	Fulham Borough Council	Borough Engineer, Town Hall, Fulham, S.W.	do.
*Terra Cotta Band Stand, South Park	do.	do.	do.
Road Metal	Warwickshire County Council	John Wilmot, County Surveyor, Birmingham	Nov. 26
*Erection of Public Buildings	Waltham Holy Cross U.D.C.	Council's Surveyor, Highbridge-street, Waltham Abbey	Nov. 27
Purifier House, &c.	Knaresborough U.D.C.	J. E. Walker, Surveyor, Town Hall, Knaresborough	Nov. 28
Brick Culvert near Keresforth-road	Dodworth U.D.C.	G. Strutt, Surveyor, High-street, Dodworth	do.
*Erection of Mortuary, &c.	Greenwich Borough Council	A. Roberts, Architect, 18, Nelson-street, Greenwich, S.E.	Nov. 30
*Retaining Wall along Shore-road	Swanage U.D.C.	Council's Surveyor, Town Hall, Swanage	do.
*200 feet 21-in. Sewer, &c.	Borough of Hornsey	Boro' Eng. and Surv., Municipal Offices, Southwood-lane, Highgate	do.
*New Warehouse on Pier, Plymouth	G.W.R. Co.	Engineer, North-road Station, Plymouth	Dec.
*Paving Circus-place, Portion of Finsbury-circus, &c.	Corporation of London	Engineer to the Corporation, Public Health Department, Guildhall	do.
*Alterations to Hot-Water Supply, N. E. Hospital	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
*Library Buildings, Cubitt Town	Poplar Borough Council	C. H. Norton, Architect, 14, Bedford-row, W.C.	Dec. 3
Hospital, &c.	Birkdale (Lancs) U.D.C.	J. T. Keeley, Town Hall, Birkdale	Dec. 4
*Internal Fittings, New University Buildings	Birmingham University	Aston Webb & Ingress Bell, 19, Queen Anne's-gate, S.W.	Dec. 14
Stone Wall, Bowerham	Lancaster Corporation	J. C. Mount, Borough Surveyor, Town Hall, Lancaster	No date.
Water Supply Works, North Lodge-road, Parkstone	Poole Town Council	John Elford, Poole	do.
House and Shop, Horden Colliery, Durham	.....	W. A. Noble, Castle Eden Colliery, Castle Eden, R.S.O.	do.
Farmhouse, Carrington Estate, Humberstone, Lincs	.....	J. C. Jonas & Sons, Cambridge	do.
*Timber Pavilion	Weston Super Mare Grand Pier Co.	Mayoh & Haley, 12, Norfolk-street, Strand, W.C.	do.
*Nautical School, Portishead	Training Ship "Formidable"	E. Gabriel, Architect, 42, Old Broad-street, E.C.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
*Clerk of Works	Borough of Portsmouth Edn. Comm.	5*l.* 5s. per week	Nov. 23
*Chair of Architecture	Liverpool University	See advertisement	Dec. 31

Those marked with an asterisk (*) are advertised in this Number. *Competition*, xxii. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xix.

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TENDERS (*Continued*):—

BASFORD (Notts).—For the execution of sewerage works, Gelling and Colwick, for the Basford Rural District Council. Messrs. Elliott & Brown, Engineers, Burton Buildings, Parliament-street, Nottingham:—

	Colwick.	Gedling.
Cope & Raynor	£12,278 17 0	£6,183 13 0
Firth & Co.	11,570 17 0	6,052 7 0
Johnson & Langley	7,816 1 2	7,429 16 0
A. Ashley	7,524 12 0	5,829 15 0
A. Jewell	7,286 8 0	5,392 18 0
H. H. Barry	7,250 0 0	5,450 0 0
J. S. Dawson	7,193 17 0	5,631 5 9
Bower Bros., West Bridgford, Notts	6,900 0 0	*5,050 0 0
Bentley & Lock, Leicester	*6,031 10 7	6,095 0 0
T. H. Harper	—	5,525 0 0
C. M. Kerry	—	6,900 0 0

BATLEY (Yorks).—For the execution of street works, North Bank-road, Surlwell-Hall-road, and Yard No. 9, for the Town Council. Mr. O. J. Kirby, Surveyor, Branch-road, Batley:—

Whitehead & Son	£1,277 12 0	Mathew Hall	£1,048 19 6
W. Yates	1,227 14 7	Coop & Son	1,034 11 3
Graham & Sons	1,192 13 3	H. Parkinson, Soothill*‡	1,028 6 4
Speight & Co.	1,156 12 0	H. & W. Barraclough	1,009 18 7
C. Waterhouse	1,153 19 8	Kenyon Bros., Halifax*§	834 5 4
Garforth Bros.	1,141 11 0		
F. Crabtree	1,061 0 11		
G. & J. Mortimer	1,060 7 4		

‡ Yard No. 9. §. For streets.

BATLEY (Yorks).—For the erection of boundary-wall at sewage outfall works, Bradford-road, for the Town Council. Mr. O. J. Kirby, Surveyor, Batley:—

J. Crossley, jun.	£676 19 0	T. Mortimer	£475 2 0
Whitehead & Son	668 12 0	Pickles	473 19 0
Chadwick & Sons	605 18 6	Humphries & Green	456 17 2
Ben Farrar	53) 0 0	Coop & Son	425 9 3
Ackroyd & Son	529 4 0	G. & J. Mortimer, Batley*	421 2 6
Baines & Son	527 14 0		
G.F. Hepworth	487 8 6		

BATLEY (Yorks).—For the erection of an approach tower to Independent Methodist Chapel, Cambridge-street, for the Corporation. Mr. O. J. Kirby, Borough Surveyor, Branch-road, Batley:—

G. Whitehead	£380 0 0	Chadwicke Bros.	£273 8 6
Garforth & Day	370 0 0	B. Farrar	261 0 0
Graham & Sons	362 0 0	G. F. Henworth	240 0 0
S. S. Baines	328 14 0	G. & J. Mortimer, Carlinghow*	197 10 0
Humphreys & Green	293 18 7		

BRISTOL.—For the Central Library for the Corporation of Bristol. Mr. H Percy Adams, architect, 28, Woburn-place, Russell-square, W.C.:—

Longley & Co.	£34,979	Cowlin & Son	£30 894
R. F. Ridd	31,985	R. Wilkins	30,676
A. J. Beavan	31,90)	Walters & Son	30,470
Kerridge & Shaw	31,817	H. Wilcox*	29,765
Stephens & Bastow	31,698		

[Architect's estimate £30,000]

CARDIFF.—For the erection of schools, &c., Llanishen-street, The Heath, for 1,200 children, with boundary-walls, latrines, playsheds, and caretaker's house, for the Cardiff School Board. Messrs. Veall & Sant, architects, Cardiff. Quantities by the architects:—

Shepton & Son	£18,623	C. C. Dunn	£15,600
David Davies	18,239	Symonds & Co.	15,411
Thomas & Co.	16,417	Knox & Wells	15,400
Evans & Bros.	16,277	W. T. Morgan	15,050
Jas. Allan	15,724	Lattey & Co., Ltd.‡	14,832

[All of Cardiff.]

‡ Accepted subject to approval by Board of Education.

EASTBOURNE.—For buildings covering refuse destructor, Roselands, for the Corporation. Mr. D. J. Bowe, Borough Surveyor. Town Hall, Eastbourne:—

Cook & Sons	£1,533	M. Hookham, Eastbourne*	£1,178
J. Martin	1,475		

FRASERBURGH (N.B.).—For the erection of a manse, King Edward-street, for the West U.F. Church. Mr. Wm. S. F. Wilson, architect, Frithside-street, Fraserburgh. Quantities by the architect:—

Masonry.—Jas. Rollo, Fraserburgh*	£509 0 0
Carpentry.—Scott & McDonald, Fraserburgh*	371 10 0
Slating.—W. & J. Morrison, Fraserburgh*	51 1 0
Plumbing.—Wm. Leask, Alford*	105 0 0
Plastering.—Alex Campbell, Fraserburgh*	75 0 0
Painting.—Wm. Stuart, Fraserburgh*	33 18 6
Total	£1,150 9 6

GALWAY.—For the execution of water-supply works, for the Urban District Council. Mr. James Perry, C.E., County Surveyor's Office, Galway:—

Cochrane & Co., Ltd., Middlesbrough*	£3,183 11 7	Div. I., 600 tons pipes, &c.
Robert Macdonald, Galway*	1,523 12 0	Div. II., pipe-laying.
McKee & McNally, Dungannon*	4,163 18 5	Div. III., reservoir, water-courses, pump-house, &c.

GRIMSBY.—For subway under Great Central Railway at East Marsh-street. Mr. H. Gilbert Whyatt, Borough Engineer and Surveyor:—

	With Steps.	Additional for Slopes
T. R. Waterman	£1,524 2 6	£801 0 0
Watling	1,400 0 0	930 0 0
Hewins & Goodhand	1,282 11 0	632 13 6
W. Burkitt, 7, Brecon-street, Buckingham street, Holderness-road, Hull*	983 10 4	526 11 8

For Asphalting Footpath, Limbert-road.

Watling	£78 0 0	
J. Guy	75 7 5	
E. R. White	61 10 1	
Burkitt	56 10 7	
Cook	2	4 per sq. yd.
Parry & Son, Kirton-in-Lindsey, Lincolnshire*	52 16 4	

HEREFORD.—For post office extension, for H.M. Office of Works. Mr. W. T. Oldrieve, architect. Quantities by Messrs. Doubleday & Shaw, Birmingham:—Bowers & Co., Bath-street, Hereford £1,840

HOUNSLOW.—For the erection of the first block of six shops and flats over, in High-street, Hounslow. Quantities supplied. Mr. W. A. Davies, architect, Town Hall Chambers, Hounslow:—

J. Macklin	£9,999	Leslie & Co.	£8,147
Jones Bros.	8,742	Sheffield Bros.	8,100
T. Hiscock	8,618	Ferguson & Co.	8,015
C. Emmett	8,550	E. Plaistow	7,859
Wisdom Bros.	8,300	W. Irwin, Islington	7,455
A. & B. Hanson	8,194		

ILFORD.—For the erection of depôt buildings, stabling, &c., Ley-street, for the Urban District Council. Mr. H. Shaw, C.E., Ilford:—

F. Willmott, Town Hall, Ilford* £9,320

ILFRACOMBE.—For the execution of road works for the District Council. Mr. Prouse, Engineer, Town Hall, Ilfracombe. Quantities by Engineer:—

J. Alderman, Kentisbury, near Barnstaple... £570

KEIGHLEY.—For paving works, Industrial and Hive streets, for the Corporation. Mr. W. H, Hopkinson, C.E., Town Hall, Keighley:—

T. E. Sugden, Midland Works, Keighley** £471 18 3

LINCOLN.—For additions to County Hospital (operating rooms). Messrs. W. Watkins & Son, architects, Silver-street, Lincoln. Quantities by architects:—

Bowman & Sons	£780 0 0	The Lincoln Co-operative Society, Lincoln*	£613 0 0
S. & R. Horton	777 0 0		
Fred. Messom	765 0 0		
W. & M. Halkes	759 12 6		

LONDON.—For the formation of a new road, off Weston-road, Fairlawn Estate, Acton Green, W. Messrs. Monson & Sons, architects, Grosvenor House, Acton Vale, W.:—

Bull & Co.	£1,617 5 0	W. H. Wheeler	£952 10 0
Kavanagh & Co.	1,166 0 0	Nowell & Co.	952 0 0
Wimpey & Co.	1,163 0 0	A. C. Soan	940 0 0
Woodham & Sons	1,071 10 0	Killingback & Co.	921 0 0
Thos. Watson	1,058 2 7	R. W. Swaker	914 10 0
R. Ballard	972 0 0	H. Morecroft, Acton Green*	793 0 0

LONDON, N.—For kerbing works, &c., Winchmore Hill, for the Southgate Urban District Council. Mr. C. G. Lawson, C.E., Council Offices, Palmer's Green, N.:—

Dunmore	£1,793 12 1	Ketteringham, Waltham Cross	£1,574 0 0
Grounds & Newton	1,712 8 2	Griffiths & Co.	1,501 16 5
Adams	1,688 0 6	Bloomfield	1,436 19 9

LONDON.—For shops and residential flats, Uxbridge-road. Messrs. Palgrave & Co., architects, Victoria Mansions, 28, Victoria-street, S.W. Quantities by Mr. G. Stephenson, 14, Queen Victoria-street:—

	Bath Stone.	Terra Cotta.
J. W. Dean	£21,000	£21,000
Kellett & Sons, Ltd.	20,025	19,750
Chessum & Sons	19,625	19,625
Ferguson & Co. (too late)	19,978	18,823
Leslie & Co.	18,841	18,861
H. L. Holloway	18,763	18,823

PONTYPRIDD.—For the construction of a road, viaduct, and bridge, for the Urban District Council. Mr. R. P. Wilson, engineer, 66, Victoria-street, S.W.:—

Heenan & Froude	£16,821	J. E. Evans	£14,550
A. Thorn‡	16,658	A. Seaton	12,810
Hughes & Stirling	15,334	Bott & Stennett Westminster*	12,387
E. Finch	15,190	Westwood & Co.§	5,831
Clark & Co.	14,679		

‡ Incomplete. § For steelwork only.

PORTSMOUTH.—For the erection of a pumping station, Eastney, for the Town Council:—

Pumping Station, &c.

W. W. Evans, Southsea* £8,999 11 1)

High Level Relief Sewer.

G. Bell, Tottenham* £37,983 0 0

PUDSEY (Yorks).—For the erection of a pair of semi-detached houses, Bankhouse-lane, for Mr. W. H. Banks. Mr. C. S. Nelson, architect, 15, Park-row, Leeds:—

Masonry.—T. Wood, Pudsey*
Joinery.—R. Farrer, Pudsey*
Plumbing.—J. Scarth, Pudsey*
Plastering.—A. Wood, Pudsey*
Slating.—F. Thompson, Stanningley*
Painting.—Armitage & Dower, Pudsey*
} Total, £597

[The proprietor finding a portion of the stone.]

ST. CLEER.—For the restoration of St. Cleer Church Cornwall. Mr. Geo. H. Fellowes Prynne, architect, 6, Queen Anne's Gate, Westminster. Quantities by Mr. R. Henry Hale, F.S.I., 33, Old Queen-street, Westminster, S.W.:—

Dart & Framers	£1,345 0 0	J. C. Lang	£1,121 16 4
G. Miners	1,239 19 3	S. Treherne, Liskeard*	1,003 5 0
N. W. Wiffen	1,170 17 6		
G. B. Andrews	1,133 17 1		

STOCKPORT.—For the execution of street works within the borough (viz., Greg-street and Whitehill-street), for the Corporation. Mr. John Atkinson, C.E., Borough Surveyor, Stockport:—

P. D. Hayes	£8,745 1 11	W. H. Eva	£8,111 16 2
Gosling & Stafford	8,305 17 2	W. H. Worthington, Manchester*	8,072 18 2

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following list of tenders:—

"CHAUCER" SCHOOL (Tabard-street, Borough).—For forming new passageway, rebuilding Infants' offices, &c.

W. Downs	£1,575 0	Rice & Sons	£1,651 0
Falkner & Sons	1,868 0	J. & C. Bowyer	1,642 0
J. Peattie	1,824 0	Maxwell Bros., Ltd.	1,633 0
R. B. Beattie	1,807 12	Johnson & Co.	1,623 0
G. Parker	1,774 0	Lathey Bros.	1,568 0
W. V. Goad	1,693 0	Mitchell & Sons*	1,374 0

LONDON SCHOOL BOARD.—Running Contracts for the Supply of Timber for Carving Cases:—

		Cobbett's.	Garrard, R., & Co.	Harris, J. F. & G.	Ingram, Perkins & Co.	Latham, James, Ltd.	London School Furniture Co.	Mallinson, W. & Co.*	Putney, S.	Stewart, J.	Previous Prices.	Approximate Annual Consumption.
Yellow pine (in 8 ft. lengths), planed one side only:	per ft.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	ft.
1 in.	super.	5½	6	6	6½	5½	5	5	6½	5	4	3,000
¾ in.	,,	4½	5	4¾	5½	5	4½	4	5	4	3	1,500
Bass or American whitewood (good green colour), planed one side only:												
1 in.	,,	4	4	3¾	3¾	4½	4½	4½	4½	4½	3½	650
¾ in.	,,	3¼	3½	3	3½	4¼	3¾	3½	4¼	3¾	3	750
Oak (not less than 6 in. wide), planed one side only:												
1 in.	,,	4½	6	7½	4½	4½	4½	4½	9	5	4½	500
¾ in.	,,	4¼	5	6	3½	4	4	3½	7½	4	3½	500
American walnut (not less than 9 in. wide), planed one side only):												
1 in.	,,	10	8	11	8½	9	10	10	11	9½	9	450
¾ in.	,,	9½	7	9	7	8	9½	8½	10	7¾	7½	500
Satin walnut (not less than 8 in. wide), planed one side only:												
1 in.	,,	4	4	6	3	3½	3½	4	5	3¾	3½	450
¾ in.	,,	3¾	3½	4¾	2¾	3½	3¼	3½	4½	3½	3	450

[See also next page.

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"EARLSFIELD" SITE, Wandsworth. (*a*) Removal of one iron building to "Beaufort House" Site—(*b*) Adaptation of two remaining iron buildings for special schools.

The Committee reported that they have arranged that one of these iron buildings shall be removed to the "Beaufort House" Site, Fulham, for the purpose of providing temporary accommodation for mentally defective children; and, as a matter of emergency, they have given instructions to Messrs. Stimpson & Co., Contractors, for the new permanent school on this site, to carry out this work (the cost of which is estimated at £500), as an addition to their contract. The Committee also have to report that they have made arrangements for adapting the two remaining iron buildings on the "Earlsfield" Site for the purposes of providing temporary accommodation for physically and mentally defective children. They have accordingly given instructions to Messrs. Johnson & Co., the Contractors for the new school, to carry out this work (the cost of which, including the provision of temporary offices, drainage, fencing, &c., is estimated at £250) as an addition to their contract.

ESSENDINE-ROAD SCHOOL (Maida Hill).—For enlargement. Enlargement—Boys', 130; girls', 130; infants', 145; total, 405. New classrooms: Boys' and girls'—50, 40, 40; infants'—55, 45, 45. Providing new staircase for boys', additional cloakrooms, lavatories, head teachers' rooms, and extending corridor for each department: also additional entrance for infants':—

Williams & Son	£6,970	Rice & Son	£6,549
C. F. Kearley	6,852	McCormick & Sons	6,424
Simpson & Son	6,804	Patman & Fotheringham, Ltd.	6,283
Johnson & Co.	6,763	Stevens Bros.	6,256
Marchant & Hirst	6,729	Treasure & Son	6,127
Wall & Co.	6,657	General Builders, Ltd.*	6,074
Dabbs & Son	6,642		
G. Neal	6,595		

GOODRICH-ROAD SCHOOL (East Dulwich.)—Erection of an additional classroom for special school.
T. D. Leng £385

MINA-ROAD SCHOOL (Old Kent-road). — For erection of Higher Grade School and improvement of existing Graded School.

(i.) Improvements to Graded School—Boys'—Re-dividing, re-stepping, and re-lighting four central classrooms; Girls'—Re-dividing, re-stepping, and re-lighting four central classrooms, forming corridor across boys' hall for access to classrooms; adapting drawing classroom for hall: Infants'—Re-dividing, re-stepping, and re-lighting four central classrooms. Revised accommodation: Boys', 296; girls', 296; infants', 362; total, 954. Loss of 444 places.

(ii.) Higher Grade School on two stories—Accommodation: Boys', 260; girls, 260; total, 520. Halls: Boys', 50 ft. by 25 ft.; girls', 50 ft. by 25 ft. Classrooms: Boys', 50, 50, 40, 40, 40, 40; girls', 50, 50, 40, 40, 40, 40. Special rooms: Drawing classroom, 615 ft. area; Science room, 615 ft. area. Manual centre on arches for 40 boys. Heating by low-pressure hot-water apparatus. Area of site of additional land, 26,545 square feet. Playgrounds, area per child: Boys', 31 ft.; girls', 31 ft.:—

Grover & Son	£18,354	J. Carmichael	£17,439
Martin, Wells & Co., Ltd.	18,100	J. & M. Patrick	17,304
Marsland & Sons	18,017	Treasure & Son	17,048
Greenwood, Ltd.	17,985	L. H. & R. Roberts	16,908
Johnson & Co.	17,953	Garrett & Son	16,977
King & Son	17,900	Thomas & Edge	16,328
Clarke & Bracey	17,852	Smith & Son	16,058
Lawrance & Sons	17,562	Mitchell & Son	16,020
Lathey Bros.	17,519	F. & H. F. Higgs	15,917
Stimpson & Co.	17,490	W. Downs*	15,739

POWIS STREET SCHOOL (Woolwich).—For adaptation of premises for Centres for Physically and Mentally Defective and Blind Children.

Old Infants' School—Adapting building for Physically Defective Children; three classrooms (one for use as dining-room as required), hall, kitchen, entrance porch, &c. Graded School—Adapting this School as follows:—Ground floor—Centre for Mentally defective children; three classrooms, hall, &c. First floor—Centre for Blind: two classrooms and hall. Also providing Teachers' room, new staircases, cloak-rooms, lavatories, additional offices, re-dividing playgrounds, providing additional entrances, &c., in connection therewith.

Smith & Sons, Ltd.	£4,210	Holiday & Greenwood, Ltd.	£3,915
Proctor & Son	4,170	T. D. Leng	3,778
Johnson & Co.	4,099	E. Triggs	3,671
Mitchell & Son	4,087	Thomas & Edge	3,628
J. & C. Boyer	3,986	H. Groves	3,592
Lathey Bros.	3,930	Bulled & Co.*	3,477

SELLINCOURT-ROAD SITE (Mellison-road, Tooting Graveney. For re-erecting two iron buildings to be removed from West Hill site, Wandsworth:—

T. Cruwys	£1,190	Humphreys, Ltd.	£907
A. Leather	1,183	J. McManus	985
F. Smith & Co.	1,024	Croggan & Co.	980
T. J. Hawkins & Co.	999	W. Harbrow	940
Mitson & Harrison*	£808.		

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EXTERIOR VIEW.

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INTERIOR OF DRAWING-ROOM.

CAYTHORPE COURT, LINCOLNSHIRE.—MR. REGINALD BLOMFIELD, ARCHITECT.

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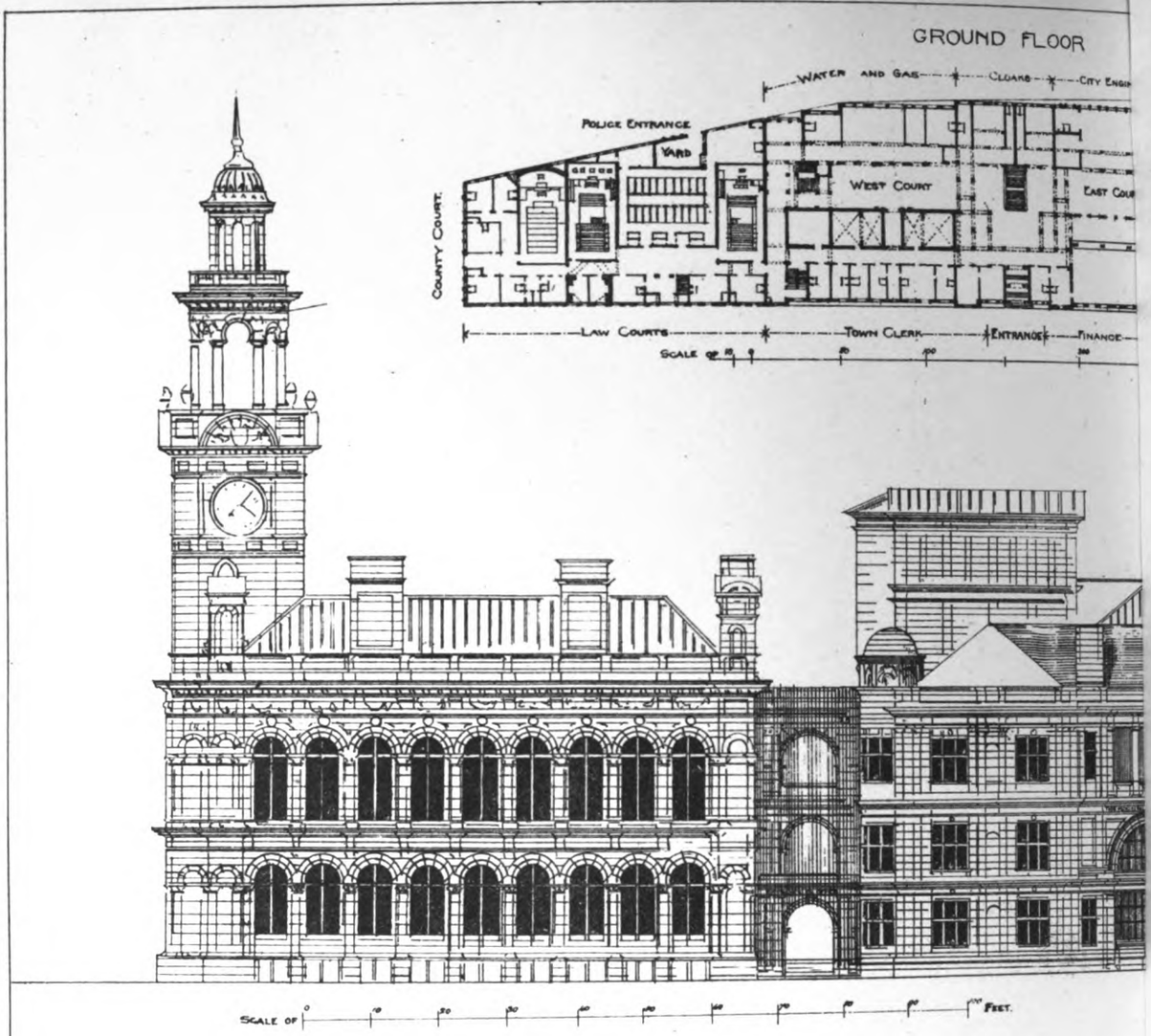

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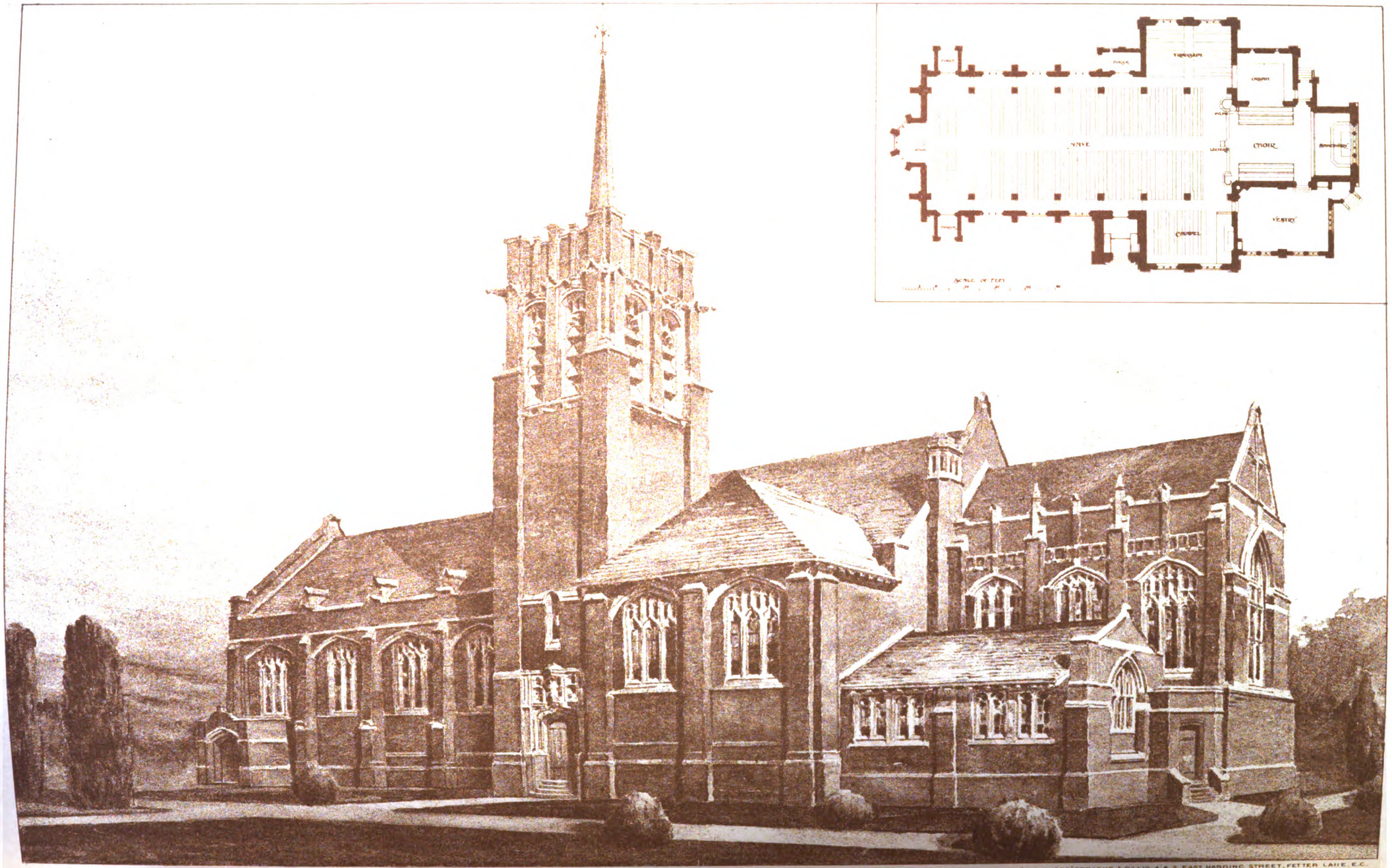

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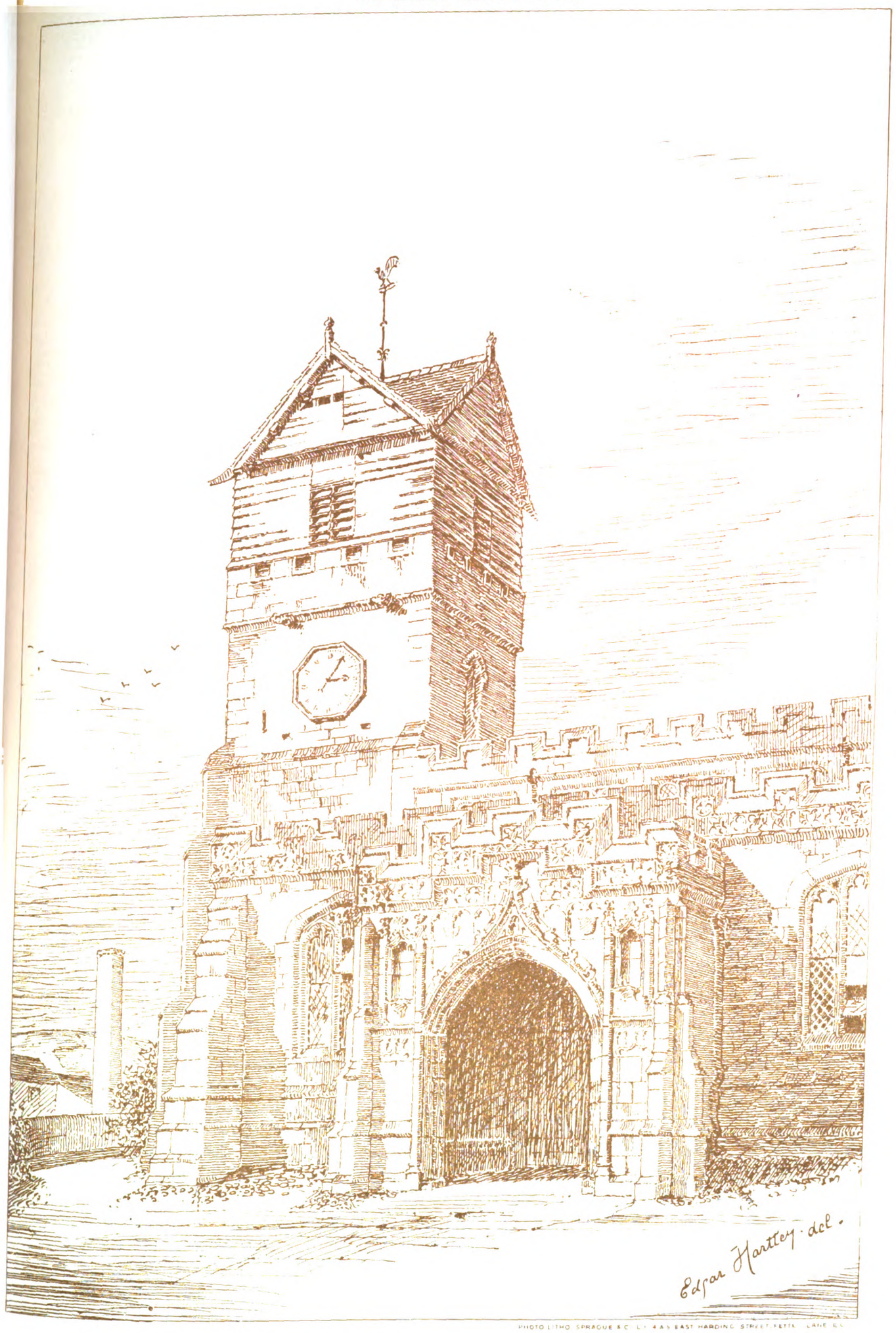

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The Builder.

VOL. LXXXV.—No. 3172. NOVEMBER 21, 1903.

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The Local Government Board Report—1902-1903.

THIS large volume, which covers a year down to the spring of the present year, contains an immense mass of information which throws light on the condition of the people at the present time. It would be impossible and out of place to touch on all the points contained in this book, but there are portions of it of considerable suggestiveness to readers of this journal.

It is satisfactory, in the first place, to note that during the year 1903 the Local Government Board sanctioned loans by urban and rural authorities to the amount of nearly two millions less than in 1901, the figures being for 1901 13 millions odd, for 1902 11 millions odd, which compare with 4 millions odd in 1892. This latter comparison must take away some of the satisfaction felt at the sight of the two first sets of figures. The last year's loans, when we bear in mind that they must be added to the borrowings of local bodies since 1871, indicate the great burden which is being continually placed on the country, since the interest and sinking fund on these loans have to be found by the taxpayer. On the other hand, some parts of these loans are in respect of reproductive undertakings; for money spent on, for example, waterworks and gasworks, repays itself by what it produces in payment by consumers. But when we recollect that no less than 110 millions were expended by local authorities in the year 1900-1901, and that of this sum 16 millions or 15.3 per cent. was devoted to the repayment of borrowed money or interest, we may well feel that great caution should be exercised by local authorities in sanctioning new works. As the requirements of society grow from year to year, and population increases, expenditure by local authorities is inevitable, but such expenditure must be made bearing in mind that every increase of the indebtedness of localities is, so to say, so much of the strength of the country taken from national to local purposes. Yet again we have to remember that the rateable and assessable value of the country is constantly on the increase. The assessable value of all boroughs in 1897-98 amounted to 51 millions, and in 1900-01 it had risen to 58 millions. Thus the problem for those who are in charge of the affairs and the finances of local districts is to keep the right proportion between increasing assessable values and increasing expenditure. For as soon as the latter grows out of portion to the former the country is spending too much money.

It is impossible, as we have already said, to do more than refer to a few points in this important volume, and these are necessarily fragmentary, since the subjects of the report are so diverse. A good deal of attention at the present time is being given to the subject of highways, and it may be useful, therefore, to glance for a moment at the finance of our highways.

It appears that on March 31, 1902, there were 27,115 miles of main roads in England, of which 16,202 were repaired by County Councils, the remainder being handed over to District Councils to repair on behalf of the County Councils. This is a weak place in the administration of our highways, for every main road ought to be repaired by the Council of the county in which it is situated, for we are confident that the 3,597 miles of main roads in rural districts would be in a better condition if actually maintained by County Councils. Be that, however, as it may, we find that the County Councils have expended for the year ending March 31, 1902, 1,077,695*l.*, and that they have also contributed to Urban District Councils 729,585*l.*, and to Rural Councils 454,639*l.* The average cost of repair of the roads maintained by County Councils was 67*l.* per mile. As regards the cost of roads prepared by District Councils which are not main roads many of these are of considerable local importance, and the total mileage of the non-main roads—that is, the roads maintained by Rural District Councils—was 95,205, and their cost, otherwise than out of borrowed money, was 1,969,540*l.*, which represents an expenditure per mile of 20*l.* 14*s.* This figure, when compared with the cost per mile of main roads, shows clearly enough why District Councils are unwilling to transfer their jurisdiction to the County Council, because they spend less on their roads than do the County Councils. It would also be very desirable if statistics were given of the staffs, their pay, and their character; by which we mean the training which the paid surveyors have received before being put in charge of an area of highways. For every highway surveyor should be properly qualified technically, whereas unquestionably many surveyors are simply amateurs. No one who is placed in charge of a section of highways can execute his duties properly unless by reason of a proper technical training he is able to appreciate the value of contour, drainage, material, etc. Many of our English roads are in their present bad condition simply because many surveyors are, as we have said, amateurs, and so the ratepayers' money is wasted because the management of the highways is not in the hands of competent men.

Turning to another point, we are glad to note a considerable number of loans to Rural District Councils for water supply and sewerage purposes. There is a great deal to be done in this respect, but we think we here note a tendency to greater energy, and it is certain that nothing will tend more to the general improvement of our rural districts in regard to these matters than the force of example. Some of the sums borrowed are curiously small. Pontardawe, Glamorganshire, for example, borrowed 340*l.* for a new water supply, and St. Neots 400*l.* for the same purpose. These facts show, however, how easily,

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and at what a small cost, the health of many localities might be improved if those in authority would realise the special importance of a pure supply of water. We must conclude by again referring to the bulk of this report, which should be issued in two or three smaller volumes, each dealing with separate and distinct subjects which are comprised in the report.

FLOOD PREVENTION IN THE THAMES VALLEY.

YEAR after year many parts of the Thames Valley are flooded with monotonous regularity. Roads are rendered impassable, communication between neighbouring towns is cut off, houses are flooded, large areas of cultivated land are injured, and business is seriously affected. The disastrous flood now subsiding has caused more distress than is generally known, and it is only one of three similar visitations during the present year. The most extraordinary thing in connexion with these periodical inundations is that no public authority has ever suggested the advisability of works intended to prevent their recurrence. As several counties are affected, it may be that no one body would be competent to carry out the necessary works, but it should not be difficult for a working arrangement to be devised among the various County Councils in the basin of the Thames.

In the present day the Thames is practically an artificial river. It has been embanked more or less from its source to the sea; the extensive marshes and lagoons, once covering large areas along its course, and occupying much of the present site of London, have been drained and reclaimed; and above Teddington the river is essentially a canal. These alterations have had the effect of deepening the channel, so that it is sufficient to carry the average flow of water, but by no means adequate to deal with exceptional volumes in times of flood. Not the slightest attempt has been made to provide escapes for flood waters in the manner familiar to all irrigation engineers, and this strange oversight is a serious blot on the reputation of a people whose engineers have carried out some of the most noted hydraulic engineering works in the world.

If we turn to the pages of history, we find that the nations of old were far wiser in their generation than we are, perhaps because their government was in the hands of men having complete authority, instead of being split up into hosts of petty councils, unwilling to take concerted action, and unable to act alone in the promotion of any extensive scheme. When one bank of the Nile was reclaimed some 4,500 years ago, the engineers of King Menes constructed a longitudinal dyke parallel to the river, and tied by cross-dykes to the Lybian Hills. Into the basins so formed the waters of the flood were led by canals. Five hundred years later the resolve was made to reclaim the other bank of the Nile, and thus to confine the river to its own channel. This task was a difficult one, and required the exercise of great engineering skill. If the river had been suddenly confined, the low-lying towns of Memphis and others in Lower Egypt would have been exposed to disastrous inundations, just as are the low-lying towns of the Thames Valley in the time of flood. But the kings of the Twelfth Dynasty were not troubled with local authorities. They simply commissioned competent engineers to carry out the required works, and left things in their hands. Consequently the reclamation of the Nile was accompanied with all precautionary works necessary for the protection of the land and other property. The engineers of the great Pharaohs widened and deepened the channel leading to the natural depression, known as the Fayûm, in the Lybian Hills, thus providing an escape for the flood waters. These were led into the depression when the flood was dangerously high, and were returned to the Nile after the waters had subsided. The artificial sheet of water so made was called Lake Mœris, and was for many years one of the greatest wonders of the ancient world. The inlet and outlet channels were controlled by earthen dams, the prototypes of our modern flood gates, and these were only cut for the entry or exit of the water at such times as were ordained by the river engineers.

The early Egyptians may have worked with primitive tools and in primitive methods, but they did something that has not hitherto been done in the Thames Valley—they worked with their brains.

Inhabitants along the course of the Thames are now asking the question whether some means of protection against flood cannot be devised by our civil engineers, who have done so much in India and in Egypt. The answer is already written in the ancient records of Egypt from which we have quoted. There is no Fayûm depression into which surplus waters can be turned, but many low-lying areas exist that could be turned into escape reservoirs at comparatively small cost. The surplus water so collected might be returned to the river in times of drought, or made the basis for additional supplies for London and other centres of population.

A proposal recently made in the correspondence columns of *Engineering* is to cut a canal connecting the Thames near Reading with Southampton Water, so as to relieve the river in the very centre of its course, and give it a second channel to the sea. It is suggested that a water-course of this kind might or might not be so constructed as to be also a means of navigation and a route for commerce. Doubtless it would be quite feasible to construct a canal between the two points mentioned, but in order to provide an efficient escape, the flood waters should be able to flow by gravitation along its entire course, and with sufficient velocity to ensure adequate relief. Unfortunately the long range of the North Downs is interposed between the Thames Valley and the South Coast, and although there is a good fall from the hills to the sea, the first part of the proposed canal would have to be raised, step by step, through locks.

Without a careful survey it would be impossible to settle definitely the details, or even the general outline, of a scheme for the prevention of floods in the Thames Valley, but that a scheme of the kind could be devised and successfully realised is an absolute certainty. We have plenty of engineers competent for the work, and the only thing wanted is a combination of the authorities concerned and a decision that the task shall be undertaken.

NOTES.

The Claims of Archæology. DR. GRENFELL'S brilliant and eloquent address at the meeting of the Egypt Exploration Fund last week dealt to a considerable extent with subjects which are beyond our province, referring rather to philological archæology than to art and architecture. But his closing remarks, on the importance of archæological study in Egypt, that storehouse of ancient documents, and the manner in which it had been neglected by England during her recent predominance in Egypt, should not be allowed to pass without a word of special emphasis. Dr. Grenfell made an indignant and only too well-merited criticism on the ignorance and indifference of the English Government, and of average English people, as to the claims of historical and archæological study. The Governments of other countries encouraged their archæologists both with sympathy and money; the Government of England cared for nothing but the interests of Egyptian bond-holders; and Dr. Grenfell pointed out the splendid example, often forgotten now, which was set by Napoléon in his Egyptian campaign, when, not content with seeking merely military and political success, he took with him all the most learned archæologists and scholars he could muster, to carry on archæological research concurrently with the fighting. The campaign was not a success in a military sense, but the devoted labours of the *savants*, with the sympathy and encouragement of their young chieftain (Napoléon was only 29 years old at that date), laid the foundation of Egyptian archæology. It is an example worth quoting and worth remembering, though we fear the lesson falls on deaf ears when addressed either to English politicians or to English society. We observe that a leading daily paper, which gave the rest of Dr. Grenfell's address nearly *verbatim*, omitted all mention of his eloquent peroration. To English journalists and their public this kind of enthusiasm is but as sounding brass or a tinkling cymbal.

Radium and the Sun. IN the light of modern discoveries, we are no longer justified in accepting some conclusions based upon theories hitherto held with regard to the origin of the sun's heat. The calculations made years ago by Lord Kelvin and other scientists, as to the possible length of time during which the sun could maintain its present energy of heat radiation, must be set aside. It has been calculated that 3.6 grammes of radium per cubic metre of the sun's volume would be sufficient to supply the entire output of the sun's energy, and, further, the suggestion has been made that at the temperature of the sun, radium may be much more energetic than at normal terrestrial temperature. This is pure conjecture, but if true, a much smaller percentage of radium would suffice. Even if radium does not exist in the sun in sufficient quantity to account for the heat radiated, it is quite conceivable that other elements present may be possessed of similar radio-active properties. Knowing the enormous amount of energy that can be contained in an atom of matter, we cannot assert that the sun is incapable of liberating atomic energy to an extent comparable with that liberated

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from an equal volume of radium. Modern science has progressed far enough to unsettle our belief in many theories, but hitherto without furnishing adequate substitutes.

Erosion on the East Coast.

FURTHER attention to the subject of the inroads of the sea on the East Coast is being given by the authorities of the various towns and districts in Norfolk. During the past six months the aspect of things in the vicinity of Lowestoft has become still more serious. At Kirkley a recent storm has wrought great havoc at a fresh point, and at Lowestoft the sea-wall has been broken up or undermined by the waves. The proposal is to protect this wall by piling, but little progress appears to have been made with the work. Some comparatively new groynes have certainly proved useful, as during the last few months less injury has been caused to the cliffs which they serve to protect, and negative evidence as to the value of groyning is to be found in the fact that no groynes exist in front of the damaged sea-wall. It is highly probable that the fresh inruptions mentioned above are due to some change in the position of the sands out at sea. The investigations of Mr. Allanson-Winn clearly prove that changes are taking place in the bed of the sea at various points near the coast line of Great Britain, owing to tidal action. In other words, it seems that erosion is not confined to the earth which is above water-level, and that those who undertake the protection of the land have to fight an invisible as well as a visible foe. At a conference held on Saturday last in Norwich Captain Frederick, of the Board of Trade, stated that he could not pledge the Department to any action, but a resolution was passed requesting the appointment of a Government engineer to report upon the general question of coast protection in Norfolk and Suffolk. No doubt a report would be very useful, but whether the Government will feel justified in applying funds derived from all parts of the country for the relief of one particular district is quite another matter.

The Pollution of Rivers.

A DEPUTATION from Yorkshire, which was received recently by the President of the Local Government Board, raised a very important question affecting the well-being of a large population. The chief object of the deputation was to ask the Government to introduce a Sewage Pollution Bill on the lines of the recommendations made in the Report of the Royal Commission, with the amendment that a charge should be made on manufacturers who polluted the rivers. Upon the main point raised there is no doubt that legislation is required. The natural character of many rivers has been changed by the admission of sewage, and some have become little better than open sewers. This being so, it is unfortunate that Mr. Long was unable to hold out any hope that a Government measure would be immediately introduced. With regard to the demand that a universal charge should be made upon manufacturers, it should be observed that practical difficulties exist of such a character that the Royal Commission felt unable to make a recommendation of the kind. The position of the manufacturer under the Rivers Pollution Prevention Acts is already one entitling him to some sympathy. He is compelled to expend a considerable amount of money in the installation and maintenance of purification plant; he derives no appreciable benefit from his outlay by being able to turn to the river for part of his water supply, or in other ways, and is beset with difficulties which, without scientific aid, he cannot overcome. In many cases, firms in the same district, besides being heavy ratepayers, each pay more for dealing with effluents than the whole community pays for the treatment of sewage. Under such circumstances there is no apparent justification for placing further burdens on industry.

The Savoy Lift Accident.

AFTER the publication of our recent "Note" on this subject, the announcement was made that one of the injured men died in the Charing Cross Hospital, and on Monday last the Coroner's jury came to the conclusion that the death of the unfortunate man occurred through the breaking of the rope; that the rope was not properly examined by qualified persons; and that if it had been so examined twenty-four hours before the accident, it would not have been allowed to be worked. This is a very negative sort of finding; it neither fixes blame upon anyone in particular, nor suggests that the lift ought to have been provided with safety catches for sustaining the cage in the event of the rope breaking. From the evidence given, it appears that the moment the signal to lower was given, the wire rope broke, and the cage fell to the basement, a distance of 63 ft. The rope had only been in use for three months, but as the pulleys were much too small, it rapidly deteriorated, and on the day before the accident, it had fourteen broken wires, so that instead of having a breaking strength of nearly 8 tons, it failed under a load of 9 cwt., in addition to the weight of the cage. The general foreman, the foreman scaffolder, and a crane-driver on the works all knew that the rope was wearing fast, and that some wires were broken, but all of them thought it was quite safe. The injured man shared the same belief, but apparently were not aware that the rope was worn. There was some conflicting evidence as to the use of the lift by workmen. The general foreman said he had never seen any of the men use it, but that, although he had issued notices prohibiting the practice, he had used the lift himself on several occasions—a most injudicious proceeding on his part. The ganger admitted that he had seen the lift used by passengers, and one of the injured men stated that he had ridden in it "hundreds of times, both with and without materials." It is perfectly clear, then, that some of the responsible foremen knew this was virtually a passenger, as well as a goods lift, and some one ought to have seen that the rope was safe. At the same time, as the men were breaking rules by using the lift, the contractors escape from blame. Nevertheless the whole affair is highly unsatisfactory, and shows that legislation is required for regulating the application and use of all lifting machinery, whether intended for passengers or not.

London Street Traffic.

THE police evidence before the Royal Commission on London Street Traffic, given recently, was almost pathetic on the subject of cabs. It appeared that the driver of a crawling cab occupies a position nearly as independent as that of the Sovereign. If he crawls, but does not ply for hire, nothing can touch him. Ladies shopping have to submit to their carriages being sent away by the police to some convenient place as regards the traffic, even when they have no footman to summon them again, but the cabby, as long as he refrains from active politics, that is, as long as he does not solicit orders, can crawl through the streets, blocking the traffic at will, and although the police may order him to trot, it appeared from the evidence it was more than doubtful whether he was compelled to obey the order, except out of complaisance. This obstruction to traffic is at least capable of easy remedy, but none of the witnesses could suggest any remedy for the block occasioned by heavy cross traffic, bridges, or subways offering no solution where such traffic is concerned. It may, however, be anticipated that the increase in the number of convenient thoroughfares which is now being carried out may tend to diminish the inconvenience, as the absence of such roads has hitherto tended to focus the traffic at certain points.

Moving Staircases.

APART from exhibitions and a few large drapery establishments comparatively little use has been made of the contrivance somewhat inappropriately termed the moving "staircase." We learn that a device of this kind is contemplated in connection with the City terminus of the Great Northern and City Railway. Those of our readers who have made frequent use of tube railways know the drawbacks of the lift system. The object of every passenger apparently is to be the last in and the first out. When a train has discharged passengers at any station, no one has the least incentive to hasten his footsteps, because the lift always waits for the last crawling pedestrian before starting on its upward trip. The result is that nobody is in the least hurry and the time necessary for getting to the surface is increased beyond all reason. By adopting the moving staircase, the Great Northern and City Railway will allow busy people to pursue the "strenuous life" without minutes of enforced inactivity, while not interfering with the contemplative progression of those who prefer to saunter through the day. No doubt the company expect some direct pecuniary gain in addition to conferring a benefit upon the travelling public, and there is certainly reason for believing that the cost of attendance should be considerably reduced.

Tenants' Liabilities in Holding Over.

THE case of Harris and Another *v.* Heckman raised an interesting point for landlords and tenants. The defendant had been the lessee of certain premises under a three-years' lease, and under the terms of this lease he was bound to pay "all rates, taxes, assessments, and outgoings." At the expiration of the term granted by the lease he held over his tenancy, thus becoming a tenant from year to year.

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Whilst he was thus holding over a notice was served by the sanitary inspector under Section 3 of the Public Health (London) Act, 1891, drawing attention to the existence of a nuisance on the premises, and as he failed to comply with this notice the landlord carried out the work at a cost of 75*l.*, and now sued him to recover this expense. The defence was two-fold; first, that the mere notice by the sanitary inspector under Section 3 did not make the expenses incurred under such compulsion of law as to enable the landlord to recover them from the defendant, as a notice under Section 4, authorised by the sanitary authority, was necessary for such a purpose; and secondly, that the landlord could not sue upon the terms of the lease, as it was inconsistent with the facts that the tenant held on from year to year under all the terms of the lease. The defence was successful on both grounds, on the second point the Court finding the parties could not be reasonably considered in fact to have continued the tenancy only from year to year with a liability on the tenant which exceeded his yearly rent.

The Housing of Roadmen.

A CORRESPONDENT in the *Times* referred recently to a question which is of considerable importance—namely, the housing of the men employed on highways by the local highway authority, whether a county or a district council. At the present time the workmen on the rural roads appear to have to find their own habitations, consequently these may be at a long distance, even in a different county. If the highways are to be properly looked after it is essential that those who work on them should not be mere casual labourers, but men capable of being, as is necessary, left to do their work for a large part of each week without supervision. It is impossible for a highway surveyor or his assistant to be on each length of road throughout the day, and there is consequently no calling in which it is easier for men to shirk their work, whether by pure idling or by getting to and from it either too late or too early. If the workmen in every area of highways were provided with houses there would be an inducement to a better class of labourer to take to this work, and it would bring into the country districts, which are said to be losing their population, a respectable and active community which would be a very useful addition to the rural population.

Scarborough Harbour.

A MOVEMENT has been commenced at Scarborough by the Corporation of the port, and supported by the fishing interest, for the enlargement of the existing harbour, by the construction of a deep sea extension outside the East pier. It is proposed that the area of the extension should be seven-and-a-half acres, with a depth of 14 ft. at low water, the estimated cost being between 250,000*l.* and 300,000*l.* So far, the scheme seems to be in every way worthy of commendation, and one that the local authorities might very properly take in hand. But they have no such intention, and suggest that the North-Eastern Railway Company should be asked to buy the existing harbour, and to carry out the extension works. Why this course should appear right to the Corporation and the Harbour Commissioners we cannot imagine. Scarborough has been a self-governing borough for fully six centuries, and ought to be in a position to provide for its own admitted needs. There is always danger in handing over public works of the kind to a powerful railway company, whose interests may not be identical with those of other people. More than one well-known watering place has been disfigured, if not ruined, by the unnecessarily obtrusive character of railway lines and stations; and it is to be hoped that, in their anxiety to promote local industries, the Corporation will not do anything likely to prove prejudicial to the interests of the town.

Institution of Electrical Engineers.

IN his presidential address to the Institution of Electrical Engineers, last week, Mr. R. K. Gray pointed out how the development of the electrical industry had been hampered in its early stages by inequitable legislation. If, however, we except the Electric Lighting (Clauses) Act of 1899 we find that there has been no legislation upon the generation and distribution of electricity since 1888, when an Act was passed to amend the defects of the original Act of 1882. This absence of legislation has not been a boon to the profession. The question of distributing electricity in bulk is now of pressing importance. It is much more economical in nearly all cases for local authorities to receive electricity in bulk, and then retail it to their consumers, than for them to start generating stations of their own. It is, therefore, desirable that the Electric Lighting Act be amended, so that the municipal area is not the unit area for distribution. Mr. Gray pointed out that the centre of production of electricity tended to gravitate northwards, and that soon nothing but consumers will be left in the metropolis. This was due to the higher cost of raw material, and the higher wages which were paid in the neighbourhood of London. He mentioned that the Institution had acquired a suitable site for a building in Tothill-street, but that in view of the possibility of several kindred societies uniting to erect one large temple of engineering there was no immediate intention of building. Professor Ayrton, in moving a vote of thanks to the president for his interesting address, mentioned that the idea of a temple of engineering had been first proposed by Sir William Siemens, who had offered a donation of 10,000*l.* for this purpose. Nothing, however, had come of this proposal at the time. The Americans had now adopted this suggestion, and such a building was being erected in New York.

All Hallows, Lombard-street.

WE are glad to see that, so far, the proposal to destroy so fine an interior by Wren as that of All Hallows, Lombard-street, has met with a decisive opposition at a meeting of parishioners, held on the 12th inst. It was stated that under the scheme drafted by the Ecclesiastical Commissioners it was proposed to demolish the present church and apply the funds resulting from the sale of the site to the erection of new churches in other parts of the diocese of London. One of these churches was to be named "All Hallows," and the fittings, furniture, bells, and stained glass of the present church were to be used in it. That, however, will not give us Wren's admirable interior, so peculiarly well suited for congregational worship. Two petitions against the demolition were read, one of them signed by the President of the Royal Academy, and a number of other persons well known in connexion with art, science, and literature. On a vote being taken, the bishop's proposals were rejected by 64 votes to 10. What use may be made of churches by Wren where congregations will not attend is a question no doubt to be discussed; but it is quite certain that the worst use you can put them to is to demolish them. If this goes on we shall have a number of the finest monuments of one of the greatest Renaissance architects sold to provide building land—a thing which would be a disgrace to England.

Chippendale Furniture.

THAT the time of a judge and jury should be occupied in a squabble as to whether a set of chairs purchased at a moderate price in a Tottenham Court Road furniture shop were genuine Chippendale work or not, and if not, whether there had been any warranty by the seller to this effect which had been broken, seems rather absurd. But this is what happened last week. In the result the purchaser had the satisfaction of receiving a small sum by way of damages, a sum insufficient to recompense him if he had really been taken in. At the same time if he had obtained genuine Chippendale work for the price he paid, he would obviously have made a good bargain, so that it is difficult to see where he was the loser. The fact is that the jury thought, as we read the report, that the furniture dealer had not been straightforward in the matter, not only as regards the so-called Chippendale chairs, but as to other furniture, and had said more about Chippendale than he should have done, and that for what he had got merely as furniture the buyer had paid too much. It is a pity that those who are in want of furniture should run after names when they are ignorant what they mean. If buyers would endeavour to cultivate their own taste, and seek to obtain furniture which combines utility and simplicity, they would obtain much better articles, have more to show for their money, and at the same time improve the character of furniture generally. If foolish people will ramble about Tottenham Court Road asking for Chippendale chairs, the trade will be certain to manufacture mere imitations of old articles to supply the demand.

New English Art Club.

THE first wall in the new English Art Club Exhibition at the Dudley Gallery contains a good many of those kind of crudities which are to be seen in no other exhibition: "The Market Church, Richmond" (5), an architectural drawing, all out of perpendicular; a "Golden Evening" and an "Autumn Morning" (6 and 14), which are little more than splashes—we overheard the remark that the latter work was "brim-

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ming over with mirth" (that is the way people talk at the new English Art Club), so perhaps it is a joke; an ugly smudge of a head dignified by the name of "A Sketch" (22), and "A Gate at Tangier" (23) by a fashionable amateur, who has discovered that to throw a little colour on to the paper anyhow, and call it something, is an art which has its public. Rounding the corner on to the next wall we get into rather happier regions. Mr. Rich's "Storrington Common" (38) is a really fine sketch, though no more than a sketch. Mr. W. Rothenstein's "Mother and Child" (61) has a great deal of character in the figures and in the rather naïve and flat treatment of the accessories; the manner in which the texture of the wood panel over the chimney-piece is differentiated by the use of a thicker pigment and heavy brush-marks is a clever bit of executive tact. The failing of this, and of Mr. Orpen's large interior with portrait groups at the top of the room (94), is that they are not in the true sense *pictures*—i.e., they are not compositions with a unity of purpose; the figures seem put in by accident rather than design. Mr. Ambrose McEvoy's "The Book" (65) shows the difference; this grouping of two figures shows design and *motif*, and not merely surface execution. Mr. James Charles's landscapes are rather bewildering to the eye in their restless spottiness of execution, yet one is reminded that nature too is spotty at times, and the nook in the fields by a plantation, called "Sweet Rest" (66) really gives the kind of impression of multiplicity of growth and of *lætæ segetes*, which one gets in an untouched corner of rural vegetation. Miss Mary McEvoy has realised a very difficult effect in the interior called "Evening Sunlight" (82), a light which really gets into one's eyes. Among other things that stand out in one's recollection are Miss Gardiner's "Lavoir à Chartres" (101), with the old houses yellow in the sunlight; Mr. Furse's fine half-length of "Mrs. M. B. Furse" (107); Mr. Mark Fisher's "An Irish Pastoral" (106); and among things that are astonishing in another sense are Mr. Wilson Steer's "Richmond Castle" (118: is this also "brimming over with mirth"?) and the delightful production entitled by its author, "Study of a Man" (125), in which the object seems to be to show how ugly a head he could produce.

The Leicester Galleries.

A MISCELLANEOUS collection of water-colours, now on view at the Leicester Galleries, in Green Street, Leicester Square, is of quite exceptional interest with regard to the general excellence of the works exhibited. Many of them are not new works, but they are such—as for instance Mrs. Allingham's perfect little picture "An Old Cheshire Cottage"—as one is glad to see at any time. As an example of minute attention to detail without the slightest hardness this is a wonderful work, even down to the indication of the plaiting of the basket carried by the girl (about a quarter-inch square in the picture), and the way the sunlight catches it. But nearly every drawing is worth looking at. Among those which there is some special reason to name are Mr. Wallace Rimington's "An Alpine Garden" (42) and Mrs Albert Stevens's "Michaelmas Daisies" (44), the latter a quite exceptional bit of flower painting. Mrs. Stanhope Forbes has two fine ideal studies of figure and landscape (50 and 54), both called "Autumn," both in what one may call the same key of feeling, but different in colour and detail. Various drawings by Mr. Sutton Palmer show great diversity of power. Mr. Walter Tyndale's "Crockery Market, Rothenburg" (65) is a rather new subject, in which a happy colour effect is supplied by the collections of variously-coloured pottery. Mr. Walter West, one of the latest Associates of the Society of Watercolour Artists, has a charming sketch of a lady, in pencil, touched with colour, under the title "Summer Days" (78). The exhibition includes works by Mr. A. Goodwin, Miss Minnie Smythe, Mr. Spiers, Mrs. Fulleylove, Mr. Orrock, and other well-known artists.

The Montague Fordham Gallery.

THE Directors of this Gallery announce that they have amalgamated with the Artificers' Guild, Limited, a company formed some time since under Mr. Nelson Dawson This company's metal-work business and workshop will continue its work, and henceforward take orders and exhibit at 9, Maddox Street. Mr. Nelson Dawson has founded a school of modern metal work based on the traditional methods of smiths' work, or at least what is left of the tradition. Perhaps no modern craft can benefit so largely from the work of the past as that of the worker in metal. In smiths' work there is still a certain tradition which in other crafts has entirely disappeared, and from the comparative indestructibility of the material there are far more numerous examples of mediæval iron work than of mediæval work in any other material. We should be glad to see a tendency to novelty nipped in the bud. Certain exhibits at the above Gallery show a tendency in that direction. Iron is, to our mind, a material calling for severe lines rather than pretty ones, unless indeed it be cast, when it is capable of great refinement. But prettiness and triviality are special sources of weakness, and the workman should, as far as possible, be left to himself. It is at the present time next to impossible to obtain metal fittings of sound design unless they are mere copies of better times, and this we attribute to the designer on paper. Ironwork is only one of the handicrafts that have been nearly smothered by modern civilisation, but Mr. Nelson Dawson has done such fine work in metal that a continuation of it is greatly to be desired. Jewelry by Mrs. Dawson and Mr. H. Wilson and the lovely pottery made by Messrs. Martin Brothers form part of the present interesting exhibition of English handicrafts.

The Quest Gallery.

A COLLECTION of silver repoussé work is now being exhibited in the Quest Gallery, 172, New Bond Street. The greater part of the exhibits are the work of Mr. Gilbert Marks, who occupies a high place among workers in repoussé metal work; great charm of execution and of design characterise the ornament that adorns the bowls, loving cups, and other pieces. Truthfulness to nature is carried, however, further than is legitimate; while admitting the beauty of the execution, we cannot but feel that a more conventional and decorative treatment is more proper for the material. The form of some of the larger vessels rather emphasises the impression that nature is more studied than the severe lines of design which characterise the best periods of the gold and silversmith's art. Miss Parsons exhibits a number of toilet necessaries, some bowls and vases which recognise the value of form and plain surfaces, though they are rather crude in outline. Of work by other artists the followers of Mr. Gilbert Marks show the best work, some of which is very beautiful, particularly an entrée dish There are besides a number of miniatures by Mr. Charles Sainton, R.I., which, whatever may be thought of the class of subject illustrated, are works of art, showing infinite care and study in their production and finish.

An Exhibition of Embroidery.

THERE is an exhibition of antique embroideries now on view at Messrs. Debenham and Freebody's, in Wigmore-street. It includes some beautiful pieces of needlework, and also some curious examples of old work, not beautiful in themselves, but interesting to the collector. One of the finest pieces of work is a large half circle of blue-green velvet, probably a church vestment, elaborately embroidered in a conventional pattern of flowers and leaves in gold and silks. There are several other church vestments which are very beautiful, one in particular, in thick white silk with a large bold design in raised gold and coloured silks. A child's frock in white silk is very fine both in design and execution, but a white silk waistcoat which is equally well worked is spoilt by the naturalistic design of flowers. One could not help thinking what an addition a beautifully embroidered satin waistcoat would be to the modern evening dress of men. There are two frocks or skirts of white satin, with a large amount of fine embroidery quite spoilt by the addition of tawdry net and spangles, and bits of feathers worked in. People who do fine needlework should use nothing which is merely a fashion of the day, for when the first freshness has gone, only tawdry vulgarity remains. Good gold thread and silk will be things of beauty for hundreds of years, if the design is well carried out. There is always something touching and pathetic in the sampler—the work of very young girls with the little moral worked in such fine stitches; one wonders what injury was done to the young eyes. The name and age is generally put at the bottom: "Rachael Punchard, aged 14, 1704," "Mary Ann Langford worked this in the 17th year of her life, 1783." On both of them is a verse beginning

"Look well to what you take in hand,
For larning (*sic*) is better than house or land."

Amongst the curiosities is a Bible cover of Stuart embroidery, a nude Adam and Eve under an apple tree, the fruit in very high relief, and rampant and couchant animals on each side of the figures. Another piece of Stuart work has high-relief figures of Charles I. and Henrietta Maria. There are several landscapes worked in fine black

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silk on white, which have almost the appearance of pen-and-ink drawings. Amongst the landscapes is one of a white silk lady standing by a white silk fountain and stream where a dog drinks; underneath is worked, "Aimable chien, viens avec moi."

Offering Commissions to Architects.

A FIRM of makers of billiard tables and accessories of billiard rooms are sending round a circular to architects in recommendation of their work, concluding with the sentence: "In the event of business we should, of course, recognise the usual architect's remuneration." The firm who send this perhaps know no better, but they have made a serious mistake if they think they can recommend themselves to the profession by such a course.*

STREET ARCHITECTURE: FORMAL OR IRREGULAR?†

IF we allow our minds to wander from the present, with its need of action and decision in small affairs, there is nothing so enthralling as the thought of carrying into effect unreal and apparently improbable projects of the mind; projects that to the architect will be connected with building operations, if not of great magnitude, at least of unimagined beauty. If, as we get older, we realise that perhaps it is well these day-dreams were never carried into effect, to have been under the spell will be some preparation for such opportunities as may occur actually in the future.

Think of starting *carte blanche* with an ideal city to build; the people would, of course, have to be ideal, too. They would want beautiful architecture, the effect of it on their minds would be as much considered as the effect on their bodies. Commerce would have no ugly side. The natural resources of the site would be equally agreeable. Formality and irregularity would be blended—

diffused in every part
Spirit divine through forms of human art.

Unfortunately for the individual architect, the comparative desirability of regular and irregular treatment of street architecture is rather an abstract matter for discussion than a practical question. It would, of course, be hard to find the man who would not tackle the question in real earnest; but, as a rule, whole streets are not given to the lot of one architect to design, nor is the architect the only judge of desirability. He may know what he wants, but it may not suit the man in the street or the man in the house. I think we shall find that the relative merits of the two manners of building are to be judged by a standard that in this workaday world no single class of persons can set up. Great schemes coming from the minds of such masters in architecture as Michelangelo, Inigo Jones, and Sir Christopher Wren were doomed to remain in the world of fancy and the unachieved. Some of these I will refer to presently. We can only judge them by such completed fragments as they have left. I daresay their designers had similar experiences to the modern architect; difficulties of site, lack of funds for the building, and patrons undecided upon what they required. It would not be uninstructive to compare the conditions under which they lived and worked to ours, to see, perhaps, whether the great ideas have any better chance now than then—given equally great men.

A definition of street architecture is hardly needed, it is the outcome of placing buildings side by side so as to form a continuous frontage to the street. The value of land and the necessity to economise space are the conditions that have produced it. The very complexity which determinees its existence, the vicissitudes of cities, their growth and their decay, make for irregularity, and sometimes for very charming irregularity.

Take, for instance, a city like Norwich, where the principal street winds round the castle, following the lines of the old moat; or Coventry and Bury St. Edmunds, with streets grouped round the monastery. They were originally poor enough stuff of wood and straw, from which the inhabitants were burnt out occasionally, and often had to retire to the castle or monastery in times of danger. There are very few examples of Gothic street architecture left that I have been able to find, and these only in illustration.

The most complete mediæval towns are to be found in Germany, the best, perhaps, being Ratisbon and Nuremberg. Both were very important places. One of the chief peculiarities of their streets is the large number of towers, some of them of great height, which were the domestic houses of many of the most wealthy and influential citizens. There is no attempt at regularity or symmetry either in the streets or houses. The position and size of doors and windows were dictated by considerations of convenience only, and the buildings generally have the merit of truthfully interpreting their internal economy. No space was wasted, business being conducted on the lower floor, while the citizen lived with his family over the shop. The steep-pitched dormer-lit roof was the store-house for goods and merchandise, raised or lowered by wooden cranes sheltered under picturesque tile-covered pents. Most of the best wooden decoration was in shop fronts. In street architecture, of which the shop was only a part, each design differed in treatment or in outline from the next one; and, as a rule, the upper stories were more highly decorated than the ground floor, where the decoration was mostly confined to the door of the dwelling house, leaving the shop in serviceable plainness. Surround such a city as this with all its original walls, gate-towers, postern-gates, and ditch, and you can imagine the romance and charm of an irregular city and its streets during the Middle Ages.

In England the movement from the older cities to the country is worthy of attention in passing, as it was the genesis of a street architecture of which there is much in the smaller towns, and even in the heart of some of the big manufacturing cities. The nobility may have planted their granges or mansions in the neighbourhood of some wealthy and industrious church centre, where the land had already been cleared and fertilised. We can imagine such a locality may have seemed a desirable one in Henry VIII.'s reign. However that may have been, after the country recovered from the dissolution of the monasteries, many hamlets grew into thriving country towns, the features of which were the church, the grange, and the High-street. The irregular architecture of such streets as these, as we see them now, is altogether charming. The doctor's house, the solicitor's office, the principal inn, and the neighbouring shops, present, as a rule, one continuous frontage to the street. There is variety of treatment according to the social importance of the inhabitant, and there is no formality nor method in the placing of them. Yet there seems to be unity in the whole street, the result not only of the mellowing years, but of local building materials and a tradition in their use and design that we shall have reason to notice later on. Wordsworth speaks of "the stream-like windings of that noble street" at Oxford, which is typical of many to be found in England.

The remains of formally laid-out towns and streets are traceable to the Romans. The spirit of control and exact discipline which characterised the Romans naturally pervaded their building undertakings. Their architecture exhibits reserve not perhaps the most attractive, for in art, as in nature, reserve is satisfying only when you feel there is something behind worth reserving, but still a reserve of power that fascinates. A power, too, that continues to exercise a profound influence upon our minds and actions, even though the conditions are so changed. Professor Lanciani, in his writings upon Rome, describes its genesis, which was anything but formal. The Sacra Via, or Queen of Streets, as it has been called, though straight in parts, had many turnings, and was rather a magnificent collection of buildings than a street in the modern sense of the word.

The towns built by the Romans after the Conquest and occupation of some neighbouring country, afford the best examples of regularity of plan. The favourite form of their towns was a rectangle, the fortified walls forming the four sides, with a gate in the centre of each. The principal streets were carried through in straight lines crossing each other at right angles: the Forum was placed in the centre of the town. Housesteads, in Northumberland, is a typical example of the remains of a Roman military town, in plan as we have described, with the Prætorium in the middle. The Roman town of Calleva Atrebatum, at Silchester, Hants, is on somewhat different lines. It occupies the site of a previous British fortified place, the Roman walls following the irregular lines of the British entrenchments. Inside the walls the town is laid out in a regular system of squares, or "insulae." In the centre stand the ruins of the Forum and a Basilica. No regular plan seems to have been followed in the insulae themselves; the space between the walls may have been too confined for a crowded population, who might have found it dangerous to build outside the city walls in a hostile country. Besides these and many other similar remains, are towns such as Lincoln, Colchester, Chester, and Chichester that are of Roman origin. Unfortunately there are only a few relics of the street architecture of the towns in their Roman state. At Cilurnum, in Northumberland, there are remains of colonnades along the façades of the streets showing that the form of street architecture then in common use was that of a continuous colonnade or verandah. The value of the colonnade, or "Stoa," was recognised almost invariably by the Romans in their streets. Mr. G. E. Fox has made a restoration of the Forum at Silchester from discoveries and architectural remains found on the site. The restoration is interesting in its indication of a formally laid-out square of street architecture. The shops, according to Mr. Fox were placed on the north and east sides of the Forum, which was itself surrounded by an ambulatory, the shops probably opening on to this outside ambulatory as well as on to the inner ambulatory of the Forum, thus getting plenty of light and great convenience for trade.

One of the finest ruined cities in the east is that in Syria called Jerash, generally considered to be identical with Ramoth Gilead. From its remains it seems to have been a complete Roman city of great importance, built to one plan without regard to previously existing buildings, which in all probability were a mere irregular collection of huts. The Roman buildings include three temples, two theâtres, a stadium, a circus, propylea, and a basilica, baths, a triumphal arch placed outside the city walls leading to a finely laid-out street of columns, of which a great number are still standing in a circular peribolos. There is, besides, a bridge and a complete circuit of walls and gateways. The street of the columns is the main street of the city, running north and south, of a mile or more in length, paved with flag stones. There seems no reason to doubt that it was a magnificent example of formal street architecture. The city was apparently deserted soon after the Roman occupation. The remains show that "the street that is called straight," in Damascus, one of the oldest cities in Syria, was laid out on formal lines by the Romans. There is evidence that the street was once lined by columns, probably supporting a covered way to protect foot-passengers from the weather. If the houses, as was often the case, were lit only from a courtyard at the back, the effect of the plain wall with the ambulatory must have been very effective.

Another interesting class of towns are those which were founded entirely in the Middle Ages, built from their foundations for a specific object. They appear to have been based upon observations of the towns built by the conquering Romans, and the similarity in their disposition will be obvious by comparing the plans of both. These towns were founded by Edward I., who granted them special privileges to encourage their occupation and advancement. In England they were called "New Towns" or "Free Towns"; in France, where they were principally founded, "Ville-neuve" or "Ville-franche," names that frequently occur. In 1298 Edward I. wrote from Bordeaux to London desiring the authorities there to send him out four persons competent to lay out the plans of towns. "The most clever and able, and those who best know how to divide, order, and arrange a new town in the manner that will be most beneficial for us and for the merchants, and who shall be ready and willing to go for that purpose wherever we may send them." The best example in England is Winchelsea; in France, Mont-

* Since the above was written, we have received indignant letters from several architects, enclosing the circular. A provincial architect writes—"I have just added this firm's name to what I call my black list—that is to say that they, with a few other firms who sent me similar offers, will never be employed on any works I am engaged on."

† A paper read before the Liverpool Architectural Society on the 4th inst. by Mr. W. Curtis Green.

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pazier. They are thus described by Parker: "These towns . . . are built on an excellent and scientific plan, combining very close packing with great convenience for individuals, while the principal streets were wide, open, and straight, crossing each other at right angles only. There are always two parallel streets at a short distance one from the other, and connected by short streets at frequent intervals; between these principal streets, and also in parallel lines, are narrow streets or lanes, corresponding to the modern mews and employed for the same purpose. By this means each plot of ground for building on is of a uniform size and shape, a parallelogram with one end facing a principal street and another a lane." The principal streets measure 24 ft. wide, the lanes 16 ft. wide, and the passages between the houses only 6 ft; these are the measurements of Montpazier the most perfect and regular of the so-called "English towns." "Near the centre of the town was a large market-place, at one corner of which was usually the church; and it should be observed that the principal streets do not cross each other in the centre of the market-place, but run in a line with its four sides, passing out from each corner in a direct line to the extremity of the town, as at Salisbury, so that the traffic did not interfere with the central space, which was planted with trees. In southern climates the houses round the market-place are built on arcades, or a series of groined vaults open on one side, with shops on the opposite side. These covered ways are of the same width as the main streets, 24 ft., so that there is ample space for two carts or waggons to pass each other without inconvenience." Thus laid out they afford unique opportunities for formal street architecture, and, if we may judge from the instances intact, that are illustrated to accompany Parker's account of their planning, the Gothic builders of the thirteenth century rose to the occasion with considerable success. If we further continue a search for the inspiration to formalism in street architecture during more modern times, we must turn again to Italy. Though there was no real lack of continuity in England between the art of the Middle Ages and the Renaissance, Italian workmen and foreign ideas played havoc, for a time, amongst the builders who were working from a tradition handed from father to son without either architect or trained designer. Then appeared Inigo Jones, the first architect in England, and probably the greatest. He spent some years in Italy, and returned saturated with Italian art. Speaking of this period, Mr. Blomfield says: "The homely fancy, the lovable humility as one might say, of English traditional art were laid aside; the art of this country was to be no longer an affair of happy instinct, but completely conscious, dependent on scholarship almost as much as on capacity in design. Henceforward abstract thought and imagination under restraint were to supersede the poetry of mediæval fancy;" a slow but remarkable change of sentiment and national character, making for formalism in religious and artistic expression. In Covent Garden Inigo Jones first conceived and carried out the idea of uniting a number of distinct dwelling houses in one architectural whole. Special distinction was given to this design by the composition of St. Paul's Church, with its fine portico and appended gateways, occupying the west side of the square. His travels in Italy evidently suggested the use of the piazza on the north and south sides. The only other street architecture that I know of attributed to him are the west side of Lincoln's Inn Fields and some houses in Great Queen-street, partially demolished.

To Sir Christopher Wren we owe the finest scheme ever conceived for laying out a city. Wren's opportunity of displaying his wonderful talents was after the Great Fire, when the City was a heap of ruins. He drew up a plan for its reconstruction, which he laid before the King and the House of Commons. This plan was accepted by the King, but eventually abandoned. Men were prepared to receive the idea of unity in the abstract; but not for a scheme, however admirable, which by reason of the necessary delay in rebuilding would have touched their interests or their pockets.

They were adverse to alter their old properties, and to forego the right to build their houses on the former sites and foundations. Thus, by a lack of public spirit—a want of confidence in the genius of the architect and the justice of the State—a grand opportunity was lost of making the new city one of the most magnificent in the world.

Wren avoided in his plan the deformity and inconvenience of the old town by widening the streets and lanes; giving efficient main thoroughfares north and south, east and west; "by planning the churches in conspicuous positions and insulating them; by forming the most public places into large piazzas, the centres of eight ways; by uniting the halls of twelve chief companies into one regular square annexed to the Guildhall; and by making a commodious quay on the whole bank of the river from Blackfriars to the tower."

"In making the plan he arranged that the streets should be of three magnitudes. The principal leading through the city, and one or two cross streets to be at least 90 ft. wide, others 60 ft., and the lanes about 30 ft., excluding all narrow dark alleys without thoroughfares, as well as all courts. The Exchange was to stand free in the middle of a piazza, and be, as it were, the centre of the town, whence the 60-ft. streets, as so many different rays, should proceed to all the principal parts of the city; the buildings to be contrived after the form of the Roman Forum, with double porticoes. Many streets were to radiate to the bridge. The streets of the first and second magnitude were to be carried on as straight as possible, and to open into piazzas. On the banks of the Thames was to be formed a spacious and convenient quay with large docks. He proposed that the churches should be designed according to the best forms for capacity and hearing, adorned with useful porticoes, and with lofty towers and steeples in the greater parishes. All trades that use great fires or yield noisome smells were to be moved out of the town."

This description, together with the bird's-eye view of the city as it might have been, were published in the *Builder* of July 3, 1875. It shows the possibilities of public buildings linked together by broad streets; the importance of grouping the principal buildings; and of good sites, and the advantage of a complete and consecutive scheme to the dignity of a great city.

An interesting figure in this connexion is that of John Wood, who was extensively employed in Bath and the neighbourhood during the first half of the eighteenth century. He seems to have been endowed with some of Wren's intellectual capacity for architectural conceptions. His execution was, of course, inferior to that of Wren; but he had the opportunity, which Wren was denied, of carrying out a very considerable scheme for building a city.

Contemporary with John Wood, of Bath, was Isaac Ware, who designed many houses of the street architecture type. It is interesting to trace the growth of London westward, taking the work of architects in chronological sequence. Ware designed some of Hanover-square, he did a great many houses in Albemarle-street, Berkeley-square, Bruton-street, Burlington-gardens, and Dover-street. Ware's work is distinguished by good planning, and by greater dignity and strength than that of his successors.

Passing over such names as Sir Wm. Chambers and the younger Dance, men of the old school of Palladian tradition, we come to a smaller breed, headed by the celebrated Adam brothers.

They designed several important buildings in Edinburgh, including some of the fine squares in the new town. Their work in London consisted principally in dwelling-houses connected in a continuous architectural treatment; they built more street architecture than any architect before or since their time, a great deal of which was speculative building, a plan for money making that they seem to have originated. Their work is the most successful formal street architecture in this country; its value as a type of what should be more thoughtfully developed cannot be too highly estimated. As a composition, George's-square in Edinburgh, is exceedingly effective. The central block on the west side is a church, on either side of which are dwelling-houses or offices. This and Covent Garden are instances in which buildings designed for totally different purposes have been formed into one fine architectural scheme.

The next work of importance in formal street architecture was Regent-street and the houses round Regent's Park, the work of John Nash in the beginning of the last century. The Regent-street quadrant shows the beautiful effect that formal street architecture may attain, even though it be not of the finest in itself; the sweeping horizontal curves are admirably emphasised. Regent-street is one of the streets that has suffered considerably in the hands of individual leaseholders, a practical objection to formal street architecture that is very obvious.

There seems to be no restraint upon a tenant painting the exterior of his own frontage at the season and in the colour of his fancy; from the coping to the iron railings of the basement, every feature is divided in fair proportions by the conscientious house decorator. The fault lies as much with the improper use of stucco as with the tenant.

It is a material greatly despised of the public, but we all know the fine effect it has given to Italian architecture of the Renaissance used on flat surfaces with stone dressings and cornices. The fact is that any material may be used provided the nature of it is expressed in the handling. In studying the past, the value of building materials is brought forcibly to light. Everyone has noticed how the accident of a local building material easily obtainable, affects the appearance of a town for good or evil; or used to affect it when transit was not so easy, and the demand upon the originality of the architect so pressing. In wooded country, the plentiful supply of oak made a style of architecture for towns such as Chester. Bath stone and Aberdeen granite give the keynote to the building of the respective towns from whose neighbourhoods they come. Both materials suggest certain ways of building conducive to formalism, and irregularity is softened to harmony by a common material for expression. Brick and tiles give a character to smaller coast towns and villages, and these materials on the continent are used for whole towns, such as Pavia, Cremona, and Crema, built of brick made in the valley of the Po. Paris owes much to her fine building stone, while the lack of a suitable material in London has led to the most incongruous mixture of styles, and the place is a veritable collection of samples. I believe if it were entirely rebuilt in London stock bricks it would be a very much finer city than it is now. At the present day there is no material that plays so important a part in the construction of street architecture as iron. It is the ghost in the architect's cupboard; not the kind that Mr. Pecksniff kept; it troubles only the man who designs himself, and who would, if he could, "build in truth and design with beauty." It is a utilitarian material, and it is not always easy to associate art with purely utilitarian requirements, such, for instance, as those of modern commerce. Is it only a material for engineers? Shall the future see the engineer, after having finished the ground floor of stanchions, girders, and plate glass, then call in the architect to design the building? I think it is a question that cannot be avoided when street architecture is under discussion, and street architecture is no contemptible addition to the written histories of the time which saw them built. The conditions have changed since art and religion evolved the architecture of the Middle Ages; the connexion between art and religion is now less obvious, but it is common sense that art can only thrive on lines parallel with the aspirations of a nation in whatever direction. I do not think it unreasonable to suppose that the nineteenth century will be famous for engineering works such as the Forth Bridge, and not for the architecture of the Revivals. We can console ourselves with the fact that the greatest works of engineering can be always wholly referred to the interaction of utilitarian motives and natural laws; and from these all architecture is distinguished by some subtle quality of fitness or beauty which is beyond analysis.

Can the subtle qualities of beauty and fitness be displayed when the whole ground floor is to be a sheet of glass to oblige the owner? The late Mr. Bentley told me that under no circumstances would he use iron, and his achievement in the roofing of the Cathedral at Westminster without it is notable. On the other hand, an architect as eminent has used it in any place that was convenient; but the layman would be unaware of its presence, so cosily is it buried out of sight. There is an attempt to use it for constructional purposes in George-street, Westminster, not without success, and I believe that some such solution to the question is the right one. Use it openly, and decorate it in a manner suitable to its nature, such as that employed in the eighteenth century in the design of grates, etc.

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There are other restrictions which are insignificant to the engineer but are a trial to the architect. Our Baron Haussmann, the Building Act, lays a formal hand on picturesque irregularity by limits to the height of a building, to the projection of cornices and bays into the street, and to the size of windows, etc. These limitations hamper the architect, and in weighing the question of irregularity and formality they must be considered, and, in my opinion, favour formalism. But it is not my object to establish the practical difficulties of adopting either the formal or irregular treatment of street architecture. It is the *desirability* we want to get at. The difficulties of arriving at that need not be confused with the difficulties of carrying either method into execution. If the desirability of one or other method could be maintained the difficulties would remove themselves.

To arrive at the abstract quality of desirability it is not sufficient to express likes or dislikes. In Browning's words—

> "Now, who shall arbitrate?
> Ten men love what I hate,
> Shun what I follow, slight what I receive;
> Ten who in ears and eyes
> Match me: we all surmise,
> They this thing, and I that: whom shall my soul believe?"

But though it may be difficult, perhaps impossible, to set up a recognised standard of taste, certain tendencies may be observed and the arguments in favour of both manners of building set forth, and at this point you become indebted to my friend Mr. Maryon Watson, who has written an admirable paper upon this subject. He points out that the man in the house and the man in the street approach the subject of street architecture from mutually exclusive standpoints, and that the truth lies with a third party, who, living in one house and looking out upon another, remarks that in large cities houses are made partly to live in and partly to look on. This third party ought to be useful to us to-night as an unprejudiced person who has thought the matter over. But before allowing him to sum the matter up, I must quote again from Mr. Watson. He says: "There are no two ways about irregularity, but formality has its grades from the dreary procession of mile stones along the high road to the elaborate evolutions of the dance"—

> "Mystical dance, which yonder starry sphere
> Of planets, and of fixed, in all her wheels
> Resembles nearest mazes intricate,
> Eccentric, intervolved, yet regular
> Then most, when most irregular they seem,
> And in their motions harmony divine
> So smoothes her charming tones, that God's own ear
> Listens delighted."

This quotation illuminates the ground upon which the formalist takes his stand. It refutes the idea that Gower-street is typical of formal street architecture, for it is that leaden formalism which is often in people's minds when the subject is referred to—an error that ought to be dispelled. It is a strong position to take up, and I think the only reply to it is that the lover of picturesque irregularity seeks a harmony in confusion—a harmony as distinct as that between musical parts, which are never discordant but essentially different. Coming to common-sense considerations, irregularity has a firm foundation. It can point out a record of successes, and a vitality to-day that keeps up the best tradition. The many delightful fronts that are being built in many materials and many styles give pleasure to many people, and are charming surprises when unexpectedly come upon. It claims to truthfully express the internal economy of the house, as well as being an index to the taste and means of the owner in its decoration. I think briefly those are the strongest points in irregularity's favour, excepting and besides the fact that it is in possession, which is proverbially better than many arguments. It claims also—though not so loudly—that the majority of architects do not receive the academic training necessary for a proper conception of large designs, such, for instance, as Frenchmen receive. Witness a recent large international competition, which, though in every way enticing, was not won by an Englishman. It claims, also, that change is desirable and essential, street architecture being a comparatively brief and passing expression, and that the restlessness of the result is not a fault but a sign of growth and development.

The formalist will admit the successes that irregularity has scored, but he will also point out the weight of vast mediocrity that it has to support. There is no doubt that formalism has fewer failures, and that what there is of formal street architecture is of more uniform excellence than irregularity can show. The formalist maintains that a city is entirely an artificial creation, with limitations that are most happily recognised by a formal street architecture; that the historic tendency is towards formalism; that already streets have a tendency towards certain trades and callings, such as Long Acre for carriage builders, Cockspur-street for shipping agencies, Clerkenwell-road for clock makers, St. James-street and Pall-mall for clubs, and Harley-street and Wimpole-street for the medical profession. It would like to disclaim the use of steel in construction as only suitable for temporary buildings; it would like to discourage advertisement and vulgar blandishments; it would make for restfulness and repose, and inculcate the value of restraint and the interdependence of the man in the house and the man in the street.

I believe the man in the street has more interest in architecture than he is credited with. Besides, he is occasionally the man in the house as well, and has, therefore, opportunities of seeing both sides of the question. He realises when within that the outer front concerns his opposite neighbour as much as, if not more than, it concerns himself. His opinion of the architectural profession—for, of course, he has one—is probably based on first-hand experience between his own four walls, and the more convenient and perfect the inside the more will he trust the architect with the out. I do not see any means for irregularity or formalism to make headway with their ideals other than by immediate ministrations of common-sense applied to ordinary requirements. Let them both strengthen their convictions, but look out for the opportunity of suppressing them where they would mar by self-assertion a pleasing harmony that already exists. Both the motive of the design and the materials for carrying it into execution should in my humble opinion be carefully considered in relation to the existing or probable surroundings of the new building in question. I believe that the ideal city will show a unity that the formalist will welcome as superior to any ideal of his limited imagination, and that the lover of irregularity will protest it is not what he understood formalism to be. In the meantime, I believe the architecture of our streets would be advanced by advocating large and comprehensive schemes for improvements where they have to be made. A city, like any other complicated organism, is best understood by tackling it in the mass first and in detail when the time comes. Before closing I must refer to the Holborn to the Strand improvement. I remember—though I do not know whether it was publicly made—a proposal of Mr. Lethaby that impressed me very much. It was that the new street should start at the steps of the British Museum, a line at right angles to which would come out at Waterloo Bridge, thus giving a view of the river from the Museum and of the Museum from the river, and connecting two of London's finest monuments. The new street would be the altitude of an equilateral triangle, the Museum the apex, and the Embankment the base, the base angles being marked by St. Paul's at one end and Westminster at the other. Some day the Embankment on the other side of the Bridge will be made, and that could have added to this idea. I wish it were possible to throw a view of that proposal upon the screen. Had such a proposal been made in Paris it would have been received with enthusiasm. A Napoléon and a Baron Haussmann have explained to Parisians the ultimate advantages of a little despotism, and the Frenchman to-day enjoys the result. He is proud of such streets as the Champs Elysées, seen down a vista of trees terminated by a sunlit triumphal arch. English people appreciate it there, but for this country it is considered absurd. Work done in the past showing any unity of feeling is marked down. In Regent-street, in the Adelphi, in Russell-square the destruction has begun—in Russell-square as the leases fall in each front is stuck over with horrible terra-cotta trimmings. Architecture has given up concerning itself with streets, and is satisfied only with public buildings and problems of domestic luxury in private country houses.

Private houses show modern English architecture at its best, partly, I suppose, because of the part they play in English character, and partly because they administer to immediate bodily comfort. But even in country houses the most successful are those that have sacrificed some comfort or corner to save a principle or to preserve an idea—the idea of cohesion or unity, or whatever you like to call it; and if some sacrifice is necessary in a building, the home of one family, surely it is ten times more important in a great city where hundreds and thousands of lives are concerned. Ought he who pays the piper to call the tune when the piper is one of a row and the tune dependent on the united efforts of the whole band? I believe there is enthusiasm for, and love of, architecture at the present day, but it is frittered away in the craze for novelty and the liberty of the individual.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The usual fortnightly meeting of the Royal Institute of British Architects was held in the Meeting Room, No. 9, Conduit-street, on Monday, Mr. John Slater (Vice-President) being in the chair in the absence of Mr. Aston Webb, R.A. (the President).

Mr. Alex. Graham (Hon. Secretary) announced the decease of Mr. Silvanus Trevail, Fellow, elected in 1892.

Mr. H. Hunter Crawford, President of the Edinburgh Architectural Association, and Mr. A. Ryan Tenison were introduced to the Chairman, and signed their names, on election to the Institute.

Monuments and Arts of Delphi.

M. J. T. Homolle, Director of the French School at Athens, then delivered a long discourse in French on "Le Trésor de Cnide et les Monuments de l'Art Ionien à Delphes," of which the following is an abstract:—

M. Homolle commenced his remarks by a tribute to the memory of Mr. Penrose, as an eminent Greek archæologist, and expressed his thanks to the Institute for having elected him (the speaker) as a member, and for the compliment which they had paid him in inviting him to come over and lecture there. In taking for his subject the discoveries at Delphi, he would single out for special treatment the Treasury of Cnidos, as a complete type of Ionic architecture of the sixth century B.C. To give a general idea of the discoveries at Delphi, and of the position of the Treasury in relation to the whole collection of buildings, he described the sanctuary of Apollo by the aid of the fine drawings of M. Tournaire, showing by the lantern the plan and elevation in its actual state, and M. Tournaire's restoration of the whole. The Treasury of Cnidos was situated at the first angle of the sacred road within the *enceinte* of the Temple; it was completely ruined, but could be restored by the aid of the fragments found in connexion with the foundations, or scattered about; some of them not perhaps belonging to that particular building, but similar in style to those found in connexion with it. The view of the Treasury in its actual state was shown, and a restored elevation of the front. The object of the lecture was (1) to justify the restoration by an analysis of its architectural elements; (2) to study the decoration of the monument in the architectural ornaments and sculptures discovered, and the traces of the painting by which they had been reinforced; and (3) to mark the place of the Treasury of Cnidos in the history of Ionic art. The plan of the small building was that of a temple *in antis*, showing a sculptured frieze bordered by egg-and-tongue ornament, with a pediment decorated with terminal figures of sphinxes. (All these various portions were separately illustrated by slides.) The two columns within the *antæ* were formed by terminal caryatide figures. The execution of the details throughout, though a little heavy, was broad and vigorous, and marked by a unity of character throughout the work. The frieze was continued on the four faces, the subjects being: on the east face, the apotheosis of Hercules; on the south face, the carrying off of the daughters of Leukippos; on the east face, the combat of the Greeks and Trojans over the body of Euphorbos, with the gods on Olympus as spectators; on the north face, the battle of the giants. In style and technique the sculptures formed two groups, differing in relief and in the rounded or sharp character of the execution. The proportions of the figures were those of Ionic art of the sixth century; the figures short and thick in proportion, and rather stiff in design. The composition was governed by a rigorous regard to sym-

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metry, the principal groups containing each the same number of figures, placed in analogous but reversed attitudes on each side of the centre. The pediment represented the strife of Apollo and Hercules for the possession of the Delphic tripod; the style was the same as that of the friezes on the west and south sides, only somewhat more stiff and rude in execution. It represented a mixture of high and low relief, some of the figures being entirely detached, others in bas-relief. The acroteria were sphinxes of the same type as those found at Delos and on the Acropolis at Athens. The caryatide columns show points both of resemblance and of difference in comparison with those at Athens. There were traces in them of Egyptian influence. The polychromatic decoration could be well studied from the remarkable series of water-colour drawings made by M. de Fonseca. The colour was applied to the architectural order, to the friezes and pediment sculpture, and to the figures in the round. It was composed of three colours: white (being the colour of the marble, perhaps heightened by a glaze), blue, and red; the backgrounds generally blue, the draperies red. There were also traces of applied metal used to give further detail to the sculptures. The name of the building, Treasure or Treasury of Cnidos, was identified by inscriptions on the stones and by the detailed and clear description of Pausanias. It was a work entirely Ionic in character and spirit, marked by somewhat exuberant richness of ornament, a somewhat crude vigour of style, a great deal of invention, and executive skill of a high order. M. Homolle concluded a lecture of nearly two hours, delivered throughout with the greatest fluency of language, by some remarks on the importance of the Ionic influence at Delphi, and on the part played by Ionia in the development of Hellenic civilisation.

The Chairman said they had heard an exceedingly interesting lecture from M. Homolle, and as the hour was late, he would ask Dr. Murray to be good enough to propose a vote of thanks to the lecturer.

Dr. Murray said that after the cordial reception which had been given to M. Homolle, he need not assure him how sensible they were of the great compliment he had paid them in coming all the way from Athens to give that splendid address on one of the most charming Greek buildings that he (the speaker) or anyone else had seen. After the most interesting, and, he was sure, the most convincing arguments of its relationship to the art of Ionia, he must not attempt to express any opinion except that of the greatest admiration for everything that had been said. He would much rather call their attention to the fact that they were under an obligation to M. Homolle for what was an even greater matter than his appearance that night. He meant that from beginning to end M. Homolle had been the leading spirit of these excavations of the French at Delphi, which in our time had no equal. The task had by no means been completed, and he was sure all present would agree in asking M. Homolle to take back to Athens their cordial wishes that he might be able to finish the gigantic task with the same success that he had begun it.

Mr. Macmillan (of the Hellenic Society) said he took it that the great honour of being allowed to second the vote of thanks was due to the fact that he was the representative of the Hellenic Society in the humble capacity of secretary. He could most cordially echo all that Dr. Murray had said as to the pleasure it had given that distinguished gathering to listen to M Homolle's lucid exposition and eloquent description, not only of the general plan of the site of Delphi, but in particular of the monuments which had been revealed to them step by step. Perhaps he might be allowed to congratulate the Institute of Architects on their brilliant success in inducing M. Homolle to come to this country, and for the first time give an account of his great work. He was only sorry that the idea did not first occur to the Hellenic Society, but perhaps he might be permitted in that connexion to say to M. Homolle, in the name of the Hellenic Society, that they hoped very much when next year the Society celebrated its twenty-fifth anniversary, they might perhaps persuade him to make another visit to this country, and perhaps take up another point of the work before the Hellenic Society.

Dr. Evans, in supporting the vote, said that perhaps only those who had been over the site of Delphi in its old state, and remembered the rustic village covering all that wonderful mass of remains which had been got up by M. Homolle and his associates, could thoroughly realise the magnitude of the work which had been carried out there. It was a great thing to undertake. He spoke as an outer barbarian, and as one who had hardly a right to speak on the subject of classical Greek, but one felt that here in Delphi we had almost the beginning of Greek religion, and that they had the point of union with that still older religion they had been trying to trace in Knossos. He gathered from one of M. Homolle's associates that one of the most remarkable of the early objects found was an actual reproduction of one of the most remarkable objects found at Knossos, which took them back to remote antiquity. There on the site of the earliest religion of the Greeks; there where they found the most brilliant of the Greek gods—Apollo; on the site of what was really the most national centre of religion, where monuments were raised in honour of the triumph of the Greeks over the Persians and other enemies—monuments which recorded the great struggles between the East and the West, which some modern Athenians seemed to forget for the moment; there the French Government undertook the great work of excavation. When they remembered that they had not only to move a whole village, and spend vast sums of money, and conduct most difficult negotiations with a very jealous Government, one could only the more admire the work which M. Homolle and his associates had carried through, and he thought they must also admire the great public spirit of the French Government in undertaking the work. They had heard a great deal about the *rapprochement* between the French and the English, and he hoped one of the results of that would be that the English Government would take the lead which the French Government had given with regard to such undertakings. It was not only the greatness of the work and the actual excavation of monuments which showed the public spirit of the French people, and also the patience and devotion of those like M. Homolle who had carried it out; it was more than that—it was the painstaking and scientific reconstruction of the fragments which had been brought up, and the piecing together of monuments, which had been so prominently illustrated by M. Homolle that evening, which showed that beyond all this great undertaking, and all the enterprise which had been shown by the Government, they must pay homage before all to the genius of the explorer.

Mr. J. L. Myers (Christ Church, Oxford) also supported the resolution, and said they must all feel immense interest in the investigations of which M. Homolle had given so full and detailed an account, and must all have been struck with the extraordinary genius displayed in the adaptation of small means to small ends, and of little details in those monuments in which the Ionian artists clearly felt so very keen and healthy an interest. They saw this displayed in the representation of the lotus flower on one of the fragments which had been shown, and he felt it was one of those cases which showed in the truest sense a living art; where the artist had only to play the tune and the stone fell into its place—Orpheus played his lute, and the rocks fell. The fragments showed that there was living art in the details as well as in the great pieces.

Sir Lawrence Alma-Tadema remarked that he had listened to and followed every word of the lecture, and he hardly knew what to say. He did feel, however, that it must have been beautiful to have reconstructed the monuments, as had been done by M. Homolle, and it was a very great boon to all of them. He was, however, so full of what he had heard, that he would only add his sincerest thanks to M. Homolle for giving them such an interesting evening.

The motion was then put to the meeting and carried by acclamation. After a few general remarks on the subject of the paper, the Chairman, speaking in French, and addressing M. Homolle, said that he had great pleasure in offering him the sincere thanks of the Institute for the able lecture to which they had listened with so much interest. Some years before they had received in that room Schliemann, the celebrated explorer of the ruins of Ilium, a city half legendary, half historic. To-day they were proud to welcome M. Homolle as the revealer and reconstructor of the Treasury of Cnidos, of such great interest for architects and archæologists. They must not forget also their debt to the French Government for the loan of the splendid collection of drawings which decorated the walls that evening.

M. Homolle briefly replied in acknowledgment.

The Chairman announced that the next meeting of the Institute would be held on Monday, November 30. It would be a business meeting for the election of members, and Mr. William Woodward would move a resolution respecting the Liverpool Cathedral Competition.

EGYPT EXPLORATION FUND.

THE seventeenth ordinary general meeting of the Egypt Exploration Fund was held at Burlington House, Piccadilly, W., on Friday afternoon in last week, under the chairmanship of Sir J. Evans (President).

Mr. H. A. Grueber (Hon. Treasurer) read the financial report, which, he said, in only one instance—that of the Archæological Survey—showed a balance on the right side of the page. In the case of the Fund proper, the excess of expenditure over income was not serious, but he had rather there had been no deficit at all. They had not been extravagant, and the Committee had done its best to keep expenses down, but, unfortunately, the receipts were under the mark of last year. The crisis at Boston had weakened their resources from that quarter, but the Committee there was getting into order, and they might hope for a speedy improvement. They had disbanded the affiliated branches at Philadelphia and Chicago. As they were able to send considerable consignments of antiquities last year to the principal museums in the United States, including Chicago, Philadelphia, and New York, it was to be hoped that the local organisations might again be revived. The general balance-sheet showed that the assets of the Fund and its branches amounted on July 31 to 4,914*l.* 2s. 5d., which was apportioned as follows:—To the Exploration Fund, 3,128*l.* 12s. 1d.; to the Archæological Survey, 798*l.* 16s. 4d.; to the Græco-Roman Branch, 936*l.* 14s.; and to the Survey Students' Fund, 50*l.*

On the motion of the Rev. F. C. Norton, seconded by Mr. Thompson, the report was adopted.

The President, in the course of his annual address, congratulated the members on the amount of good work done during the past twelve months by the different branches of the Fund, and on its prosperous condition—at all events, so far as numbers are concerned, for the losses by death and withdrawals had been as nearly as possible counterbalanced by the accession of new subscribers. Proceeding, he alluded to the losses which the Society had sustained by death during the year, and specially referred to the late Professor Mommsen. The most important work of the Exploration Fund during the past season had been carried on by Professor Petrie, with Mr. Currelly as his principal assistant, at Abydos. A large number of the objects found, which were exhibited at University College, London, during the month of July, and elicited a great deal of interest, had now been distributed amongst various institutions, including the British and Ashmolean Museums n England, and numerous public institutions in the United States of America and elsewhere. A remarkable feature in the case was that on the old temple site at Abydos there seemed to be remains of no less than ten successive temples, ranging in date from probably before the First Dynasty down to the Twenty-sixth. The ivory carvings of the early period presented a singular refinement in their work, and the glazed pottery—sometimes displaying a conjunction of two colours—gave evidence of the high state of perfection which the potters' art had attained before the Fourth Dynasty, or, say, upwards of 3,700 years before our era. Any points of contrast or resemblance between early Egyptian civilisation and that of Minoan Crete was at the present time of the highest interest and value, and Professor Petrie, in describing some black pottery of the First Dynasty, stated that "this class of pottery is unlike any known in early Egypt," and added that "the forms of the vases are clearly of the Greek family," and that a piece of the neck of a tall vase with a pointed base "placed side by side with black pottery of the late neolithic age from Knossos was in-

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distinguishable in colour, burnish, and general appearance. They belong to one fabric, and the source of that is presumably Cretan." Amongst the objects from the early deposits before the Fourth Dynasty were naturally-formed flints, which Professor Petrie suggested had been picked up because of their likeness to sacred animals, and perhaps had been venerated before any artificial images were attempted. As to the work during the ensuing season, it had been arranged for M. Naville to continue excavations in the cemetery adjoining the great temple of Deir-el-Bahari. Although a vast amount of labour would have to be expended in clearing the spot of the accumulation of soil that had been deposited upon it in connexion with the temple excavations, it was hoped that some of the early tombs might be rendered accessible within a few weeks, and that a fair harvest of interesting relics might be reaped. The future operations of Professor Petrie on behalf of the Fund had not yet assumed a definite form. It had been proposed, however, that he should carry on excavations in the immediate neighbourhood of the Step Pyramid of Sakkara, which was generally regarded as being among the earliest of the pyramids and anterior to those of Gizeh. Looking at the very great and, indeed, exceptional interest of the site, the Cairo authorities were not unnaturally averse to delegating its exploration to any other body on the usual terms. The Committee of the Fund, recognising the historical importance of the discoveries likely to be made, agreed to undertake the exploration on special terms. In addition to the work at Sakkara, it was proposed to carry on excavations on some other site at an accessible distance hereafter to be arranged. Having referred to the work of Dr. Grenfell and Dr. Hunt in their excavations in search of papyri at Oxyrhynchus and the Fayoum, the Chairman said the main work of the Archæological Survey lay last season among the northern tombs of El Amarna, where those of Pa-nebesi and Meryra the Younger were exhaustively worked out in facsimile drawings by Mr. N. de Garis Davies. This gentleman also spent a considerable portion of his time at El Till, and a fortnight at Beni Hassan. The Archæological Survey, in the execution of its task, was obliged to occupy itself with all monuments, however unsightly or badly preserved, and had at present the good fortune to be engaged on the records of perhaps the most attractive chapter in Egyptian history, marked by a striking and novel development both in religious thought and in art. Almost all the materials for the study of this remarkable movement were supplied by the tombs, boundary tablets, and ruins of El Amarna, the site of the new capital by which the new epoch was signalised, and every Egyptologist lived in hopes that some fresh light will be ere long thrown on this period. In conclusion, the Chairman said that a healthy industry was pervading every branch of research, whether in excavations and explorations, the publication of memoirs, records, and texts, or the history, philology, and mythology of Egypt.

Professor Petrie said that at the close of one of the main enterprises of this Fund, it was well to consider how far they had carried out the object with which it was begun. The first principle in view had been the unfolding of the history of Egypt, a history which is the most important of all to the Western World, as it is the elder brother of all the civilisations of the Mediterranean. To understand how the land had been developed, what changes it had undergone, and what relations it had had with other countries, was to explain the past course of our own civilisation, and give a truer view of the nature of man than could be gained from any other means of study. So far as the acquisition of material objects is needed to encourage the individual interests of museums, and to educate the public by actual contact with historical evidences—so far they had an interest in distributing a portion of what they found. And there was also another very important reason for spreading the actual antiquities over several centres. The risks due to many peaceful causes—to say nothing of the greater risks of warfare—rendered any one museum at least liable to serious injury. At the present moment the whole remains that had been recovered of Cretan splendours are at the mercy of half an hour's fire in an old barrack. And to trust all one's eggs in one basket—to the immunity of one place from fire, riot, fanaticism, theft, and war—is an unfair treatment of those scanty remains which are all that tell of the great past. It was, therefore, the true policy to spread the actual objects found over a wide area, as the Fund is in the habit of doing; and to publish everything fully and rapidly, without any undue expense which would detract from the subsequent work. When some people said they would like more costly publication, let them say also whether they wish to reduce the completeness of the record issued or the amount of future work; then they should know what they really mean. Now, in view of these principles, look at the result of their four years at Abydos. They had been costly years, but could they have got more for their money? He certainly thought not. He was well satisfied to have given four years of his life to that work; and he thought they might be equally satisfied to have each given four of their guineas to it. To have recovered and published in order the history of the early kings, to have shown what the arts and skill of the Egyptians were in those primal days, to have illustrated the rise of the civilisation, to have uncovered the successive temples of 4,000 years, and to see more of the beginning of the grandeur of Egypt than they knew of the early condition of the European states, was the greatest prize that was to be gained in the study of the history of man. Some said, "Why not continue to work in so rich a field?" He replied, "We do not make things, we find them." After exhaustively turning over every handful of the myriads of tons of dust at the Royal Tombs, after recovering the plans of all the temples in that 20 ft. of ruins down to native sand, there must be a close of that flow of results. The general cemetery of Abydos had been partly worked by them during three years in addition, with the very best and sharpest labourers, but yet scarcely any history had been obtained there. Therefore it did not seem at all promising to continue to work in a general cemetery which had done nothing to help them. The great historical sources having now been exhausted, it was rather to some other site that they must look for the continuance of the main objects of the Society. He must give his best thanks to the staff of workers who have so cordially, and many of them so generously, helped in these labours. Miss Hansard had given most accurate and beautiful copies of many of the sculptures and inscriptions, often assisted by Miss Murray's knowledge of the language and fine copying. Miss Eckstein helped by being responsible for attending to all objects found; cleaning, marking, and storing. His wife took part in all the varied labours of the camp. Mr. Stannus did a large part of the planning of the temples. And the permanent workers, Mr. Currelly and Mr. Ayrton, heartily prepared plans and descriptions, besides looking after large sections of the workmen, in which, also, Mr. Rawnsley took part. So far as he could see, all the information which they could hope to obtain had been safely garnered; and a great deal more had been recorded than had ever been understood in such a site before. Now, regarding the future, there had been some difficulties through no cause of their own. So far back as eighteen months ago, he had ascertained from Professor Maspero that he had no objection to them working at Sakkara in order to continue their series of historical discoveries of the Royal Dynasties. Professor Maspero showed the same impartial furtherance of scientific knowledge which has always distinguished him. But when the official sanction of the Egyptian officials in Cairo was desired, it was said that the interests of the museums prevented the Fund working. They then offered to work without claiming anything that the museums might want, and now they were informed distinctly that, nevertheless, the application was refused. The interests of the museums were not, therefore, the sole cause of hampering their researches. It was not thought desirable that he should say anything more on this subject. He might, however, remind them that the ground formerly reserved for the museums had been divided between six parties of Germans, Americans, Italians, and French, and the work of these parties was favoured diplomatically, and in some cases financial aid was given. More than this he would not say about the situation.

Dr. B. P. Grenfell proceeded to give an account of the excavations which he and Dr. Hunt had carried out at Fayoum, Hibeh, and Oxyrhynchus. He said that in March, 1902, just as they had finished all that they wished to excavate in the Fayoum, a fortunate chance led to them finding the rich Ptolemaic necropolis at Hibeh, which was about 100 miles south of Cairo. The excavations there led to the discovery of many third century B.C. papyri, including numerous literary fragments. They then visited Cynopolis, which produced no results, and then returned to Oxyrhynchus, which during their seven years' absence had remained practically untouched. The ruins of the ancient Oxyrhynchus, which was about 100 miles south of Cairo, were 1¼ miles in length, and covered an area which was exceeded by few cities in Egypt. The good fortune which attended them in 1897 did not desert them, and they found an immense mass of papyrus. The bulk of the documents from one mound belonged to the third century after Christ, with some specimens of the second and fourth centuries, among which Latin papyri were not uncommon. In the other mound the papyri ranged from the first to the fourth century after Christ. It would almost seem as if they had come upon the remains of libraries of classical and theological writings. Two of the theological fragments of the third century were of exceptional interest. The first consisted of part of a collection of sayings of Jesus, similar in style to the so-called Logia discovered by them in 1897. [Dr. Grenfell gave much interesting information and suggestion on this portion of the subject which it hardly lies within our province to report.] What historians would regard as the jewel of the find was the discovery of a Latin historical papyrus of considerable length. On the back was written the text of the Epistle to the Hebrews, but on the front, in a beautiful uncial hand of the third century, was a new epitome of the History of Livy, books 37-40 and 48-55. Dr. Hunt and he left next week for Egypt, and the excavations at Oxyrhynchus would be resumed before the end of the month, and since there was still a great deal of work before them, he hoped the money would be forthcoming to continue there until the site was thoroughly exhausted. It was true that the unopened cases of papyri, which now threatened to overflow the room in which they were stored, contained the most valuable collection of papyri in existence, but excavation was a kind of gambling, and now that the French, Germans, and Italians were entering into the field which Dr. Hunt and he opened, it was impossible for them to stop unless circumstances absolutely compelled them to do so. Another ten years or so would probably see the end of excavations in Egypt for papyri, and, indeed, of excavations in Upper Egypt altogether. The chances of accidental and sporadic finds would remain indefinitely, but it must be remembered that no excavations were worth undertaking, even if they were practicable, unless there was a reasonable prospect of finding something important. The Egyptian Delta, from Cairo to the Mediterranean, was too damp for the preservation of papyrus, and their successors must, if they wished for new theological texts, have recourse to Abyssinia or the Soudan, where they were not likely to find them in Greek. If they desired new classical texts, they must fall back on Herculaneum, the charred rolls of which required years to unwind, and even then could only partially be deciphered. Dr. Grenfell concluded his paper with an eloquent appeal to the English Government and nation to recognise the great importance of Egyptian archæology, instead of treating our occupation of Egypt as of merely political and commercial importance; and he contrasted with our national indifference on this subject the example of Napoléon, who by the assistance of the *savants* whom he took with him on his Egyptian campaign, had laid the foundation of Egyptian archæology.

A cordial vote of thanks to the Chairman was agreed to on the motion of Judge Bayli, K.C., seconded by Mr. J. S. Cotton.

PREVENTION OF WATER WASTE.

A CONFERENCE between the Plumbers' Company, the Royal Institute of British Architects, and some of the larger water undertakings, with reference to the waste of water in domestic use, was held on Tuesday in one of the Committee-rooms of the Guildhall. Dr. Robert Crawford, the Warden of the Company, presided, and it was stated by Mr. Coles, Clerk of the Plumbers' Company, that invitations to the conference had been addressed to authorities representing a population upwards of 100,000. Gentlemen were present on behalf of the Local

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Authorities of Birmingham, Cardiff, Dublin, Glasgow, Liverpool, Plymouth, Sheffield, the Royal Institute of British Architects, the Tees Valley Water Board, and the British Association of Waterworks Engineers.

The Chairman explained the efforts which the Plumbers' Company had made to secure the better practical education of plumbers, and said that, although the country had been thoroughly roused to the great advantages to be derived from the increase of skill and education on the part of the plumber, especially in the case of the young plumber, it must be acknowledged that the movement in the direction which was most essential, namely, the sanitary side, had not been quite successful. Throughout the country 12,000 plumbers had been registered, and the position of the plumber had undoubtedly greatly changed. The Plumbers' Company had now been asked to take a further step, and endeavour to act as a connecting link between architects on the one side, and the water-supplying authorities on the other, with a view to secure the profitable and economical use of water. As a preliminary to the discussion, he proposed, "That this conference of architects and water authorities approves the efforts of the Worshipful Company of Plumbers to secure the more efficient training of plumbers, and the registration of qualified men, and pledges itself to support the Company in their endeavour to secure the necessary legislation in furtherance of that object."

Mr. Alderman Hind (Stockton-on-Tees) seconded the motion.

Mr. H. D. Searles-Wood, representing the Royal Institute of British Architects, proposed, "That, with the object of giving practical effect to the previous resolution, the representatives of the Royal Institute of British Architects and the Water Authorities present recommend that preference be given to the employment of registered plumbers to carry out and inspect plumbers' work executed under architects and Water Authorities." He explained that, while the Royal Institute of British Architects were strongly in favour of the movement for the better education of the plumber, they could not pledge themselves to the sole employment of registered plumbers, because, as architects, they did not interfere between the contractor and the men whom he employed; but whatever system of technical training might be adopted, the Institute would strongly deprecate any interference with the apprenticeship system.

Mr. Alderman Holdsworth (Bradford) seconded the motion.

Mr. E. A. Lees (Secretary to the Water Committee of the Birmingham Corporation) asked whether the resolution pledged the conference to recommend the employment of registered plumbers only, because in Birmingham, as elsewhere, the work of some plumbers who were not registered gave as much satisfaction as that of others who were registered.

Mr. Atkinson (Hull) said that if the Corporation of that city were to recommend that work should be given to registered plumbers only, the unregistered plumbers would be in arms.

The Chairman pointed out that there was nothing in the resolution to warrant the rejection of the plumbers who were not registered, but the object was, of course, to encourage the registration of plumbers.

The resolution was then adopted.

A discussion followed on the subject of waste prevention in the domestic use of water, Mr. Lees, Mr. Thomas Blashill, Mr. Gale (Glasgow), and others speaking as to the standardisation of fittings, model by-laws and regulations, and other measures which might be submitted for the approval of the Local Government Board. Eventually, on the motion of Mr. Searles-Wood, seconded by Mr. Bancroft (Hull), it was resolved to form a Committee representing the Plumbers' Company, the Water Authorities, architects, and the British Association of Waterworks Engineers to consider the question of standard regulations and fittings.

COMMERCIAL APPLICATIONS OF LIQUID AIR.—It is reported that liquid air is delivered in Berlin at the price of about 2s. per gallon. The receptacles used are made of glass, with double walls, the space between the walls being filled with suitable insulating material, the walls silvered to prevent the radiation of heat and the whole enveloped in an insulating material. They are said to retain their temperature for fourteen days. Several drops of the liquid in a glass of water produce freezing, and it is intended for such uses as refreshing drinks and improving the condition of the air in sick-rooms.

A NEW ROCK-BORING APPLIANCE.

LAST week we were invited to inspect the operation of a new labour-saving device intended for use in mines, quarries, and on all works where stone is used for structural purposes. The apparatus is not in any way a machine drill, but is rather a drill holder and turner arranged in such a way as to enable one man to do work for which the assistance of two men has been required heretofore.

In order to make clear the nature and object of the device, which is termed by the inventor the "Drillibite," a brief description is necessary. We will first describe the arrangement of the apparatus for mining work.

An ordinary spreader bar, with a cylindrical steel shaft is set up vertically between the floor and roof of a working, and at a suitable distance from the face of the rock. Upon the shaft of the bar is clamped a cylindrical body, which we will call the tool-holder. The cylinder contains a piston to which are attached powerful grip levers holding the drill tool, and the levers are so arranged that a very slight pressure is sufficient to grip the shank of the tool with very considerable force. The force necessary for this purpose is afforded by a spiral spring placed at the back of the levers, and held in position by a cover closing the back end of the tool-holder. The shank of the drill passes through the centre of the spiral spring, and projects through the cover of the cylinder. Inside the cylinder suitable gear is provided for drawing back the piston, and at the same time for rotating it through part of a circle after every stroke of the hammer, and after such partial revolution the spiral spring throws the tool forward to its original position in the hole that is being bored. Connected with the cylindrical body of the tool-holder is a bar extending diagonally to the ground and arranged so that its lower end may be placed in the most convenient position for the operator. At the end of the bar is a simple mechanical device, provided with a pedal or foot lever connected with a wire cord attached at the further end to part of the mechanism by which the piston of the tool-holder is drawn back and rotated.

In actual operation the workman stands a little behind the tool-holder, and places the foot-lever so that it is close to one foot. The tool being adjusted to the point at which it is desired to drill a hole in the rock face, all the workman has to do is to keep on hitting the end of the tool projecting through the holder, and to press down the foot-lever between each stroke. An automatic escapement is fitted to the foot-lever device, so that a simple downward pressure of the foot is sufficient to cause the withdrawal, twisting, and replacement of the tool, and a simple arrangement in the same device regulates the extent of the arc described by the tool between each stroke of the hammer. No forward adjustment of the tool-holder is required, because, when the tool is thrown back into the hole, the spiral spring is fully extended, and therefore exerts comparatively little pressure on the grip levers. Consequently, the force of the blow given by the hammer is sufficient to drive the tool through the holder to such an extent as may be necessary. On the other hand, when the tool is thrown back, the spiral spring is compressed, and causes the grip to hold the shank very lightly during partial rotation, and at the commencement of its return stroke.

As usually set, the tool completes a circle in about fourteen strokes, and from the tool marks made in the tests witnessed by us last week, it is quite clear that the action of the apparatus is extremely regular and satisfactory. Other noteworthy features are that the tool can be set at any desired angle with the working face, and when once set it is held at the correct angle until the hole has been drilled to the requisite depth.

Such are the essential features of the invention, but we ought to mention that for builders and contractors a more convenient method of using the "Drillibite" is provided by a portable stand, comprising a head with two claws for catching hold of the rock, and two hinged legs with pointed ends that can be stuck firmly into the ground. A third leg is hinged to the frame for the attachment of the foot-lever device before mentioned. By the use of this stand the "Drillibite" can be applied to drill holes in any position, vertically, horizontally, or at any angle.

It is evident that the saving of one half the manual labour formerly required must represent a very considerable economy in contract and other work, and a further saving should be effected by the greater speed at which work can be performed by this semi-automatic machine.

The patentee is a mining engineer of long experience in the Colonies, and he has certainly produced his invention in a thoroughly practical form. The apparatus is well-designed and strongly made, and the few wearing parts can easily be replaced at trifling expense.

ENGINEERING SOCIETIES.

THE INSTITUTION OF CIVIL ENGINEERS.—At the ordinary meeting on the 10th inst. Sir William White, K.C.B., F.R.S., President, in the chair, Professor Unwin read a paper on "Tensile Tests of Mild Steel, and the Relation of Elongation to the Size of the Test Bar." In the case of steel, he said, the engineer relied on tests of samples for assurance that he was obtaining suitable material. It was important, therefore, that the information given by tests should be definite and comparable. Mechanical tests were for the engineer the most important, but, as usually conducted, they were not wholly satisfactory, and had to be supplemented. The object of the paper was to consider some conditions which affected the results of tests, especially as regarded the measurements of ductility. Ductility was probably the most important quality in the material for working purposes. Some conditions were then discussed. The time-effect was only negligible provided inertia forces might be neglected. The method of gripping the test-bar and the form of fracture as affecting the results were discussed, and the influence of enlarged ends on the elongation. The effect of the position of fracture between the gauge-points was examined, and some numerical results were given. Next, the effect of small variations of cross section, which was greater than was ordinarily supposed, was shown. The total elongation was shown to consist of a general stretch, nearly uniform along the bar, and a local stretch. As geometrically similar bars deformed similarly, the percentage of ultimate elongation was the same in similar bars of the same material. The law of percentage of elongation in geometrically dissimilar bars was then examined, and it was shown that for bars of any given material, of gauge-length l and cross-section A, the percentage of elongation was given by the equation—

$$e\,\% = \frac{c\sqrt{A}}{l} + b$$

where the first term on the right was the local and the second the general extension, c and b being constants. This equation was first verified by application to some results obtained by Mr. Barba on bars of varying gauge-length, cross section and form of cross section. The proportion of local to general extension in certain cases was determined. An account was then given of a series of tests on ship and boiler plates of different thicknesses, made for the Engineering Standards Committee. The results were first discussed by using plotted curves without assuming the elongation equation. Taking from the curves the elongations for bars of a standard form, the real relative ductility of these bars was found. This was compared with the elongations for bars of constant width, such as were generally used in testing. It was shown that the elongations in the latter case were very misleading as to the relative ductility. In the case of similar bars the ductility decreased as the thickness of the plates increased. But the results on bars of constant width would lead to the conclusion that the thickest plates were the most ductile. The constants in the elongation equation were then given for the bars in each of six series of tests, and for plates of ¼ in. to 1¼ in. thick, with a detailed comparison of the elongations calculated by the equation and observed in the tests. A further series of tests on plates with varying percentages of carbon was given. The constants c and b in the elongation equation decreased as the percentage of carbon increased. Lastly, a series of tests was made by Mr. F. C. Fairholme, of the Cyclops Steel Works, on short test-bars cut from tires and axles. It was shown that the elongation equation was applicable to these short test-bars. The forms of short test-bars which could be used in such cases was discussed, and a very simple recommendation was made which would secure that in all such tests the elongation would be comparable. The question of quality figures for

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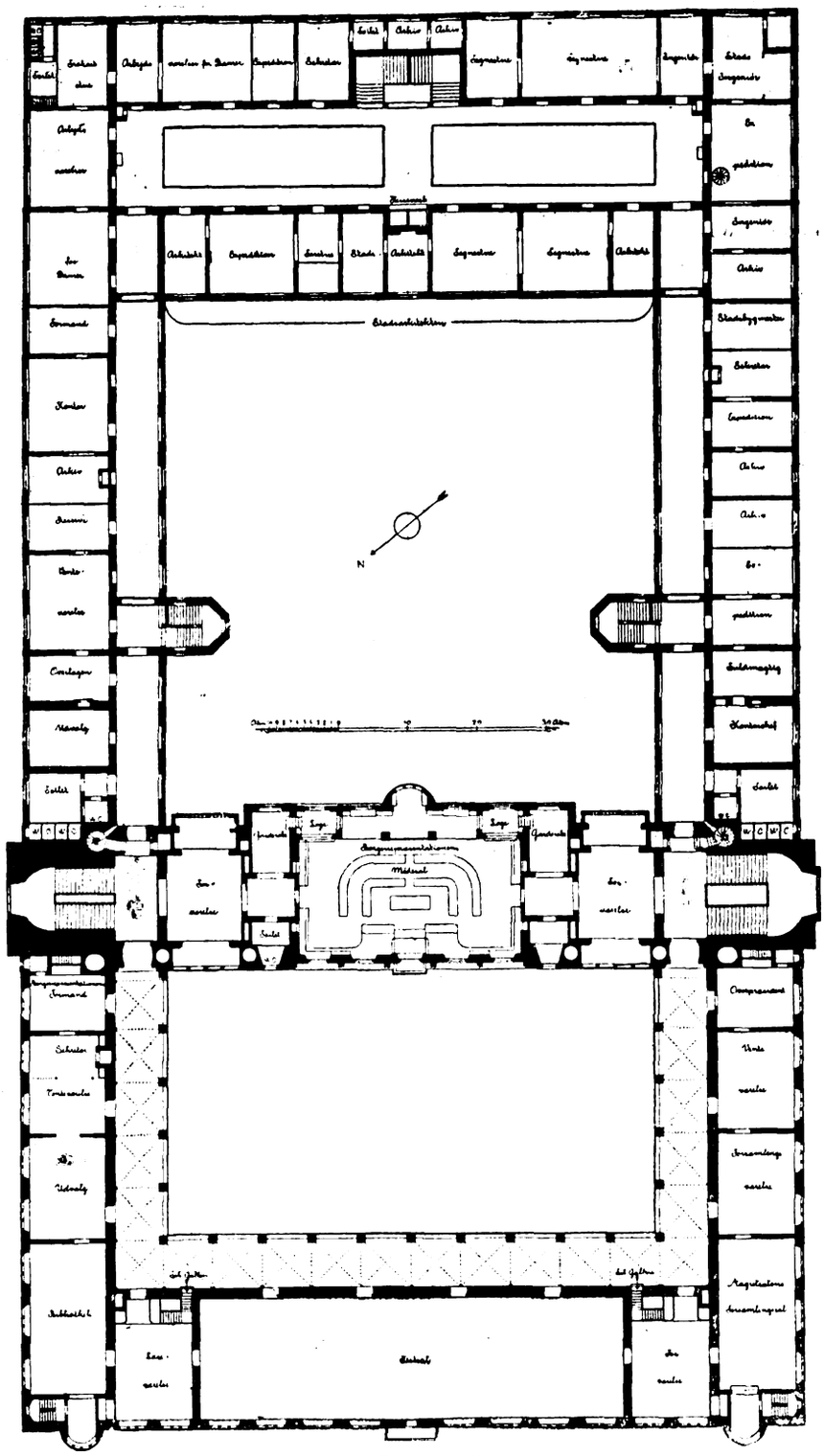

Copenhagen Town Hall. Plan.

materials was then examined. It was pointed out that if quality figures were to be of value the tests must be made on similar test-bars, or the results must be reduced to equivalent results on similar bars. The values were examined of the quality figure for the whole of the tests described in the paper for test-bars of different areas of section.

Illustrations.

NEW TOWN HALL, COPENHAGEN.

THE Copenhagen Town Hall, of which we give some illustrations, has been completed this year from the designs of Herr Martin Nyrop, who was architect for the exhibition buildings at Copenhagen in 1888, erected on the site on which the Town Hall now stands. Herr Nyrop's design for the Town Hall, after several competitions, was accepted by the Town Council in 1892, and work was commenced in the spring of that year.

The plan shows the general disposition of the buildings. The smaller quadrangle is covered, the other one open.

The materials used for the walling are mostly a light-coloured stone, and granite for the plinth.

The design, as will be seen, is not a reproduction of any one of the leading styles of architecture, but contains features which may be attributed to suggestions from various styles. The tower has a distinctly Lombardic appearance except for the finish, which is northern in character and not altogether satisfactory. In the main, however, the building presents a satisfactory unity of style and treatment, and shows a good deal of originality without anything that can be called eccentricity.

The photographs of the various separate portions of the building, shown in the second sheet, were sent to us without any titles affixed to them to indicate in what part of the building they occur. This, however, is of no great consequence; they were selected, from among a considerable number, to indicate the degree of originality to be found in the treatment of the doorways and other features, and serve to show that this is no ordinary academical architecture. The design of the door in the left hand corner of the plate, with its carving *à jour* in the upper panel, is especially good. In the middle of the plate is a view of the larger quadrangle, and below it one of the main entrances from this quadrangle.

On the main front, shown in the general view, the figures on each side of the balcony over the central entrance are bronze statues holding shields with armorial bearings, and over the balcony is a statue of Bishop Absalon, who is called the founder of Copenhagen, in copper relieved with gilding. The arms of the city, three towers, are introduced into the architectural decoration in many places; they are to be seen over the door in the lower left hand corner of the sheet of details, and on a shield in the centre of the roof in the general view.

The smaller (covered) courtyard, with a glass roof, is really intended as a place for specially convened public meetings. Two small staircases at the angles lead up to the upper loggia, which runs all round the court, as shown on the plan. This loggia contains a number of slabs bearing inscriptions referring to important events in the history of the city—sieges, great fires, granting of charters, etc.

Two large staircases, accessible from this court, lead to the central block of building, in which is the Council-chamber (see plan). The staircase on the left, called the "Citizen's Staircase," is decorated with carved oak balustrades representing a procession of artisans employed on a large building—architect, mason, joiner, carpenter, painter, electrician, bell-founder, slater, etc. The Council-chamber is wainscoted, with a foliage frieze painted in green above the wainscot. The staircase on the right is the "Presidential Staircase," with panels of polished marble and brass balustrade, all the materials presenting a contrast to that used in the "Citizens' Staircase" on the other side. The suite of rooms extending along this wing, and leading round to the large apartment in the centre of the main front, are all intended for the use of the President and Mayors of the town, and are decorated with oak panelling and silk tapestry. The large room in the centre, not yet fully decorated, is intended for official entertainments.

In the remaining buildings surrounding the larger courtyard, and which are treated in a simpler manner, are grouped the various municipal offices, such as the administrative, poor law, sanitary, hospital, engineering, and surveying departments. The central courtyard is laid out as a garden with a fountain in the centre, thus giving a pleasing and cheerful look out from the windows of the business rooms; a point often neglected in English official buildings, where it seems to be generally supposed that any kind of gloomy courtyard is a good enough spectacle for the employees to look out upon.

Altogether, we think Copenhagen is to be congratulated in possessing, in its new Town Hall, a fine and remarkable building, a credit to its architect and to the city.

NEW PREMISES, LEICESTER-SQUARE.

THE front towards Leicester-square, of which we give an illustration, was carried out from the designs of Messrs. Wimperis and East, as the firm was styled at that time. Since then, Mr. East has gone to South Africa, and another partner has taken his place, the firm being now "Wimperis and Best."

The drawing was exhibited at the Royal Academy this year.

The second, third, fourth, and top floors are occupied by the Green Room Club.

The materials of the front are: Bays and dressings in Bath stone, general face in salt-glazed bricks and quoins of gauged red brickwork, and Broseley tiled roof.

The builders were Messrs. Prestige and Co.; the electric push-button lift was provided by the Otis Co.; the heating of the building throughout was done by Mr. Gould; the iron casements were by the Crittal Manufacturing Co.; and the carving was done by Mr. William Hearn.

STEDHAM MILL, MIDHURST, SUSSEX.

THIS little flour mill was built in the summer of 1902, to replace one destroyed by fire, which contained an old-fashioned stone plant run by a water wheel.

The new mill contains a complete roller

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plant driven by a 48 in. turbine, with a 6½ ft. fall of water, giving an output of 1½ sacks per hour; the whole plant being provided by Messrs. Henry Simon, Ltd., of Manchester.

Estate labour and local materials were employed throughout. The walls up to the ground floor level are built with stone from the old mill, and above the plinth in brickwork, strengthened by buttresses, while piers mark the positions of the heavy rolled steel joists which carry the floors. The roof is of simple king-post construction, and is covered with tiles. The floors were laid with 9 by 3 deals, set flat-wise without joists to save headroom.

The general aim was to give some interest to a purely utilitarian building by turning its practical necessities, such as the ventilating shaft with louvres, and the turbine house, etc., to account in the design in an honest and straightforward way, and by taking every care with the materials and details, the whole design being treated in a simple and broad manner.

The illustration is from the tail-water side, showing the turbine house and ventilator, and the drawing was exhibited at this year's Royal Academy.

The architects are Messrs. W. A. Forsyth and H. P. G. Maule.

DESIGNS FOR A VILLAGE CHURCH AND A COUNTY TOWN CLUB.

The drawing showing these two very characteristic designs was exhibited at a Royal Academy exhibition some time back, and was included at the time in the *Builder Academy Album*, but has not appeared in our usual weekly publication.

The intended materials in both cases were the same; the light bands of stone roughly worked, and the dark bands to be tiles laid flat.

The designs are by Mr. G. Ll. Morris.

COMPETITIONS.

New Parliament Houses, Denmark.—The Danish Parliament has just sanctioned a proposal to rebuild the castle of Christiansborg, Copenhagen, which was destroyed by fire in 1884, for the use of the Houses of Parliament, Supreme Court of Justice, and to furnish room for great State festivals given by the King of Denmark. The cost, not including the artistic decoration of the interior, is computed to be 350,000*l.*, and a commission has been appointed to fix the rules for the competition for designs. The premiums offered for sketches range from 100*l.* to 200*l.*, and at the final competition a first premium of 500*l.*, as well as two of 150*l.*, will be given.

ARCHITECTURAL SOCIETIES.

Manchester Society of Architects.—A meeting of the Manchester Society of Architects was held on the 12th inst. at the Chamber of Commerce Rooms, Mosley-street, under the presidency of Mr. J. W. Beaumont. It was announced that the Council had awarded the following prizes:—For the most satisfactory work in the R.I.B.A. course at the Manchester School of Technology: First year course, Mr. R. J. Vernon (prize value 4*l.* 4s.); second year course, Mr. S. Moss (prize value 4*l.* 4s.) For the best work in the evening classes of architectural design at the School of Art: Mr. H. B. Laycock (prize value 4*l.* 4s.) For the best set of measured drawings and sketches suitable for publication in the Sketch Book (Mr. Beaumont's prize): Mr. C. Paterson (5*l.* 5s.) For the best set of architectural sketches in connexion with the summer visits: First prize, Mr. Frank Dyer (3*l.* 3s.); second prize, Mr. J. H. Somerset (1*l.* 1s.) For the best set of measured drawings of old work: First prize, Mr. J. H. Somerset (3*l.* 3s.); second prize, Mr. R. J. Vernon (1*l.* 1s.) For the best commentary on old buildings of the neighbourhood, in connexion with Mr. Corbett's map: Mr. S. H. Oldham (1*l.* 1s.) For the best design for window and balcony (junior class of design): Mr. C. Norman Taylor (10s. 6d.).—Mr. A. E. Corbett read a paper the same evening on "Modern Domestic Architecture," which was illustrated by means of lantern slides. He said most architects would agree that the undoubted advance of late years in the art of architecture had been more marked in domestic architecture than in any other branch. There were doubtless many reasons for this, and one of the chief reasons appeared to be due to a feeling that modern architecture must be founded more on sound and straightforward construction and the suitable treatment of materials than on the forms of buildings erected to fulfil the requirements of some bygone century, although careful study of these old buildings is a necessity to every architect. Noting various points as to the choice of materials and methods of construction, stress was laid on the advantages of solid construction of floors, etc., and detail given of some varieties of solid concrete or wooden floors. A double cavity wall was mentioned as probably having some advantages. Speaking of various treatments of wall surfaces, half-timber work, when used merely as a casing in front of a brick wall, was condemned as being a useless, and more or less perishable, deception. The aspect and planning of the chief rooms and of the house as a whole were briefly commented on and illustrated by examples of plans by Mr. Norman Shaw and others. Referring to the external treatment, it was insisted that the scheme must be mentally realised as a combination of materials of certain colours and textures, not merely as a pleasing arrangement of lines on paper, and that local material should generally be preferred. While moulded brick is a useful material, terra-cotta was thought to be quite unsuitable for country houses. The remainder of the paper consisted of comments on lantern slides, showing over fifty views and plans of good modern domestic work by leading architects.—After a few words by Mr. J. W. Beaumont, the President, a vote of thanks to the lecturer was proposed by Mr. W. A. Royle, and seconded by Mr. J. S. Hodgson.

Sheffield Society of Architects.—On the 12th inst. Mr. Hugh Stannus gave an address before members of the Sheffield Society of Architects and Surveyors. The occasion was the ordinary monthly meeting of the Society, which was held in the Lecture Hall of the Literary and Philosophical Society's rooms in Leopold-street. Mr. T. Winder took the chair. Mr. Stannus entitled his address "Architectural Education." He remarked that it was a very good beginning for a man to have tried his hand at all three styles, the old Classical, the Mediæval, the Renaissance, in addition to the modern. A good knowledge of German would be found helpful, especially in the mastery of text-books, and some idea of legal work would be sure to prove useful. A budding architect should also keep up his literary knowledge in order to be able to submit a lucid report to any public body. Mr. Stannus went on to advocate that a professorship of architecture and of architectural science should be created in Sheffield in connexion with the establishments of higher education. Such a professor ought to be responsible for the teaching of architecture and should have a proper status among his colleagues, the other professors, and amongst his fellow citizens. He would give lectures not only to those who were going to be architects, but also to those who were going to be their clients. By that means the general body of people would realise that architecture had evolved through the centuries without a break. The people would then realise that the work of an architect was not merely the designing of mouldings or the arranging of extra quantities to a builder.—A discussion followed, and on the motion of Mr. E. M. Gibbs, seconded by Principal Hicks, and supported by others, a vote of thanks was accorded to the lecturer.

Northern Architectural Association.—The opening meeting of the winter session of the Northern Architectural Association was held on the 11th inst. at 36, Northumberland-street, Newcastle. The President (Mr. J. Walton Taylor, F.R.I.B.A.) occupied the chair, and in his address he said they were met to inaugurate the forty-fourth session of the Association. The thought uppermost in their minds would doubtless be the generous gift of 1,500*l.* by their old friend, Mr. Wm. Glover, a past President of the Association. The interest would be devoted to the library, to providing lectures or other educational facilities, and to instituting a travelling studentship, with medals and prizes, which the Council had suggested should be named after the donor. Of the sum, 500*l.* had been set apart by Mr. Glover as the nucleus for a permanent building for the Association. It had been hinted by some of the senior members that the main object for which the Association was formed in 1858 had been somewhat lost sight of in the social efforts which had been made to interest and assist the younger members. The Association, he would remind them, was formed to promote union amongst its members, the elevation of the profession of architecture, the establishment of uniformity in practice, and the general advancement of the art and science of architecture. They would agree with him that if an association was to be successful, its activities must not be too much confined to one section only, but must be representative of all the various interests and agencies. If more attention had been given to the younger members of late years than formerly, the result would prove the wisdom of the course taken. He appealed to his older brethren to support the Council and himself in their honest endeavour to further the interests of every department of their work, for the seniors as well as for the students, and to make the Association a greater means of usefulness than it had ever been before. This year the Council of the R.I.B.A. had made a departure which was of the greatest importance to the profession. He referred to the question of the education of architects and the conference of the allied presidents held in London, adding that he was hopeful that at no distant date a chair of architecture would be established at the Durham College of Science, which, in a large association such as this, ought to be self-supporting. This would be one of the first subjects to be considered by the Council during the coming session. With regard to registration, the allied presidents were in favour of it, but thought the Institute was the proper body to take the subject up. The past year, the President continued, had been one of great activity in the building world. There was every indication of a falling off in the erection of large undertakings, whilst speculative building was practically at a standstill. It was interesting to compare the old maps of Newcastle, prepared by Mr. Oliver (father of the late Mr. Thomas Oliver, F.R.I.B.A.) with the most recent surveys. They then realised the vast development which had taken place. Pleasure gardens and country walks of the olden time were now covered with streets, so that the neighbouring villages were now practically part of Newcastle. Should the proposed extension of the city boundaries be carried out, the municipal area would be increased by 11,624 acres, and the total area of Newcastle would be 16,979 acres, with a population of about 278,665. The greatest transition in Newcastle took place about seventy years ago, when the late Mr. Richard Grainger secured Anderson-place and grounds and the nuns' gardens and fields, and had the ground cleared and laid out into wide thoroughfares. The President exhibited a plan and isometrical view, prepared by Mr. T. Sopwith in 1834, which showed the original scheme. He also reproduced, from the plan, a description of the proposed new streets and market. These showed how closely the first ideas had been adhered to. Having described the thoroughfares, the President said, although a great deal of the credit was due to Mr. Grainger and his legal adviser, Mr. John Clayton, he should not overlook the important part which their first president (Mr. John Dobson), Messrs. J. and G. Green, Mr. Wardle, and others took in designing the handsome street frontages. It was to be regretted that there had been so little recognition of these pioneers of architecture. Something should be done by this Association to keep their names green. Whether it would be possible, in the near future, to realise Mr. Glover's cherished wish of securing a permanent home for the Association it was difficult to say. If that were done it would not be difficult to have an exhibition of the works carried out by those men, and thus form a museum of art. Failing that, it might be possible to secure a corner in the new Laing Art Gallery to be known as the architectural section. Although they might justly be proud of their principal streets, he was afraid they could not be of their northern suburbs. Architects were often censured for the state of affairs which prevailed, and were even held responsible for the inferior class of houses. He attributed the evil to greed for gain. Instead of the entire district being in the hands of one public-spirited owner, it was bought up in sections by syndicates, who competed against each other for the largest return for their investments. He pointed to what was being done by other towns in creating fine suburbs, with wide streets and avenues of trees and attractive detached houses standing in the midst of well-planted gardens; and declared that our public bodies should do something to prevent these self-centred vested interests, and

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formulate a well thought out scheme for the development of all new districts. Turning to the housing problem, he said the subject had been taken up at different times by philanthropists, budding politicians, and social reformers, but, so far as he was aware, no society of architects had ever dealt with it in a practical way. They might claim to know something of the difficulties. Some of the social reformers had advocated costly schemes for pulling down large areas of slum property and building palatial blocks of dwellings at the public expense. Others had visions of transporting the dwellers of slumland into the suburbs and forming a colony there on the model of Bourneville, near Birmingham, Saltaire in Yorkshire, or Port Sunlight. They might take it that people of this class did not like the restraint and order inseparable from industrial buildings. Moreover, the high buildings constructed of fireproof materials could not be erected under the local by-laws and yield a fair return on the capital. The President showed also how men preferred being near their work, and expressed approval of the action of the Newcastle Corporation in erecting workmen's dwellings on the line of the tram route. The quick and frequent electric tram and train service promised, he added, to be a solution, to a great extent, of the housing problem.—Colonel Haswell proposed, and Mr. Jas. Garry (Hartlepool) seconded, a vote of thanks to Mr. Glover for his gift of 1,500*l.* (Consols) to the Association.—The resolution was carried with acclamation.—Mr. Charlewood proposed, and Mr. C. S. Errington seconded, a vote of thanks to the President, which was heartily accorded and duly acknowledged.

Edinburgh Architectural Association.—At a recent meeting of this Association, Mr. J. A. Arnott in the chair, Mr. Ramsay Traquair delivered to the "Associates'" Section a lecture under the title "Notes on Later Scotch Gothic." The lecturer traced shortly the rise and progress of Gothic work in Scotland, pointing out the manner in which the earlier English work was replaced by a mixed school influenced both from France and England. Great stress was laid on the need of studying the simpler examples of the later style as a base on which to raise new ideas. A number of characteristic buildings of the Later Decorated period were then described more fully. The paper was illustrated by lantern slides.

Architectural Association of Ireland.—A visit by members of this Association was paid recently to the new nurses' home in connexion with Cork-street Hospital. The visitors were received by the architect to the building, Mr. W. M. Mitchell, R.H.A., who, having exhibited the drawings and made a brief explanatory statement, afterwards conducted them through the building, pointing out the various objects of interest therein. The new home is very advantageously situated opposite the hospital, with Cork-street intervening. The main front enjoys a sunny aspect, overlooking a lawn of considerable extent bordered by trees, which was formerly used as the burying ground of the Society of Friends. No interments, however, have taken place there for nearly half a century, and it will shortly be transformed into a garden for the rest and refreshment of the inmates after their duties at the hospital. Accommodation is provided in the building for about fifty nurses, each having a separate bedroom, while large, airy day-rooms occupy the ground story. The floors, partitions, etc., are fireproof throughout, and an external wrought-iron staircase is provided for emergencies. The entire building is heated by hot water, and electric lighting has been adopted. The sanitary wing, which is connected with the main building only by a corridor having cross ventilation, is fitted with the most approved type of baths, lavatory basins, etc. The building and sanitary contractors, respectively, are Messrs. H. and J. Martin, and Mr. H. MacGarvey, while Mr. Hynes acted as clerk of works.

Engineering Standards Committee.—The Engineering Standards Committee have appointed Messrs. Crosby Lockwood and Son, of 7, Stationers' Hall-court, E.C., as official publishers to the Committee. All the reports and specifications published by the Committee may be had from the official publishers to the Committee, or direct from the offices of the Committee, 28, Victoria-street, Westminster.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday, in the County Hall, Spring Gardens, S.W., Lord Monkswell, *Chairman*, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Camberwell Borough Council 6,496*l.* for paving, etc., works; and Mile-end Old Town Guardians 1,000*l.* for poor-law purposes. Sanction was also given to Westminster City Council to a loan of 2,494*l.* for street improvement.

Tramways.—The following recommendations of the Highways Committee were agreed to after discussion:—

(*a*) That a special meeting be summoned to consider and decide whether the Council shall exercise its powers under Section 43 of the Tramways Act, 1870, in respect of the purchase of the undertaking authorised by the London Southern Tramways Act, 1882.

(*b*) That, with a view to enable the Council to decide whether or not it will give notice to purchase the undertaking of the London Southern Tramways Company under Section 43 of the Tramways Act, 1870, it be referred to the Highways and Improvements Committees to ascertain whether the local authorities concerned will agree (1) to consent to the adoption of the overhead system of electrical traction for the whole of the system with the exception of the lines in South Lambeth-road, (2) to contribute one-third of the net cost of the necessary street widenings for the reconstruction of the tramways in that manner, and (3) to consent to the doubling of the tramways where decided upon.

The following recommendations were also agreed to:—

That the estimate of 90,000*l.*, submitted by the Finance Committee, be approved; and that expenditure on capital account not exceeding that amount be authorised for the purchase of the rails, and other track materials, required in connexion with the reconstruction, for electrical traction, of certain sections of the London County Council Tramways and of the Council's (Northern) Tramways, and for the construction, for the same method of traction, of certain authorised tramways.

That the estimate of 13,850*l.*, submitted by the Finance Committee, be approved; and that the expenditure on capital account of sums not exceeding that amount in all, be authorised, in connexion with the extension, under the powers conferred by the London County Council (Tramways and Improvements) Act, 1901, of the existing tramways in Tooting High-street, along portions of that thoroughfare and Defoe-road, and the construction of new termini in those thoroughfares.

That expenditure be sanctioned of a sum not exceeding 2,650*l.* in respect of the construction for the underground conduit system of electrical traction, of a portion of the tramways, authorised by the London County Tramways Act, 1900, along St. John-street and St. John-street-road.

That the offer of Messrs. J. G. White and Co., Ltd., to carry out the work referred to in the foregoing resolution, on a schedule of prices 15 per cent. in excess of those under the contract entered into between them and the Council for the reconstruction of the New-cross and Greenwich, etc., tramways pursuant to the resolution of December 9, 1902 (p. 1880), be accepted.

That the Highways Committee be authorised to make arrangements for the purchase of the rails and other track materials required for the portion of the tramways in St. John-street and St. John-street-road, referred to in the foregoing resolutions.

Certificates as to Re-naming of Streets and Re-numbering of Houses.—The Historical Records and Buildings Committee reported as follows, the recommendation being agreed to:

Section 38 of the London Building Act, 1894, provides that "the Council shall keep a register of all alterations made by them in the names of streets and in the numbers of the houses therein . . . It shall be lawful for any person to inspect such register and to take a copy of any portion thereof upon payment of such reasonable fee as the Council may from time to time determine." The following is an extract from the existing regulations of the Council in relation to the fees to be charged:—

"Any person interested in property affected by any order of the Council for renaming streets or renumbering houses, is permitted, on application, to make a copy of the order and a tracing of the plan attached thereto; or a certified copy of the order and plan may be furnished to him on his paying the cost of making the same. A fee of 1s. is to be charged to all persons seeking information involving a reference to the records with regard to orders for renaming streets or renumbering houses. If a copy of an order and plan be required, there will be a further fee of not less than 1s. 6d. A more extended plan may be obtained for a larger payment. Copies of orders and plans are to be made in the Superintending Architect's department."

No scale has been fixed as to the amount of the "larger payment" for more extended plans, but, in practice, fees have been charged varying from 1s. 6d. for a copy of an order without a plan, or with a plan showing not more than three houses, to 8s. for a copy of an order with a plan showing from forty-six to fifty houses. This arrangement has worked satisfactorily, and we think that it should be formally approved by the Council, and at the same time, be extended so as to include provision for a plan showing up to 300 houses. We recommend that the approval of the Council be given to the scale of fees, set out in the schedule to this report, to be charged for the provision of copies of orders, with or without plans, in relation to the renaming of streets and renumbering of houses.

[The following is the schedule referred to: Scale of fees to be charged for the provision, under Section 38 of the London Building Act, 1894, of copies of orders, with or without plans, in relation to the renaming of streets and the renumbering of houses:

		£	s.	d.
For a copy of an order without a plan, or with a plan showing 3 houses.....		0	1	6
For a copy of an order with a plan showing...	4 or 5 houses	0	2	0
	6 or 7 houses	0	2	6
	8 or 9 houses	0	3	0
	10 or 11 houses	0	3	6
	12 or 13 houses	0	4	0
	14 or 15 houses	0	4	6
	16 to 20 houses	0	5	0
	21 to 25 houses	0	5	6
	26 to 30 houses	0	6	0
	31 to 35 houses	0	6	6
	36 to 40 houses	0	7	0
	41 to 45 houses	0	7	6
	46 to 50 houses	0	8	0
	51 to 75 houses	0	10	6
	76 to 100 houses	0	12	6
	101 to 150 houses	0	15	0
	151 to 200 houses	0	17	6
	201 to 300 houses	1	0	0]

Indication of Houses of Historical Interest.—The same Committee recommended, and it was agreed:—

That the commemoration, by means of the erection of memorial tablets, of the following houses of historical interest in London, viz.—(1) No. 56, Devonshire-street, Portland-place (Sir John Herschel); (2) No. 1, Devonshire-terrace, Portland-place (Charles Dickens); and (3) No. 12, Clarges-street, Piccadilly (Edmund Kean), be approved.

Housing.—The Housing of the Working Classes Committee reported as follows:—

"In accordance with practice the housing manager has submitted to us a report of the work of his department during the year ended March 31, 1903. The report is satisfactory since it shows that, notwithstanding the continued increase in the rates, which now amount to 19.46 per cent. of the outgoings, and the heavy income-tax for the year, the percentage of outgoings over the whole of the Council's dwellings is only 44.45, or .97 per cent. less than last year.

The total loss by empties, including the rents lost at the opening of new dwellings, has amounted to 2.7 per cent. of the total rents receivable, and the rent written off as irrecoverable amounted to only 2s. 11d. per cent. of the rent in charge, which is comparable with 10s. per cent. written off in 1901-2. The usual annual census for the Council's dwellings was taken in December, 1902, and showed that 9,480 rooms were occupied by 13,818 persons, or an average of 1.45 persons per room, and that the number of cases of overcrowding, which were immediately remedied, in most cases by transfer to larger tenements in the Council's dwellings, was only 15. . . ."

Improvements.—The following recommendations of the Improvements Committee were agreed to:—

That the estimate of 3,930*l.* submitted by the Finance Committee be approved; that the Improvements Committee be authorised to take all necessary steps for the widening to 54 ft. of New King's-road, Fulham, at the Draycott-lodge site, and at Nos. 182, 184, and Elysium-cottage.

That the statutory consent of the Council be given to the extension of the widening of Castle-alley, Whitechapel, proposed to be undertaken by the Metropolitan Borough Council of Stepney, in accordance with the plan presented to the Improvements Committee on July 22, 1903, and that the Borough Council be informed that the Council is not prepared to make any further contribution towards the cost of the improvement.

That the offer of Messrs. J. G. White and Co.,

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Ltd., to carry out for the sum of 3,111*l.*, and in accordance with the working drawings, bills of quantities and specification prepared by the Council's Engineer, the paving and other works connected with the widening of St. John-street, be accepted.

Richmond Hill View.—The deed of covenant between the Council, the Richmond Corporation, and Sir John Whittaker Ellis to restrict building on land within the view from Richmond Hill was approved.

Building Conditions.—The Report of the Corporate Property, Charities, and Endowments Committee contained the following :—

"It will be remembered that at the auction held on October 13 last certain valuable plots in the Strand, Kingsway, and Aldwych were offered on lease, but no bids for them were made, and it is in consequence of this result that we have carefully considered whether the building conditions relating to the leasing of the Council's surplus land acquired in connexion with various improvement schemes should be modified, with a view to the letting of the land more expeditiously. It has been suggested that it is not the obligation to spend money upon a building or the condition as to the approval of elevation and design that causes would-be bidders to hold back, but the fear of subsequent complications and delay, and the opinion has been expressed that where such large sums of money are at stake a reference to an independent arbitrator of standing should be allowed. As the conditions stand at present there is no provision made for arbitration. No. 13 of the conditions provides that in the event of any dispute arising between the Council and the lessee in connexion with the erection of the buildings, such dispute is to be settled by the Council's architect, whose decision shall be final. The point, therefore, which we have had chiefly to consider is whether any modification of the condition in question should be made so as to provide for an appeal to an independent arbitrator in the event of any failure of agreement between the Council and the lessee. We have made inquiries as to the practice which obtains in regard to the letting of land on the estates of the large ground owners of London, and we are advised that the conditions in use on these estates are generally more onerous than those imposed by the Council, and that no provision for arbitration is made in the conditions. It does not appear that the Council's conditions have hitherto restricted building operations on its land. From figures which have been submitted to us it appears that the building work on the Council's freehold has increased nearly sevenfold since the year 1897, and we are of opinion that the inability to dispose of more surplus land is not due to the conditions, which have been practically the same for many years past. We are further informed that while the standard of work insisted upon is sufficient for its purpose, the Council does not press this beyond what is believed to be consistent with the circumstances of the case. That the tendency is towards leniency rather than the strict letter of the conditions is in a measure confirmed by the large increase in the building work on the Council's land. Having regard to all the circumstances, we do not think that the Council would be well advised to make any alterations in its building conditions, and we are of opinion that, although there were no bidders for the plots of land in connexion with the Holborn to Strand improvement at the last auction, the Council will not experience any difficulty in eventually disposing of the plots under the existing conditions. We may remind the Council that on May 26 last, when reporting on the question of the elevation of the buildings to front on the Strand, Aldwych, and Kingsway, we recommended that, in the event of disagreement, the lessee should be allowed to consult with certain architects with a view to his submitting an amended design, and that should the amended design not be approved, the designs should be submitted to the Senior Architectural Royal Academician for his decision. The Council did not adopt our recommendation, but decided that the design should be such 'as the Council should approve as worthy of the position,' thus, in effect, allowing no appeal against its decision. We have given instructions for a copy of the Council's building conditions to be supplied to each member of the Council, and we report the facts for the information of the Council."

The Chairman of the Committee (Mr. Mullins) asked that the report might be withdrawn.

Mr. Goodrich asked whether it was a fact or not that the Valuer had recommended the inclusion in the Building Conditions of a clause to refer disputes to an independent arbitrator?

Mr. Mullins said he preferred to defer any explanation until another report was submitted.

The subject then dropped.

Land and Houses in London.—The following motion by Mr. Leon was agreed to, i.e. :—"That it be an instruction to the Local Government and Taxation Committee to prepare a return to show separately and for a series of years the net value of (*a*) land and (*b*) houses in the County of London (in continuation of a similar return presented by the Council in 1897 to the Royal Commission on Local Taxation), and also the area of building land unbuilt on."

The Council then adjourned.

THE QUANTITY SURVEYORS' ASSOCIATION.

The first general meeting of this Association was held on Wednesday, the 18th inst., at the Holborn Restaurant. There was a numerous attendance of both London and provincial members of the profession, and Mr. W. Hoffman Wood, of Leeds, was voted to the chair.

The proposed memorandum of association, having been read by the Hon. Secretary, Mr. F. B. Hollis, was unanimously adopted by the meeting. The following officers were then elected :—President, Mr. Walter Lawrance, F.S.I. ; vice-president (London), A. J. Gate, F.S.I. ; vice-president (provincial), W. Hoffman Wood, Leeds ; and a council of twelve, consisting of the following eight London and four provincial members :—London—W. Lawrance, F.S.I. ; A. G. Cross, F.S.I. ; A. J. Gate, F.S.I. ; W. R. Hood, F.S.I. ; R. L. Curtis ; H. England ; H. W. Crickmay ; and F. B. Hollis, who was elected hon. secretary and treasurer. Provincial—H. Curtis-Card, F.S.I., of Lewes ; H. L. Beckwith, F.S.I., of Liverpool ; R. J. Tollit, of Cambridge ; W. Hoffman Wood, of Leeds.

The Hon. Secretary, Mr. F. B. Hollis, 17, Bedford-row, W.C., will be glad to receive further applications for membership or for particulars of the Association.

THE LONDON BUILDING ACT.

The Paddington Borough Council on Tuesday resolved to inform the London County Council that they were of opinion that the administration of the London Building Act and the exercise of the functions of the District Surveyor should be transferred to the Metropolitan City and Borough Councils. Also that, *inter alia*, the London Building Acts require amendment in the following particulars, viz. :—

Regulations for the pulling down of buildings towards the greater safety and convenience of the public.

Provisions for an increase in the minimum width of new streets in certain cases.

In default of (*b*), administration of Act as regards new streets by Borough Councils.

Incorporation of provisions as to new streets with Metropolis Management Acts instead of Building Acts.

Provision for compensation for land taken for widening streets where re-building operations are contemplated, and arrangements of the exercise by the road authority of a right of pre-emption.

In default of (*b*), naming and numbering streets generally by Borough Councils.

Similar regulations for the heights of buildings at whatever times the streets upon which they abut may have been laid out.

Increased heights of buildings permitted.

Removal of certain restrictions as to the heights of buildings where the latter will not be used for habitation.

Requirements governing all buildings in courts, whether or not used for habitation, due regard being given to precautions against fire.

Provision of parapets around all lofty buildings.

Fireproof roofs to all projecting one-story shops and lofty buildings. Modification of provisions relating to the fireproof construction of public buildings in certain cases.

In default of (*b*), control by Borough Councils alone of all vaults under streets.

Permission for the use of other materials than brick for staircases in public buildings.

Better regulation of oriels and bay windows.

Surrounding of vacant land by hoardings or fences.

Regulation of railway companies' combustible buildings.

Alterations of existing law as to temporary, special, and wooden structures and buildings.

Application of party wall regulations to the re-building of an existing external wall.

Revision of dangerous structures procedure.

Exemption from Act of buildings erected by Borough Councils.

Better description of mortar.

Modifications of law as to hollow walls in some cases.

An investigation of the County Council's power to vary and repeal, where necessary, by-laws made under the Building Act.

The Slate Trade.—The Blue Book on Mines and Quarries for 1902, just issued, shows a slight increase in the output of slate, which is, however, still 150,000 tons below that of 1898. The export trade shows an increase of nearly 24,000*l.* over previous year, and the trade generally is in a very healthy state. The Festiniog Quarry proprietors have decided to continue present prices for the coming year.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

The London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses :—

Kensington, North.—(*a*) That the resolution, reported to the Council on 6th October, consenting to the erection of a studio building at the rear of No. 16, Addison-road, North Kensington, in accordance with the application of Mr. H. Cayley on behalf of Mrs. Clarke, be rescinded.—Agreed.

(*b*) That the Council do not consent to the erection of a studio building at the rear of No. 16, Addison-road, North, Kensington, with the boundary fence at less than the prescribed distance from the centre of the roadway of Princes-place (Mr. H. Cayley).—Refused.

Lines of Frontage and Projections.

Lewisham.—The retention of porches to six houses on the south side of George-lane, Hithergreen, Lewisham, westward of the Fever Hospital (Messrs. Norfolk and Prior for Mr. C. C. Story).—Consent.

Fulham.—Buildings on the north-west side of Conan-street and south-west side of Edith-villas, Fulham, so far as relates to the erection of porches and oriel windows to such buildings (Mr. J. P. Flew, jun.).—Consent.

Fulham.—Buildings on the east side of Townmead-road, Fulham, so far as relates to an alteration in the position of one of the buildings (Mr. W. T. Hanman for Messrs. MacFarlane, Lang, and Co.).—Consent.

Hackney, Central.—A building on the site of No. 222, Mare-street, Hackney, to abut also upon Darnley-road (Messrs. Holman and Goodrham for the Royal London Friendly Society.).—Consent.

Hackney, North.—That the application of Mr. G. H. Paine for an extension of the periods within which the erection of eight houses with bay-windows on the east side of Upper Clapton-road, Hackney, between No. 174, Upper Clapton-road and Moresby-road, was required to be commenced and completed, be granted.—Agreed.

Hammersmith.—One-story shops in front of Nos. 350, 352, 354, and 356, King-street, Hammersmith (Messrs. B. T. and W. J. Flexman).—Consent.

Lewisham.—That the application of Mr. A. H. Kersey for an extension of the periods within which the erection of houses with bay-windows on the west side of Brockley-rise, Lewisham, was required to be commenced and completed be granted.—Agreed.

Westminster.—A church, with towers and porch upon the site of Nos. 18, 19, and 20, Montpelier-place, and Nos. 1, 2, and 3, Alfred-place, Westminster (Messrs. Boehmer and Gibbs for Baron Sir John H. W. Schröder).—Consent.

City of London.—A stone balcony over the entrance to No. 1, Old Broad-street, City (Mr. H. C. Clarke for the Indemnity Mutual Marine Assurance Company, Ltd.).—Refused.

Hackney, Central.—One-story additions at the rear of No. 44, Mortimer-road, Kingsland, to abut upon Downham-road (Mr. J. B. Watts).—Refused.

Hammersmith.—Two one-story shops at the rear of No. 24, Shepherd's-bush-green, Hammersmith, to abut upon Camden-gardens (Mr. F. A. Dawkins for Messrs. Kellett and Firth).—Refused.

Paddington, South.†—An iron and glass shelter in front of No. 49, Cambridge-street, Hyde-park (Messrs. Carr and Parr for Mr. R. Borer).—Refused.

Wandsworth.—A one-story addition to "Malet-lodge," No. 283, Upper Richmond-road, Putney, to abut also upon Marlborough-road (Mr. H. Brown for W. J. Mansell).—Refused.

Wandsworth.†—Buildings upon a site upon the western side of Streatham High-road. Wandsworth, to abut upon Guildersfield-road (Mr. A. Conder for Mr. M. Holmes).—Refused.

Wandsworth.†—Buildings on the western side of Streatham High-road, Wandsworth, between Guildersfield-road and Glencairn-road (Mr .A. Conder for Mr. M. Holmes).—Refused.

Width of Way and Space at Rear.

Fulham.†—An addition to a building on the south-east side of Elysium-mews, Fulham-park-road, Fulham (Mr. A. Bingham).—Consent.

Width of Way.

Islington, West.†—A dwelling-house on the east side of Adam's-place, George's-road, Holloway (Mr. W. Goring).—Consent.

Clapham.—That the Council do accede to the request made by Mr. E. C. Ide for Mr. G. Heridge for permission to retain Nos. 27, 29, and 29A, Upper Orchard-street, Lyham-road, Clapham.—Consent.

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Hackney, North.†—A one-story addition at the rear of No. 150, Tottenham-road, Dalston, with external walls at less than the prescribed distance from the centre of the roadway of Culford-mews (Mr. G. Chamberlain).—Consent.

Rotherhithe.—A building on the north side of Seth-street, Rotherhithe (Mr. J. P. Choate for Mr. W. C. Latham).—Consent.

Brixton.—A one-story shop upon part of the forecourt of "Herbert House," Coldharbour-lane, Camberwell, with external walls at less than the prescribed distance from the centre of the roadway of Milkwell-yard (Messrs. T. Laws and Son for Messrs. Hammond and Baker).—Consent.

Lines of Frontage and Construction.

Lewisham.—A projecting steel structure in front of premises on the west side of Kilmorie-road, Forest-hill (Mr. J. M. Kennard for "Oxychlorides," Ltd.).—Refused.

Space at Rear.

Kensington, South.—A modification of the provisions of Section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a building, with external staircase and balconies at the rear, on the site of Nos. 11 and 11A, North-row, Earl's-court, Kensington (Mr. W. G. Hunt for Mr. C. G. Hatt).—Consent.

Hoxton.—A studio at No. 207, Old-street, Shoreditch (Messrs. Edwards and Co.).—Refused.

Width of Way, Line of Frontage, and Space at Rear.

Holborn.—A building with a projecting staircase in front and an irregular open space at the rear, on the site of No. 50, Ormond-yard, Holborn (Mr. W. H. Winder for Mr. F. Pettitt).—Consent.

Deviation from Certified Plans.

Strand.—Certain deviations from the plans certified by the District Surveyor, under Section 43 of the Act, so far as relates to the proposed rebuilding of Nos. 61, 62, and 63, Jermyn-street, Piccadilly (Mr. W. Woodward for Messrs. White and Co. and Mr. F. Sweetland.)—Refused.

Whitechapel.—Certain deviations from the plans certified by the District Surveyor under Sections 13 and 43 of the Act, as far as relates to the proposed rebuilding of the "Archers' public-house, No. 24, Osborne-street, Whitechapel, at the corner of Old Montague-street (Mr. J. D. Scott for Mr. A. J. Goddard).—Refused.

Formation of Streets.

Lewisham.—That an order be issued to Mr. J. W. Webb refusing to sanction the formation or laying out of a new street for carriage traffic, to lead from Codrington-hill to Crofton-park-road, and of a street for foot traffic only to lead out of the east side of Bexhill-road, Lewisham.—Refused.

Buildings for the Supply of Electricity.

Bermondsey.—Supports for a cast-iron tank at a generating station and works on the west side of The Neckinger, Spa-road, Bermondsey (Messrs. Kincaid, Waller, Manville, and Dawson for the Council of the Metropolitan Borough of Bermondsey).—Consent.

Cubical Extent.

—Deptford.—A modification of the conditions of consent of December 16, 1902, to the erection of two sheds at Messrs. Farquharson Bros. and Co.'s wharf, approached from the north side of Rollins-street, Deptford, so far as relates to the erection on the roof of one of the sheds of a wooden sign-board and lettering (Messrs. Farquarharson Bros. and Co.).—Consent.

Dwelling-houses on Low-lying Land.

Rotherhithe.—That the solicitor do prepare a licence under Section 122 of the Act, to Mr. H. Chamberlain, for the erection of six dwelling-houses on low-lying land situate near No. 360, Rotherhithe-street, Bermondsey.—Consent.

The recommendations marked † are contrary to the views of the local authorities.

ROYAL COMMISSION ON LOCOMOTION.

THE Royal Commission on Locomotion sat again at Westminster Palace Hotel on Thursday last week, under the Chairmanship of Sir David Barbour.

Mr. Andrew Young, the Valuer to the London County Council, was called and said that he had been valuer to the Council since 1889, and prior to that date was Valuer and Surveyor to the London School Board. He had valued and negotiated the purchase of all the property required by the Council in connexion with street improvements carried out by them since they were constituted under the Local Government Act, 1888. Referring to the tables submitted by Mr. Gomme, the Clerk to the Council, and which gave particulars of the various improvements carried out by the Council and the Metropolitan Board of Works, witness said that they showed that in the case of new thoroughfares the surplus land formed a much greater proportion of the gross cost than in the case of widenings. In the case of Northumberland-avenue the receipts from surplus land exceeded the gross cost by approximately 120,000*l.* With regard to the Thames Embankments, although the purchase of the necessary property involved very heavy expenditure, the bulk of the land reclaimed was devoted to public purposes, and the value of the cleared sites was comparatively small. He was of the opinion that the only economical method of carrying out street improvements was by laying out the new streets in such a way that it would not be necessary to acquire a large proportion of valuable property now occupied for business purposes. Where practicable they should be carried through property of an inferior class where the formation of a broad thoroughfare would not only be possible at much less cost for property, but would, by facilitating ventilation, improve the condition of the district from a sanitary point of view. One important point in connexion with street improvements was the extent to which it might be profitable to extend the area of property taken for recoupment, and as the proposal under consideration was the construction of streets of a greater width than any hitherto projected in London, viz., 160 ft., he thought there would be more than usual difficulty in deciding that point. The construction of a road of such size would of necessity involve an outlay of great magnitude. The effect of the construction of such streets would raise enormously the value of property in the remoter districts, on account of their being brought more readily into touch with the central districts of London. If special means for locomotion were provided, by means of surface tramways and tube railways beneath the streets, the possibilities of recoupment would not only be increased but would extend over very large areas of those remoter districts. He had prepared estimates of the cost of acquiring the necessary property for one of the proposed roads, in all probability the cheapest of them to construct. The thoroughfare he had taken would form a continuation of the new street from Holborn to the Strand. It would cross the Thames, and then proceed through Southwark, Bermondsey, and Camberwell to the Crystal Palace. In preparing his estimate he had included an area of land 150 ft. deep on either side of the proposed thoroughfare. That would enable the Council to purchase the property under existing conditions and to resell with the benefit of the improvement that would be conferred upon the property after the construction of the new road. These limits were purely arbitrary, and it was obvious that a very much larger area of property would be benefited by the construction of the street through which the road would pass. The probable gross cost of acquiring the property amounted to 12,000,000*l.*, but a considerable proportion of that sum could no doubt be recovered by the sale of the surplus property, after the improvements had been executed. He considered that in laying down such new streets they should as far as possible take the form of new thoroughfares and not merely the widening of existing roads. Experience had shown that new streets were more economical in the sense that they returned a larger amount by way of recoupment after construction than did mere road widenings. It was evident that the acquisition of so large a quantity of property as would be required for the scheme he had mentioned, and also for schemes of a like nature, would displace a considerable number of persons of the working classes. New accommodation for these persons would have to be provided, and probably to some extent before the old houses were demolished. That would considerably enhance the difficulty of carrying out such schemes. The magnitude of rehousing might be judged from the fact that, according to a computation he had made with regard to the proposed Strand to Crystal Palace street, more than 41,000 persons would be displaced, and to provide sufficient new accommodation would necessitate the acquisition of a site or sites of over 200 acres. Such an area could only be acquired, without making further displacements, on the outskirts of the county near the southern end of the proposed road. It had been found, he continued, in speaking of the erection of such houses in the centre of the county, that it was not commercially possible to erect artisans' dwellings on valuable commercial land. Again referring to the route to the Crystal Palace, witness said that approximately it would be 6¼ miles in length, and on the basis of a gross cost of 12,000,000*l.* sterling the cost per mile would be over 1,750,000*l.* With one exception the older improvements were for widenings very much less than that which he had suggested, the exception being the Holborn to Strand improvement, where the roadways were being made 100 ft. wide. The length of the improvement was approximately half-a-mile, and the estimated cost of acquiring the necessary property 4,500,000*l.*, or at the rate of 9,000,000*l.* per mile. The extent of the property scheduled for the purpose of recoupment was exceptionally large, and it was estimated that in view of its position as much as 4,000,000*l.*, or nearly 89 per cent. of the estimated gross cost, would be received from the sale of surplus land. The net cost of property, therefore, worked out at about 1,000,000*l.* sterling per mile. It was not to be anticipated that similar satisfactory results would accrue from an improvement which was not so centrally situated. In the latter case, where the land value might be appreciated in as great a proportion, the buildings formed a large proportion of the total value of the property bought, and there would be on the destruction of those buildings a comparatively greater loss. The London County Council had for several years past been engaged in preparing a plan showing the ownership of property within the county, and, from the information relating to about 5-6ths of the county, it would appear that while 27,450 acres, or about 35 per cent. of the total area of London, were vested in the comparatively small number of less than 100 persons, a further area of 33,350 acres was vested in nearly 10,000 owners. The matter was further complicated by the fact that London had been developed on the lines of building leases for terms of less than 100 years. That rendered more difficult the formation of a satisfactory scheme for the persons who would benefit by the construction of the roads to contribute towards the cost. He had prepared estimates of the probable cost of interfering with cellars and vaults beneath the roadways from Hammersmith to the City and from the City to Stamford Hill along the route of a suggested shallow tramway-subway. From the information he had received he estimated that the interference with those cellars and vaults would involve the payment of compensation to the extent of over 1,250,000*l.* The estimate was based, however, on the assumption that the Council would obtain special statutory powers exempting them from the operations of the general law, whereby they would be able to interfere with such cellars and vaults without being compelled to take the whole of the property of which they formed a part. It had been assumed also that the Council would not have to pay for the subsoil of the streets. The total length of the route was 5¼ miles, so that the cost would be roughly 250,000*l.* per mile. Witness then dealt at considerable length with certain points arising out of the examination of Mr. Gomme, more particularly with reference to matters in connexion with the Holborn to Strand improvement.

Sir Alexander Bruce, the Assistant-Commissioner of the Police, was then called. At considerable length he went into the matter of the regulation of surface traffic. Omnibuses and hackney carriages, he said, formed 60 per cent. of the total traffic within the county.

METROPOLITAN ASYLUMS BOARD.

THE usual fortnightly meeting of the Metropolitan Asylums Board was held on Saturday last week, at the offices, Victoria Embankment; Sir R. Hensley in the chair.

Among the correspondence received was a letter from the Local Government Board stating that that Board had approved of the amended plans of the additional accommodation to be provided for nurses at the South-Eastern Ambulance Station. The Local Government Board asked also to be furnished with a detailed estimate of the cost of the proposed re-construction of the South-Eastern Hospital, and to be informed of the result of the managers consideration of the matters referred to at the recent interview between the Chairman of the Hospital's Committee and the Managers' architect and the Board inspector, Mr. Downes, and their architect. The letters were referred to committee for consideration and report.

On the recommendation of the Children's Committee the Works Committee were authorised to carry out the work of re-laying the surface water drain at the Downs School. The cost is estimated by the Engineer to be 150*l.*

BIRMINGHAM MASTER BUILDERS' ASSOCIATION.

THE ordinary annual general meeting of the members of this Association was held on the 12th inst., at the Grand Hotel, Colmore Row, Mr. Albert S. Smith presiding. The annual report expressed regret that the depressed condition of trade referred to twelve months ago has continued during the past year. After again meeting the Operative Plumbers in conciliation, the committee had been unable to come to any satisfactory arrangement as to the code of working

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rules, the operatives declining to sign for less than three years. There were, therefore, no rules in existence with this branch. In view of the unreasonable demand of the National Association of Operative Plasterers in various parts of the country, that members should be paid on works in districts where a lower rate of wages prevailed than the current rate of the districts where the contractor's chief office was situated, the committee had given notice to the Operative Plasterers to abolish all existing rules after April 1 next. With this exception, the committee had, after careful consideration, decided not to disturb the trade by serving notices for alteration of rules, although, in their opinion, the present state of the trade fully justified notices to reduce the existing high rate of wages. The dispute with plasterers at Marle Hall, Llandudno, on this question had been before the committee on several occasions, and also before the National Federation, and was not yet fully disposed of. On several occasions deputations had interviewed sub-committees of the Architectural Association on matters of importance in the interests of the trade, notably the interpretation of the Prime Cost Clause in the conditions of contract, and "items of making good after other trades." The balance-sheet showed total ordinary receipts for the year 219*l.*, which, with the balance from last year, made a total of 391*l.* The various disbursements amounted to 204*l.*, and there remained 187*l.* to the credit of the Association.

In moving the adoption of the report and balance-sheet the President said he wished that the opening paragraph of the report had been different in tone. Trade last year was bad. Since then it had visibly declined. The decline was small in volume, which also meant that the builder's profits had been proportionately fine. They could not say that prices were low. Materials had not come down to any great extent. Labour was at the highest point it had ever reached; and so they could not quite say that building prices were low. Nevertheless, the committee, after carefully considering the question, had refrained from giving notice to the operatives for a reduction of wages, hoping that trade would soon show a turn for the better. The relationship between masters and men had been good throughout the year, with the exception of one branch. He referred to the plasterers. With them, as with other branches, a code of working rules was drawn up and signed by masters and men. These rules applied over a radius of five miles; but the National Association of Operative Plasterers had sought during the year to extend the radius to 120 miles, under cover of a by-law of their own union. He thought this needed no comment from him to show its flagrant unfairness and onesidedness. If they sent a plasterer into a district where the rate of wages was lower than theirs, they must pay him their rate of wages; if they sent him into a district where wages were higher they must pay him the higher rate of wages. It was thought by the committee that if the signed rules of the plasterers were to be contravened in such a way—by by-laws made to circumvent them—it would be better to be without them at all. It was hoped and confidently expected that other towns would follow their example in giving notice to the operative plasterers to abolish the existing rules after April 1 next. Until rules could be made which would be loyally abided by and fairly kept by both sides it would be better for them to have none.—Mr. William Sapcote seconded the motion, and endorsed what the President had said in reference to the plasterers.—The motion was carried unanimously. Lieutenant-Colonel Barnsley was unanimously elected President for the ensuing year, and Mr. J. B. Whitehouse vice-president; Mr. G. Twigg was reappointed treasurer; Messrs. Thomas Johnson and J. S. Surman auditors; a committee was elected, and Mr. E. J. Bigwood was re-elected secretary. On the motion of Mr. J. B. Whitehouse, seconded by Mr. C. Copeland, a vote of thanks was passed to Mr. Albert S. Smith for his services during the past year in the position of President. Mr. Smith having responded to the compliment, a vote of thanks to the chairman concluded the meeting.

A dinner followed in the Grosvenor Room, and was largely attended. The chair was occupied by Lieutenant-Colonel John Barnsley. After the loyal toasts had been honoured, the toast, "The City and Trade of Birmingham," was submitted by Councillor Whittall, who gave an account, from a builder's point of view, of the work carried on in some of the departments of the Corporation, mentioning in particular the Public Works Department and the Drainage Board. He also attached much importance to the education side of the work of the Corporation, and in this connexion referred to the results obtained at the technical schools. If manufacturers were to compete satisfactorily in the commercial and manufacturing world it was imperative that the greatest attention should be paid to the scientific and technical training of students. He mentioned that in the building trade there were no fewer than 580 students, while a great many applicants had had to be rejected owing to the pressure on the school accommodation.—Mr. Ebenezer Parkes, M.P., whose name had been coupled with the toast, responded. Mr. Thomas Barnsley proposed the toast, "Success to the Birmingham Builders' Association," giving an account of the work carried on by the organisation during the past year. The toast was acknowledged by the President. The toast "The Architects and Surveyors" was proposed by Mr. J. B. Whitehouse, and Mr. Arthur Harrison and Mr. Anthony Rowse responded on behalf of the architects and surveyors respectively.—Mr. A. S. Smith, the new President, proposed the toast, "National Federation of Building Trade Employers of Great Britain and Ireland," and referred to the work which had been performed under its auspices, especially during the past few years. The response came from Alderman John Bowen, the ex-president of the National Federation, and Mr. C. H. Barnsley (President of the Midland Federation).

Correspondence.

THE OLD SORBONNE CHAPEL, PARIS.

SIR,—Accompanying the plan hereof in your issue of August 8, I wrote: " . . . owing to the Rue de la Sorbonne 'new buildings' cutting across the western extremity of the nave, it is impossible to state for certain the length of the chapel, and whether it had any towers at the west end, as shown in the 'Tapestry Map' of Paris."

In the photograph of the plan from which my diagram was taken there *is* no trace of foundations further west; but the Librarian of the Paris University, at the Sorbonne, while assuring me no foundations of the west front were discovered while excavating for those of the "new buildings," has courteously sent me a small tracing of the foundations of the old chapel, *plus* the plan of that part of the new buildings abutting on the site of the foundations referred to, and, just west of the "new buildings," in the Rue de la Sorbonne itself, are marked two fragments of wall foundations, at 16 mètres from the interior line of the quadrangle at the point of juncture with the northern side of the old chapel plan. These two fragments are practically opposite the extremities of the north and south walls of the old chapel site, and though my correspondent has marked them with notes of interrogation, it is obvious that the fragments stand for the foundations, or part of them rather, of the west towers. This implies the construction, at a later date than the chapel itself, of a façade of some importance, as the plan of the chapel shows no aisles or transepts. The "evidence" for the Tapestry Map view is supported, or rather corroborated, by an illustration in the "Collection Destailleurs," of the eighteenth century.

JOHN A. RANDOLPH.

The Student's Column.

CONCRETE-STEEL.—XXI.

FOUNDATIONS.

CONCRETE-STEEL is of especial value in foundation work of all kinds. By its use the amount of excavation required for ordinary foundations is considerably reduced, and there is a corresponding reduction in the mass and weight of the foundations necessary for the support of buildings. Apart from the saving so effected, the further advantage follows that there is little interference with the hard crust frequently overlying soft and unstable strata.

Foundation slabs are often desirable for ground of low or variable bearing power. In one case there would be a general settlement with ordinary foundations subjected to uniform loading, and in the other case there would be local settlement in specially weak points which are not unfrequently found in unsuspected places. By forming a foundation slab or "raft" the entire building may be "floated," so that adequate support will be afforded over the entire site.

Assuming the ground to possess uniform bearing power, the tendency must be for columns or walls to depress the portions of the slab immediately below them, and to force up the intermediate portions, as shown diagramatically in Fig. 36. In a case of this kind the effect is the converse of that produced in a continuous beam carrying a uniformly distributed load. Beneath, and for a short distance on each side of, each column or wall, the lower fibres and the upper fibres in the middle portion of each span are in tension. To meet these conditions, the steel reinforcement of the slab should be disposed after the manner indicated in Fig. 37.

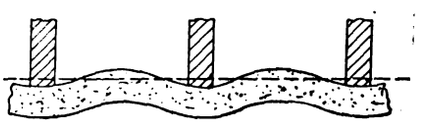

Fig 36.

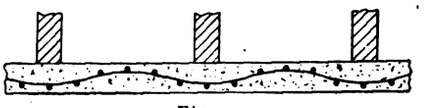

Fig. 37.

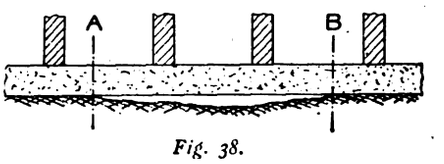

Fig. 38.

But there is no guarantee that the ground will act in the uniform manner here suggested. It may tend to sink at in some entirely unexpected part, as shown in Fig. 38. The effect will then be to disorganise any arrangement of the reinforcement such as that proposed in Fig. 37, for the whole of the lower fibres between the points A and B will be in tension, and in sections of the foundation slab on each side of AB the whole of the upper fibres will be in tension.

Consequently we arrive at the conclusion that in all cases where the uniformity of the ground cannot be absolutely relied upon it is a necessary precaution to employ reinforcement continuously in the upper fibres, and similarly to apply continuous reinforcement in the lower fibres of foundation slabs.

This is a point of vital importance which is sometimes overlooked in concrete-steel construction. It may frequently be quite safe to apply all the reinforcement near the lower surface of the slab, but as the absolute stability of the foundation is a most essential factor in all building construction, we think it would be wise to apply reinforcement near both surfaces as a matter of precaution against unforeseen contingencies.

Economy is always desirable, but an extra ton or two of steel is much less costly than a new building, and a little extra expense in the foundations may generally be regarded as an insurance premium of account of contingencies.

It will, of course, be understood that the reinforcement must be disposed in longitudinal and transverse lines in all foundation slabs, thereby forming a network capable of withstanding stresses in any direction.

As an example of a continuous floor slab, we may quote one constructed on the Hennebique system in a large granary and flour mill at Swansea.

The granary measures 127 ft. long by 48 ft. 6 in. wide, the total height from the foundations to the roof being about 112 ft., or 130 ft. to the roof of the cleaning tower. This building is designed for the storage of more than 7,000 tons of grain.

The adjoining flour mill measures 80 ft. long by 40 ft. wide, and is 112 ft. high from foundation to roof, the latter being constructed so as to form a storage reservoir capable of holding about 100 tons of water.

The foundations of both buildings are upon soil consisting of sand and rubbish brought as ships' ballast and deposited on the soft mud of the estuary at Swansea.

In order to ensure perfect stability, a continuous foundation slab was formed for the two buildings, and, as the buildings are entirely of concrete-steel, they constitute a monolithic structure in which all the members afford mutual support to each other, and local settlement is practically impossible.

A somewhat similar example is to be found in the Co-operative Wholesale Society's warehouse, at Newcastle-on-Tyne.

This building measures about 125 ft. long by 90 ft. wide, the height from foundation to roof being 95 ft.

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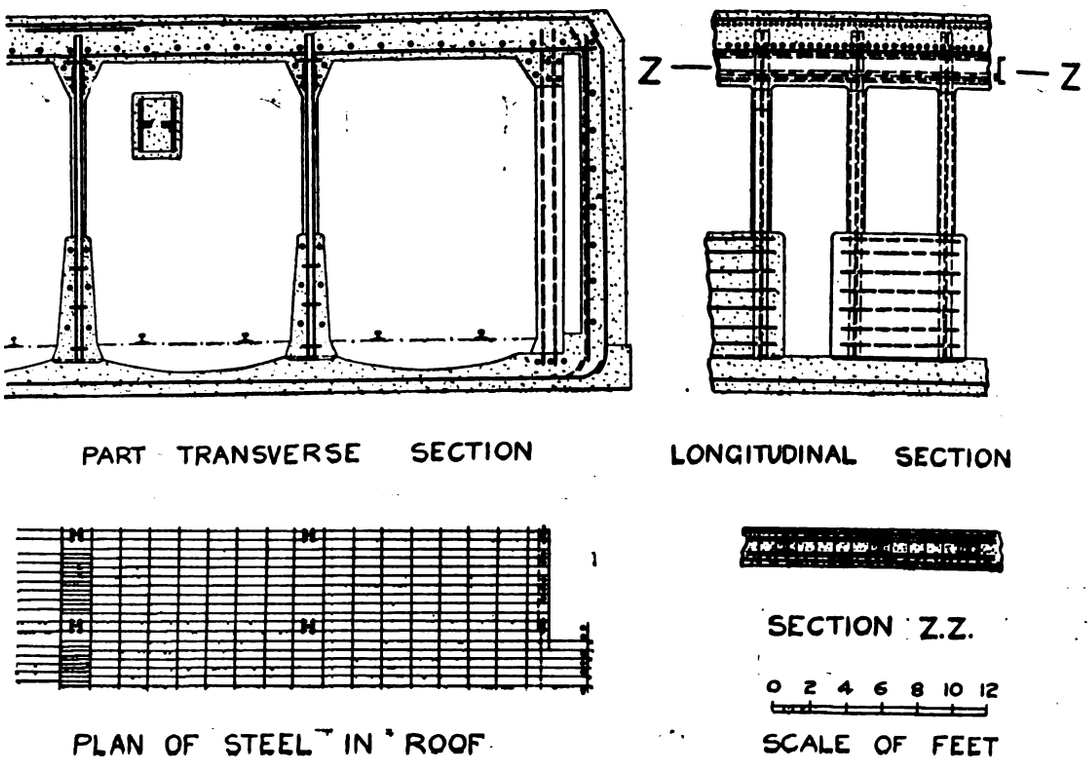

Fig. 40.

The ground is said to be composed of slush, peat, quicksand, etc., to a depth of more than 60 ft., and here again a continuous foundation slab of concrete-steel was laid down, calculated to resist a reaction of the ground to the extent of about 2½ tons per square foot, and to distribute the weight of the building uniformly over the whole area of the site.

This building, also, is constructed entirely of concrete-steel, and with its foundation slab practically represents a huge box girder in which no local displacement is at all likely to occur.

Expanded metal is a very suitable form of reinforcement for foundation work of the kind mentioned above. It affords an excellent bond, and owing to its continuity in every direction gives to every part of a foundation adequate resistance to local settlement.

Foundations constructed on the Cottançin system have been used in France and elsewhere with considerable success. The distinctive characteristic of this type of concrete-steel is a woven core of metal rods forming a continuous network in which longitudinal and transverse wires are interwoven after the manner of basket-work. Foundations on the caisson principle constitute a feature of this system. The foundation slab is of concrete or brick reinforced in the usual way by a network of steel rods, and is further stiffened by walls built on the underside, so as to form a series of cellular compartments. Foundations so designed have been found very useful in the case of treacherous soils.

As an example showing the suitability of the Cottançin system under such conditions, we may mention the experiments conducted by engineers of the Ponts et Chaussées, at Tunis, for the purpose of ascertaining the most suitable type of foundation for the extension of the city over the silt-covered area of an ancient salt lake. Ordinary foundations were found to be incapable of supporting a load exceeding 32 lb. per square foot without unequal settlement, while those of the Cottançin type carried a load of 777 lb. per square foot, with a uniform subsidence of only 0.08 in., and when the load was increased to 1,711 lb. per square foot the settlement was still uniform and was less than 1.19 in.

An example in a more accessible locality is to be found in the boiler-house foundation recently constructed in St. James's Park, Westminster, for H.M. Office of Works. The soil in this district is of alluvial character, and in early times the whole area was more or less covered with water. Those of our readers who have had occasion to erect buildings in Westminster, or who have observed the operations conducted by others, are probably aware that deep and expensive foundations are generally thought necessary to insure stability. The Cottançin foundation to which we refer was designed for the purpose of supporting some heavy steam boilers for the pumping-station in St. James's Park, and as a depth of 12 in. was found to be amply sufficient, the advantage presented by this form of concrete-steel foundation is quite evident.

In this instance the walls of the caissons, or cellular compartments, were built of steel-cored brick with a cover, or foundation slab, of reinforced concrete, the whole being tied together to as to constitute a single self-contained structure.

One argument advanced in favour of the Cottançin system is the non-communication of vibrations from heavy machinery through the soil. Satisfactory confirmation of this contention was furnished by the foundation built for the 1,000 horse-power Cockerill gas-engine at the Paris Exposition of 1900. This machine was said to cause a shock equal to 250 tons every tenth of a second. The foundation, constructed on the artificial soil of the Champ de Mars, consisted of brick-steel caissons with a concrete-steel covering slab, and the holding-down bolts of the engine were taken through cement-steel tubes to the bottom of the brick walls.

Footings for columns are frequently constructed as shown in Fig. 39, which includes

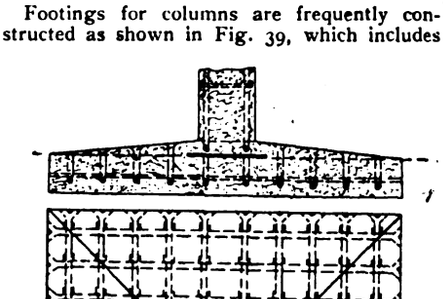

Fig. 39.

a section and half plan of a footing on the Hennebique system, but, with the exception of the stirrups for resisting shear, the design is very similar to that generally adopted by various engineers.

A footing of this character may be regarded as consisting of an infinite number of cantilevers connected together and radiating from a central abutment, and subject to bending stress from uniformly-distributed loads acting in an upward direction, while the central abutment carries an almost concentrated load acting in a downward direction.

Hence, the upper portion is in compression and the lower portion is in tension, and the main reinforcement must be near the lower surface of the foundation. The horizontal plate in Fig. 39 is intended to distribute the vertical pressure of the column, of which a small part is shown in the section.

Footings of very considerable size have been made on this principle, the largest hitherto constructed having a side of about 70 ft.

Concrete-steel foundations, substantially as here described, were employed in all the columns in a large sixteen-story office-building recently erected at Cincinnati, U.S.A. This building, which is designed in accordance with the Ransome system of concrete-steel, is rectangular in plan, and occupies a site measuring approximately 100 ft. by 50 ft. It is built on a stratum of gravel and sand, and the supporting columns are spaced so as to require main girders of 17 ft. and 33 ft. span centre to centre, and secondary girders of about 16 ft. and 18 ft. span.

The footings vary in size according to their position and loading. Along the two street frontages seven footings are built separately, one for each column; at the back, which adjoins a four-story building, there are six foundations each carrying two columns; and along one side, next to a six-story building, one continuous foundation carries four columns.

The dimensions of the single-column foundations are as follows:—

Area of base	.....	12 ft. 9 in. square.
Area of top	.....	4 ft. 9½ in. square.
Height (base to top)	.....	3 ft. 1 in.
Reinforcement longitudinal		27 bars, ¾ in. square, 11 ft. 3 in. long.
,, transverse		26 bars, ¾ in. square, 11 ft. 3 in. long.

The two-column foundations have sloping sides and one sloping end, the other end being connected with the back wall of the building. Above the sloping sides a rectangular longitudinal rib is formed, running the whole length of the foundation, at each end of which one column is fixed, and at the junction with the column away from the party wall additional concrete is placed to fill up the angle formed by the sloping sides and the upper rib of the footing.

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The main dimensions of the two-column foundations are as follows:—

Length of base	20 ft. 10 in.
Width of base	10 ft. 0 in.
Height (base to end of batter)	3 ft. 1 in.
Height (base to top of rib)	6 ft. 0 in.
Length of longitudinal rib	19 ft. 10⅞ in.
Width of longitudinal rib	4 ft. 5 in.
Height of longitudinal rib	2 ft. 11 in.
Reinforcement in lower portion, transverse.	49 bars, 1 in. square, 12 ft. 0 in. long.
Reinforcement in upper portion, longitudinal.	2 bars, ¾ in. square, near top surface in middle.
" "	10 bars, 1¼ in. square, spaced equally across section just below ¾ in. bars.
" "	9 bars, 1¼ in. square, spaced equally across section just below the other 1¼ in. bars, and having the ends bent down to form a truss.
Stirrups in upper portion, vertical.	9 ¾ in. inverted U-bars, in cross section. (8 such sets of stirrups in longitudinal section)

The four-column foundation extends below and beyond the external face of the party-wall at one end of the building, and the base of the footing projects about 4 ft. beyond the front end of the wall. The width of the foundation varies from 7 ft. 9 in. to 8 ft. 10 in., the other dimensions and the reinforcement being generally similar to those of the two-column foundations.

The footings are all built independently of the columns, for which cast-iron base plates are provided. In one sense this seems to be an undesirable feature, as it breaks the continuity of the concrete-steel construction. As, however, the loads are large—ranging from 500 tons to 750 tons per column—the adoption of cast-iron column bases is a wise precaution for insuring the adequate distribution of the load transmitted.

Fig. 40 represents an interesting example of concrete-steel construction designed for the subway of the Philadelphia Rapid Transit Company. The section shows rather more than one-half of a four-track subway, and the drawings serve to illustrate floor as well as foundation design, for the roof of the subway is essentially the same as a floor under a uniformly distributed load. It should be remarked that the outer black line in the foundation, wall and roof is intended to represent a waterproof layer of asphaltic mastic ½ in. thick. In other respects the drawings are self-explanatory.

NEW BOARD SCHOOLS, LONDON: SESSION 1904.

The School Board for London have just issued their annual list of the sites in respect of which they will apply to the Board of Education for a Provisional Order to enable them to meet the increasing demands for elementary school accommodation. The total number of sites scheduled is 47, ranging in area from 960 sq. ft. to, say, 105,850 sq. ft., but inasmuch as five are alternative sites, the actual number to be taken is 42. Taking a mean between the areas of each pair of alternative sites, we calculate that the 42 sites cover in the aggregate 839,578 sq. ft. (or thereabouts), that is to say, between 19 and 20 acres. The 47 scheduled sites lie in the boroughs of Hammersmith, two: land in Faroe-road; and about 105,850 sq. ft. in Adelaide-road, with part of Thorpe-banks. Deptford, two: Lucas-street; and some land on the eastern side of the Shortlands and Nunhead Railway, alternative to the Avignon-road site scheduled last year. Greenwich, about 77,760 sq. ft. in Sherington-road, part of the East Combe Estate. Lewisham: 75, Ardgowan-road. Woolwich, three: Foxhill School; Maryon Park; and Greenvale-road. Hackney, four: two alternative sites in Culford and Hertford-roads; and two in Benthal and Glyn-roads. Shoreditch: Gloucester-row and Upper John-street. Camberwell, two: 220, Peckham-rye; and Gloucester-road. Southwark, two: Beresford-street; and Doddington-grove, alternative to Upper Kennington-lane site. Battersea, three: Ingrave, Berkley, and Wayford-streets, Culvert and Creek-roads, and Berkley-square; 50 houses in all, with the site and soil of Berkley-square. Lambeth, four: Brixton-hill; "Glenelg" in Court-road; Priory-road; and Upper Kennington-lane. Wandsworth, four: West-hill; Rastall-avenue; Hearnville-road; and nine houses and gardens in Montserrat-road, in lieu of the Stratford-grove site scheduled last year. St. Pancras, three: Holmes and Fortess-roads, and Harrison-street. Hampstead, land, houses, gardens, etc., Nos. 24, 32, and 34, Haverstock-hill. Paddington: Fermoy-road. Bermondsey, two alternative sites, embracing many houses in Kenning, Adam, Clack, Albion, and Temeraire-streets. Poplar, two: Fern-street; and Eagling and Bruce-roads. Stepney, eight: in Trafalgar-square, Walker, Pigott, Varden, Berner, and Blakesley-streets; two alternative sites in St. Peters-road and Norfolk-street; and the Wycliffe Chapel and its adjacent burial-ground, Philpot-street. Penge U. D.: No. 32, Versailles-road, being the Homes for the Deaf, at Anerley.

ART IN SCOTLAND.

In a report which they have just issued the Departmental Committee appointed to inquire into the administration of the Board of Manufactures, with special reference to the administration of the grants made by Parliament for purposes of Art in Edinburgh, recommend that (*a*) the Board should be reconstituted as the Board of Trustees, and consist of fewer (15) members, to include three members of the Royal Scottish Academy, and holding office for a period of five years; (*b*) a new School of Art for Edinburgh should be established on the lines of the Glasgow School of Art, the present school under the Board being then discontinued, and the applied Art School being incorporated with the new school, but subject to the control of Sir Rowand Anderson as long as is possible; (*c*) the constitution of the National Gallery should be assimilated to those of the National Galleries of London and Dublin, the director being given liberal powers in the purchase of pictures; (*d*) a new building should be erected or acquired for the National Gallery, the trustees to contribute 20,000*l.* out of their accumulated funds; (*e*) when the new National Gallery is provided the whole building now occupied by the National Gallery and Royal Scottish Academy should be handed over to the Royal Scottish Academy to be used by that body exclusively for Art purposes, including exhibitions and Art-education; (*f*) in return for a Treasury grant towards maintenance and up-keep of the building the Academy should convey to the nation all the works of art at present lent to and exhibited in the National and National Portrait Galleries; (*g*) the existing grant of 200*l.* per annum for five years for the purchase of antiquities by the Society of Antiquaries should be made permanent; and (*h*) the Board should exercise a general supervision and ultimate control over the National and National Portrait Galleries, and continue to hold in trust Dunblane Cathedral. The report contains various other recommendations in respect of increased grants in aid, salaries, allowances, etc., and suggests that increased charges, amounting to a total of 4,200*l.*, should be put upon the annual votes. Mr. Akers-Douglas, Home Secretary; Sir John Stirling Maxwell, M.P.; Sir Walter Armstrong, Director of the National Gallery of Ireland; Sir Kenneth J. MacKenzie, King's and Lord Treasurer's Remembrancer; and Mr. T. Ryburn Buchanan, M.P., formed the committee of inquiry.

OBITUARY.

Herr Kamillo Sitte.—A Reuter telegram from Vienna states that Herr Kamillo Sitte, a prominent architect and writer on art topics in Vienna, died recently in his sixtieth year. He was the author of the work entitled "The Construction of Cities upon Artistic Lines," which has recently been translated into French and English.—*Times.*

GENERAL BUILDING NEWS.

Wesleyan Chapel, Hafod, Wales.—The foundation stones of the new Wesleyan Chapel, Hafod, Wales, were laid recently. The new building is to accommodate 300 people, and will cost about 1,300*l.* The builder is Mr. Julian, Pontypridd, and the architect Mr. A. O. Evans.

Workhouse, Hexham.—On the 10th inst., at the meeting of the Hexham Board of Guardians, a report was read from Messrs. Oliver, Leeson, and Wood, architects, Newcastle, on the subject of improvements to the Union Workhouse. The architects suggested that the most satisfactory course would be to adopt a scheme for rebuilding the old portions by instalments as found convenient, and in such a manner that the various portions when built would form a comprehensive scheme. The Workhouse Improvements Committee recommended that the plans submitted be approved, and that the building of the infirmary be commenced first, and that the other portions be carried out by sections; and further that the width of the proposed new dormitories be reconsidered, with a view to their being made 21 ft. wide instead of 18 ft., if thought desirable. Some remarks followed, when it was agreed that a copy of the architects' report be sent to each guardian, and that the matter come up for consideration at their next meeting.

Chapel, Borrowash, Derbyshire.—On the 7th inst. the Primitive Methodists of Borrowash opened their new chapel. The new chapel is a brick building, with stone dressings. A stained-glass window adorns the front elevation, just over the projecting lobby. An orchestra at the rear is provided for the choir and the organ, near which there is also a vestry. The total cost, including land, heating by hot water, and furnishing will be about 1,025*l.* The architect is Mr. F. S. Antliff, of Draycott, and the builder Mr. G. Wagg, of Derby.

Police-court, Grimsby.—The new County Police Court in Brighowgate, Grimsby, has just been opened. The buiidings comprise a new Courthouse, with Justices' retiring-room, witnesses' room, etc. The Superintendent's house is on the east side of the road leading to the administrative block and stables. The Court-house and the administrative block, which consists of two residences for constables, a charge room, cells, and exercise yard, are on the west side of the road. The stable and coach-house are at the extreme end of the site. Messrs. Hewins and Goodhand, Grimsby, secured the contract, the amount of their tender being 9,121*l.* 12s. The concrete facings have been supplied by Messrs. Daniels and Co., of Lincoln, and have been made with a mixture of red Mansfield stone and Portland cement. The wood block flooring of the Court-house has been executed by the Westminster Patent Flooring Company. The terrazo floors in the main entrance, Justices' entrance, and lavatory, have been laid by the Aerolithic Company. Messrs. Boyle and Son, Holborn, have provided the ventilation, and Mr. D. J. Dobby, of Grimsby, the heating apparatus of the Court-house and cells, also the lighting by gas of the Court-house. Messrs. Sharpe and Co., of Grimsby, have carried out the plumbing work of all the buildings and the gas for the Superintendent's house, administrative block, and stables. The entrance gates have been supplied by Messrs. Jones and Willis, of Birmingham. The lead lights and casements have been supplied and fixed by Messrs. A. Seward and Co., of Lancaster. Mr. Thropp, the County Surveyor, has been architect for the work, and during the chief part of the period of construction has had the assistance of his partner, Mr. R. R. C. Harding, architect. Mr. Mark Hatcliffe has acted as clerk of works.

Dispensary, Leeds.—The new Dispensary in North-street, Leeds, is nearing completion. The architects are Messrs. Bedford and Kitson. The site of the new building, which covers over a quarter of an acre, has been purchased at a cost of 10,000*l.*, and the building will cost about 18,000*l.* Accrington brick has been used in the buildings, with dressings of Portland stone. The residential part faces North-street, and occupies the first and second floors, with kitchens and servants' rooms above, while the ground floor of the North-street front is occupied by the board-room, secretary's office, etc. Behind this, and entered by a door at the south-western corner in Hartley Hill, is an out-patients' waiting-hall, covering an area of 90 ft. by 30 ft. On either side of this are the surgical, medical, and ophthalmic consulting and examination rooms From the waiting hall dual corridors lead to the dispensary lobby, where, immediately they have been attended to, patients will leave by a special exit door opening on to Hartley Hill. Provision has been made on the floor above for the chemical laboratory and for a suggested dental department, while on the same level as the street there are two casualty rooms, with a waiting-room attached.

Wesleyan Chapel, Rotherham.—The new Wesleyan Chapel, Talbot-lane, Rotherham, was opened on the 12th inst. The church itself consists of nave, transepts, and chancel, and will accommodate 860 worshippers, 500 being on the ground floor and 360 in the gallery, which extends round three sides of the building. There are vestries for the minister and the choir, on the ground floor, and a chamber at the side of the chancel and choir is provided for the organ. Advantage has been taken of the sloping nature of the ground, and a church parlour, 36 ft. by 22 ft., has been arranged below the chancel, and on this level also are the kitchen, two class-rooms, and a storeroom. From the gallery level access to the existing school premises is gained,

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and there are separate entrances and staircases to the gallery, both from the front and the rear of the church. The woodwork of the pews and the open waggon-headed roof is of pitch pine. The choir stalls are of wainscot oak with carved and traceried seat ends. The pulpit is also of oak, carved and enriched. The tracery windows throughout are filled with tinted leaded lights, the work being carried out by Mr. T. W. Camm, of Smethwick, Birmingham, and the three chancel windows are filled with stained glass, and carried out by Mr. S. Evans, of Birmingham. The heating is by low-pressure hot water apparatus supplied by Wright Bros., Sheffield. The ventilation is by means of hopper inlets on Tobins' principle—the windows also opening inwards at the top—and outlet ventilators placed on the roof. The whole building is faced with stone. The contract has been carried out by Mr. Robert Snell, of Masbro', from the designs and under the supervision of Messrs. W. J. Morley and Son, architects, Bradford, the whole cost being 10,000*l.*, exclusive of organ.

Proposed Additions to Cardiff Workhouse.—A meeting of the Cardiff Workhouse Building Committee was held at Ely recently, when the plans submitted by the architect (Mr. Seward) for additional accommodation for nurses at the Cardiff Workhouse were considered and adopted previous to sending them to the Local Government Board.

Infirmary, Axbridge.—A new infirmary has just been erected at Axbridge, on the north-east side of the workhouse. The infirmary is a building of two stories, constructed of lime-stone, with Bath-stone dressings, and tiled with Bridgwater inter-locking tile. The building is in two distinct parts, the east side for the men and the west side for the women, and consists of bed accommodation for seventy-two people. On the ground floor are two main wards, having twelve beds each, and being 36 ft. long and 24 ft. wide, with lavatory accommodation adjoining; and there are also four separation wards for noisy or offensive cases, with separate lavatory accommodation; and also two smaller separation wards; and the nurses' kitchen, which has a small lift from the first to the second floor. There is also a lift for patients who are unable to walk, and it is also large enough to take a bed-chair if necessary. Day-room accommodation is provided in two rooms facing the south, with bay windows, and also two bathrooms. The first floor is exactly similar to the ground floor, with the exception that on the women's side the two separation wards will be utilised as lying-in wards, and in both cases the day-rooms will be specially reserved for consumptive cases, and there are also two separation wards for this purpose, and instead of a kitchen, there is a sitting-room for the nurses on duty. Hot water pipes and coils are laid on throughout the whole of the building. Verandahs have been constructed seven feet wide, on the south side of the building. The whole of the building is lit by electric light. The total cost of land, construction of building, heating, lighting, and other contingent expenses comes to a little under 100*l.* per bed. Mr. C. Addicott, of Weston-super-Mare, was the builder, and the architect was Mr. A. Powell.

Board School, West Hampstead.—The Hon. E. Lyulph Stanley opened a new Board School at Kingsgate-road, West End-lane, Hampstead, on the 16th inst. The building was commenced in September last year and completed in October at a cost of 18,000*l.*, and was handed over to the School Board by Messrs. Lawrence, the builders, one month before the contract time. The school is a senior mixed school, and there is also a separate school accommodating sixty mentally defective pupils. The main school will accommodate 450 children. Mr. T. J. Bailey is the Board's architect.

Y.M.C.A. Buildings, Mountpottinger, Belfast.—The Committee of the Mountpottinger Y.M.C.A. have secured a site for their new premises on the Albertbridge-road. The block has a frontage of 137 ft. and is bounded on two of the sides by Templemore-avenue and Frank-street. The plans of the new building consist of three blocks—A, B, and C. In block A, which comprises three floors of 126 ft. long by about 35 ft. wide, the accommodation is as follows:—Six shops and all requisites for offices or shops. In the centre of the block is the main entrance of the Y.M.C.A., 10 ft. wide, leading to a central vestibule or hall, from which the main departments of the building are reached. To the left, the general office and the secretary's office. The main stairs lead off to the left. Behind these are the lobby and entrance to the lavatories and cloakrooms. At the top is the entrance to the large hall and to the gymnasium, and to he right the public cloakroom and kitchen offices, and also a bicycle store, with entrance from Frank-street. On the first floor is a square gallery and a large hall; also minor hall, reading-room, parlour, and games room. The top floor comprises a central lounge, with seats round, from which access is obtained to the rooms for the athletic, camera, boys', and cycling clubs; also a room for the choral society, committee-room, large and small classrooms, and the Christian Workers' parlour and library. Block B contains the large hall, about 62 ft. square, with entrances at both ends from Frank-street, and also another entrance from the central hall. Below the platform accommodation is provided for ante-room, lavatories, cloakroom, speakers' room, and ladies' room. The large hall will, with galleries and platform, accommodate about 1,200. Block C contains the gymnasium, with open lantern roof. This would be connected with the lavatories and dressing-room, and has also a separate entrance to a back lane in case of emergency. The complete scheme will involve an outlay of 12,000*l.*; but at present the committee have arranged for the carrying out of the front block only. The contract for the first block has been given to Messrs. M'Laughlin and Harvey, and the plans have been prepared, and the work is being superintended by, Mr. Wm. J. W. Roome, architect, Belfast.

Bury Park Congregational Church, Luton, Beds.—The opening of this Church took place recently. The building is designed in Perpendicular Gothic, freely treated. A square tower forms a feature at the corner of the block. The accommodation provided is as follows:—468 adults on ground floor and 65 in end gallery. Total, 533; or a mixed congregation of about 610 persons, with possible future galleries in transepts and over-vestries for 160 more sittings, or a final total of over 800 persons in a mixed congregation. A church parlour, vestries and other conveniences are provided. The buildings to be faced with red brick, with Bath-stone dressings. The joinery internally will be stained transparent green, and wax polished. There are red granite columns supporting four crossing arches, and the lead lights are richly coloured. The building is roofed with green slates. Heating is by low pressure pipe apparatus. The contract is let to Messrs. T. and E. Neville, of Luton, and amounts to 4,429*l.* The architects are Messrs. George Baines and R. Palmer Baines, Clement's-inn, Strand, London, W.C.

Southport Building Trade.—In his annual report of the Highway Department, Mr. R. P. Hirst, the Borough Surveyor of Southport, states that the number of plans approved during the year showed an increase as compared with last year, principally in dwelling-houses. The number of buildings certified on completion, however, shows a considerable decrease. The number of detached dwelling-houses built during the year was 33, as compared with 17 last year and 29 in the year ending March 31, 1901. On the other hand, only 70 semi-detached dwelling-houses were built as compared with 75, 101, and 127 respectively in the three previous years.

Business Premises, Reading.—The new block of business premises, which are being built in Reading for Messrs. McIlroy, Ltd., are now nearing completion. The new building has a site at the corner of Oxford-street and Cheapside, having a frontage of 260 ft. to the former and 200 ft. to the latter. It is six stories high. The premises have been constructed of fireproof material, and are lighted throughout by electricity. Messrs. J. Morris and Son, architects, designed the building in the Renaissance style, freely treated. Mr. H. W. Goodwin is the builder.

Schools, Belfast.—The school buildings which have been erected in connexion with Macrory Memorial Church, Duncairn-gardens, were opened on the 6th inst. The buildings adjoin the church, and are constructed of red brick, having a flat roof, which will be utilised as a playground. The building consists of a senior school, an infants' school, and two classrooms, the entire space affording accommodation for 350 children. The building contract was carried out by Mr. Robert Ewing, the architect in charge being Mr. Frazer.

Sanatorium, Eastby, Yorkshire.—The Bradford Union Phthisis Sanatorium at Bardon Moor, Eastby, was opened on the 3rd inst. The portions of the institution which were opened and are ready for occupation are the western pavilion and the administrative block. Work on the second pavilion has not got beyond preparing the foundation. The administrative buildings, two stories in height, are centrally situated at the rear of the patients' quarters, and are built of local stone. They comprise rooms for the resident medical officer, the matron, and the domestics. The patients' pavilion, except the central portion, over which there is a room for nurses, is only one story high. It contains four single bedrooms, four two-bed-rooms, one four-bed-room, one five-bed-room, and a dining-room. The other wing, when built, will have similar accommodation. Each room has a window in front opening the full width, also a large unglazed window at the back opening into a corridor that runs the length of the building. This corridor, which is glass-screened, is intended to protect the patients' rooms from the severe weather of the winter months. The windows are arranged so as to allow the air free play through the pavilion. The structure is of wood, and is roofed with red tiles. All the interior walls have been lined with fire-proof blocks, and only the floors are inflammable. Automatic sprinklers for extinguishing fire have been provided. The heating is by means of hot water, on the low-pressure system; and electric light, provided by an oil engine, dynamo, and storage battery, will be available throughout the establishment. The buildings are being constructed from the plans of Mr. Fred Holland, Engineer and Architect to the Board, of Bradford; and the contractors are:—Mason, Mr. E. Balmforth, Bradford; joiner, Mr. A. H. Shaw, Skipton; plumbers, Messrs. W. and J. Harrison, of Keighley, and Mr. C. Horner, of Skipton; plasterer, Mr. J. Greenwood, Cross Hills; slaters, Mr. H. Thornton, of Skipton, and Messrs. Thomas Nelson and Sons, Bradford; painters, Messrs. E. Harland and Sons, Bradford; heating engineer, Mr. G. H. Mason, Skipton; electricians, Messrs. Smith and Crofts, Bradford. The consulting electrical engineer was Mr. S. W. Cuttriss, of Leeds.

Church, Elland, Yorkshire.—The new Church of All Saints, which has been erected in the upper part of Elland, was dedicated on the 4th inst. The original idea was to erect a church at a cost of 15,000*l.*, capable of accommodating about 800 worshippers, but it was found impossible to carry out the whole scheme at once, and it has therefore been limited for the present to the erection of chancel, three bays of the nave, and a side chapel. This will accommodate about 400 worshippers. The style is Early English, and the work has been carried out under the supervision of Mr. G. H. Fellowes Prynne, architect, of Westminster. The materials used are local stone for the external walls, lined internally with red brick with stone dressing, roofed with red tiles. The contractors for the work are Messrs. J. Charnock and Sons, Halifax. Up to the present the church has cost between 11,000*l.* and 12,000*l.*

SANITARY AND ENGINEERING NEWS.

A New Canal in the Midlands.—A survey is being made in respect of a projected scheme for the construction of a ship-canal from Mid-Cheshire into the Potteries District, and so to Wolverhampton and Birmingham. The proposal relates to an extension, for the transit of steamers of 300 tons burden, from the Weaver Navigation at Winsford Bridge, near Over, in Cheshire, which terminates northwards at Weston Point, where the Weaver flows into the Mersey. The new line of communication would in effect supplant the present small canal, and afford greatly increased facilities for developing the inland pottery, coal, stone, and other trades, by means of through transit to Liverpool and Manchester, and at the same time open out southwards the salt and chemical traffic of the Weaver Navigation.

Bridge, Aberavon.—The Aberavon Corporation, with a view to developing the lower part of the town, and also with the idea of connecting the Port Talbot Docks (which are in the borough of Aberavon) with the town, deemed it advisable to proceed with the construction of a new road leading from Jubilee-road to the River Afon, and then to span the river by means of an iron girder bridge. A Provisional Order was obtained for the construction of the road and bridge in 1899 to cost 12,000*l.*, and the work has now been completed. The bridge is built on the tidal portion of the River Afon. The H.W.M.S.T. is within 4 ft. of the under side of the girders. The total length of the bridge is 340 ft., made up of three spans. The piers and abutments are of local stone, built on concrete, supported by piles driven down 28 ft. below the bed of the river. From the bed of the river to the top of the piers the height is 20 ft. The pillar and cutwater caps are of granite. The superstructure is composed of six steel box girders and 40 cross girders riveted and bolted to the box girders. The flooring is composed of steel curved plates riveted to cross girders, covered with 6 in concrete, and finished with a layer of asphalt. The road from Victoria-road to the bridge is 420 yards in length. A portion of the road is made through a pool, with an embankment 16 ft. in height. The carriageway is made of 9 in. bottom ballast and 6 in. limestone metalling. The engineer for road and bridge was Mr. J. Roderick, Borough Surveyor. The contractors for the masonry, etc., were Messrs. Clarke, and Co., Cardiff; and the contractors for the steel work only, Messrs. Gilbert Thompson and Co., Birmingham. The road was made by the Corporation, under the supervision of their Surveyor.

Pier, Weston-super-Mare.—The commemoration pile of the Weston-super-Mare

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Grand Pier was driven on the 7th inst. The directors of the company have placed the contract with the firm of pier engineers and contractors, Messrs. Mayoh and Haley, of London. The total length of the pier is 6,600 ft. by 45 ft. wide, and that portion of the pier upon which the pavilion will be erected is 160 ft. wide. The pier will be of the lattice girder type. The pavilion will be of steel and wood, with four corner turrets and central dome, the dimensions of pavilion being 150 ft. by 90 ft. wide. The main hall, 85 ft. by 70 ft., is arranged to seat 2,000 persons. The stage is 62 ft. by 23 ft. The entrance hall is 42 ft. by 28 ft. The ground-floor refreshment-room is 33 ft. by 22 ft., the one on the balcony floor being the whole width of the building, and its depth being 20 ft.: it can be also used as a reading-room and lounge. An electric tramway will run the entire length of the pier. At the main entrance two buildings, each 50 ft. long by 12 ft. wide, will contain ladies' and gentlemen's lavatories, pier master's office, stores, switch-room, pay office, etc., with verandah over gates and turnstiles, etc. The consulting engineer for the pier is Mr. G. N. Abernethy, of Westminster.

Aerial Ropeway, Aberfeldy, N.B.—An aerial ropeway has been opened at Aberfeldy, N.B. It was built by Messrs. John M. Henderson and Company, engineers, Aberdeen. The District Committee have, since the closing a year or two ago of the Ladywell Quarry, near Dunkeld, experienced difficulty in procuring road metal in certain parts of the district. There is no quarry in the Murthly or Dunkeld neighbourhood, while the nearest one to Pitlochry is four miles away. All the whinstone quarries in the district are situated high upon the moors, and consequently considerable haulage over the roads is entailed in placing the metal on the main roads, which bear the bulk of the traffic. The Committee, acting on the advice of their Road Surveyor, Mr. William Bell, C.E., resolved to construct an aerial ropeway from Gateside Quarry to Aberfeldy railway station, the intention being to distribute the metal from Aberfeldy station to points between Struan in the north and Murthly in the south, and to put it on the roads in proximity to the railway system as found necessary. The ropeway is carried on steel trestles, 37 in number, varying in height from 30 ft. to 40 ft., and placed at distances of about 100 yards apart. The system consists of an endless steel rope running over pulleys on the trestles. Skips, or buckets, are filled direct from bins underneath the stone-breaker at the quarry end, and the metal is delivered into waggons or carts at the railway station end as required. There is a fall of 1,000 ft. from the quarry to the station, so that the full skips assist in hauling up the empties. The skips, 100 in number, are of steel, and carry 3 cwt. of metal each. They travel at a speed of about four and a half miles per hour, and are placed upon the rope at intervals of about 100 yards. The capacity contracted for was 80 tons of stone per ten-hours day, but the actual capacity is about 120 tons per day of ten hours.

Artesian Wells in London.—At the new offices now in course of erection for the Royal London Friendly Society, Finsbury-square, Messrs. Alfred Williams and Co., of Artesian Works, Bow, have just obtained from a 6 in. internal diameter steel-lined artesian well a supply of over 2,000 gallons per hour, which has been proved by analysis to be wholesome drinking water of high quality. The following strata were passed through:—

Blue clay	68
Mottled clay	16
Mottled clay and sand and hard pebbles	10
Hard pebbles and green sand	8
Hard green sand and pebbles	22
Grey sand	29
Pebbles	1
Chalk and flints	296
	450 ft.

The pumping plant consists of a deep-well pump, which is lowered down the bore-hole about 100 ft. below water level. The pump rods are balanced and connected to worm gears running in oil baths and mounted on ball bearings. This arrangement is connected direct to an electric motor, which is connected to the mains of the Electric Supply Co. No driving belt is required, and all that is necessary is to switch on the current, and the water is delivered into storage tanks on the roof, which in this instance will be about 90 ft. from ground level.

FOREIGN.

France.—M. Guillaume, Director of the Académie de France at Rome, has just completed a marble statue of Thiers, to be placed in a gallery at Versailles reserved for statues of Presidents of the Republic. The statue is placed on a pedestal of grey marble, with small figures at the angles symbolising "History" and "Eloquence."——The Municipality of Limoges have unfortunately decided to demolish the ancient ramparts of the town, and also the Pont St. Etienne, dating from the fourteenth century. The Municipality of Bayonne have also determined to demolish a portion of their ancient ramparts, notably the fortified gateway, adorned with some good sculpture of the seventeenth century; it is the gate at the entry to the bridge over the Adour.——A new casino is talked of at Annecy, of which M. Durel is to be the architect. The scheme includes also the repair of the existing theatre, and the building of a bridge in the rear of the theatre; representing a total outlay of 600,000 fr.——Opposite to the statue of Renan recently inaugurated at Tréguier, there is to be placed a "Calvary," executed by M. Hémots, sculptor, including in the composition a figure of Christ, in red granite, 12 mètres high, and five monumental statues on the pedestal. This monument will be inaugurated in May next year.——The Government has commissioned from M. Graf, the sculptor, two bas-reliefs, intended for the façade of the Museum of Clermont-Ferrand, symbolising on one side Painting and Sculpture, and on the other side Architecture and Archæology.——The Municipality of Bordeaux are about to undertake some extensive public works, including the reconstruction of the Church of Saint Rémi, the transfer of the Hôpital St. Jean, the building of a new Lycée, and new buildings in connexion with the Faculté de Médecine.——A new transporter bridge has been established across the Loire at Nantes, to give more direct access to the State railway terminus. It is 141 mètres in length, with two pylons 76 mètres in height. The roadway is 50 mètres above the highest water level of the river, and a fine view of the city and neighbourhood is obtained from it.——M. Gérand has been elected president of the Société des Architectes of Bordeaux.——The Municipal Council of Paris has decided that the name of "Charles Garnier" should be given to the square formed at the meeting of Rue Auber and Rue Scribe, to the right of the site on which the Garnier Monument is erected.——The Service de la Voie Publique of Paris has entered a formal opposition to the erection of the monument to De Musset, by M. Mercié, on the site in front of the Théâtre Français, on the ground that the small *place* is already encumbered with monuments, and that the Voie Publique Department intends to form there a subterranean latrine in imitation of those in London.——The death is announced, at the age of 73, of the landscape painter Camille Pissaro, one of the founders of the Impressionist school, who acquired a legitimate reputation as painter, lithographer, and etcher. He was a pupil in the first instance of Corot, but went into Impressionism as a disciple of Manet, and devoted his talent to painting rural life, as well as the landscapes of Normandy and the Isle de France. The Luxembourg Museum includes, in the Caillebotte collection, several pictures by this remarkable painter, whose three sons are all artists of recognised talent.——M. Edmond Peigné, editor of the *Journal des Travaux Publics*, has died, at the age of 70.——The death is also announced, at the age of 55, of M. Brisson, Architecte-Voyer of the Third and Tenth Arrondissements of Paris; that of M. Lafou, member of the Société Centrale, at the age of fifty-four; and that of M. Naveau, member of the Société Nationale des Architectes Français, at the age of sixty-three.

Germany.—Two memorials to the Emperor Frederick have lately been unveiled. One, in Berlin, at the entrance of the Thiergarten, is composed of two groups of figures—the Emperor supported on the right and left by Field-Marshal Count Blumenthal and the naturalist Helmholtz, and the Empress Frederick with the accompanying figures of the philosopher Zeller and the scientist von Hoffmann. The other memorial, at Potsdam, consists of a single figure of the Emperor in the uniform of the Dragoons.

Austria.—The Church of St. Canisius in Vienna is completed. The architect is Herr von Neumann. The Church is built mainly in Romanesque style but with some details of Gothic character. On the high altar is a painting of Christ on the Mount of Olives, by Baroness Oer.——The sculptor Herr Franz Erler, has celebrated his fiftieth anniversary as a member of the Vienna Academy. He has attained his seventy-fourth year.

MISCELLANEOUS.

Professional and Business Announcements.—Mr. F. G. Minter, builder and contractor, has removed his works from Page-street, Westminster, to Ferry Works, High-street, Putney, S.W.——Messrs. Waygood and Co., lift manufacturers (London), have removed their Glasgow offices from 94 Hope-street to 116, Hope-street, Glasgow.——Mr. George Evans, surveyor, has removed from Adelphi House, 10, Duke-street, W.C., to 24, Hazlitt-road, West Kensington, W.——The partnership hitherto subsisting between Mr. W. H. Waterman and Mr. A. A. Abrahams, under the style of Messrs. Waterman and Abrahams, architects and surveyors, of 7, Cullum-street, Fenchurch-street, E.C., has been dissolved. Mr. Abrahams will in future continue to carry on the business at the same address in his own name.——Referring to our recent obituary notice of the late Mr. J. Martin Brooks, Mr. Groome asks us to mention that the style of the firm was changed some twelve months ago to that of "James Brooks, Godsell, and Groome," and that the practice of the firm will be continued under this style.

A Trap for Sinks and Basins.—Messrs. Benham and Sons have sent us a price list and illustration of their patent "Access" waste trap for sinks, lavatory basins, etc. It is made of cast-iron in two shapes, known as "Angle" and "Vertical," the first having the outlet horizontal like a P-trap, and the second having it vertical like an S-trap. In both cases the inlet and outlet are connected into a drum-like chamber, one side of which is sealed with an inspection cover, which is easily removed and refixed by means of two brass fly-nuts. The angle or P-trap appears to be the more satisfactory of the two. Judging from the illustration, however, we should say that the vertical trap will not be as clean as the ordinary drawn-lead S-trap.

Bamburgh Church, Northumberland.—A new stained glass window, representing St. Cecilia, accompanied by two other emblematical figures, has been placed in Bamburgh Church. The window is from the studio of Messrs. Bacon Bros., of London.

A New Bench for Sash Frames.—Mr. H. White, builder, Stanley-street, Reading, sends us a model of a very good system invented by him for fixing sash frames on the bench for working. Instead of screwing through the frame, which weakens it and does not always hold it as tight as is desirable, he has a bench with a solid block at one end, against which the frame is butted. Two metal arms carrying transverse screw-clips project from each end of the block, and by screwing on to the frame it is held tight at this end. To hold the other end of the sash frame there are two screw clamps on bearers fixed to the bench, working horizontally on the central axis of the bench and facing each other; these are screwed up in opposite directions to the top bar of the sash, which is tightly held between them. The end of each screw has a flat metal disc which bears upon the wood. The contrivance is, like most really useful things of the kind, perfectly simple in its action.

Salford Housing Scheme.—The proposal of the Salford Corporation to build workmen's dwellings on land in Seaford-road, Pendleton, was the subject of a Local Government Board inquiry in the Salford Town Hall on the 13th inst. by Major C. E. Norton. The application of the Corporation was for sanction to borrow 47,737*l.* under the Housing of the Working Classes Act, 1890, for the purchase of the site and the erection of houses. The Town Clerk, Mr. L. C. Evans, in his opening statement, explained that the Corporation, under an order of the Local Government Board of 1900, were bound to provide accommodation for 1,500 persons who were dispossessed of their homes by the demolition of insanitary property in various areas. The Corporation had already, by several schemes, provided housing for 2,432 persons, and had therefore exceeded their obligations. One of the sites on which, under the order, the Corporation had to build houses was known as Block 3, a piece of land off Chapel-street, near Trinity Church; but after an inquiry, in December, 1901, the Local Government Board relieved the Corporation of the obligation to build on this particular site, on condition that they provided dwellings upon the Seaford-road site. It was the proposal to fulfil the condition which was the subject of the present inquiry. The scheme prepared provided accommodation for 1,155 persons. When this had been carried out, the Corporation would have provided for 3,587, or for 2,087 more than they were obliged to. The Seaford-road site had already been approved of by the Local Government Board, so that he understood the scope of the inquiry that evening was limited to the details of the scheme and the suitability of the proposed buildings Mr. Corbett, the Borough Engineer, explained the scheme.

The Roman Station at Wilderspool.—A meeting was held on the 13th inst. of the Lancashire and Cheshire Antiquarian Society at the Chetham Library, presided over by Mr. W. E. A. Axon. The recent excavations on the site of the old Roman station at Wilderspool, near Warrington, have resulted in the discovery of remains of buildings and workshops and a cobble-paved courtyard. There were evidences of jewellers' and brass founders' furnaces, showing clearly the occupations of the people of the ancient Roman Civitas; and a feature of the discovery was that these remains existed at a

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very slight depth below the surface—in some cases not more than 1½ ft. to 2½ ft. The remains found were chiefly fragments of earthenware, bronze and other ornaments, silver coins of Trajan, Hadrian, etc., and some cups and dishes nearly complete. The collection is housed in the Warrington Museum.—The thanks of the meeting were given to Mr. T. May for a report on the subject.—Other business before the meeting consisted of a paper by Mr. William Harrison on the opening of the original Birmingham and Manchester Railway.—Mr. Tallent-Bateman exhibited and presented to the Society a series of old engravings of Lancashire and Cheshire halls; and the Chairman exhibited a packet of Jacobite documents, letters, etc., relating mainly to the events of 1745.

Scottish National Gallery.—The Departmental Committee which recommended the erection of the new National Gallery for Scotland in Edinburgh has under consideration a site for the gallery. The land in question is that occupied by the Royal High School at the foot of the Calton Hill. So far the matter has not gone beyond the inquiry stage, but the results of measurements made by Mr. Blanc, R.S.A., of both the High School and the present National Gallery buildings have been laid before the members of the Board of Manufactures and the Departmental Committee. The superficial floor space of the buildings occupied by the National Gallery and the Royal Scottish Academy is 12,490 ft., while the floor area of the main buildings of the Royal High School, with its fine central hall, amounts to 13,914 ft. By taking in the recently-erected gymnasium this area could be increased to 22,810 superficial feet. There are also at the Royal High School other buildings which give an additional area of 2,346 ft., which might be suitable for minor exhibitions, and there are possibilities of extension of the main building which would give 3,000 to 4,000 additional superficial feet of space. —*Morning Post*.

Acetylene Blow-Pipe.—The application of acetylene gas to the blow-pipe has recently been made, and an article in *Le Génie Civil* sets forth the advantages of this new departure. One of these is the very high temperatures, which are in the neighbourhood of 4,000 deg. F. Oxygen is used in connexion with acetylene, and being of higher calorific power than hydrogen accounts for the increase of temperature. The lower cost of acetylene as compared with that of hydrogen is also important where the blow-pipe is to be used for any length of time. The flame can be easily regulated as to its power, for the brilliant illumination given by acetylene renders the effect of the different quantities of oxygen immediately visible, the reverse being the case where hydrogen is employed. Tests made with the new process show welded steel bars to have a tensile strength of 49,770 lbs. per square inch.

Screen, Parish Church, Berkhamsted.—The old screen in this church has been enriched by the filling-in of its lower panels by fourteen carved figures. The work has been carried out by Messrs. Harry Hems and Sons, of Exeter.

Lifts.—The new Savoy Hotel extensions will be equipped with nineteen "Otis" electric elevators. The installation comprises five powerful passenger elevators, four luggage elevators, and ten service elevators. All are electric, with "Otis" controllers, and, with the exception of two or three smaller short rise ones, the speed of the elevators will range from 250 ft. to 300 ft. per minute and upwards.

Displacement of Persons of the Working Class, St. Pancras.—The Housing of the Working Classes Committee of the London County Council reported as follows at Tuesday's meeting of the Council:—"In 1899 our attention was called to a small insanitary area in Brunswick-street, now called Tonbridge-street, St. Pancras. The site appeared to be one which should be dealt with under Part I. of the Housing of the Working Classes Act, 1890, and we therefore entered into negotiations with the freeholders with a view to securing their co-operation in carrying into effect a scheme under the provisions of that part of the Act. These negotiations for various reasons proved abortive, and no further steps were taken in the matter. The area, which is bounded on the east by Tonbridge-street, on the south by Cromer-street, and on the north and west by the rear of the premises in Hastings and Judd streets, was until recently occupied by about seventy houses, accommodating when fully let about 500 persons of the poorer classes. The population in March, 1900, was, however, only 247. During last summer the then owners displaced the occupants of the houses on the area, except those of Peace-cottages and Brunswick-buildings, which were subsequently closed by magistrate's order, and leased the property to the East End Dwellings Company, Ltd., who have since demolished the whole of the houses for the purpose of erecting dwellings for the working classes similar to those erected by them on the adjoining site in Argyle-place. In a few cases accommodation was found for the persons displaced in the vicinity, but the majority of those displaced have left the neighbourhood. The dwellings to be erected by the East End Dwellings Company will afford accommodation for about the same number of persons as the buildings demolished. The accommodation will, however, be of a better class, and the rents will be somewhat higher. It should be noted that, owing to the fact that the whole of the leases expired at the same time, the cost to the freeholders of dealing with the area has been greatly reduced, and it is no doubt partly owing to this fact that it has been possible for the site to be redeveloped for the accommodation of persons of the working class."

The Nightingale-street Scheme.—We take the following from the last issue of the "Sanitary Chronicles of the Borough of Marylebone":—"The greater portion of the Nightingale-street area has now been cleared, the general plan of the buildings to be erected is prepared, and the work of construction will shortly be commenced. It may be well to state that the action of Lord Portman is taken by virtue of a 'Provisional Order,' which is as much an Act of Parliament as any one of the general Statutes. The chief powers and duties under this Order are as follows:—

'5. The existing buildings constituting the Improvement area shall be taken down and removed, and new dwellings upon the said lands, or on some part or parts thereof, shall be erected by the Viscount Portman as may be determined from time to time in that behalf by the (London County) Council, with the approval of one of his Majesty's Secretaries of State. The new dwellings shall be constructed in such manner as to position, elevation, size, design, and extent of accommodation as the (London County) Council, with such approval as aforesaid, shall prescribe or approve, and to their satisfaction, so as to afford in the aggregate suitable accommodation for not less than 576 persons of the working classes.

Such dwellings shall be furnished with such water-closets, sinks, water supply, and other proper sanitary arrangements as the Council shall prescribe and to their satisfaction. Such of the lands constituting the Improvement area as shall not be required for the purpose of providing accommodation as aforesaid for 576 persons of the working classes may be formed or laid out as an open space or recreation-ground for the use of the residents in the new dwellings to be erected by the said Viscount Portman. Viscount Portman shall carry this scheme into execution in accordance with, and subject to, the provisions of the Housing of the Working Classes Act, 1890, and this scheme, and subject to such modifications therein, or additions thereto, as may be prescribed and made under the authority of the said Act.

6. The following street shall be stopped up and form part of the Improvement area—viz., the whole of Nightingale-street.

The last section of the Order, abolishing Nightingale-street, will render alterations of the existing Nightingale-street sewer a necessity; the sewer not only receives Nightingale-street sewage, but also that of the Board School and some six houses in Capland-street. If the sewer should have to be removed, provision must be made by the Local Authority for the drainage of the houses now draining into the sewer and not included in the scheme."

Siamese Teak Exports.—In an official Report to the Foreign Office on the trade of Bangcock, Mr. Vice-Consul Lyle mentions that last year the export of teak proved remarkable, the Customs returns showing 56,649 tons to have been exported, valued at 348,944*l*. This was considerably above the average of the last five years, and 108,080*l*. in excess of 1901. The quantity taken by the United Kingdom was 1,195 tons. As to prices during 1902, Europe squares varied from 8*l*. to 9*l*. per ton, f.o.b., and Europe planks from 9*l*. to 10*l*. The better class of India squares brought from 4*l*. to 4*l*. 10s. Prices in the early part of the year were poor, but a shortage in the Burmah supplies caused a considerable advance in price, especially for timber of Europe quality. Europe shipments have, however, dropped from 13,157 tons in 1901 to 8,217 tons in 1902. This drop may be due to the generally poorer quality of the timber now worked. It is by no means suggested that the stock of teak is becoming attenuated, but the closing of forests for conservation, and the consequent reduction of area from which to select, offer the forester a greatly lessened opportunity of selection.

Mahogany from Lagos.—The Blue Book of the Colony of Lagos, prepared by the Hon. C. H. Harley Moseley, C.M.G., for the year 1902, has just been received. It states, *inter alia*, that in regard to mahogany, the year was a very satisfactory one—the most satisfactory, in fact, in the history of the mahogany trade of the colony. Large quantities were exported, and record prices were obtained at the auctions held throughout the year. Owing to short supplies of Cuban and American mahogany, African wood was in great demand, both in England and America, and Lagos timber in particular was largely bought. Although high prices and keen competition ruled in Lagos, the exporters made fair profits, the gradual rise of market in England all the year helping them considerably. Many logs which in previous years it would not have paid to ship were exported during 1902, and found keen buyers in Europe. The prices per superficial foot, starting at 1d. in January and ½d. in February, rose by October to 1½d., and by December to 1¾d.

Abbeys and Cathedrals.—On the 10th inst., at Owens College, Manchester, Professor Capper, concluded his series of lectures on the architecture of Abbeys and Cathedrals. The lecture was on the "Relationship between Cathedral and Abbey." Just as the twelfth century, he said, was the century of the abbeys, the thirteenth was the century of the cathedrals. The great cathedrals of the thirteenth century in France represented a movement of revolt; they were built in response to an outburst of national enthusiasm and national feeling which was combined with great religious zeal and fervour. Nowadays it took a whole nation to build a cathedral, but in those days comparatively small areas, such as Paris, Rouen, and Amiens, erected these edifices, which might be taken as representative of an outburst of national life, as evolved in local areas. Though more or less on the typical cruciform plan, these cathedrals were designed to suggest thoughts embodied in what were perhaps the finest halls in existence—single vast spaces which were roofed over, and produced a sense of unity as though they rose out of the cities which they typified. In England, Winchester, Canterbury, Durham, and other cathedrals were abbeys at the same time, but the French cathedrals had nothing to do with the French abbeys. They were built rather in defiance or in rivalry of the abbeys, expressing, if anything, antagonism to monastic orders. Beautiful as English cathedrals were, they were very different from the French, and he thought that was because of their history. For instance, Canterbury was both a cathedral and an abbey. The eastern extension was built to accommodate the monks. There were really two churches in one—the church of the laity, or the people, was the western portion, and the church of the monastery, or the monks, was the eastern portion. The result was to make English churches very long. He did not think the English cathedrals could compare with the French in the unity of design to which he had referred, but they had a charm and beauty all their own. He referred particularly to the way in which they were grouped round the central tower. They would see how it was that so many Benedictine abbeys were preserved, and how it was that the Cistercian abbeys were not. The reason was that the Benedictine abbeys were built in cities, in commanding situations, and they entered into the life of the people, whilst those of the Cistercians were in remote districts. It might have been that at the Norman Conquest the intention was to hold the country by means of the Church as well as by force of arms, but the result had been that the abbey churches, even when the abbeys themselves were suppressed, were still in existence. They were the churches of the people, of the dioceses, and though the abbey itself decayed the church remained. That applied to quite a number of priory churches also, which were at once priories and parish churches.—At the close of the lecture, on the proposition of Dr. Hopkinson, a hearty vote of thanks was accorded to Professor Capper.—*Manchester Courier*.

Westminster City Council.—At the meeting of the Westminster City Council on Thursday last week, the Finance Committee submitted an estimate of certain paving works, etc., necessitated by a settlement in connexion with the tunnel of the Metropolitan District Railway Company at Eccleston-street. The estimated cost was 950*l*., of which the Railway Company have agreed to pay 200*l*. The question of the payment to be made by the Company is to be reconsidered, however. The Works, Sewers, and Highways Committee also reported on this matter, but the matter was referred back for further consideration. The last-named committee reported also on a plan submitted to them by the Engineer to the London County Council, showing the proposed paving of Kingsway and Aldwych. The Engineer stated that in view of the fact that the roadway of that portion of Kingsway within the Borough of Holborn would be paved with asphalt, it was proposed to pave the whole of Kingsway to its junction with Aldwych of that material, but with regard to Aldwych and the intersection with Kingsway, wood paving was suggested. The Committee recommended, and it was agreed, to send a communication to the London County Council stating that the City Council had no objection to the plan of paving Aldwych, but that from experience they had found wood paving preferable to asphalt in a street of the character of Kingsway, and hoped that wood blocks would be used for the carriage-way of that street.

Court of Common Council.—At the usual Court of Common Council held on Thursday last week at the Guildhall, the following resolution was moved by Mr. Deputy Wilkinson:—"That it be referred to the Bridges Committee to consider and report as to the advisability of the substitution of hard wood or other material for the granite sets now in use on London Bridge."

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Mr. Wilkinson had canvassed a large number of cartage contractors and had found that 197 were in favour of granite sets and 750 against.—The Chairman of the Committee said that all due consideration had been given to the matter, and they had decided in favour of granite. The motion was lost.

NEW RAILWAY TO VESUVIUS.—A new railway has been completed from Resina, in the Bay of Naples, to the foot of the cone on Mount Vesuvius, where connexion is made with the old Funicular Railway to the crater. The actual starting point of the new line is Pugliano, between Resina and Naples, which, with the exception of a short section not yet open for traffic, is connected with Naples by an electric tramway. When this short extension is finished passengers will be able to travel by railway from the centre of Naples to the summit of Vesuvius, saving much time and discomfort. The new railway has a total length of 4.7 miles, and is divided into three sections. On the first and third ordinary motor-driven electric cars can run, as the maximum gradient is only about 1:12.5. The second section has a maximum gradient of 1:4, and the use of a rack rail is necessary. The rack rail is constructed on the Strub system, and is similar to that on the line up the Jungfrau. The cars have a seating capacity for twenty-four passengers, and two independent brake systems have been applied, providing ample security. A generating station for the new line has been built and equipped at the foot of Monte Cateroni.

SELF-SUPPORTING WALLS AND PARTITIONS.—A new method, known as the "Pruess System," of constructing walls and fire-proof partitions possesses some features of interest. Walls built in this manner consist of iron, brick, and cement forming one rigid plate. The iron is embedded in cement, and is in the form of hoop-iron placed horizontally and vertically, thus making a complete frame-work, and reinforcing the filling so that it may be able to resist tensile as well as compressive stresses. The distance apart of the hoop-iron layers depends in great measure upon the kind of material used for filling the frame-work, but for brick it is found that a spacing of 1 ft. 6 in. is most suitable. It is claimed that the system is very convenient for facing old buildings with minimum disturbance and maximum efficiency. The new work is not only supported in the usual way from the ground, but is also supported by its metal framing, which is secured to clamps caulked into the old work. The system is not limited to any particular thickness, for it lends itself to the construction of 3 in., 4½ in., 9 in., or thicker walls, and is particularly suitable for hollow walls. The ordinary brick bond can be observed when required, or in the case of thin partitions the panels of the framework can be filled in with thin slabs of fire-resisting material. Owing to the self-sustaining character of the construction, girders are not required over window and door openings. Garden walls are generally built 3 in. or 4½ in. thick, with piers spaced from 10 ft. to 12 ft. apart, and a rolled steel joist is built into the pier to ensure stability. When partitions are formed on this system they afford good ties between floors and ceilings, as the framework is always suitably secured by the end of each hoop-iron. Owing to the comparative lightness of the construction the foundation can be reduced in weight and extent.

CAPITAL AND LABOUR.

BRADFORD PLASTERERS' DISPUTE.—The dispute in the plastering trade of Bradford, which has lasted for nearly a year, promises to come to an end in the near future. Representatives of the masters and the men have met, and decided to submit the case to an arbitrator of the Board of Trade. The origin of the dispute was a notice by the employers to reduce the men's wages from 9½d. to 8½d. an hour, and the men at once retaliated by a demand for 10½d. an hour. The masters also proposed certain alterations to the trade rules. Three hundred men came out on strike, but many of them have since secured work elsewhere. It has been agreed that the arbitrator shall be asked to fix the rate of wages, the masters agreeing to regard 9½d. as the maximum and the men 8½d. as the minimum, that is to say, the arbitrator will be free to fix an intermediate figure if he thinks fit. The subject of the proposed alteration of rules will be referred to his judgment unconditionally.—*Yorkshire Observer.*

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

26,620 of 1902.—J. H. CARTLAND, H. J. ARNOLD, and J. LILLY: *Apparatus for Raising and Lowering Window Sashes and the like.*

This invention relates to apparatus for raising and lowering window sashes. In the framing at the one side a metallic plate is fixed against which the edge of the sash slides. In this plate is formed a central slot whose length is determined by the length of travel required for the sash. At the upper end of the sash a bracket is attached which passes through the slot and terminates on the other side with a screw nut which engages with a long screw running parallel with the edge of the sash. This bracket is so made and attached that the sash may be readily released from the frame when required. This bracket bears against the inner side of the plate, that is, the weight so to speak of the sash is borne thereat. Upon the lower end of the sash, and at the same side, is placed an anti-friction plate or roller. Hence the sash is hung as it were from the one side and carried on the slotted plate. At the lower end of the screw a pulley device for operating the same—and made adjustable to the different widths of framing—consists of a grooved pulley carried from a bracket plate secured to the front of the frame, which also carries two other groove guide pulleys over which the manipulating cord may pass so that the screw may be operated by means of a cord at the front, and thereby the sash raised or lowered. The pulley at the lower end of the screw is made with a non-circular hole, and preferably of a taper form, which fits on to a corresponding non-circular part formed on or attached to the screw. The said pulley is carried on the bracket plate in such a manner that when the latter is removed from the front, the pulley may come with it, by which means the new cord when required may readily be placed around the said pulleys.

9,557 of 1903.—J. W. CHILDS: *Locks and Latches for Sliding, Folding, Shutting, and other like Doors.*

This invention relates to locks and latches, and consists in constructing a metallic case rivetted together or cast in one piece, with the side of the case movable for the purpose of removing or examining the works. In the case a hooked and weighted latch is provided of a suitable shape formed to fall in position for fastening into a catch plate by its dead weight; the centre or pivot being at the back end of the case. The bolt forming the lock is situated above the latch, and is thrown through a slot either by a tumbler with a square hole to receive a spindle or by a key. The latch is lifted and the door opened by pulling the handle in the direction the door is to be opened. The bolt is constructed with two slits or pins on which a pivotted weighted lever with a turned-down end engages, either holding the bolt when forced outwards for locking purposes, or to hold the bolt in its normal position; the aforesaid bolt and lever being operated by a tumbler or by means of a key. The bolt is provided with projections at the side or at the bottom for the purpose of engaging with a tumbler or key above described.

18,543 of 1903.—W. DALBECK. *Door Locks.*

A door lock consisting in the combination with a port and a follower of ball crank shape, fixing said ball in its opened and closed position, a spring attached at one end to the free end of an arm of said follower, a lever connected to the other end of said spring, and a latch actuated by said lever.

18,888 of 1903.—J. LEVICK: *Manufacture of Flushing Cisterns.*

The manufacture of the outer bell and the containing vessel of automatic flushing apparatus by forming the said parts from ductile sheet metal by spinning or drawing through, or partly by spinning and partly by drawing through, thereby avoiding the formation of seams or joints.

19,016 of 1903.—J. GRESLEY: *Manufacture of Hydraulic Cements.*

The manufacture of hydraulic cements by burning artificially and intimately mingled mixtures of natural or artificial aluminium silicates, which may or may not contain lime or iron oxide, as kaolin and other clays, pozzuolana, etc.; or certain industrial refuses, as slags and the like, on the one hand, with lime especially in form of carbonate, on the other hand, wherein molecules of SiO_2, molecules of Al_2O_3, and molecules of CaO are mixed in such relation that the number of the lime unities is greater than the sum a+b of the acid unities, and may reach to the sum 2 (a+b), the burning being effected below the sintering temperature of the mixture.

19,453 of 1903.—H. BOLDT and H. MARQUARDT: *Means for Fixing Plugs in Walls.*

Means for securing plugs in walls, consisting of a sleeve having inwardly bent tongues, the free ends of which are bent outwardly to engage in the wall when forced outwards by a plug being driven into said sleeve, and lugs on said sleeve for retaining the plug therein.

19,731 of 1903.—V. L. MCCUSKEY: *Tiling Blocks.*

A tiling or building block, consisting of a hollow block having a recess in its inner face adapted to fit about a studding and having the end of the walls forming it bevelled on lines converging toward the centre thereof.

19,756 of 1903.—H. J. WEEKS: *Stop for Windows and Doors.*

The combination of a bracket having a diametrical recess, a catch fitting said recess, and pivotted near the lower edge of one of its ends therein, and a flat spring secured within the recess adapted to maintain the catch in position when turned upon its pivot at right angles to the bracket, the whole serving as a window stop.

20,056 of 1903.—J. MORRIS: *Automatic Fire Extinguishing Appliances.*

This invention relates to automatic fire extinguishing appliances, and its object is to overcome the difficulty experienced in keeping the valves tight against the varying pressure and water-hammer action in the supply pipes. For this purpose the valve is slightly cupped, and interposed between it and its seat is a stiff but elastic disc, which is caused by the pressure of the water to assume a more or less cup form, thereby pressing its edges against the seat more and more as the pressure increases.

20,161 of 1903.—A. E. C. JACOBSOHN and F. O. WEBER: *Method and Apparatus for use in Sinking Wells, Boring, and like Operations.*

The method of raising earth in well sinking, boring, and like operations in which a vessel closed at the top is forced into the ground through the supernatant water as far as possible, communication between the atmospheric air and the interior of the vessel being then made, the vessel being thereupon forced completely into the earth, communication with the atmospheric air being then closed and finally the vessel drawn up with its contained charge.

23,564 of 1902.—G. A. CHADDOCK: *Doors, Windows, and the like Aperture Closing Devices.*

This consists in providing guides whereby the closing member or door is held against rotation in its upward movement, but guided into an opening and closing swing in its descending movement in such a way that the whole or part of the weight of the closing member is utilised to produce an opening and closing swing in a self-acting manner after the member has been lifted and released.

25,076 of 1902.—E. WILKES: *Locks.*

A lock in which an inward movement of the bolt, while the same is engaged with a lever or levers or tumbler, ensures the movement of a stop or abutment into position, which prevents the further inward movement of the bolt, and thereby relieves the lever or levers and stump of the bolt or the tumbler from pressure.

28,526 of 1902.—I. WROBLEWSKI: *Casement Windows.*

A window with sash frames adapted to be lifted by means of a lever, the said sash frames and window frames being provided at their upper and lower parts and sides with flanged joints, the inclined surfaces of which are adapted to bear automatically against each other under the action of inclined hinges.

245 of 1903.—E. UHLAND: *Water-closet Seats.*

Water-closet seats adapted to be elevated or folded back, in which the seat is connected by a rod with the handle of the flushing apparatus, with the object of elevating the seat simultaneously with the operation of the flush by pulling the handle.

17,220 of 1903.—M. GAEBEL: *Domestic Stoves or Fire Grates.*

A perforated fire-grate lining suspended in the fire-box (or otherwise arranged therein) serving as a protecting screen for a hot-water coil-pipe and for circulating air.

18,002 of 1903.—O. SHULTE-MARMELING and A. SHULTE-MARMELING: *Sash Adjuster or Door Holder.*

A sash adjuster and door holder consisting of a curved serrated bar fixed to one part of the sash or door, and a spring pinion arranged on the other part.

18,490 of 1903.—ALLEN DE VILBISS, Jun.: *Recording Locks.*

In a recording lock, the combination with a key-operated locking bolt, of recording mechanism and means for actuating it through the movement of the key, said mechanism including a time-indicator and a key-indicator.

28,123 of 1902.—M. DIEMLING: *Fire and like Escapes for Windows.*

A fire or the like escape consisting of a window

*All these Applications are in the stage in which opposition to the grant of Patents upon them can be made.

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shutter capable of being extended to form a ladder-like communication with the ground.

28,267 of 1902.—J. J. MEAGHER: *Ventilator or Cowl.*

In combination in a ventilator an upright shaft, concentric apertures around said shaft, planes adapted to cause an upward current into the top of said shaft and arranged concentrically around it, and a preferably hollow ring around the orifice of said shaft, forming a funnel-shaped orifice.

25,564 of 1902.—R. H. BROWN: *Street and other Gully Traps.*

A gully or like trap for street and other use, having a vertical or approximately vertical grid or grids, in lieu of, or in addition to, the ordinary surface grid, said vertical grid forming the entrance to a chamber or passage or it might be chambers or passages, leading directly to the trap, so that there is less tendency of the gully being choked, or the water has access to the outlet chamber and trap without passing through the surface grid.

25,569 of 1902.—J. FIELDING: *Apparatus for Making Artificial Stone Slabs and Blocks.*

In the manufacture of artificial slabs and such like articles, the arrangement of a double movable mould working over a single fixed porous sheet and perforated plate, whereby the use of loose sheets of linen-covered zinc is dispensed with.

25,807 of 1902.—L. A. GARCHEY: *Manufacture of Artificial Granite.*

The process of manufacturing blocks of de-vitrified glass intended as substitutes for natural granite and stone in all ways in which such are employed, this process consisting in casting the glass in a heated ingot mould and in allowing it to become de-vitrified by slow and gradual cooling.

25,896 of 1902.—H. L. DOULTON and R. J. PLEACE: *Appliances for the Automatic Discharge of Liquid.*

Means for retaining liquid in a chamber before being automatically discharged, by the adoption of two valves acted upon simultaneously by a ball which floats as the liquid rises, one valve being opened and allowing water to pass to, and the second valve closing the waste pipe from, the tank above. The supply of water, which may be regulated by a third valve if desired, is delivered into the upper tank, causing a valve there to act and allow the escape of compressed air from a siphon fixed in the chamber, which then discharges the liquid.

25,898 of 1902.—H. L. DOULTON and R. J. PLEACE: *Automatic Siphons.*

In connexion with two automatic siphons, the adoption of cylinders of different sizes to allow greater air space in one than in the other, for the purpose of alternate discharge of liquid.

17,801 of 1903.—J. V. DAVIES: *Apparatus for Facilitating Tunnel Construction.*

In an apparatus for facilitating the construction of tunnels, a movable platform partitioning off the bottom of the tunnel, a support for said platform comprising skids or the like movable in said tunnel, and means carried by the platform for transferring tunnel plates or other devices from one end of said platform to the other and over or around spoil that may be thereon.

20,227 of 1903.—P. M. JUSTICE (O'Rourke Engineering Construction Co.): *Tunnels, and in the Method of Constructing same.*

The method of constructing tunnels, which consists in forming a structure adapted to serve as a portion or section of the tunnel, sinking said structure bodily to permanent position and carrying forward the work of excavation laterally from said structure.

20,228 of 1903.—P. M. JUSTICE (O'Rourke Engineering Construction Co.): *Metallic Tunnel Structures.*

A subterranean driven tunnel structure comprising a plurality of substantial cylindrical lining sections incorporated into one structure, and so arranged that the arcs of contiguous sections overlap, each section being composed of a series of segments, the segments along the adjacent sides of contiguous sections being omitted, skew backs upon which the opposing arches and inverts have their bearing, and supports between said skew backs to resist the radial thrust, openings through said supports being provided for inter-communication between the sections.

28,020 of 1902.—J. W. BROCKMAN and H. GREAVES: *Means of Attaching Zinc and other Tiles or Plates to Roofing and other Surfaces.*

The employment in the attachment of tiles or the like to roofing or other surfaces, of a hook, eye bolt, or its equivalent, for the double purpose of securing the head of the lower tile and the foot of the upper tile, by transfixing the former and hooking or engaging the latter.

MEETINGS.

FRIDAY, NOVEMBER 20.

Architectural Association.—Mr. H. M. Cautley on "Farm Buildings." 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

Glasgow Architectural Craftsmen's Society.—Mr. J. C. Walker on "Planning and Construction of Burgh Buildings." 8 p.m.

Institution of Mechanical Engineers.—The following Papers will be read and discussed so far as time permits:—(1) "Roofing Existing Shops while Work is Proceeding," by Mr. R. H. Fowler: (2) "Experiments on the Efficiency of Centrifugal Pumps," by Mr. Thomas E. Stanton, D.Sc. 8 p.m.

SATURDAY, NOVEMBER 21.

Junior Institution of Engineers.—Visit to Orchard Dock, Blackwall, to witness a demonstration of fire-extinguishing, &c., by invitation of the Clayton Company. 2.30 p.m.

MONDAY, NOVEMBER 23.

Surveyors' Institution.—Mr. H. T. Scoble on "Industrial Decentralisation, an important factor in the solution of the Housing Problem." 8 p.m.

Society of Arts (Cantor Lecture).—Mr. Bennett H. Brough on "The Mining of Non-metallic Minerals."—I. 8 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Dr. E. P. Manby, B.A., on "The Hygiene of Byres, Lairs, Cow-sheds and Slaughter-houses, and all places where Animals destined for the supply of Food are kept, and the Hygiene of Markets, Dairies, and other places where Food is Stored, Prepared or Exposed for Sale, and Transported." 7 p.m.

TUESDAY, NOVEMBER 24.

Institution of Civil Engineers.—Mr. H. R. Mill, D.Sc., LL.D., on "The Distribution of Mean and Extreme Annual Rainfall over the British Isles." 8 p.m.

Institute of Sanitary Engineers Ltd. (Lectures in Practical Sanitary Science).—Mr. W. J. Dibdin, F.I.C., on "Sewage Disposal."—II. 7 p.m.

WEDNESDAY, NOVEMBER 25.

Sanitary Institute (Lectures for Sanitary Officers).—7 p.m.

Society of Arts.—Mr G. F. Parker on "The Universal Exposition at St. Louis, U.S.A., 1904." 8 p.m.

Northern Architectural Association.—Rev. Canon Savage, M.A., on "The Development of the distinctly English Type of Church." 7.30 p.m.

Edinburgh Architectural Association.—Mr. David M. Nesbit on "Warming and Ventilation." 8 p.m.

Institution of Civil Engineers.—Students' visit to the Great Northern Railway; Underground Stations at Finsbury Park. (Train from King's Cross (local) to Finsbury Park, 2.24 p.m.)

THURSDAY, NOVEMBER 26.

Builders' Benevolent Institution.—Fifty-sixth annual dinner, Whitehall Rooms, Hôtel Metropole, Charing Cross, W.C. 6 p.m. (Sir Weetman D. Pearson, Bart., M.P., President, in the chair.)

London Institution.—Sir William Ramsay on "Radium and the Periodic Law in connexion with Recently Discovered Elements." Illustrated. 6 p.m.

Institution of Electrical Engineers.—(1) "The Testing of Electric Generators by Air Calorimetry," by Mr. R. Threlfall, M.A., F.R.S. (2) "The Edison Accumulator for Automobiles," by Mr. W. Hibbert. 8 p.m.

Sanitary Institute (Demonstrations for Sanitary Officers).—Inspection at the Metropolitan Cattle Market, York-road, N. 2 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

November 6.—By WM. CLARKSON.

Walthamstow.—26 and 27, Back-rd., u.t. 59 yrs., g.r. 3*l.* 5*s.*, w.r. 35*l.* 1*s.* £160

By SCOBELL & LAKE.

Canonbury.—3, Compton-rd., u.t. 41½ yrs., g.r. 10*l.*, y.r. 40*l.* 430

By WHITE, DRUCE, & BROWN.

Soho.—55, Greek-st. (S.), f., y.r. 80*l.* 1,850
St. John's Wood.—2, Melina-pl., f., y.r. 80*l.* 1,290

By C. H. & J. W. WILLMOTT.

Shepherd's Bush. 18, Warbeck-rd., f., e.r. 48*l.* ... 700
26, Brooklyn-rd., u.t. 36 yrs., g.r. 10*l.*, e.r. 80*l.*... 500

By EDWARD WOOD.

Lee.—30, Leyland-rd., u.t. 60 yrs., g.r. 18*l.*, y.r. 60*l.* 420
Victoria Park.—125 and 126, Codogan-ter., f., y.r. 92*l.* 910
Camden Town.—50, Torriano-av., u.t. 41 yrs., g.r. 5*l.* 5*s.*, y.r. 46*l.* 420
Finsbury Park.—68, Mountgrove-rd., u.t. 63 yrs., g.r. 13*l.* 13*s.*, y.r. 82*l.* 720

November 10.—By C. H. BROWN.

Pimlico.—32, Sutherland-ter., u.t. 60½ yrs., g.r. 9*l.*, e.r. 65*l.* 680
236, Vauxhall Bridge-rd., f., y.r. 48*l.* 960

By FIELD & SONS.

Ilford, Essex.—61 to 119 (odd), Sheridan-rd., f., e.r. 819*l.* 6,500

By HAROLD GRIFFIN.

Battersea.—144, Bridge-rd. (S.), with stabling, u.t. 63 yrs., g.r. 1*l.*, y.r. 165*l.* 10*s.* 900

By HAMILTON, MIALL, & BRAGG.

Kensington. 7, Sterndale-rd., u.t. 73½ yrs., g.r. 8*l.*, y.r. 40*l.* 420
Dalston.—215, Queen's-rd. (S), u.t. 25½ yrs., g.r. 6*l.*, y.r. 43*l.* 355
148, Richmond-rd., u.t. 35 yrs., g.r. 5*l.* 5*s.*, y.r. 38*l.* 300

By ROGERS, CHAPMAN, & THOMAS.

Marylebone.—57 and 59, Cleveland-st. (Regent Residences). u.t. 44¾ yrs., g.r. 40*l.*, w.r. 291*l.* 4*s.* (including mortgage) 1,600

By JAMES T. PEAT (at Reigate).

Reigate, Surrey.—4 and 6, Glovers-rd., f., y.r. 31*l.* 4*s.* £155
3 and 5, Priory-rd., f., w.r. 27*l.* 6*s.* 295
Fernhill, Surrey.—A freehold cottage and ½ acre, y.r. 8*l.* 175

By J. BAKER, COOKE, & STANDEN (at Mill Hill).

Mill Hill.—Uphill-rd., eight plots of land, f. 645
Lawrence-st., four plots of land, f. 995

By J. C. PLATT (at Hammersmith).

Hammersmith.—33, The Grove, u.t. 44 yrs., g.r. 6*l.*, e.r. 60*l.* 400

By STEPHEN JACKSON (at Masons' Hall Tavern).

Harrow, Middx.—West-st., The Cricketers' p.-h., f., with goodwill 4,620

November 11.—By BAXTER, PAYNE, & LEPPER.

Bromley, Kent.—Highland-rd., Sunnycourt and 1 a. 1 r., f., p. 3,500
St. Mary Cray, Kent.—High-st., two freehold shops, warehouse, and cottage, also 4 to 12, Lawrence's-yd., y.r. 122*l.* 14*s.* 1,110

By E. H. HENRY.

Streatham. 'Dahomey-st., *l.g.r.s* 97*l.* 10*s.*, reversion in 93½ yrs. 2,350
Clapham.—6, Offerton-rd., u.t. 64 yrs., g.r. 6*l.* 10*s.*, y.r. 45*l.* 450

By HOWELL, SON, & BONNIN.

Westminster.—15, 16, and 19, Vincent-sq., u.t. 54½ yrs., g.r. 37*l.*, y.r. 225*l.* 2,080

By FRANK JOLLY & CO.

Strand.—28, Wellington-st., and 11, York-st. (S), f., y.r. 261*l.* 10*s.* 8,000

By MARK LIELL & SON.

East Ham.—42, 44, 46, and 48, Rutland-st., f., w.r. 83*l.* 4*s.* 900
13 and 15, Clifton-rd., f., w.r. 40*l.* 6*s.* 360
Tottenham.—130 to 142 (even), Tewkesbury-rd., u.t. 73 yrs., g.r. 24*l.* 10*s.*, w.r. 145*l.* 12*s.* 540

By F. C. SQUIRE & CO.

Sydenham.—37 and 39, Wells-rd., f., y.r. 51*l.* 700
4, Fransfield-gr., u.t. 45½ yrs., g.r. 6*l.*, e.r. 28*l.* ... 155

By PHILIP STOCK.

Brixton.—86, Gresham-rd., f., y.r. 36*l.* 1,050

By WALTON & LEE.

Tooting Graveney.—Mitcham-rd., The Eldon House Building Estate," 3 a. 2 r. 18 p., f. 5,000

By DOUGLAS YOUNG & CO.

Brixton.—28, Elliott-rd., u.t. 59½ yrs., g.r. 7*l.* 10*s.*, e.r. 45*l.* 360

By BLAKE & DANNATT.

Dulwich.—181 and 183, Friern-rd., u.t. 85 yrs., g.r. 12*l.*, y.r. 60*l.* 605
264, Friern-rd., u.t. 58 yrs., g.r. 6*l.* 6*s.*, y.r. 35*l.*... 350
New Cross.—3, 5, 7, and 9, Barlborough-st., u.t. 72 yrs., g.r. 20*l.*, w.r. 119*l.* 12*s.* 960
Forest Hill.—20 and 22, Honor Oak-pk., u.t. 66½ yrs., g.r. 9*l.*, y.r. 50*l.* 495

By A. DOWELL (at Edinburgh).

Kincardine, &c., Aberdeenshire.—The Estate of Findrack, 1,950 acres 20,200

November 12.—By HIBBERD & CO.

Harlesden.—14 to 24 (even), St. John's-av., u.t. 94 yrs., g.r. 42*l.*, w.r. 295*l.* 2*s.* 1,800

By C. C. & T. MOORE.

Shoreditch.—13 and 14, Hoxton Market (with workshops), f., e.r 67*l.* 875
Hackney.—22, Rodney-rd., u.t. 68½ yrs., g.r. 7*l.*, e.r. 40*l.* 425
Stratford.—48 to 53, Carpenter's-rd., u.t. 54 yrs., g.r. 25*l.* 4*s.*, w.r. 166*l.* 8*s.* 750
16, The Green, u.t. 70½ yrs., g.r. 5*l.* 5*s.*, e.r. 33*l.* 16*s.* 165
Poplar.—14 and 16, Moness-st., u.t. 69½ yrs., g.r. 8*l.* 10*s.*, w.r. 63*l.* 14*s.* 480

By FAREBROTHER, ELLIS, & CO.

Lambeth.—78, Westminster Bridge-rd., f., y.r. 60*l.* 750
Kensington.—13 and 15, Lisgar-ter., u.t. 77 yrs., g.r. 20*l.*, y.r. 110*l.* 1,050
3, 5, 7, and 9, Stonor-rd., u.t. 77 yrs., g.r. 40*l.*, y.r. 220*l.* 1,775
26, 28, and 34, Edith-rd., u.t. 72 yrs., g.r. 33*l.*, y.r. 185*l.* 1,660
59 and 61, Gunterstone-rd., u.t. 73 yrs., g.r. 24*l.*, y.r. 135*l.* 1,145
12 and 14, St. Dunstan's-rd., u.t. 79 yrs., g.r. 14*l.*, y.r. 80*l.* 800
27 to 37 (odd), St. Dunstan's-rd., u.t. 79 yrs., g.r. 36*l.* y.r. 232*l.* 2,050
15, Margravine-gdns., u.t. 79 yrs., g.r. 6*l.* 10*s.*, y.r. 40*l.* 335
Fulham.—19 and 25, Rostrevor-rd., u.t. 81 yrs., g.r. 12*l.*, y.r. 78*l.* 810

By E. & A. SWAIN.

Notting Hill.—43 to 49 (odd), Portland-rd. (S), u.t. 46 yrs., g.r. 29*l.* 8*s.*, y.r. 150*l.* 1,170

By H. J. BLISS & SONS.

Stepney.—24, Eastfield-st., f., w.r. 23*l.* 8*s.* 260
North Woolwich.—27, 29, and 31, Brookbank Cottages, w.r. 66*l.* 6*s.*; also l.g.r. 12*l.*, u.t. 55½ yrs., g.r. 24*l.* 290
West Wickham, Kent.—7 and 8, Sussex-rd., f., w.r. 31*l.* 4*s.* 210

By STIMSON & SONS.

New Cross. 2 to 20 (even), Lubbock-st., u.t. 62¾ yrs., g.r. 30*l.*, w.r. 263*l.* 18*s.* 1,800
Walworth.—191 and 193, Walworth-rd. (S), u.t. 71 yrs., g.r. 57*l.*, y.r. 170*l.* 1,615
Peckham.—11, Elcot-av., u.t. 76½ yrs., g.r. 6*l.*, w.r. 33*l.* 205
Dulwich.—29, Melbourne-gr., u.t. 70½ yrs., g.r. 6*l.*, y.r. 28*l.* 280
Peckham.—3 to 9 (odd), Haymerle-rd., u.t. 36 yrs., g.r. 20*l.*, w.r. 150*l.* 16*s.* 710
Stockwell.—7 to 15 (odd), Sidney-rd., u.t. 33½ yrs., g.r. 20*l.*, y.r. 162*l.* 16*s.* 1,230
Streatham.—95 to 105 (odd), Eardley-rd., u.t. 77½ yrs., g.r. 28*l.* 16*s.*, w.r. 202*l.* 16*s.* 1,150
Brixton.—8, Helix-rd., u.t. 86 yrs., g.r. 7*l.*, y.r. 40*l.* 450
Kew Green.—Burton's Restaurant, f., y.r. 80*l.* 1,325

By NEWBON, EDWARDS, & SHEPHARD.

Barnsbury.—34, Half-Moon-cres., f., e.r. 55*l.* 665
36, 38, and 40, Half Moon-cres., and 22, Charlotte-ter. (including the Duchess of Kent p.-h.), f., e.r. 168*l.* 3,570

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Charlotte-ter., f.g.r.s 72*l.*, reversion in 2½ yrs.... 57 and 59, Copenhagen-st. (8); 1, 2, and 3, Charlotte-ter.; 48, 49, and 50, Payne-st., f., e.r. 242*l.*	£6,050
49, 51, 53, and 55, Copenhagen-st. (8), f., y.r. 100*l.*	2,350
29 to 47, Payne-st., f., y.r. 200*l.*	2,325
Stoke Newington.—52, Filey-av., u.t. 87½ yrs., g.r. 10*l.*, y.r. 65*l.*	5,950
1, Kyverdale-rd., u.t. 76½ yrs., g.r. 9*l.*, e.r. 55*l.*... 25 to 35 (odd) and 41, Kyverdale-rd., u.t. 76½ yrs., g.r. 79*l.*, y.r. 401*l.*	620
14, Kyverdale-rd., u.t. 76½ yrs., g.r. 9*l.*, y.r. 55*l.* 20 and 22, Alkham-rd., u.t. 76½ yrs., g.r. 16*l.* 16*s.*, y.r. 110*l.*	520
Stamford Hill.—3, Denver-rd., u.t. 86½ yrs., g.r. 7*l.*, y.r. 45*l.*	4,060
55, Northfield-rd., u.t. 81½ yrs., g.r. 9*l.*, y.r. 60*l.* 21, East Bank, u.t. 81½ yrs., g.r. 10*l.*, y.r. 60*l.* ...	500
Pentonville.—2, Rodney-st., u.t. 23 yrs., g.r. 25*l.*, e.r. 124*l.* 16*s.*	950
Islington.—38, Halliford-st., u.t. 42 yrs., g.r. 5*l.*, y.r. 42*l.*	425
Stoke Newington.—15 and 19, Benthal-rd., u.t. 72 yrs., g.r. 10*l.*, y.r. 68*l.*	600
Hackney.—28 to 31, 36 to 39, Margaret-st., u.t. 11½ yrs., g.r. 45*l.*, w.r. 197*l.* 12*s.*	650
Haggerston.—10, Cester-st., f., w.r. 36*l.* 8*s.*	300
Tottenham.—94 and 96, Tynemouth-rd., f., w.r. 62*l.* 8*s.*	310
Tynemouth-rd., two freehold building plots ...	525
November 13.—By A. & A. Field.	685
Forest Gate.—53 Suffolk-st., f., w.r. 20*l.* 16*s.*..... 78, Odessa-rd., u.t. 50 yrs., g.r. 2*l.* 10*s.*, w.r. 32*l.* 10*s.*	220
By Hards & Bradly.	170
Deptford.—250 to 256 (even), Lower-rd., area 23,590 ft., u.t. 62 yrs., g.r. 12*l.*, y.r. 156*l.*.....	1,100
By Hillier & Parker.	
Old Ford.—74, 76, and 78, Usher-rd., f., w.r. 126*l.* 2*s.*	1,100
By Rider & Sons.	
Notting Hill.—23, Kenley-st., u.t. 38½ yrs., g.r. 4*l.* 10*s.*, w.r. 39*l.*	185
15, Brewster-gdns., u.t. 80 yrs., g.r. 5*l.*, y.r. 38*l.*	350
1 and 3, Lionel Mews, u.t. 67 yrs., g.r. 8*l.* 8*s.*, y.r. 58*l.*	370

Contractions used in these lists.—**F.g.r.** for freehold ground-rent; **l.g.r.** for leasehold ground-rent; **i.g.r.** for improved ground-rent; **g.r.** for ground-rent; **r.** for rent; **f.** for freehold; **c.** for copyhold; **l.** for leasehold; **p.** for possession; **e.r.** for estimated rental; **w.r.** for weekly rental; **q.r.** for quarterly rental; **y.r.** for yearly rental; **u.t.** for unexpired term; **p.a.** for per annum; **yrs.** for years; **la.** for lane; **st.** for street; **rd.** for road; **sq.** for square; **pl.** for place; **ter.** for terrace; **cres.** for crescent; **av.** for avenue; **gdns.** for gardens; **yd.** for yard; **gr.** for grove; **b.h.** for beer-house; **p.h.** for public-house; **o.** for offices; **s.** for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 6	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 10 0	" at railway depôt
Red wire Cuts	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire	4 4 0	" " "
Do. Bullnose	4 10 0	" " "
Best Stourbridge Fire Brick	4 8 0	" " "
Glazed Bricks.		
Best White and Ivory Glazed Stretchers	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	80 0	per ton, delivered.
Best Ground Blue Lias Lime	21 0	" "

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11*s.* 6*d.* per yard, delivered.
Stourbridge Fire Clay in sacks 27*s.* 6*d.* per ton at rly. dpt.

PRICES CURRENT (*continued*).

STONE.

	s. d.	
Bath Stone—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "
Portland Stone (20 ft. average)—Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	" "
	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt
Beer in blocks	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

York Stone—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly.dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16× 8 best "	7 0 0	"
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green	15 2 6	" "
20×12 best Eureka unfading green	17 2 6	" "
18×10 " "	12 10 0	" "
16× 8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16× 8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000 at rly. depot.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and Valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. Ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards—1 in. and 1½ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

PRICES CURRENT (*continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
Joiners' Wood.		
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube	0 4 0	—

Prepared Flooring—	Per square.	
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards	0 11 0	0 13 6
¾ in. by 7 in. do. do.	0 14 0	0 18 0
1 in. by 7 in. white do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders, " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Fitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5

METALS.

	Per ton, in London £ s. d.	£ s. d.
Iron—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	—
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 5 0	9 10 0
" " galvanised	17 10 0	—

(*And upwards, according to size and gauge.)

Sheet Iron (Black)—		
Ordinary sizes to 20 g.	9 15 0	—
" " 24 g.	10 15 0	—
" " 26 g.	12 5 0	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0	—
Ordinary sizes to 22 g. and 24 g.	13 5 0	—
" " 26 g.	14 5 0	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0	—
" " 22 g. and 24 g.	16 10 0	—
" " 26 g.	18 0 0	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	—
" " 22 g. and 24 g.	13 5 0	—
" " 26 g.	14 0 0	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0	—
" " " 26 g.	14 0 0	—
Cut nails, 3 in. to 6 in. (Under 3 in., usual trade extras.)	9 5 0	9 15 0

[*See also page 535*

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COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Required.	Premiums.	Designs to be delivered
Water Supply Scheme	Clare (Suffolk) R.D.C.	Not stated	Dec. 10
Designs for New Council House & Free Library Bdgs.	Erdington U.D.C.	50*l*., 30*l*., 20*l*.	Feb. 1, '04

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Culvert, Dublin	G. N. R. Co. (Ireland)	W. H. Mills, Engineer, Amiens-street Terminus, Dublin	Nov. 23
Boundary Walls, &c., Savile-road, Savile Town, Yorks	Thornhill U.D.C.	S. W. Parker, Surveyor, Council Offices, Thornhill	do.
Rebuilding Rum Puncheon & other Premises, Swansea	Mr. W. Williams	H. C. Portsmouth, Architect, 6, Fisher-street, Swansea	do.
Alterations to Hospital, Gallows Plain	Hertford Corporation	W. L. Grant, Architect, Sittingbourne	do.
Road Works, Whiteford-road	Plymouth Corporation	J. Paton, Borough Engineer, Plymouth	do.
Intermediate Schools, Porth	Glam County Council	T. M. Franklin, County Council Offices, Cardiff, Glamorgan	do.
Offices near the Wheat Sheaf Tram Depot, Sunderland	....	F. E. Coates, Architect, 41, Fawcett-street, Sunderland	Nov. 24
Road Works, Pudding Mill-lane	West Ham Town Council	J. G. Morley, Borough Surveyor, Town Hall, West Ham	do.
Street Works, back Collingwood-road, N.	West Hartlepool Corporation	J. W. Brown, Civil Engineer, Town Hall, West Hartlepool	do.
Sunday School, Penwithick Stents, St. Austell	.....	W. J. Jenkins, Architect, Bodmin	do.
Eight Houses, Garden and Clarendon Streets	Consett (Durham) Co-Op. Soc., Ltd.	E. Huntley, Newmarket-street, Consett	do.
Coastguard Station, &c., Aranmore, co. Donegal	Office of Works	Secretary, Office of Public Works, Dublin	do.
Walls, &c., Park Hotel, Glandwr-road, Abertillery	.....	G. Kenshole, Architect, Station-road, Bargoed	Nov. 25
Road Metal, &c.	Erdington (nr. Birmingham) U.D.C.	H. H. Humphries, Engineer, Public Hall, Erdington	do.
Boundary Wall	Swadlincote D.U.D.C.	G. B. Smedley, Civil Engineer, Gasworks, Swadlincote	do.
House, Swansfield Park-road, Alnwick	.....	M. Temple Wilson, Architect, Alnwick	do.
Street Improvement Works, Slauthewy-road	Newport (Mon.) Corporation	R. H. Haynes, Borough Engineer, Town Hall, Newport, Mon.	do.
Sewers, &c. (1 mile)	Bettys-y-Coed U.D.C.	R. R. Owen, Union Offices, Llanrwst	do.
Paving Works, Langton-street and other roads	Gateshead Corporation	J. Bower, Civil Engineer, Town Hall, Gateshead	do.
Sulphate Plant Building at Gasworks	Evesham Town Council	F. H. Fletcher, Engineer, Evesham	do.
Fire Station, Grove-road	Borough of Eastbourne	Borough Surveyor's Office, Town Hall, Eastbourne	Nov. 26
Setts, &c.	Haworth (Yorks) U.D.C.	W. Robertshaw, North-street, Keighley	do.
Schools, Edwardsville, Treharris	Merthyr Tydfil School Board	J. L. Smith, Architect, Aberdare	do.
Road Works, Vicarage-road	Ware (Herts) U.D.C.	J. E. Smales, Surveyor, New-road, Ware	do.
Business Premises, Pengam, Wales	.....	Mr. Davies, Gellihaf, Maesycwmmer	do.
Rebuilding 59, High-street, Merthyr	.....	C. M. Davies, 112, High-street, Merthyr	do.
Sewerage Works, West Wylam, Northumberland	Hexham R.D.C.	J. E. Parker, Engineer, Post Office Chambers, Newcastle-on-Tyne	do.
Granite (300 tons)	Rickmansworth U.D.C.	The Surveyor, Town Hall, Rickmansworth	do.
Pulling down Houses, Upper St. John-street	Lichfield Corporation	E. Brooke, City Surveyor, Stowe-steet Depot, Lichfield	Nov. 27
Generating Station and Tramcar Shed	Kilmarnock Town Council	R. Blackwood, Burgh Surveyor, Market Bridge, Kilmarnock	do.
Additions to Workhouse, Bagthorpe	Nottingham Guardians	G. M. Howard, Workhouse, Bagthorpe	do.
Road Metal, Elgin, N.B.	.....	A. Hogg, Surveyor, 24, Academy-street, Elgin	do.
*Erection of Public Buildings	Waltham Holy Cross U.D.C.	Council's Surveyor, Highbridge-street, Waltham Abbey	do.
Purifier House (Contract No. 1)	Knaresborough U.D.C.	J. E. Walker, Town Hall, Knaresborough	Nov. 28
Street Works, Saints-road and others	St. Anne's-on-Sea (Lancs) U.D.C.	Thos. Bradley, Council Offices, St. Anne's-on-Sea	do.
Heating Mission Church, Toronto, Bishop Auckland	.....	Hicks & Charlewood, Archs., 67, Westgate-road, Newcastle-on-Tyne	do.
Hotel, Merthyr Vale	.....	T. Roderick, Architect, Merthyr Tydfil	do.
Thirty-one Cottages, &c.	.....	do.	do.
Additions to Hospital, Ipswich	Radcliffe Co-operative Soc., Ld.	J. S. Corder, Architect, Wimborne House, Ipswich	Nov. 30
Business Premises	King's Norton U.D.C.	J. G. Crone, Architect, 26, Colth Market, Newcastle-on-Tyne	do.
Waiting Room, &c	Batley Town Council	A. W. Cross, Surveyor, 23, Valentine-rd., King's Heath, nr. Brmhm.	do.
Destructor Buildings, &c., New Ing Fields	Leeds R.D.C.	Borough Surveyor, Branch-road, Batley	do.
Road Works, Davies-avenue, Roundhay	Brandon (Suffolk) R.D.C.	E. J. Silcock, Civil Engineer, 10, Park-row, Leeds	do.
Water Supply Works	.....	H. Walker & Son, Civil Engineer, King-street, Nottingham	do.
C. I. Pipes, Thornton, near Poulton-le-Fylde, Lancs	Leeds R.D.C.	A. Hindle, Civil Engineer, 44, Abingdon-street, Blackpool	do.
Road Works, &c. Old Park-road	Thornton &c. Corporation	E. J. Silcock, Engineer, 10, Park-row, Leeds	do.
Sewerage Works, &c. Poulton-le-Fylde	Royal Insurance Co's Offices	A. Hindle, Civil Engineer, 44, Abingdon-street, Blackpool	do.
Alterations to Premises, Commercial-road, Halifax	Local Government Body	T. Kershaw, Architect, 1, York Bank Chambers, Halifax	do.
Gymnasium at County School, Bethal-road, Carnarvon	Swanage U.D.C.	R. L. Jones, County Architect, 14, Market-street, Carvarvon	do.
*Retaining Wall along Shore-road	Felling Education Committee	Council's Surveyor, Town Hall, Swanage	do.
Alterations to House, Heworth, Durham	Leyton District Council	H. Miller, Architect, Council Buildings, Felling	Dec. 1
*Outfit of Sybourn-street Temporary School, Leyton	Major Evans	W. Jacques, Architect, 2, Fen-court, E.C.	do.
Lodge, Coachhouse, &c., Carnagarve, Moville, Ireland	Brentford U.D.C.	R. H. Nolan & Co., Carlisle-road, Londonderry	do.
*250 Cubic Yards of Blue Guernsey Granite	London County Council	Council's Surveyor, Clifden House, Boston-road, Brentford	do.
*Painting, &c., Works, Crossness Outfall Works	Borough of Hammersmith	Engineer's Department, County Hall, Spring-gardens, S.W.	do.
*Central Free Library	Brighton Town Council	H. F. Hone F.R.I.B.A., 13, Hart-street, Bloomsbury, W.C.	Dec.
Electrical Plant at Power Station, Southwick	Croydon Union	A. Wright, Engineer, Moorgate-street, E.C.	Dec
*Two Relief Stations	Hambledon (Surrey) R.D.C.	Wills & Anderson, 4, Adam-street, Adelphi, W.C.	do.
Sewers, &c., Wonersh	Hertford & Ware Jnt. Hosptl. Brd.	E. L. Lunn, Surveyor, 36, High street, Guildford	Dec. 9
*Alterations, &c., at Isolation Hospital, near Hertford	Admiralty	W. L. Grant, Architect, Sittingbourne	Dec. 11
*Coast Guard Station at Littlehampton	The Admiralty	Superintending Engineer, H.M. Dockyard, Portsmouth	do.
*New Coastguard Station at Queenborough	Birmingham University	Director of Works Department, 21, Northumberland-avenue, W.C.	do.
*Internal Fittings, New University Buildings	West Ham Education Committee	Aston Webb & Ingress Bell, 19, Queen Anne's-gate, S.W.	Dec. 14
*Electrical Wiring Fittings, &c.	do.	W. Jacques, A.R.I.B.A., 2, Fen Court, Fenchurch-street, E.C.	do.
*Galvanised Iron Portable Dust-bins, &c.	H.M. Works and Public Buildings	do.	do.
*Construction of a New River Wall, &c.	.....	H.M. Office of Works, Storey's Gate, S.W.	Dec. 15
*Alterations to Centre Tower of Rochester Cathedral	Mr. T. J. Jackson	C. H. Fowler, Architect, The College, Durham	No date.
Printing Works, &c., Stanley, Durham	Mr. C. Heap	T. E. Crossling, Architect, Front-street, Stanley	do.
Refronting Shop, 6, Cheapside, Kendal	York City & County Bnkg. Co., Ld.	J. Stalker, Architect, Kendal	do.
Banking Premises and Houses, Boston, Spa	Methodist New Connexion	Danby & Simpson, Architects, 10, Park-row, Leeds	do.
Church, Cheadle Heath, Stockport	Halifax Corporation	J. Wills & Sons, Architects, Victoria Chambers, Derby	do.
Electricity Sub-station, Hipperholme	Training Ship "Formidable"	James Lord, Civil and Borough Engineer, Halifax	do.
*Nautical School, Portishead		E. Gabriel, Architect, 42, Old Broad-street, E.C.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
Clerk of Works	Hipperholme U.D.C.	2*l*. 5s. per week	Nov. 24
*Foreman Pipelayers	Corporation of Bloemfontein	30*l*. per month	Nov. 25
Engineer	Rhyl U.D.C.	3*l*. 3s. per week	do.
*Clerk of Works	Parish of Willesden	3*l*. 3s. per week	do.
Main Road Surveyor	East Sussex County Council	150*l*.	Nov. 27
Borough Electrical Engineer	Poplar Borough Council	400*l*.	Nov. 28
Highways' Surveyor	Romsey (Hants) R.D.C.	120*l*.	Dec. 5

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PRICES CURRENT (*continued*).

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	14 0 0 ...	—
Pipe in coils	14 10 0 ...	—
Soil pipe	17 0 0 ...	—
Compo Pipe	17 0 0 ...	—
ZINC—Sheet—		
Vieille Montagne ton	26 0 0 ...	—
Silesian	25 15 0 ...	—
COPPER—		
Strong Sheet per lb.	0 0 10½ ...	—
Thin "	0 0 11½ ...	—
Copper nails "	0 0 11 ...	—
BRASS—		
Strong Sheet per lb.	0 0 10 ...	—
Thin "	0 0 11 ...	—
TIN—English Ingots "	0 1 4 ...	—
SOLDER—Plumbers' "	0 0 6 ...	—
Tinmen's "	0 0 8 ...	—
Blowpipe "	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

45 oz. thirds	2½d. per ft. delivered
" fourths	1½d. " "
21 oz. thirds	3½d. " "
" fourths	2½d. " "
26 oz. thirds	3½d. " "
" fourths	3½d. " "
32 oz. thirds	4½d. " "
" fourths	4½d. " "
Fluted sheet, 15 oz.	2½d. " "
" 21 oz.	3½d. " "
½ Hartley's Rolled Plate	1½d. " "
⅛ " " "	2d. " "
¼ " " "	2½d. " "

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels... per gallon	0 1 9
" " " in drums "	0 2 1
Boiled " " in pipes or barrels... "	0 2 0
" " " in drums "	0 2 4
Turpentine, in barrels "	0 3 8
" in drums "	0 3 10
Genuine Ground English White Lead per ton	19 0 0
Red Lead, Dry "	19 0 0
Best Linseed Oil Putty per cwt.	0 8 0
Stockholm Tar per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Wine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TERMS OF SUBSCRIPTION.

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TO CORRESPONDENTS.

"OZONE" (The idea is not new, and has been adopted to some extent in the United States. We may have more to say on the subject).—R. E. (Below our limit).—W. L. and G. E. W. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BRIDLINGTON.—For the erection of five cottages and alterations to two others, North Back-lane, for Mr. E. H. Rudd. Mr. A. T. Martindale, architect, 66, Wellington-road, Bridlington:—

J. Stork	£930 0 0	Smallwood & Shaw	£821 2 6
J. H. Hudson	892 10 0	F. Kneeshaw	820 0 0
J. Rennard	888 15 0	H. Hoggard	788 5 0
E. Wilson	835 10 0	J. Sawdon	773 0 0
F. Flintoff	830 0 0	W. Barnes*	740 0 0

[All of Bridlington.]

BROADSTAIRS.—For additions to Bleak House, Broadstairs, for Mr. Thomas Barry. Mr. William A. Burr, architect, 65, Chancery-lane, W.C.:—

New Boiler House, &c.—J. May, Broadstairs* £160 10
Hot Water Work.—Keith & Blackman Co., Ltd.* 100 0
Greenhouses.—Pearce & Co., Holloway* 146 0

DARENTH.—For providing and fixing new sanitary fittings in the children's department, and for renewing and repairing the corridor floor in both the adults' and children's departments, at the Darenth Asylum, for the Metropolitan Asylums Board:—

Munn & Son	£16,380 0 0	Enness Bros.	£7,179 0 0
M. Batchelor	11,285 0 0	A. H. Inns, Bishopsgate, E.C. (less £246 2s. 8d. for agreed variations and omissions)*	7,039 0 0
Gardner & Hazell	10,561 0 0		
Vigor & Co.	10,440 0 0		
Hayes & Co.	10,266 15 2		
J. Lonsdale	9,200 0 0		
Doulton & Co.	9,080 0 0		
Titmas & Sons	7,621 0 0		
Thomas Cole	7,335 0 0		

[Engineer's estimate, £6,700.]

ENNISKILLEN.—For the erection of cells at the Court House for the Fermanagh County Council:—

J. Bloomfield, jun.	£263 0	James Donelly	£254 10
Hynes & Son	258 14	James Traynor	239 10
B. Hughes	264 10		

EWELL.—For the erection of the laundry, mortuary, &c., buildings at the Epileptic Colony, Ewell, for the London County Council:—

Enness Bros., Erith* £1,643

HANLEY (Staffs).—Accepted for the execution of building works, for the Hanley, Stoke, and Fenton Joint Hospital Board. Mr. Elijah Jones, architect, Albion-street, Hanley:—

Buildings.—John Bagnall, Fenton, Stoke-on-Trent £5,816 0 0
Lancashire Boiler and Appliances.—William Hill, Ltd., Fenton, Stoke-on-Trent 500 0 0
Cooking Apparatus.—Summerscales & Sons, Ltd., Keighley, Yorks. 294 12 6
Electric Lighting.—G. A. Steenthal, Cooper-street, Manchester 484 15 6
Furniture.—W. S. Sherratt, Burslem, Stoke-on-Trent 260 0 0
Drapery.—Geo. Fleet & Co., Stoke-on-Trent, 175 5 10½
Ironmongery.—J. C. Schoefield, Hanley 79 1 9
Bedsteads.—J. C. Schoefield, Hanley 65 17 10
Crockery.—Geo. Fleet & Co., Stoke-on-Trent 8 5 0
Painting.—Birchall & Son, Hanley 330 0 0

HARTLEPOOL.—For the execution of street works, Rokeby and other streets, for the Corporation. Mr. H. C. Crummack, C.E., Borough Buildings, Hartlepool:—

Contracts 1, 2, 3, 6 and 8.
J. T. Short, Stranton Green, West Hartlepool,* £2,584 2
Contracts 4, 5 and 7.
George Pickering, Thornton-street, West Hartlepool* £553 6

HASTINGS.—The supply of granite kerb for the Corporation. Mr. P. H. Palmer, C.E., Town Hall, Hastings:—

Goodchild & Co., 49, Fenchurch-st., London, E.C.,* 1s. 2¾d. per foot.

HOLYHEAD.—For the erection of a chimney shaft at electricity works, for the Urban District Council. Mr. Price F. White, engineer, Electricity Works, Bangor, N. Wales:—

The Alphons Custodis Chimney Construction Co., Ltd., 119, Victoria-street, S.W.,* £617.

IPSWICH.—For extension of the water main, &c., at Borough Asylum, for the Corporation. Mr. E. Buckham, Engineer and Borough Surveyor, Town Hall, Ipswich:—

Stearn & Son	£238 0	F. H. Orvis, Bishops Hill, Ipswich*	£192 10
Crisp & Smith	205 0		

IPSWICH.—For the erection of a public convenience, Alexandra Park, for the Corporation. Mr. E. Buckham, Borough Surveyor, Town Hall, Ipswich:—

W. Grayston	£357 10	C. A. Green	£280 0
W. H. Death	330 0	G. Burgoyne	264 6
S. A. Kenny	320 0	S. Skerritt, Woodbridge-road, Ipswich*	241 0
A. Sadler	320 0		
Grimwood & Sons	307 0		
C. Borrett	300 0		

LEAVESDEN.—For alterations to the windows of Leavesden Asylum, for the Metropolitan Asylums Board:—

Hill & Co.	£1,560 0 0
Spencer & Co.	1,320 0 0
Mary Pearson	1,175 0 0
Howard & Co.	968 0 0
Iles, Ltd.	887 10 0
H. Martin	810 0 0
J. P. White	783 0 0
Gardner & Hazell	768 0 0
J. S. Kimberley	744 10 0
Moss & Sons, Ltd.	695 15 11
G. & J. Waterman	664 0 0
W. Sampson	660 10 0
The Parkstone Steam Joinery Co.	650 0 0
King & Co.	597 10 0
T. Robinson	596 9 0
Enness Bros.	566 0 0
E. Chamberlain	500 0 0
George Wiggs, 90 and 92, St. Alban's-road, Watford*	463 0 0

[The Engineer to the Board's estimate was £550.]

LEEDS.—For laying water-main (2 miles in length) Wortley to Beeston, for the Corporation:—

Young & Co., Wakefield* £598 0 6

LONDON.—For the reconstruction of slipper-baths, &c., at the Marshall-street Baths, for the Westminster City Council:—

Stubbs, Alexander, Ltd.	£5,977	Sabey & Son	£4,600
Harding & Son	5,900	Hall, Beddall, & Co.	4,420
Patman & Fotheringham, Ltd.	4,753	Ferguson & Co.	4,250
Davis & Bennett	4,600	B. E. Nightingale	4,057
		Doulton & Co., Ltd.*	3,980

Extension of Electric Lighting.

Slatter & Co.	£273 10	Laing, Wharton, & Co.	£237 12
Bolding & Sons, Ltd.	236 6	A. H. Wood*	228 0

LONDON.—For the completion of the boundary-wall at the Grove Hospital, for the Metropolitan Asylums Board:—

Cropley Bros.	£498	Coleman & Co.	£406
A. C. Soan	490	Enness Bros.	357
Gardner & Hazell	477	E. Wall	350
H. Kent	416	T. Cole, Barnsbury, N.*	323

[Engineer's revised estimate, £335.]

LONDON.—For alterations, &c., to bakehouses under the Factory Act, 1901. Mr. Jas. W. Hall, surveyor, 13, Priory-park-road:—

325, *Kilburn-lane, N.W., for Mr. C. Moxham.*

E. Hall	£206	C. Godson	£116
J. Huish	142	F. Hilborn	112

12, *Malvern-road, W. Kilburn, N.W., for Mr. Hargeusheimer.*

F. Hilborn* £122 10

12, *Canterbury-road, Kilburn, N.W., for Mr. L. Schmitz.*

F. Hilborn	£196	A. Balfour	£182
G. Heal	189		

LONDON.—For alterations at 190 and 192, Edgware-road, W., under the Factories and Workshop Act, 1901, for Mr. W. Straker. Mr. H. Gardiner Gribble, architect, Woking:—

Johnson & Son	£890	Pitcher & Son	£670
C. Horton	707	Sims & Woods*	600

LONDON.—For the construction of three underground conveniences, for the Tottenham Urban District Council. Mr. W. H. Prescott, C.E., Combes Croft House, 712, High-road, Tottenham, N.:—

Rowley Bros., West Green, S. Tottenham* £5,262.

NEWHAVEN.—For the erection of Post Office buildings. Mr. F. J. Rayner, architect, Fort-road, Newhaven:—

Peerless Dennis & Co.	£1,264 0	Miller & Selmes	£1,000 9
C. S. Jenks	1,166 0	M. Woolger	875 0
		C. Cooke, Newhav'n*	832 13

NEWHAVEN.—For alterations to Primitive Methodis Chapel. Mr. F. J. Rayner, architect, Fort-road, Newhaven:—

C. S. Jenks	£945 0	M. Woolger, Newhaven*	£808 0
J. G. Pickard	910 0	C. Ccoke	792 15

PANTYWYLL (Wales).—For rebuilding the Castle Inn, for Messrs. Giles & Harrup, the Brewery, Merthyr Tydfil. Mr. C. M. Davies, architect, 12, High-street, Merthyr:—

J. Jenkins	£1,630 10	John Williams	£1,389 10
S. Hawkins	1,530 0	T. Jones, Waiter-street, Dowlais*	1,247 10
E. Sullivan	1,480 0		
M. Warlow	1,394 10		

PINNER (Middlesex).—For the restoration of cemetery chapels, and erection of a mortuary building, for the Burial Board. Messrs. Harrison & Ward, architects, 66, Victoria-street, Westminster, S.W. Quantities by Messrs. Ruault & Young, London:—

	A.	B.
Bate Bros.	£668	£384
G. & J. Waterman	479	290
Goodchild & Jefferys	457	281
J. Rackham	369	258
W. J. Page	375	232
J. Darvill, Watford*	315	220

[*See also next page.*

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PONTYGWAITH (Wales).—For additions to working men's Institute:—
W. D. Humphries, carpenter, Florotown,* £670.

PORTLAND.—For the erection of a stone wall, band-stand foundation, &c., Easton-square, for the Urban District Council. Mr. R. Stevenson Henshaw, Engineer, Council Offices, New-road, Portland. Quantities by Engineer:—

J. Conway	£826 6 8	F. J. Barnes.	
Wakeham Bros.	673 10 0	Portland*	£645 0 0

ROCHDALE.—For the erection of the first portion of the Church of the Good Shepherd. Mr. E. H. Lingen Barker, architect, Hereford:—

Hatch & Son	£3,784	G. F. Endersby	£2,965
Ashworth & Wolfenden	3,193	Nicholl & Son	2,942
G. F. Halliday	3,050	T. Pickles, Luddenden Foot*	2 620
W. Hopkins	2,999	G. H. Eastwood	2,615

ST. ANDREWS (N.B.).—For macadamising, &c., Market-street, for the Town Council. Mr. Wm. Watson, Burgh Surveyor, Town Hall, St. Andrews. Quantities by Burgh Surveyor:—

D. B. Shaw	£554 3 6	Wm. Wilson	£444 17 4
Robert Taylor	510 10 1	Laing & Co.	402 3 3
Martin & Macfarlane	502 12 9	Strachan & Son	383 13 9
		T. S. Dick, Broty Ferry*	360 11 2

SLIGO.—For the erection of a labourer's cottage, Drumcollumb, for the Rural District Council. Mr. A. T. Heron, B. E. Union, Ballisodare, Co. Sligo:—
Jno. Anderson, Ross Riverstoun, Co. Sligo...£102

STREET (Somerset).—For the construction of a reservoir (150,000 gallons), for the Urban District Council. Mr. A. P. I. Cotterell, C.E., 28, Baldwin-street, Bristol:—

D. Dunthorne	£1,278 10 0	S. Ambrose	£1,190 0 0
J. Hatherley	1,257 10 0	Hulsh, Street, Somerset*	973 4 11
Wright & Son	1,240 0 0		
Willis & Son	1,220 0 0		

WALLINGFORD.—For Wallingford and Crowmarch Joint Hospital Board. Mr. Sam'l Couch-Jones, architect and surveyor, Land Chambers, Friar-street, Reading:—
Contract No. 1—Administration block only.

Hughes	£1,290 0	Bosher & Son	£1,093 10
Brasher & Son Wallingford*	1,180 0	Gibson & Son	1,078 0

[Architect's estimate, £1,160.]

Contract No 2—Drainage, &c.

Hughes	£450	Bosher & Son	£345
Gibson & Son	420	Brasher & Son, Wallingford*	312
Osenton	377		

[Architect's estimate, £350.]

WEASENHAM.—For alterations and additions to Weasenham Hall, Norfolk, for the Right Hon. the Earl of Leicester, K.G. Mr. C. Smedley Beck, architect, Norwich. Quantities by Mr. A. J. Chambers, Norwich:—

R. Dye	£11,435	Mussell White & Sapp	£10,670
Smith & Son	11,065	Hawes & Sons, Norwich*	9,999
G. Riches	10,795		
Youngs & Son	10,780		
W. H. Brown	10,759		

WOODFORD (Essex).—For sewerage contracts, for Woodford Urban District Council. Mr. W. Farrington, C.E., Council Offices, Woodford Green. Quantities by Messrs. Rider, Hunt, & Co., 181, Queen Victoria-street, E.C.:—

	Contract No. 1. £ s. d.	Contract No. 2. £ s. d.
T. Adams	9 544 9 0	18,498 1 11
G. J. Anderson	8,952 10 1	13,545 6 2
Arnold & Sons	9,440 0 0	16,648 0 0
George Bell	8,653 0 0	14,010 0 0
J. & T. Binns	9,223 0 3	16,568 13 7
Cooke & Co.	8,934 0 0	16 560 0 0
Coxhead & Co.	8.685 0 0	14,142 0 0
J. T. Dawson	9,953 15 0	15,697 6 6
Freeman & Son	8,545 13 1	13,776 1 2
W. & C. French	10,026 14 7	15,814 16 10
Hodson & Sons, Nottingham	*8,042 1 0	15.510 19 4
John Jackson	9,086 5 0	20,713 2 9
Joseph Jackson	9,289 10 6	—
Johnson & Langley	8.553 9 0	15,889 13 6
Killingback & Co.	10,126 5 7	18,798 10 6
M. S. Kitteringham	11,693 0 0	19,668 17 4
W. Manders	8,247 0 0	13,989 0 0
Moss & Sons, Loughborough	8,408 14 2	*13.065 9 5
Roger & Co.	10,754 0 0	18,713 0 0

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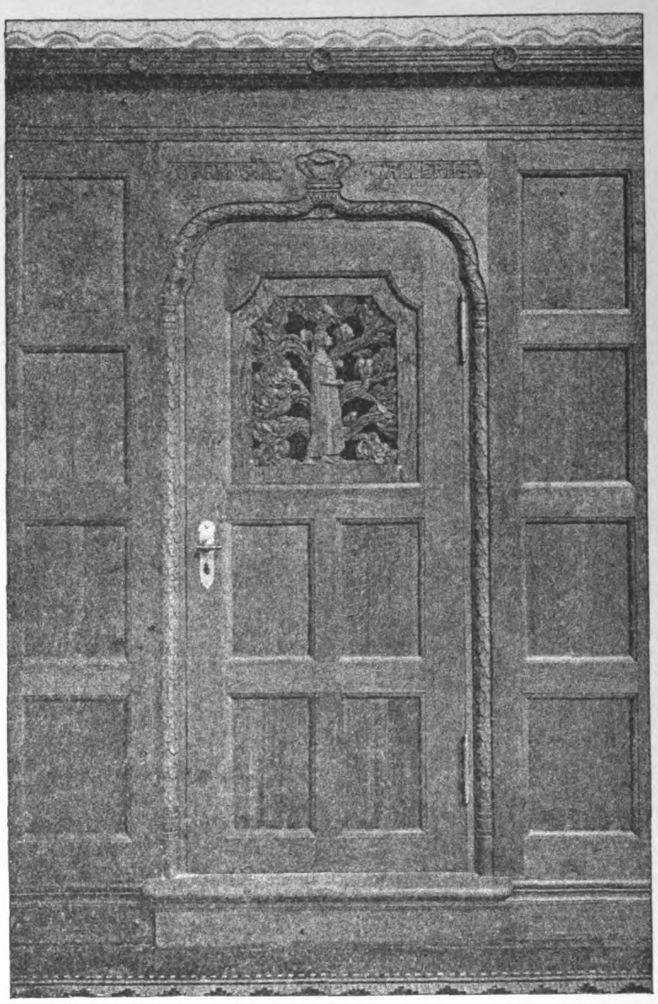

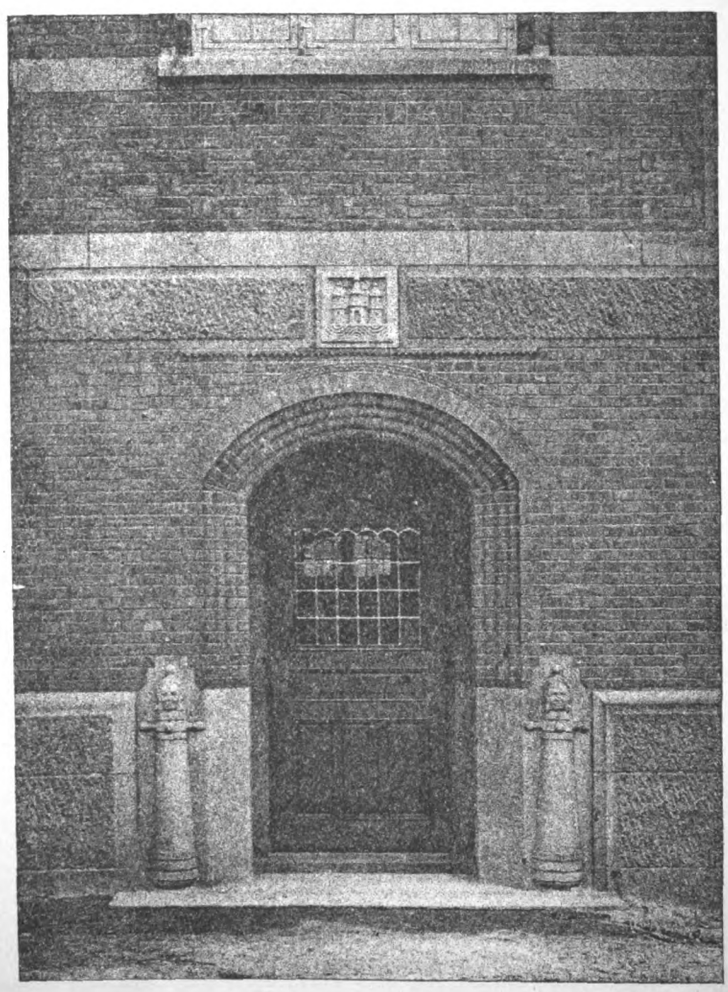

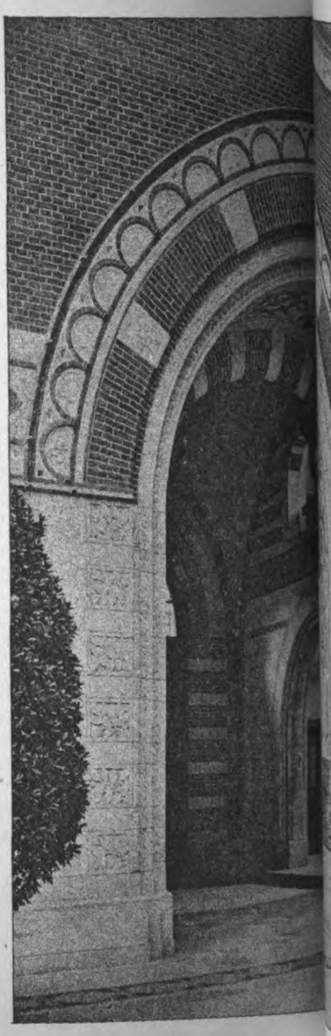

TOWN HALL, COPENHAGEN.—
VARIOUS

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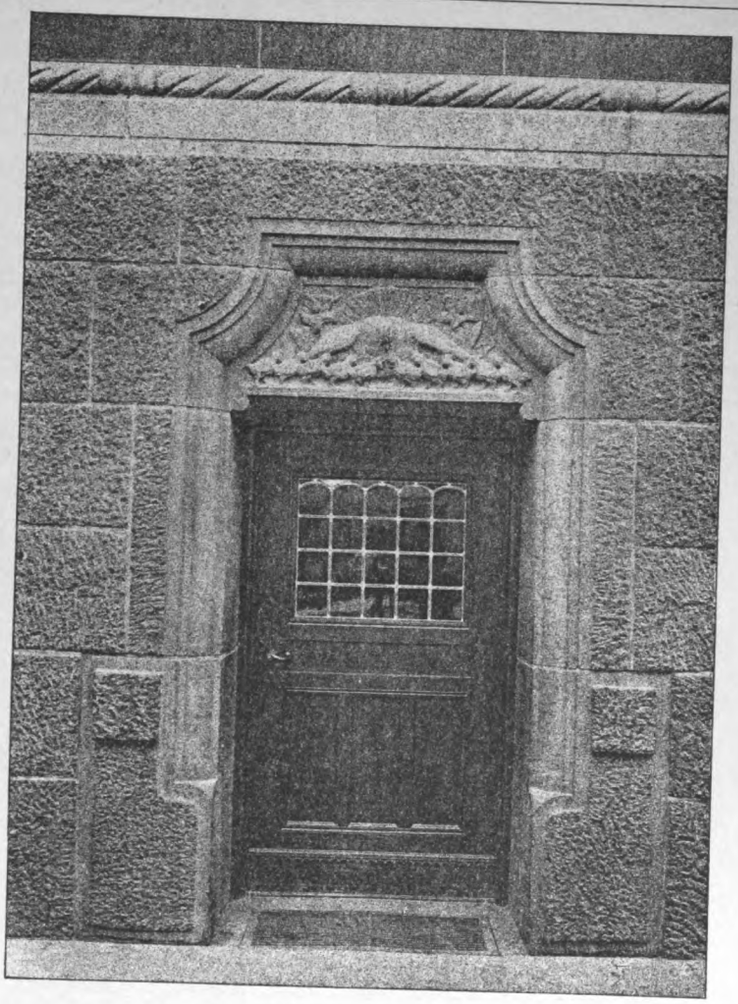

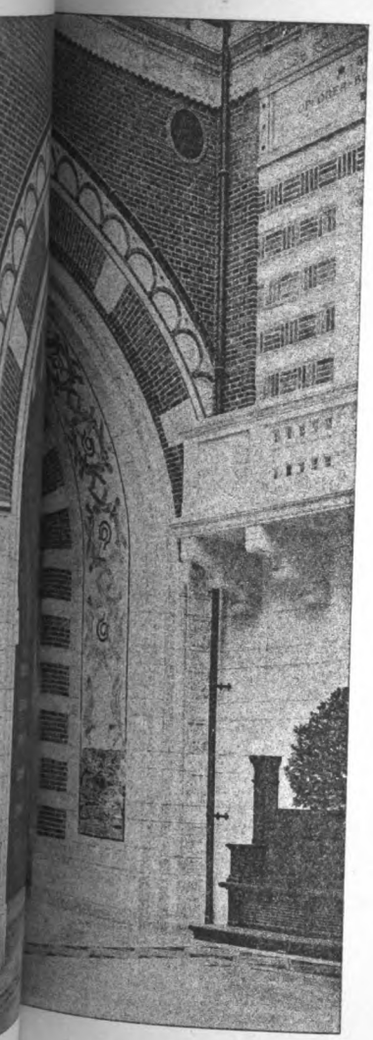

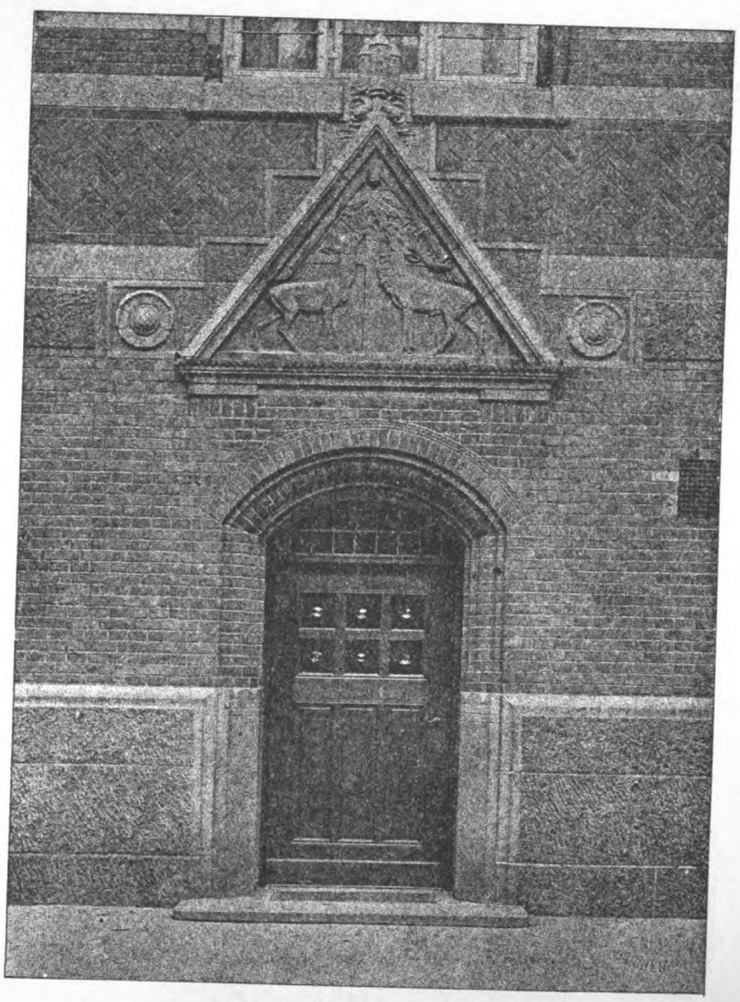

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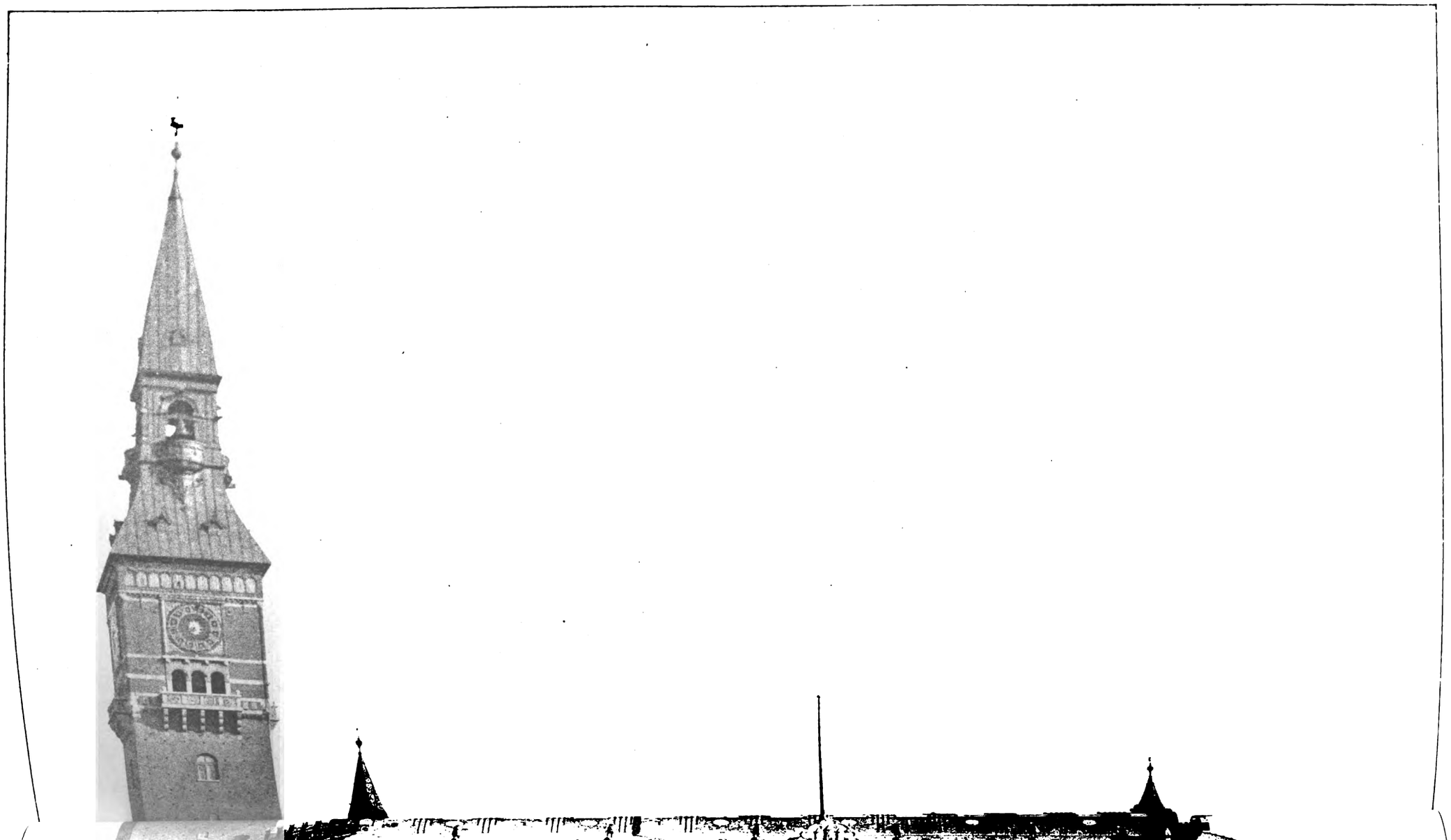

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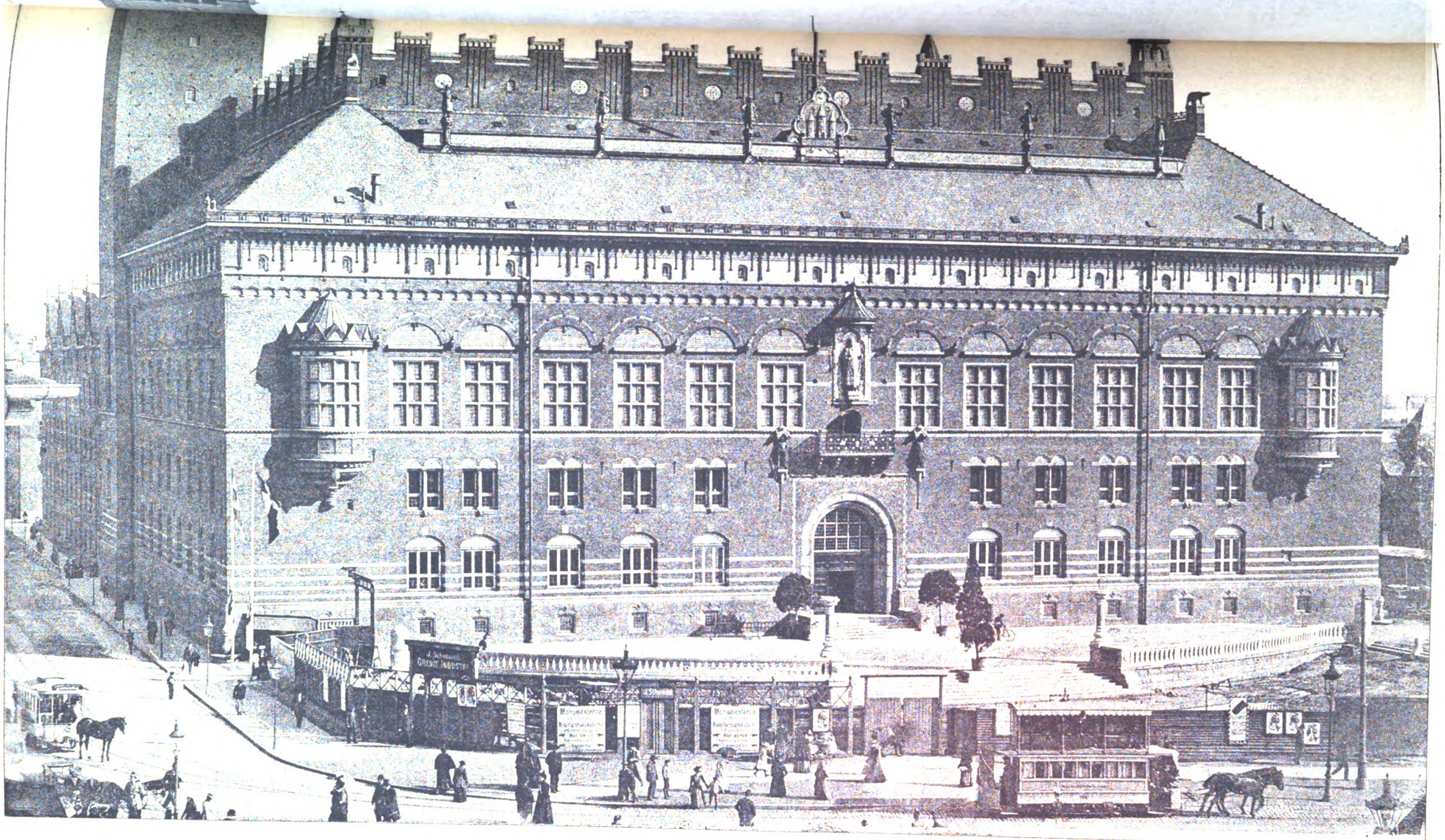

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TOWN HALL, COPENHAGEN.—Herr Martin Nyrop, Architect,
GENERAL VIEW.

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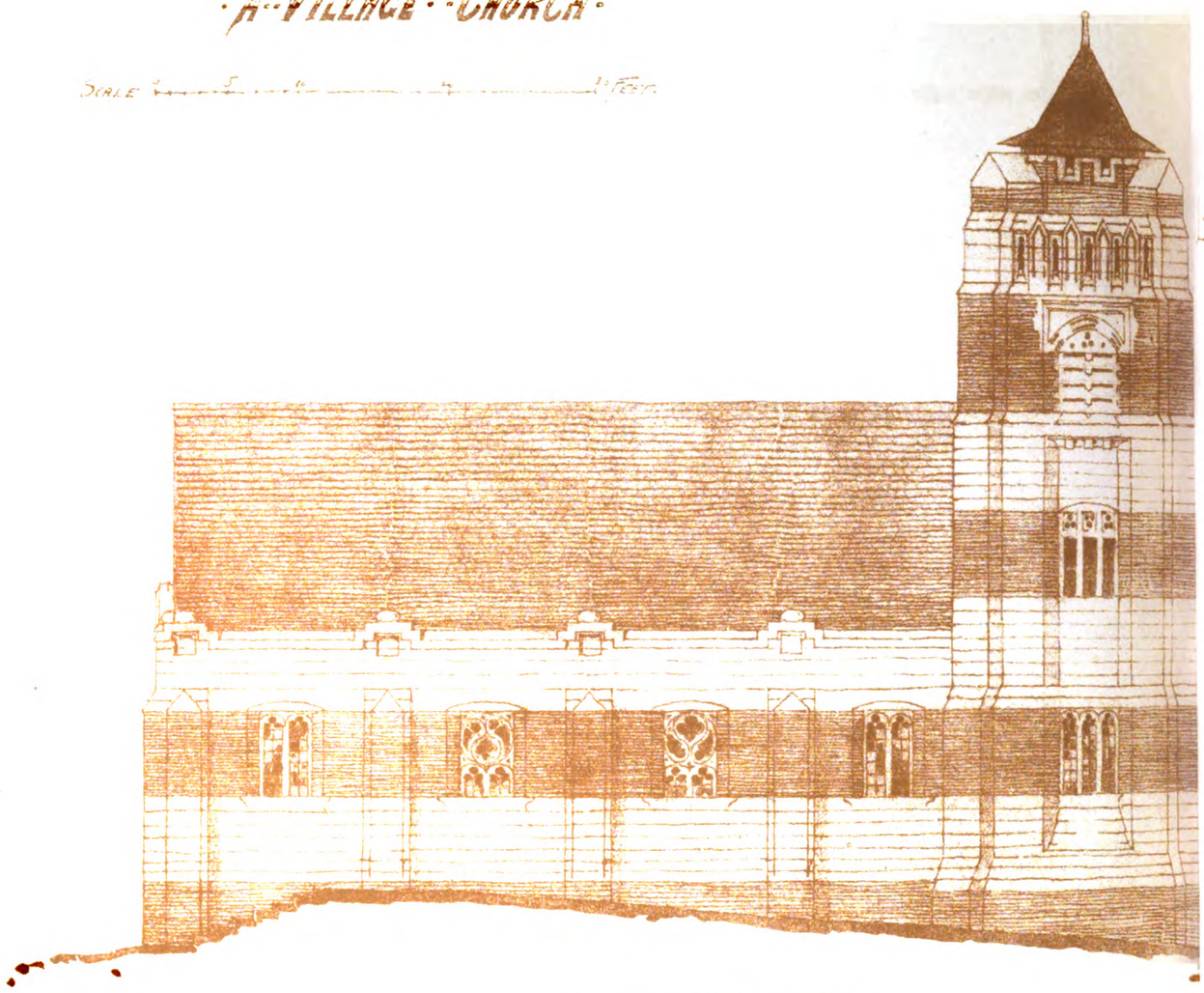
A VILLAGE CHURCH

SCALE



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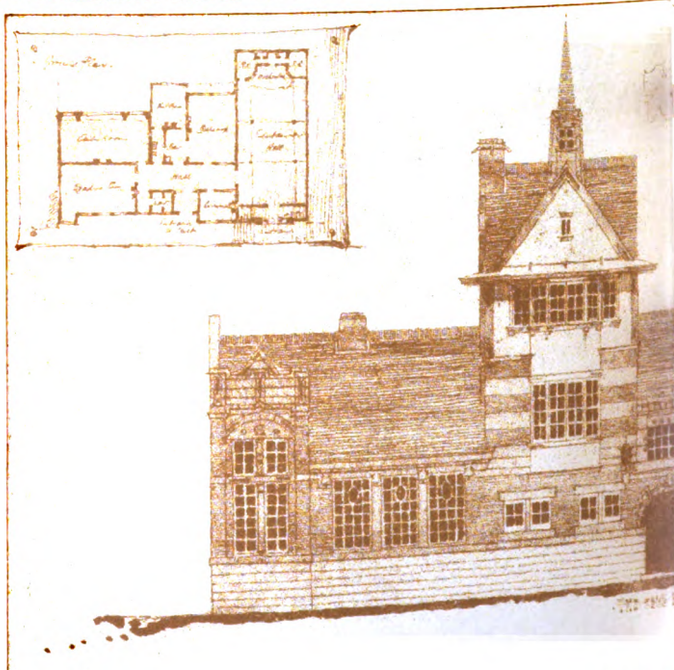

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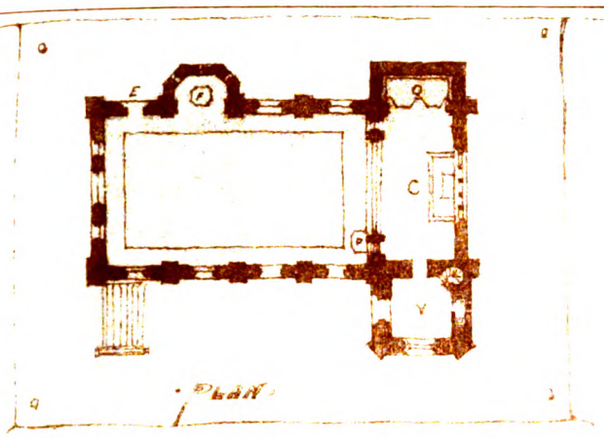
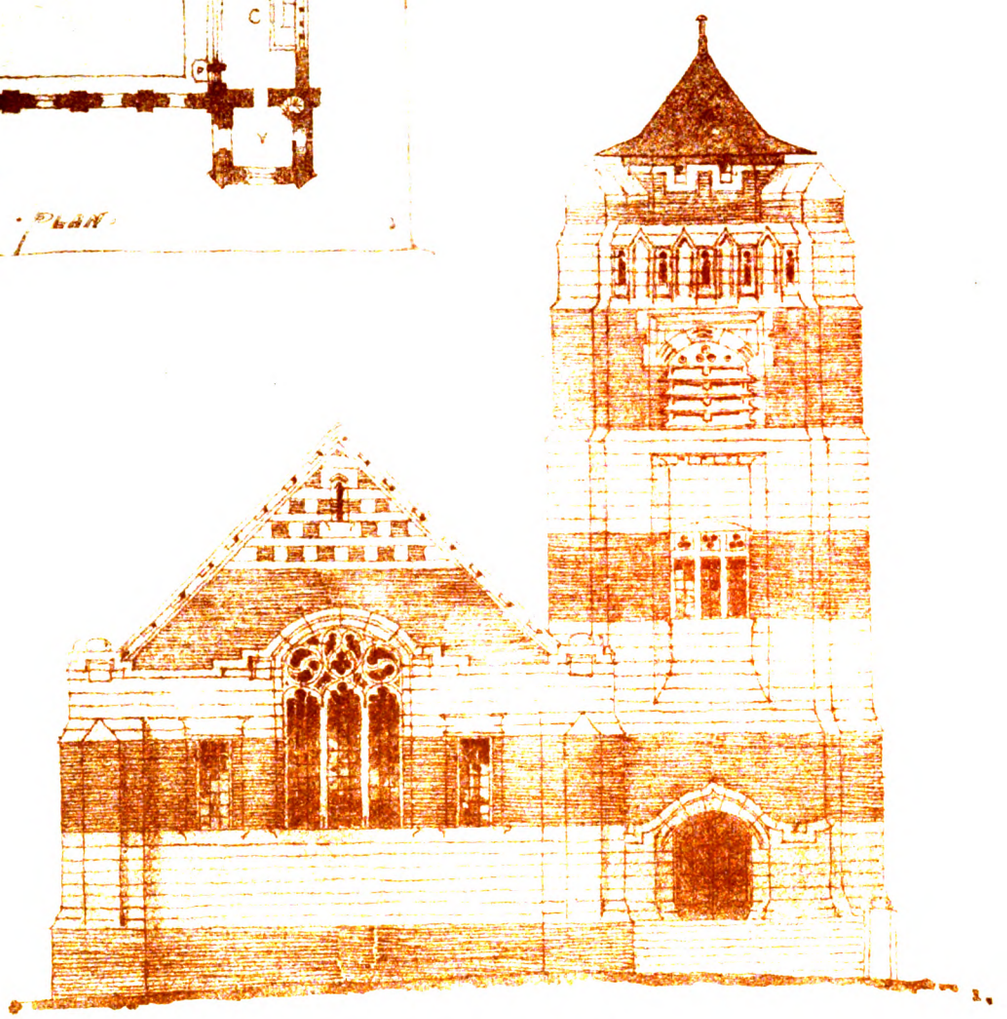


PLAN



WEST ELEVATION

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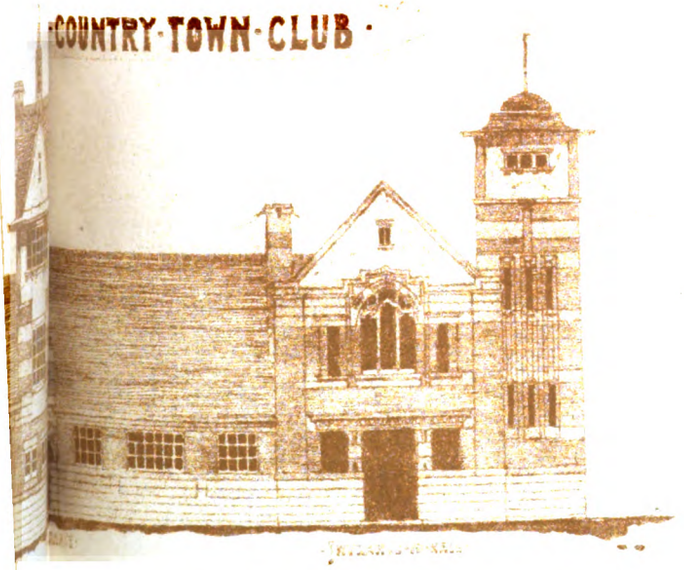
COUNTRY TOWN CLUB



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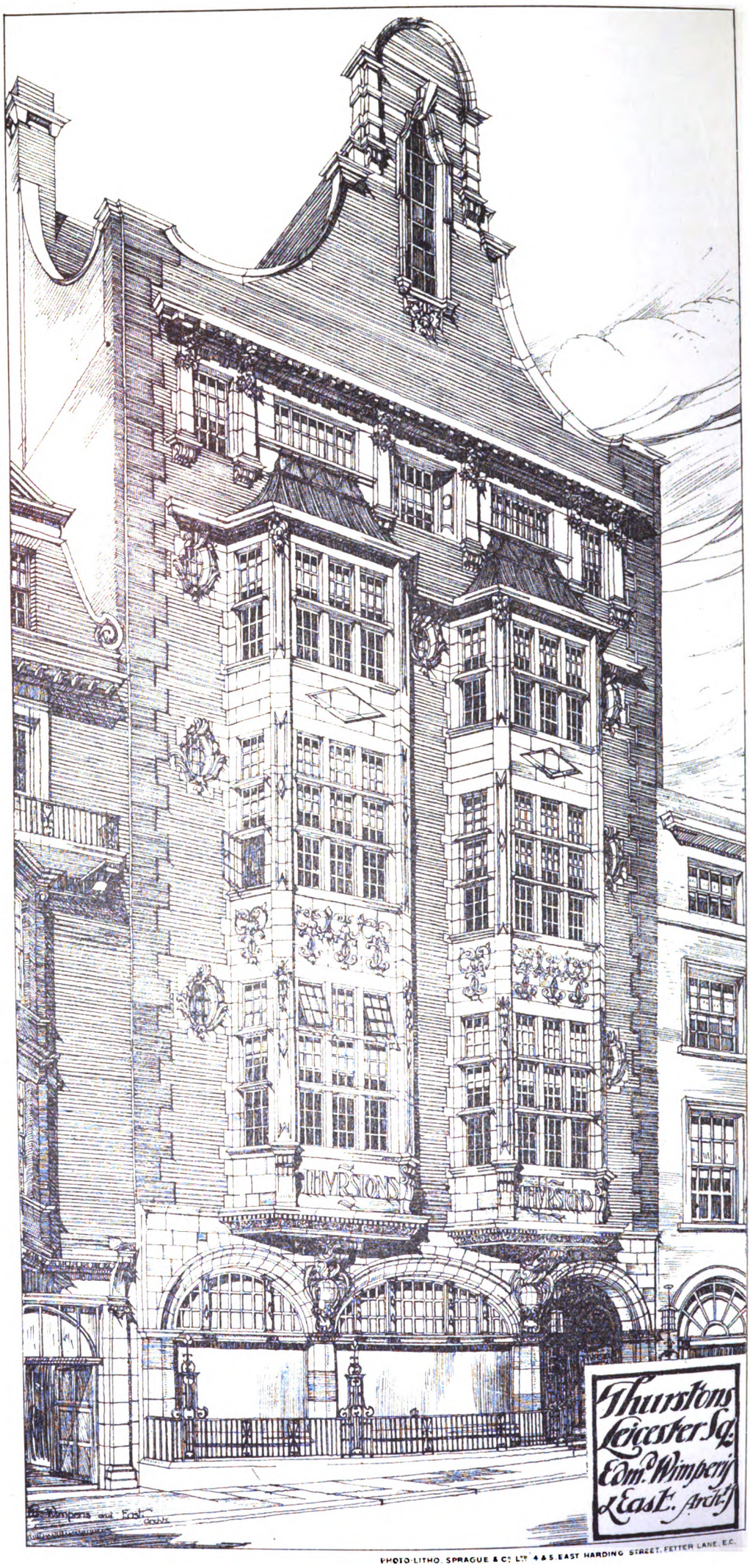

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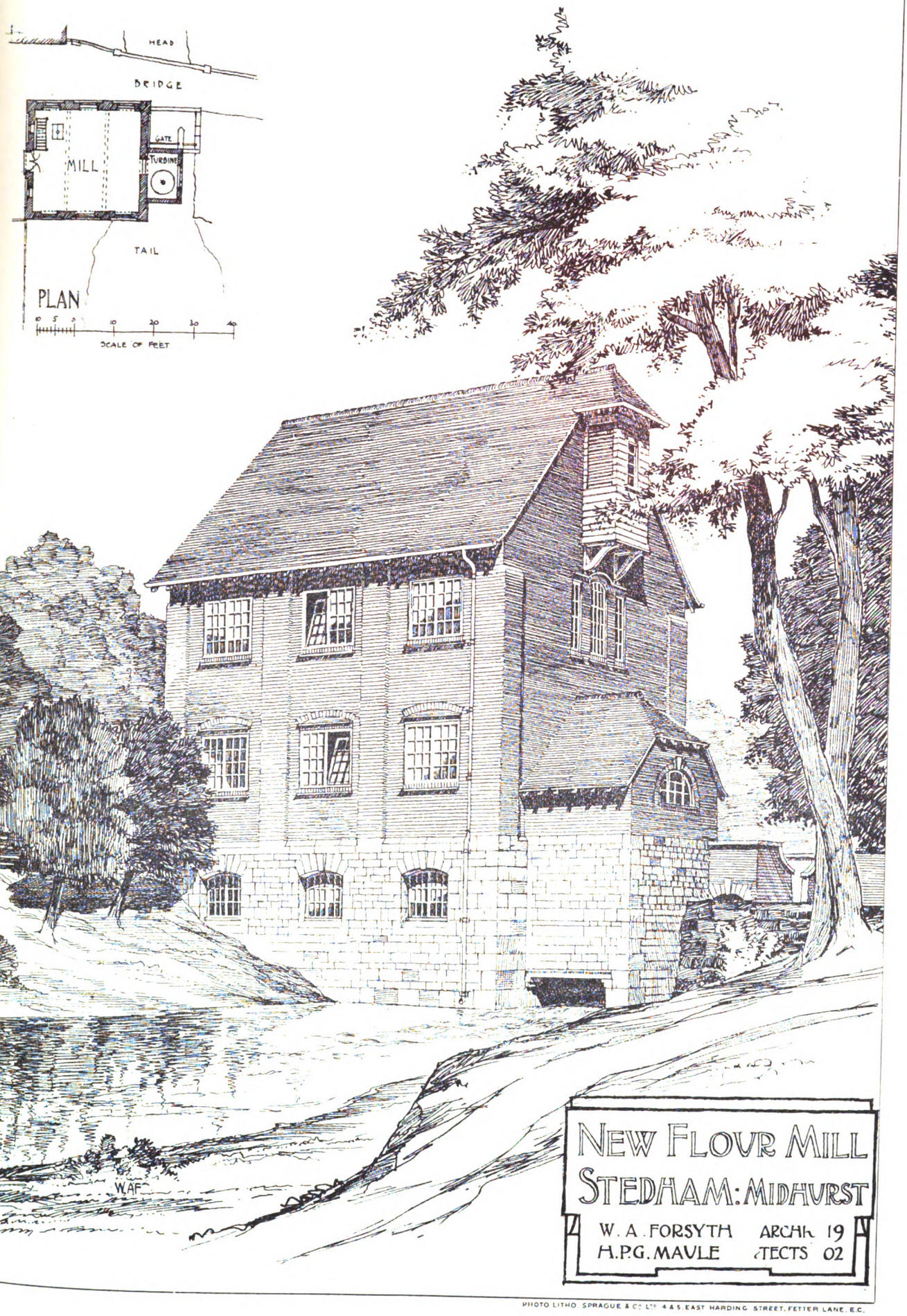

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VOL. LXXXV.—No. 3173.

The Builder.

NOVEMBER 28, 1903.

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Caythorpe Court, Lincolnshire ..... Messrs. Reed, Smart, & Tappin, Architects.
House at Limpsfield ..... Mr. Reginald Blomfield, Architect.
St. Mary's Church, Hilperton ..... Mr. E. W. Marshall. A.R.I.B.A., Architect.
..... Mr. C. E. Ponting, F.S.A., Architect.

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Houses—Trees—Shrubs.

WE are now at the season of the year when the planting of trees and shrubs is general, sometimes in replenishing or adding to gardens which have been in existence for some time. Unquestionably in England, more than in any other country, trees and shrubs as additions to houses are prized, but in too many cases the desire to have grounds beautified in this manner is carried out with singular want of thought.

In the planting of trees and shrubs in proximity to a house the first requisite is the use of the imagination. The faults committed from a neglect of it can be seen in innumerable country gardens, and near hundreds of villas. For trees and shrubs are constantly planted by those who entirely forget their future growth. Nothing is indeed more easily overlooked, and so it comes to pass that grounds are laid out thinking only of the present. It is one of the commonest sights in the world to see a large coniferous forest tree cribbed and confined in the small space of a villa garden, when, after darkening windows as it grew larger, and being rendered hideous by the cutting of its limbs, it is finally cut down and made into firewood. Again, how often in country gardens do we see houses darkened and rendered damp by the proximity of some fine tree which the original planter has placed in an unsuitable position because he never tried to realise the respective proportions of tree and house in a distant future? And in the present time the occupier is torn asunder by his wish to preserve a beautiful natural object, and his wish not to have his house made dark and damp by an ample and misplaced shade. Imagination, then, the picturing in the mind of the young tree of to-day in its maturity, is absolutely necessary, if planting, especially within sight of a house, is to be properly executed. The example just given is, of course, an extreme case, but how constantly do we find views from windows blocked or spoilt by the intervention of trees and shrubs which, admirable enough in the days of their youth, become positive nuisances as they increase in size. The necessity of imagination and thought in planting trees and shrubs as external additions to a house cannot, therefore, be too strongly insisted on, and it might be exemplified to any extent.

But position and distance being considered in reference to the future, a further consideration—and we are looking at this subject of planting chiefly in relation to the house, and not in regard to grounds, whether woods or shrubberies, which may be regarded as standing by themselves—is the nature of the trees and shrubs. This is an important point, and one too often neglected. The owner has a liking for this tree or that, and he forthwith has one planted, without regard to its peculiarities. But while one tree may be quite objectionable near a house, another may be almost harmless. Thus, a horse chestnut, with its immense mass of large and dense foliage, retaining a quantity of moisture, and capable of shading the brightest summer sun, may positively spoil a house, where a birch, fragile, small-leaved, and admitting between its drooping twigs both sun and air, may be planted much closer to a building than the chestnut or the oak. Again, though the elm has many attractions, it is a bad tree to plant near houses, or, indeed, in grounds at all. Its roots running along the surface of the ground render it very liable to be bodily overturned by autumn gales; and as it grows older its limbs, or even its upper trunk, are at any time liable to break off in the most treacherous manner. Then, again, if we do not look too far ahead, the slow growth of the walnut and the mulberry makes them suitable to be planted where there is a view which it is not desired wholly to prevent, though for some reason or other a tree is necessary within the field of vision. The importance, too, of the smaller growing trees is too often overlooked, such as the ilex, the sumach, the acacia, and the snowy mespilus; whilst the inconvenient habit of the lime, beautiful tree as it is, of shedding its leaves in dry weather, or very early in the autumn, makes it a tree to be planted cautiously near a house.

Fashion, of course, there is in planting as in everything else, and in this respect the fashion of dotting coniferous trees about lawns, whose real home is in a forest among companions, has often spoilt views from windows. They grow up exposed to every wind, unhappy and shapeless, or standing forlorn, unsuited to their surroundings. It is all very well to say that they are green throughout the year—the deciduous tree, it is true, is leafless in winter, but its form is always present, a form, in the case of many trees, as the lime and the birch, almost as attractive in summer as in winter. There are many other points in regard to planting in relation to houses which deserve a larger and more elaborate notice than it is possible to give them here. Such, for instance, is the question of planting in relation to aspect—a point which is frequently not sufficiently regarded. Planting may be done extensively and desirably for the purpose of breaking east and north winds, but it should, conversely, be done sparingly, and then with a full appreciation of the character of the trees and shrubs when plantations are made to the west and south of a house. Here, again, imagination is most important. For some years a new plantation gladdens the heart of the owner every time he looks upon it from his window. Presently, he begins to no-

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tice that he finds less and less sunshine, the walks grow damp and green, and finally he comes to the conclusion that he has deliberately blocked out the sunshine. Nor is it possible to say anything upon the interesting question of what may be termed avenue planting, which is most important in relation to large mansions, and appears to be now rather neglected. This kind of planting must necessarily be often disconnected from the house, as in the magnificent vistas at Castle Howard, four of which converge on a centre, after the French fashion; though at Blenheim, Vanbrugh's other house, the fine avenue comes right up to the south-west entrance.

Turning for a moment to shrubberies—which are within the reach of every one, from the owner of the villa in the suburbs to the possessor of an ancestral home—perhaps the most important point to bear in mind is that they should have variety of foliage and flower, so that both in summer and winter they should be a pleasant sight from a house, and, as it were, environ it at a reasonable distance with soft colouring. Mr. William Robinson, the well-known writer on horticulture, has rightly criticised the use of the common laurel, which has spoilt more shrubberies than any other plant, and for the use of which there is no excuse when the number of charming evergreen and deciduous shrubs which can now be obtained is remembered. But in the case of shrubberies, quite as much as in that of trees, their relation to the house to which they are near should be borne in mind. Thus a slight convexity of line of the outer-edge will give the appearance of space, and prevent house and shrubbery from seeming to crowd each other. So, too, care in placing low-growing shrubs in front places, and others, such as the fine cypressus, in the background, is more important, since it will frequently make all the difference to the appearance of the house to which the shrubberies belong.

The question of planting shrubs thickly or sparsely and their relation to the soil is chiefly one for the horticulturist, but it is a point which needs careful thought, and may make all the difference between an agreeable view from a drawing-room window, and one which is essentially disappointing. If placed too closely in the first place shrubs necessarily become too crowded, and then some of them must be sacrificed. Very often the shape of that which is left has been spoilt. On the other hand, when shrubs are planted sparsely, this necessitates more work in keeping the ground around them clean and free from strong growing weeds. In many shrubberies also which are to be regarded as being in connection with houses, it is most important that flowering shrubs should be planted among the evergreens. It is the business of the horticulturist to recommend the shrubs best suited to particular soils and climates, and to advise how best to carry out the general principles which in many ways belong to the province of the architect, who too often sees views which he has thought over in connexion with his work, lost by thoughtless planting, rooms darkened by trees in too close proximity to a house, and agreeable approaches narrowed by the forgetfulness of the obvious fact that trees and shrubs increase in size from spring to spring.

SOME CONSIDERATIONS ON THE EFFECT OF STRESSES ON CANTILEVERS.

By T. Mackenzie.

WHAT I will first consider under this head is what may be termed a simple approximate method of determining the amount of vertical displacement, or the deflection, of levers under various conditions of load, &c.

Fig. 1 represents the upper half, or the part in tension, of an ordinary cantilever of uniform section; the line $oo_1\ o_2\ o_3$, &c., being the neutral axis. The under half, or the part in compression, is omitted for sake of clearness.

First, imagine the lever capable of bending at the points $oo_1\ o_2\ o_3$, &c., only. The portions between the shadings remain straight with parallel sides; and the shaded portions show the fibres between the contiguous portions stretched; the upper surfaces $a\,b$, a_1b_1, a_2b_2, &c., show the maximum stretching in the sections.

It is required to find S, the amount of vertical displacement of the free end.

Now, instead of finding the actual amount of S, we approximate to it by calculating the sum of the chords $c\,d$, $d\,e$, $e\,f$, and $f\,g$, or $p_1+p_2+p_3+p_4$, and if the total deflection be small, it is obvious that the approximation is sufficiently accurate.

To find the sum of the chords:—

The angles $a\,o\,b$, $a_1\,o_1\,b_1$, $a_2\,o_2\,b_2$, $a_3\,o_3\,b_3$, are respectively equal to the angles $c\,o\,d$, $d\,o_1\,e$, $e\,o_2\,f$, $f\,o_3\,g$. $\therefore p_1 : l = a\,b : y$

Whence $p_1 = \dfrac{a\,b \times l}{y}$.

Now, to find the ratio of $p_1 : p_2 : p_3 : p_4$:—

Produce $o_1\,d$ to h, making $o_1\,h = l$.

Then, since the angles $c\,o\,d$ and $h\,o_1\,i$ are to each other in the ratio of the distances of W from o and o_1,

$$\therefore p' : p_1 = o_1\,d : l. \quad \therefore p' = \frac{p_1 \times o_1\,d}{l}$$

And $p_2 : p' = o_1\,d : l. \quad \therefore p_2 = \dfrac{p' \times o_1\,d}{l}$.

$$= \frac{p_1 \times (o_1\,d)^2}{l^2}.$$

Then this ratio holds throughout, whatever be the number of chords; hence, $p_1 : p_2 : p_3 : p_4 = l^2 : (o_1\,d)^2 : (o_2\,e)^2 : (o_3\,f)^2$. That is, the deflection varies as the squares of the distances of W from the sections.

Now, if a line $a\,b$ (fig. 2) be drawn to represent l, and a perpendicular $b\,c$ be dropped from one end of it to represent p_1 on the same scale; and also if ordinates p_2, p_3, and p_4 be drawn at their appropriate points along l; then the curve $a\,c$, which joins the feet of the ordinates, will be a parabolic curve.

Clearly, then, if the lever bends at every point in its length, the fig. 2 will be completely filled by ordinates, and the total deflection of the free end will be represented by the area of the figure—that is, $S = \dfrac{p_1 l}{3}$.

Hence, the figure is the difference of a semi-parabola and a circumscribing rectangle, and the area of a semi-parabola = height × ⅔ base.

Approximately, then, $S = \dfrac{p_1 l}{3}$.

But we found $p_1 = \dfrac{a\,b \times l}{y}$.

$$\therefore S = \frac{a\,b \times l^2}{3y}.$$

Now, ab is the amount by which the extreme layer of fibres in the first section is stretched.

Let r be the unit stress in this layer.

Let n represent the original length of the fibres at ab.

And let E be the modulus of elasticity of the fibres; that is, E is the unit stress which would produce an amount of stretching equal to n, the original length.

Thus, $a\,b : n = r : \mathrm{E}$.

$$\therefore a\,b = \frac{r}{\mathrm{E}}\,n.$$

Whence we get

$$S = \frac{r}{\mathrm{E}}\,n + \frac{l^2}{3y} = \frac{r\,l^2}{3\,\mathrm{E}\,y}\,n.$$

Now if we adopt n as the linear unit of calculation, then $n = 1$, and $S = \dfrac{r\,l^2}{3\,\mathrm{E}\,y}$.

For r any equivalent value may be substituted, thus we have

$$\frac{r}{y}\mathrm{I} = \mathrm{W}\,l. \quad \therefore r = \frac{\mathrm{W}\,l\,y}{\mathrm{I}}.$$

Whence finally $S = \dfrac{\mathrm{W}\,l^3}{3\,\mathrm{E}\,\mathrm{I}}$.

It must be noted that if the calculation is required to be even approximately correct the linear unit must be very small, as n is extremely small, being, in fact, the distance from one point to another along the length.

(*b*) Now, suppose the lever to be of equal strength throughout, and let the depth be constant and the breadth vary. Then since r is constant we have the angles $c\,o\,d$, $d\,o_1\,e$, &c., all equal—

Therefore $p' = p_1$,

and $p_2 : p' = o\,d : l$.

$\therefore p_1 : p_2 : \&c. = l : o\,d : \&c.$

Hence the figure which denotes the tota deflection if the lever bends at every poin is a triangle, and

$$S = \frac{p_1 \times l}{2} = \frac{\mathrm{W}\,l^3}{2\,\mathrm{E}\,\mathrm{I}}.$$

(*c*) If the lever be of uniform strength with constant width we have $a\,b$ constant throughout.

Let y_1 be the depth at the second section, that is, at $a_1\,o_1$, then

$$y_1^2 : y^2 = o_1\,d : l. \quad \therefore y_1 = y\sqrt{\frac{o_1\,d}{l}}$$

$$p_1 = \frac{a\,b \times l}{y}$$

$$p' = \frac{a\,b \times l}{y\sqrt{\dfrac{o_1\,d}{l}}}$$

$$p_2 : p' = o_1\,d : l. \quad \therefore p_2 = \frac{p' \times o_1\,d}{l} =$$

$$\frac{a\,b \times l}{y\sqrt{\dfrac{o_1\,d}{l}}} \times \frac{o_1\,d}{l} = \frac{a\,b \times o_1\,d}{y\sqrt{\dfrac{o_1\,d}{l}}}.$$

$$\therefore p_1 : p_2 = \frac{a\,b \times l}{y} : \frac{a\,b \times o_1\,d}{y\sqrt{\dfrac{o_1\,d}{l}}}$$

$$= l : \frac{o_1\,d}{\sqrt{\dfrac{o_1\,d}{l}}}$$

and $$p_1^2 : p_2^2 = l^2 : \frac{(o_1\,d)^2}{\dfrac{o_1\,d}{l}}$$

$$= l : o_1\,d.$$

$\therefore p_1^2 : p_2^2 : p_3^2 : \&c. = l : o_1\,d : o_2\,e : \&c.$

Then the figure which represents the total deflection of the free end when the lever bends at every point is a semi-parabola.

$$\therefore S = \frac{2\,p_1\,l}{3} = \frac{2\,\mathrm{W}\,l^3}{3\,\mathrm{E}\,\mathrm{I}}.$$

(*d*) Now let W be placed at any point distant x from the free end.

Clearly the deflections of the free end

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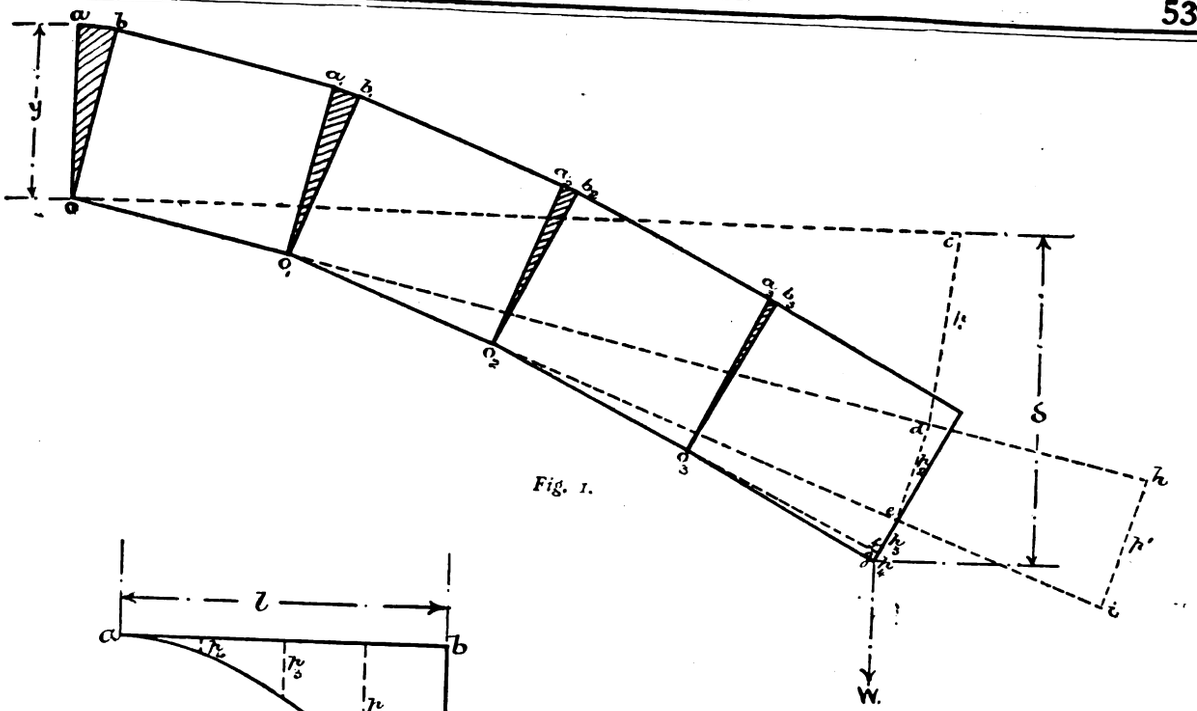

Fig. 1.

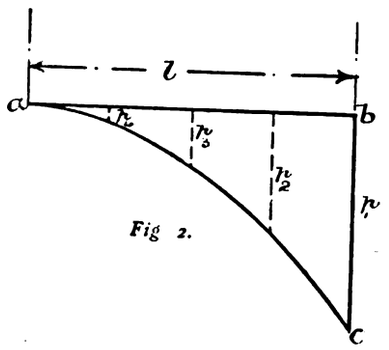

Fig 2.

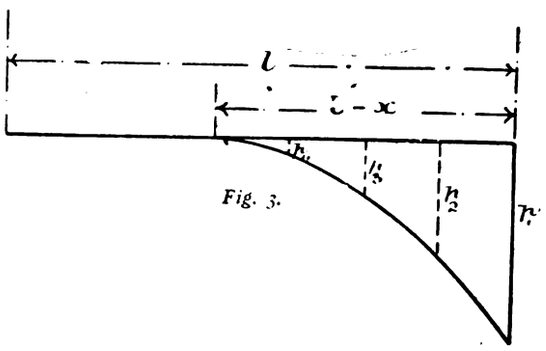

Fig. 3.

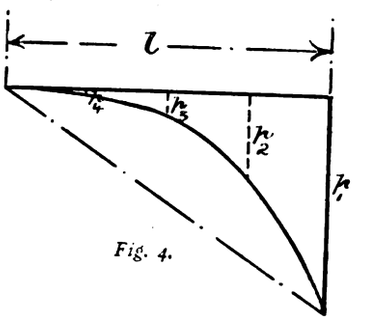

Fig. 4.

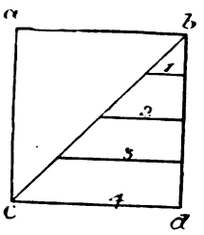

Fig. 5.

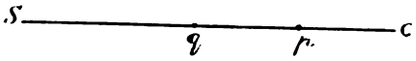

Fig. 6.

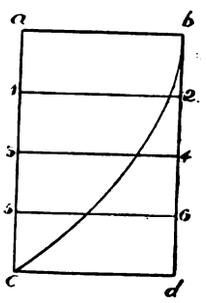

Fig. 7.

have the same ratio as when W is at that end, but are less in amount.

In this case, however, the lever only bends from the fixed end to the weight W.

Let the section be uniform; then fig. 3 gives the total deflection of the free end. Here the principal axis of the figure is of course $= (l - x)$.

The area is $\frac{p_1 \times (l-x)}{3} = \frac{r\,l\,(l-x)}{3\,E\,y}$.

But $\frac{r}{y} \times I = W\,(l - x)$.

$$\therefore r = \frac{W\,(l-x)\,y}{I}.$$

Whence $$S = \frac{W\,l\,(l-x)^2}{3\,E\,I}.$$

(*e*) If d and r are constant, and $\therefore$ b varying, then

$$S = \frac{W\,l\,(l-x)^2}{2\,E\,I}.$$

(*f*) If b and r are constant, then

$$S = \frac{2\,W\,l\,(l-x)^2}{3\,E\,I}.$$

(*g*) If a lever be taken and supported at both ends, and a weight W placed at its centre, then the formulæ are easily deduced from the foregoing. When the centre deflects to its maximum, it may be considered as fixed there, and the two ends deflected upwards under the support reactions, which are each equal to $\frac{W}{2}$; thus we have on each side of the centre a lever of length $\frac{l}{2}$, with one end fixed and one end free, with a load $\frac{W}{2}$ acting at the free end.

If the section be uniform, we have by (*a*)

$$S = \frac{\frac{W}{2} \times \left(\frac{l}{2}\right)^3}{3\,E\,I} = \frac{W\,l^3}{48\,E\,I}.$$

(*h*) If the lever be of uniform strength with b varying, we get from (*b*)

$$S = \frac{W\,l^3}{32\,E\,I}.$$

(*i*) If the strength be uniform with d varying, we have from (*c*)

$$S = \frac{W\,l^3}{24\,E\,I}.$$

(*k*) Now consider a lever of length l, supported at both ends, and a weight W placed at any point distant x from the nearest support.

Suppose the lever of uniform section.

Let R = reaction of nearest support.
" R^1 = " farthest "
" y = distance from nearest support to point of greatest deflection.

Consider the lever as fixed at point of greatest deflection and the two segments deflected by the external forces which act on them. The amount of deflection of each segment is equal to that of the other.

Now deflection due to $R = \frac{R\,y^3}{3EI}$.

" " " $W = \frac{W\,y\,(y-x^2)}{3EI}$.

" " " $R^1 = \frac{R^1\,(l-y)^3}{3EI}$.

Then we have the equation—

$$R\,y^3 - W\,y\,(y-x)^2 = R^1\,(l-y)^3.$$

For R put $\frac{W\,(l-x)}{l}$, and for R^1 put $\frac{W\,x}{l}$ and reduce.

We get $y^2 + y\,(x - 3l) = -l^2$.

Whence $$y = \frac{(3l - x) \pm \sqrt{(3l-x)^2 - 4l^2}}{2}.$$

To prove this put $x = \frac{l}{2}$ and work out: it will be found $y = \frac{l}{2}$, which is correct, as

d

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then the case is the same as (*g*). If $x=\frac{l}{4}$, then $y=\cdot43l$ and $(l-y)=\cdot57l$.

In any case the point of greatest deflection does not deviate much from the centre, and in view of the fact that at any rate the calculated deflection is only approximate, therefore it is sufficiently accurate to consider the centre the point of greatest deflection, except in special cases.

Then $$S=\frac{R^1\times\left(\frac{l}{2}\right)^3}{3EI}=\frac{R^1l^3}{24EI}.$$

(*l*) If r and d are constant, then by (*b*)

$$S=\frac{R^1\times\left(\frac{l}{2}\right)^3}{2EI}=\frac{R^1l^3}{16EI}.$$

(*m*) If r and b are constant, then by (*c*)

$$S=\frac{2R^1\times\left(\frac{l}{2}\right)^3}{3EI}=\frac{R^1l^3}{12EI}.$$

Now consider a cantilever of uniform section with the weight uniformly distributed along the length.

Clearly, the angles $a\,o\,b$, $a_1\,o_1\,b_1$, &c., are to each other in the ratio of the moments of flexure at o, o_1, &c.

The mom. of flex. at $o=\frac{W\,l^2}{2}$

" " $o_1=\frac{W\,(o_1\,d)^2}{2}$

$\therefore p^1 : p_1=(o_1\,d)^2 : l^2$

$\therefore p^1=\frac{p_1\times(o_1\,d)^2}{l^2}$

Also $p_2 : p^1=o_1\,d : l$

$\therefore p_2=\frac{p^1\times o_1\,d}{l}=\frac{p_1\times(o_1\,d)^3}{l^3}$

Then $p_1 : p_2 : p_3$: &c., $=l^3 : (o_1\,d)^3 : (o_2\,e)^3$: &c.

Now draw $a\,b=l$ (fig. 4), $b\,c=p_1$. Also $p_2\,p_3\,p_4$, at their appropriate points and in the above ratio. The figure $a\,b\,c$ represents the sum of deflections when the lever bends at every point. The area of the figure is about $\frac{1}{4}\,p_1\times l$.

Then $$S=\frac{r\,l^2}{4\,E\,y}$$

And $$\frac{r}{y}\,I=\frac{W\,l}{2}\quad\therefore r=\frac{W\,l\,y}{2\,I}$$

Whence $$S=\frac{W\,l^3}{8\,E\,I}.$$

If the lever be of uniform strength, with r and d constant, then $p^1=p_1$

And $p_2 : p^1=o_1\,d : l$.

$\therefore p_1 : p_2 : p_3$: &c., $=l : o_1\,d : o_2\,e$: &c.

Then if the lever bends at every point, the total deflection of the free end will be equal to the area of a triangle with base p_1 and height l,

or $$=\frac{p_1\,l}{2}=\frac{r\,l^2}{2\,E\,y}=\frac{W\,l^3}{4\,E\,I}.$$

(*p*) If the strength be uniform with a constant breadth, then

$$p_1=\frac{a\,b\times l}{y}$$

$$p^1=\frac{a\,b\times o_1\,d}{y\left(\frac{o_1\,d}{l}\right)}$$

For y varies directly as its distance from the free end.

Then $$p^1=\frac{p_1\times\overline{o_1\,d}^2}{l}=\frac{p_1\times l}{o_1\,d}$$

And $p_2 : p^1=o_1\,d : l$

$$\therefore p_2=\frac{p^1\times o_1\,d}{l}=\frac{p_1\times l}{o_1\,d}\times\frac{o_1\,d}{l}=p_1$$

$\therefore p_1=p_2=p_3=$ &c.

Hence, if the lever bends at every point the total deflection of the free end = a rectangle $=p_1\times l$

$$=\frac{r\,l^2}{E\,y}=\frac{W\,l^3}{2\,E\,I}.$$

(*q*) Lever supported at both ends, and W uniformly distributed. Suppose the section to be uniform, the centre may be considered as fixed, and the ends deflected under the forces which act on them. These forces are (1) the support reactions, and (2) the uniformly distributed loads which act in opposition to (1).

The resultant deflection is clearly the difference of (1) and (2).

Deflection due to (1) is $\frac{\frac{W}{2}\times\left(\frac{l}{2}\right)^3}{3\,E\,I}=\frac{W\,l^3}{48\,E\,I}$.

" " (2) " $\frac{\frac{W}{2}=\left(\frac{l}{2}\right)^3}{8\,E\,I}=\frac{W\,l^3}{128\,E\,I}$.

Then $$S=\frac{W\,l^2}{E\,I}\left\{\frac{1}{48}-\frac{1}{128}\right\}=\frac{5\,W\,l^3}{384\,E\,I}.$$

(*r*) If the lever be of uniform strength, with b varying, then from (*h*) and (*o*) we get

Deflection due to (1) is $\frac{W\,l^3}{32\,E\,I}$.

" " (2) " $\frac{W\,l^3}{64\,E\,I}$.

$$\therefore S=\frac{W\,l^3}{E\,I}\left\{\frac{1}{32}-\frac{1}{64}\right\}=\frac{W\,l^3}{64\,E\,I}.$$

(*s*) If the strength be uniform with constant breadth, then by (*i*) and (*h*)

Deflection due to (1) $=\frac{W\,l^3}{24\,E\,I}$.

" " (2) $=\frac{W\,l^3}{32\,E\,I}$.

$$\therefore S=\frac{W\,l^3}{E\,I}\left\{\frac{1}{24}-\frac{1}{32}\right\}=\frac{W\,l^3}{96\,E\,I}.$$

(*t*) If a lever be fixed at both ends, and a weight W be placed at the centre, then before the deflection can be calculated it is necessary to ascertain the point at which the bending moment vanishes between the support and centre.

Let x = distance from the supports to the V P.

Let y = distance from centre to the V P.

Now the B M at support = shearing force at V P $\times$ x.

And the B M at centre = shearing force at V P $\times$ y.

Now the shearing force is constant throughout and equal to $\frac{W}{2}$, hence B M at support $=\frac{W\,x}{2}$.

B M at centre $=\frac{W\,y}{2}$.

The sum of B M's at support and centre $=\frac{W}{2}(x\times y)=\frac{W\,l}{4}$.

Take $a\,b\,c\,d$ (fig. 5) to represent the sum of the B M's $=\frac{W\,l}{4}$.

Now if we begin either at centre or support and calculate the ratio of the B M's at that point caused by the shearing force $\frac{W}{2}$ at successive points along the lever, we will obtain a curve $b\,c$ which will divide the sum of the B M's at support and centre into two parts in the ratio of the actual B M's at these two points; thus, suppose we select the support, and let m_1 and m_2 be the B M's at that point caused by the shearing force at two successive points distant p and q from the support.

Then—

$$m_1=\frac{W}{2}\times p$$

$$m_2=\frac{W}{2}\times q,$$

$$\therefore m_1 : m_2=p : q;$$

that is, the bending moment at support increases directly as the distance increases then $b\,c$ is clearly a straight line cutting the ordinates 1, 2, 3, &c., in the ratio of their distances from b. The figure $b\,c\,d$ is therefore the portion of the sum of B M's which belongs to support, the balance belongs to centre.

Then B M at support = B M at centre $=\frac{W\,l}{4}\times\frac{1}{2}=\frac{W\,l}{8}\quad\therefore x=\frac{l}{4}$.

The total deflection is equal to the sum of the deflections of the two parts into which the half length is divided by the V P.

$$\therefore S=2\left\{\frac{\frac{W}{2}\times\left(\frac{l}{4}\right)^3}{3\,E\,I}\right\}=\frac{W\,l^3}{192\,E\,I}.$$

(*u*) Now if the load be uniformly distributed along the length, or $=w$ per unit of length, then sum of B M at support and centre $=\frac{w}{2}(x+y)^2$.

Now begin at centre and find the ratio of increase in B M at that point, thus let m_1 and m_2 be the B M's at c (fig. 6) caused by the forces acting on $p\,c$ and $q\,c$ respectively,

$$m_1=(w\times p\,c\times p\,c)-\left(w\times p\,c\times\frac{p\,c}{2}\right)=\frac{w}{2}(p\,c)^2$$

$$m_2=(w\times q\,c\times q\,c)-\left(w\times q\,c\times\frac{q\,c}{2}\right)=\frac{w}{2}(q\,c)^2$$

$$\therefore m_1 : m_2=(p\,c)^2 : (q\,c)^2.$$

Then the curve $b\,c$ is parabolic and cuts the ordinates 12, 34, &c. (fig. 7), in the ratio of the squares of their distances from b. Thus the portion of the figure $a\,b\,c\,d$ which belongs to centre is $b\,c\,d$, and the portion due to the support is the remainder, $a\,b\,c$; $a\,b\,c$ is a semi-parabolic, and therefore the area is $\frac{2}{3}\times a\,b\times b\,c$, leaving $\frac{1}{3}\times a\,b\times b\,c$ as the area of $b\,c\,d$.

The B M at support is hence twice that at the centre.

B M at support $=\frac{2}{3}\times\frac{W}{2}\times\frac{l}{4}=\frac{W\,l}{12}$.

" " centre $=\frac{1}{3}\times\frac{W}{2}\times\frac{l}{4}=\frac{W\,l}{24}$.

Where $W=w\,l$.

To find x and y we have

$$\frac{w\,x^2}{2}+w\left(\frac{l}{2}-x\right)=\frac{w\,l^2}{12}$$

Whence $x=\frac{l}{6}\left\{3-\sqrt{3}\right\}=0{\cdot}211\,l$

and $y=\frac{l}{2}-x=\cdot289l$.

But for the purpose of estimating the amount of deflection it is sufficient for all but important cases to consider $x=y$, and the vanishing point at $\frac{l}{4}$ from support and from centre.

Thus S = sum of deflections of the two parts

$$=\left\{\frac{\frac{W}{4}\times\left(\frac{l}{4}\right)^3}{3EI}+\frac{\frac{W}{4}\times\left(\frac{l}{4}\right)^3}{8EI}\right\}$$

$$+\left\{\frac{\frac{W}{4}\times\left(\frac{l}{4}\right)^3}{3EI}-\frac{\frac{W}{4}\left(\frac{l}{4}\right)^3}{8EI}\right\}$$

$$=2\left\{\frac{\frac{W}{4}\times\left(\frac{l}{4}\right)^3}{3E\,I}\right\}=\frac{W^3}{384EI}.$$

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NOTES.

Official Neglect of Artists.

A CORRESPONDENT in the *Times*, who signs himself "A Lover of His Country," draws attention to what he justly styles the "curious contrast" between this country and most others in regard to the choice of distinguished guests who are invited to meet Sovereigns or Presidents visiting this country. Anyone, he said, who ran over the list of Royal or Presidential guests, when our King visited the King of Italy and the President of France, would have observed among them the names of men eminent at Rome and Paris in literature, painting, sculpture, architecture, music, and science, and he adds (quite rightly) that the omission of any such names would have been inconceivable either to an Italian or a Frenchman. The "Lover of His Country" proceeds:—

"I have from sheer curiosity run through the catalogue of persons invited, whether to Windsor or to the Guildhall, to meet the King and Queen of Italy, and I have not been able to discover the name of one single writer, painter, sculptor, architect, musician, or scientist, pre-eminent as such, or even eminent."

The fact is, however, characteristically English. This is a country where, practically, no one cares for art, except a few specially educated persons; in the eyes of the official respectabilities who presumably draw up these lists, an artist is no doubt a vulgar person, not "de nôtre monde" (as Ethel Newcome said to her cousin), and not fitting to be brought into the presence of a Royal visitor, any more than he is fitted to receive a "birthday honour," a distinction which goes mostly in reward for political or military services, or for the mere fact of being rich. We are glad someone besides ourselves has called public attention to the subject, though we doubt whether anything will come of it. The King, of course, could alter all this in a moment if he chose, but it may be doubtful whether the point has ever been properly brought before him.

London Water Arbitration.

A VERY important point in the London Water Arbitration in reference to the New River Company's claim of 13,000,000*l.* has been decided by the Court of Arbitration. A considerable portion of this claim is based on the assumption that the profits of the company are distributable among the proprietors, and that the dividend is not limited to 10 per cent., with any surplus above that sum being disposed of in aid of the rates. The point is a very simple one. When the New River Company was originally incorporated by Royal Charter in the time of James I., there was, of course, no limit to its dividends. In 1847 the Water Works Clauses Act was passed, which does limit the dividends. This general Act was incorporated in a private Act of the New River Company in 1852, except any clause which might be inapplicable to the undertaking. The company says that the clause as to the limitation of dividend is inapplicable, while it is the contention of the Water Board that the clause applies, and this contention has been upheld by the Court. An appeal even to the House of Lords is threatened by the Company on this point; it may be that the intention will not be carried out, but meanwhile, an important decision has been given in favour of the Water Board.

The Fall of a Viaduct.

AN adjourned inquest was held on Tuesday last, on the four men killed in the recent collapse of a brick viaduct in course of construction on the Cheltenham and Honeybourne branch of the Great Western Railway. A portable crane was in use on the viaduct at the time of the disaster, for hoisting and distributing materials, and while the centring was being removed the three last finished arches collapsed, one after the other, precipitating the crane and a large amount of *débris* to a depth of between 30 ft. and 40 ft. The viaduct was being built in blue brick and lime mortar, in accordance with the drawings and specifications of the Great Western Railway Company, and under the supervision of the company's resident engineer. The mortar was of excellent quality, the work had been executed to the entire satisfaction of the resident engineer, and the removal of the centring was conducted under the supervision of an experienced foreman. After deliberation, the jury concluded that there had been no want of reasonable care and skill on the part of those concerned, a decision with which we fully agree. Nevertheless, it is perfectly clear that engineering practice is at fault in sanctioning the employment of lime mortar in rainy weather, such as that prevailing at the time of the accident. Lime mortar is never suitable for thick walls or other masonry, for its hardening depends upon the slow action of the atmosphere, and in wet weather hardening takes a long time. Even under favourable circumstances the mortar in the interior of thick masonry does not set hard for years, and may not set at all. Lime mortar 2,000 years old has been taken from subterranean vaults in the same condition as freshly mixed mortar. Such mortar is unsuitable for structures liable to severe vibration, and in the United States its use has been abandoned on all first-class railway works. As almost every failure of masonry is due to the disintegration or the yielding of mortar in the joints, cement mortar should always be used for structures like arches. This form of mortar is practically as cheap as lime mortar, it sets immediately, it continues to harden independently of contact with air, and is the only mortar whose strength increases with age. While exonerating the engineers and contractors from blame, the jury expressed the opinions that, considering the wet weather, the centring was removed too soon; that arches of the kind, especially in winter, should be set in cement mortar; and that the crane was carried too far along the arch, having regard to the fact that the supports of the track did not extend to the next pier. There must have been some particularly sensible men on this jury, and they have read a useful lesson to all engineers who have continued to place unwarrantable reliance upon lime mortar.

Building Rules for Concrete-Steel.

WHILE London jogs along with an obsolete Building Act, other cities of the world recognise modern practice by framing regulations that permit its application, and at the same time provide for the safety of the public. The most recent manifestation of the kind is to be found in the code prepared by the Bureau of Buildings of the Borough of Manhattan, U.S.A, relating to concrete-steel construction. Concrete-steel is so largely employed in floor construction that this department of work alone is sufficient to justify official recognition, but it seems highly probable that walls and columns will be increasingly built of the same material. Hence the authorities are to be thoroughly commended for taking up the matter. In the rules now published we observe that gravel or stone concrete is prescribed, cinder concrete being no longer permitted. This stipulation is wise, for the resistance of cinder concrete is admittedly low, and it is quite possible that for equal strength no difference of weight exists between cinder and good stone or gravel concrete. The proportions of the mixture are to be cement one part, sand two parts, gravel or broken stone four parts, or such proportions as will ensure a crushing strength of not less than 2,000 lb. per square inch at the end of twenty-eight days. Some of the rules relative to the fineness of sand and the size of crushed stone appear to be open to question, but generally they provide satisfactory safeguards. In computing the moments of resistance for concrete-steel beams it is stipulated that the maximum values shall be 500 lb. per square inch extreme fibre stress in compression, and 350 lb. per square inch in direct compression. Similarly the maximum shearing stress is limited to 50 lb. per square inch. These values are perfectly safe, the latter perhaps erring a little too much on the side of safety. The bases indicated for calculation avoid unnecessary complications, and taking the regulations as a whole, they certainly appear to be wisely framed and to be generally satisfactory.

New Electric Railway System.

A NOVEL system of electric supply for working railways has recently been patented in many countries. It proposes to use the new Edison battery in conjunction with a novel application of Hopkinson's three-wire system of electric supply. If the Edison battery has the high efficiency and durability which its makers claim for it then the multiple supply system appears to us to be quite feasible. In our climate we do not think that any overhead high-tension system could be sufficiently well insulated to make it absolutely trustworthy. In winter it would be difficult to prevent a coating of ice forming round the large insulators that would be necessary to support the heavy overhead wires. In the new system the high-tension conductors are placed between the rails, and the system of protection adopted would make it quite safe. The voltages between the conductors and the rails are each 2,000, so that the voltage of supply to the two live conductors between the up and down tracks respectively would be 4,000 volts. All the four rails are connected electrically, and form the return conductor when the loads on the up and down tracks are balanced. The conductors are divided into sections, and a section is only alive when a train is on it. In addition to the motors, which are worked by the high-tension supply, every train

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carries a set of low-tension motors which are worked by a battery of Edison cells carried by the train itself. The low-tension motors worked by the cells make the train independent of the line supply, and so secure certainty of operation. They can also be charged from the line, and one of the claims made for the Edison cell is that no regulation of the charge or discharge is necessary, as excessive currents do not damage it. Another great advantage is that there is no necessity to take the high-tension conductors into stations or through crossings, as each train is practically an independent unit. It is proposed to have central supply stations every thirty miles apart, and every section of the line would be in connection with two stations.

The Panama Canal.

By the signature of the new Canal Treaty, of which the details were settled with such astonishing celerity by the Governments of the United States and the Panama Republics, the interoceanic canal scheme has entered a new phase. The Treaty gives to the United States the control of a zone five miles wide on each side of the canal, for which either actual sovereignty or a lease in perpetuity will be conferred, and, further, the islands in Panama Bay will be transferred to the United States for the purpose of fortifications for protecting the canal. The extraordinary adventures of the scheme may now be regarded as finished for good, and we may reasonably hope that its future history will tell us of nothing more exciting than the diligent and skilful execution of a great engineering work. All maritime nations are interested in the venture, and the money required for its prosecution will be amply repaid by the immense savings that will be effected by the ultimate opening of the new waterway.

The Rainfall of October.

During last month the distribution of the unusual rainfall was of varied character. The driest region, in which, however, the fall was little below 6 in., was along the eastern coast, its inland boundary being an irregular line, extending from Beachy Head, through London, and northwards till about level with the Wash, thence running westward in a broad tongue towards the valley of the Don. Part of Staffordshire was included in the region, and after passing near the base of the Derbyshire hills, the boundary returned to the sea south of Bridlington. Two areas on the east coast of Scotland were comparatively free from rain during the month, these being in the Edinburgh district and north of the Highland district beyond Aberdeen. Parts of the Western Highlands of Scotland, the English Lake District, the inland regions of Wales, the moorlands of Devon and Cornwall, and a tract between Salisbury and Guildford all received about 10 in., or over 1,000 tons of rain per acre; while some districts in Wales had fully 15 in., and the gauge at the Stye in Cumberland registered 32 in. In the London district 6.03 in. fell at Camden-square in October, the maximum quantity for forty-six years past. Some people hold the opinion that the rainfall is intimately associated with periods of sunspot maximum and minimum, but it is very difficult to establish any reliable theory on the point. Records appear to show that rainfall is more copious during times of sunspot minimum, but Sir Norman Lockyer tells us that the monsoon rains in India are heaviest with an intermediate stage of sunspots. Further, the zones of precipitation move about the globe in such a way that it is very difficult to draw inferences for any particular district.

Woodbury Gallery.

A small exhibition of Arts and Crafts now on view at the Woodbury Gallery is chiefly noticeable for the collection there of a number of Miss E. M. Rope's charming sculpture creations of child-life, real and symbolical. Those who do not know her work of this type have a good opportunity here of seeing a number of examples together, and enjoying the union of good modelling with poetic fancy and invention which they display. Miss Rope has made a special study of children's figures in bas-relief, using them in most cases to illustrate some symbolic fancy, and her productions of this kind form almost a class of themselves; there is nothing else quite like them in contemporary sculpture. Among the general objects exhibited are two upright pianofortes designed by Mr. H. Baillie Scott for Messrs. Broadwood, one in ebonised mahogany with open panels of coloured metal and wood, the other an oak case, fumed, with iron furniture. Both are good as designs, but both are made on that foolish and wrong-headed pattern which artistic designers, for some reason, are trying to thrust upon us, of enclosing the key-board and the upper part of the instrument behind large folding doors, which when closed misrepresent the real form and structure of the instrument, and when open are in everyone's way. It is folly to make pianofortes in that way, whatever artistic treatment may be bestowed upon it. Among other things in the exhibition we noticed especially a bronze table fountain, triangular on plan, with pendant electric lights, by Mr. J A. Hodel, and some good flat silver girdles by the same artist; an admirable copper hot-water jug and two copper flower-vases, coming from the Keswick School of Industrial Arts, and an oval-shaped soup-tureen from the same school, very good in design, but with the fatal defect that it is rickety on its base; nothing can atone for that; the first business of a table utensil is to stand firm and steady; if it does not it is useless, whatever its artistic design. A set of silver salt, pepper, and mustard pots, exhibited by Messrs. Ramsden, Omar, and A. C. E. Carr, have a good solid character, and the same may be said of the two simply treated silver goblets exhibited by Mr. John Williams. There are other good things in the collection, but the cataloguing and numbering was rather incomplete, and it was not always easy to identify them. But the exhibition is worth a visit, were it only for the sake of Miss Rope's bas-reliefs.

The Modern Gallery.

At the Modern Gallery is a collection of water-colours, by Mr. G. C. Haité, under the title "Venice: Colour and Sunlight." The title at once defines and excuses what is the special character of these works—that they are more occupied with colour effect than with clear definition of form; their general effect is what we may call a little too ragged, and this is more felt, naturally, in the larger than in the smaller subjects. The first one in the catalogue, a "Shop doorway," a little bit of still-life effect, is one of the best in the collection—as an impression of colour and composition it is admirable; and, generally speaking, it is in these smaller and slighter sketches that the principal successes are made; reminiscences of colour effect. Such are: "Off Bellestrino" (6); "Piazza, St. Marks" (20); "Gondola at the Door" (42); "Palazzo Moceniso" (48); "Blue Posts" (100), a rather larger one, but with the same qualities. Of the larger drawings, one of the most effective is "Under the Archway" (92); "The Boat-yard, Rio San Trovaso" (78), is another very effective sketch. The special aim in this and others is evidently colour effect, and they are successful in what the artist apparently aimed at. Some of the slight studies, in pencil touched with colour, such as the "Fruit Stall Studies" (36 and 37) are excellent examples of rapid study of effect.

Mr. Walter Crane's Exhibition.

A selected collection of works by Mr. Walter Crane is on view at Messrs. Dickinsons' Galleries, at 114, New Bond-street. It includes a good deal of the decorative book illustration work of which he has made so great a success, and which is well-known. There are also some water-colours, which are interesting as records of scenes by an artist who is not specially or professedly a water colourist. Among these "An Old Welsh Farm" is picturesque, and "White Horses" is a coast scene in which the sweeping movement of the sea is finely conveyed. There is also the larger work, "The Crest of the Wave," represented by a number of small figures; a fancy, which we never thought a very happy one. The real interest of the exhibition is in the decorative design—the page illustrations of books already referred to; the costume studies for figures in the Guildhall Masque; the designs for embroidery and for a printed hanging, and the vases in red lustre made by Messrs. Maw and assistants, from Mr. Crane's designs.

THE ARCHITECTURAL ASSOCIATION.

The usual fortnightly meeting of this Association was held on Friday evening last week in the Meeting-room of the Royal Institute of British Architects, No. 9, Conduit-street, Regent-street, W., Mr. R. S. Balfour, Vice-President, in the chair in the absence of Mr. H. T. Hare, the President.

Mr. H. Tanner, jun., Hon. Secretary, read the minutes of the last meeting, which were agreed to, and Mr. Louis Ambler, Hon. Secretary, read a list of nominations for membership.

The following gentlemen were then elected members of the Association:—Messrs. H. S. Stowell, J. A. Wilson, F. S. Chesterton, C. W. Lucas, G. Hubbard, R. H. Browne, Lucio Velasco, H. de A. Broun-Morrison, F. A. Collard, S. Murray, S. L. Steane, and L. G. Rayner.

Mr. Horace Field was also reinstated as a member.

The Chairman announced that a meeting of the Discussion Section would be held on December 2, when a paper would be read by Mr. H. T. B. Spencer on "Theatres."

New Premises Fund.

The Chairman then announced the following

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list of additional donations to the New Premises Fund:—Messrs. H. Saxon Snell, 52*l.* 10s.; Edwin C. Pinks, 15*l.* 15s.; A. O. Collard, 11*l.* 12s.; W. D. Caröe (second donation), 10*l.* 10s.; W. Talbot Brown, 5*l.* 5s.; R. H. Butterworth, 5*l.* 5s.; Lander, Bedells, and Crompton, 5*l.* 5s.; C. E. Varndell, 5*l.* 5s.; W. C. Waymouth, 5*l.* 5s.; Edmund Woodthorpe, 5*l.* 5s.; G. Corderoy, 5*l.*; A. H. Kersey, 3*l.* 3s.; J. E. Capell, 2*l.* 2s.; W. Dewes, 2*l.* 2s.; R. A. V. Harrison, 2*l.* 2s.; W. Stewart (second donation), 2*l.* 2s.; Arthur Stratton, 2*l.* 2s.; H. Tooley, 2*l.* 2s.; F. A. Coles, 1*l.* 1s.; L. G. Detmar, 1*l.* 1s.; A. W. Field, 1*l.* 1s.; A. J. Hopkins, 1*l.* 1s.; Ernest Newton, 1*l.* 1s.; T. M. Smith, 1*l.* 1s.; C. F. A. Voysey, 1*l.* 1s.; R. H. Dods, 10s. 6d.; D. B. Hart, 10s. 6d.; L. Morgan, 10s. 6d.; and T. Campbell Pope, 10s. 6d.

On the motion of the Chairman, a vote of thanks was accorded to the donors. The Chairman also announced that 162 members had doubled their subscriptions in accordance with the Committee's suggestion. This would produce a sum of 116*l.*; as there were 1,552 members of the Association, there were still many others who might do the same.

Farm Buildings.

The Chairman then called on Mr. H. Munro Cautley to read the following paper on "Farm Buildings":—

It will be within the memory of a few of you, and I hope sincerely very few, that but twelve months ago I read a similar paper to this before the Discussion Section of this Association, and as the practice of farming does not vary so rapidly as to have changed much in that time, I am afraid that much of what I then said must be repeated now; but I have been at pains since then to solicit fresh facts from my farmer friends, and to settle my convictions on several points, which I did not then dare debate, in order to fit myself for, and fill the wider scope enjoyed by this paper.

I am fully aware of the diversity of conditions under which farming is engaged upon in this country, and that the problem so satisfactorily solved in the West Country would require a totally different solution to be equally satisfactory in the East, but the underlying principles are essentially the same, so that I shall speak to-night wholly from within my practical experience, gathered on farms and amongst farmers in the Eastern Counties, and as the one condition that does not vary is that of the agriculturists' finances, I shall restrict myself to the description of that type of buildings and fittings in which the truest economies are effected, and thus made most suitable to meet the requirements of those to whom farming is a real business.

It is so easy to be elaborate, so difficult to exercise economy, that no difficulty will be experienced when one has to build a toy farm for a rich hobby-rider in introducing the porcelain bin and the cataloguer's nickel-plated fittings for the humbler forms, the principle remaining the same, and the only importance being that they are entirely suitable for their purpose.

And now as to the site and position of the buildings.

The first essential, of course, is a good water-supply for both house and yards. You will, no doubt, have noticed that this necessity was provided for by our ancestors by grouping all the buildings about some good pond, and though no doubt picturesque in these days of windmill-power and hydraulic rams, some further reasons must be adduced for planning the buildings about visible water.

The next most important point, in my estimation, is to get the building quite close to some hard metalled road maintained at the public expense. A farmer's private roads in and about his holding are a perennial source of expense to him, and I have rarely seen them except in such a condition that the labour of carting is doubled.

In this disastrous year, when I have seen corn unable to be carted from the land owing to its heavy state, there seems an added importance to this point.

As to the position of the buildings on the holding, in an arable one they should be as near the centre as possible, unless on the slope of a hill, when it should be nearer the top to save the uphill carting of manure. Of course, it will be thought there is left the uphill carting of the crops, but with the improved machinery of to-day, threshing and winnowing can be accomplished all in one performance, and thus there is no necessity for bringing all to the stackyard adjoining the barn, but much can be stacked in the field it is cut in and marketed straight from there.

In dairy farms, however, the buildings should be near the centre of the pasturage part of the holding, so as to avoid fetching and feeding the cows from long distances.

And further good points one might look to find in an ideal homestead would be a dry, healthy soil, easy drainage, and a sheltered southern slope.

The best aspect for stock is no doubt south with a touch of east in it; but when building on a slope, unless the aspect is utterly wrong, the building should perhaps be placed across the direction of the slope, or some very awkward steps will have to be dealt with.

Finally, in rebuilding old homesteads—and in England most of our work must be with such—do not accept it as an axiom that they should be rebuilt on the old site. Some of the foregoing advantages should be looked for on the holding, and if found in greater measure at some other point rebuild your homestead there. Do not be afraid of leaving one or two buildings too good to be pulled down isolated; they will prove useful for a variety of objects.

And now, having to erect a new homestead, what should be its arrangement and construction? Of the conditions which govern it we are sure. It should be built with an eye to careful economy of construction and maintenance, in the most labour-saving and convenient manner possible; but, above all, it should provide for the most suitable and sanitary housing of live stock, that they may be maintained in the most healthy, and therefore profitable, manner.

Should the solution of this problem seem easy to anyone, I am afraid its appearance will be found very deceptive, for I have never seen any group of buildings for a mixed farm, even when I have visited so-called "model" buildings, which were not teeming with defects.

I have not come with any perfect plan, nor am I prepared to tell you how it may be attained, but I believe that it will be found somewhere between the two extremes, presented by the old-fashioned and modern or "model" homesteads.

But perhaps it would be most helpful to glance at the advantages and disadvantages of both. In an old homestead there will generally be a large rambling old barn of flail-threshing memory, with perhaps the cowsheds ranged about same; then the stables will be in an entirely separate block, the piggeries in another, the granary, chaff-cutting house and cartshed in another, and various outlying loose boxes and small cowsheds wherever there is an odd corner.

In addition to this, the yards are nearly always of a much too large a size, rain-washed and wasteful of litter, all tending to the making of bad manure, whilst apparently the aspect was rarely studied at all. This is obviously not of a labour-saving character, or suitable to the modern practice of farming. It means carrying fodder from the granary to both the cowsheds and the stables, from the mixing floor to isolated stock scattered about the homestead, and straw from the stackyard and barn to all the various departments, which, besides entailing endless labour, keeps all the roadways in a constant litter.

But to turn to the modernised type, which common usage designates as "model." Here all the buildings, even down to the fowl house, are grouped in one large parallelogram, the outside walls of which arise square and gaunt, with scarcely an opening to be seen. I am not urging its ugliness, though I believe it to be the outcome of one of its most practical defects, namely, that everything is approached from within, frequently from internal roads and alley-ways. Were it situated on some of our blackest wold lands I should find excuse in the pitiless winds and rains which drive across them, but why when on some sheltered hillside or sunny valley? Did it save roadways, as its exponents urge? I should not even then think it counterbalanced its disadvantages, for think of the indescribable filth into which these internal approaches must be churned, the insanitariness of it all, and on a heavy winter's night or sultry summer's day the stagnation of the exhalations so enclosed. But it does not save roadways, the sparse openings are distributed on all sides and they must have approaches, so I believe the system is even wasteful of cartway.

I cannot believe, either, that the buildings so grouped can be as healthy and sanitary as those built in more open formation, for the large deposit of manure which accumulates in the yards must have a deleterious effect when in so confined an area, whilst the ravages of disease would be much more difficult to check.

The internal alley-ways, also, make independent walls just as necessary as they are in more open formation, so I do not believe there is any economy effected in construction. In case of fire, too, the whole range of buildings is endangered, and unless the removal of the stock was undertaken early in the conflagration many must inevitably be lost, whilst in any case their rescue would be seriously hampered.

In designing a complete homestead myself I should certainly have as few internal approaches as possible, but everything, as far as possible, approached from a common farm roadway, and whilst grouping the cowsheds, stockyards, and piggeries under the shelter of the barn, granary, etc., keep the horse yards, stables, and cartsheds distinct.

The staffs that work these two departments are entirely distinct, and if over the cartsheds a roomy loft was constructed, into which a stack could be threshed direct, the extra labour involved is nothing, as only chaff and corn would have to be carted from the granary block, which is but a small operation, and even if the departments are grouped in one block it is impossible to get them all adjoining the barn and granary so closely as to save all labour and carriage.

But I will proceed to the practical details in connexion with the various buildings, only reminding you again that I shall treat of each in its simplest form, believing so thoroughly as I do, that all repairs should be capable of being undertaken by the estate carpenter, or else whatever is broken or missing is sure to be neglected till some serious mishap arises through it. For this reason, and for the reason that on most estates enough timber is felled and steam-sawn sufficient for the purpose of repairs, I am strongly in favour of the simplest wood construction in everything but the main fabric. Where it is only a question of nailing a plank up a tenant will always do it himself, but should it be anything less simple, it is either neglected, or the landlord burdened with it.

In cart-horse stables, it is very desirable that each horse should be provided with a separate division, which must in no case be less than 6 ft. wide. In old-fashioned stables it was not at all unusual to find all the horses standing together with no divisions between, but this is much to be regretted. It is but seldom, perhaps that one horse damages another, but it will be found that under such circumstances, some of the horses will never lie down, much to the detriment of their working powers, and, what is worse, the stronger horses will prevent the weaker from getting their fair share of food.

Here then is a strong plea for separate stalls, but it will be found, I am afraid, that many farmers shrink from what they consider such extravagance, when, perhaps, the best compromise is to divide up for pairs, the divisions with 10 ft. centres, and the weak horses can then be put together.

The width of stables may be arrived at by allowing 2 ft. for manger, 7 ft. for standing, 12 in. for gutter, and 5 ft. for passage way behind.

The cubical contents necessary, 800 ft. per animal, applies to both stables and cow-sheds.

No general rule for determining the number of horses required to be provided for can be given, as to-day many farmers go in for stock so largely, that laying down much grass, the quantity of arable land is greatly reduced, and not so many horses needed. Roughly speaking, a horse to every 25 acres is what is generally needed.

The manger should be of 1½ in .plank, and about 3 ft. high, with stout, rounded, hardwood chin-piece, preferably in oak, as I believe the acid in this wood makes them most averse to crib-biting. The divisions should have hardwood heel posts, 1 ft. in front of gutter and 5 ft. out of ground, with, it will be hardly necessary to add, all the arrises taken off, as should be done to all fittings, and the boarding to them may be 1 in. rough, but in any case should not be tongued, neither tongued into the rails (as this makes repairs difficult at once), but nailed one side only, and kept off the ground to prevent decay.

I will say nothing about feeding passages

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behind the manger, as there is not the objection in feeding horses from the front there is with cows, but should it be possible to indulge in this extravagance, there is no doubt that horses would do better with their noses further from the wall.

The doors should be 4 ft. wide, and at least 7 ft. 6 in. high in two heights, and capable of being hinged right back and there fastened, as should all farm doors, whilst the windows should be of the hit and miss pattern, with glazing over, unless, having a lofty stable, you can put your light in front, but well above the horses' heads; or,better still, can bring yourself to put plenty of glass tiles in the back slope of the roof, than which, I suppose, there is really no better way of lighting (at all events for cowsheds) or of avoiding breakages. But unless the roof is pantiled and glass tiles are being used, large sheets should be employed, as every joint forms a lodgment for dirt, and obstructs the light.

For the paving in stables, a very hard brick will be required, or the iron-shod feet of the horses will make short work of it. Blue bricks on edge will make the cheapest efficient paving, or there is a red brick made at Skier's Spring, near Barnsley, which I believe to be just as good. The fall would be at least one in forty, and the gutter can best, perhaps, be made with bull-nosed bricks, and of sufficient width to allow the free passage of a shovel.

To ensure the all-important ventilation, I think the best and safest form is still that employed by our ancestors, namely, carrying the eaves well over, leaving out all filling between the rafters' feet, and raising every fourth or fifth ridge tiles. A fodder and harness-room combined should be in connexion with the stable, and approached from same. A small compartment opening out of same for chaff is a great convenience, especially if arrangements are made for filling it from outside by a small door high up.

Lofts running over the stables, with arrangements for bundling the hay down into over-head racks, are to be condemned on every score. They cannot be as healthy, and even if we do not think the over-head rack a faulty arrangement in itself, filling them from above so that all the dust of the loft gets into their eyes is evidently wrong, whilst the very ease of the operation conduces to the greatest wastefulness, enough stuff often being put down to last a week.

If, on the other hand, hay racks by the side of the manger are adopted, and the hay has to be carried separately to each manger, it is far less likely the men will be troubled with this spirit of wastefulness.

To form these racks, the chin-piece should be carried through, bars let into same and carried down on to a brick pinning about 9 in. high, and the bottom sloped up to the back so as to let out all the hay-seed and dust.

The stables should have direct access to a horse-yard, with shelter sheds in same, in the construction of which it must be remembered that the manure is allowed to accumulate to a depth of about 2 ft. before removal, so that the eaves must be kept high enough to allow of it, and for the horses to pass beneath, about 8 ft. is usual. They are often also made far too shallow, so that little protection is afforded the animals, 14 ft. must be the minimum depth, and 2 ft. or 3 ft. more may be added with advantage. All the eaves should be spouted to prevent the manure being more rain-washed than is necessary, but I would not advocate horse-yards being entirely covered. In the Eastern counties we turn the horses out at night, and attribute their hardiness to it, which will make evident my objection to doing so.

In all shelter-sheds, cart-sheds, etc., where one has to employ posts let into the ground to take the roof-plates, one is troubled with the constant annoyance of rotting feet, and the attendant necessities of spurring them. I have seen various attempts to obviate this. An ingenious one, based on the fact of posts always rotting at the ground level, was to set them in a drain pipe, the top of which was kept 6 in. above the ground and filled in with cement; but the best I think I have seen is the use of steel joists bedded into a block of cement, and attached to the roof plates with angle irons, but should these be used, there must be bolted to both sides of the web, at least for a height of 6 ft, a chamfered block of wood, or serious injury may happen to the animals. Cast-iron columns ought never to be used owing to their liability to fracture, a cart backed up against them would in many instances be sufficient to break them, and I have even seen a 4 in. one broken by a bull which found it in its way.

The gates of all yards should be 10 ft. wide, and hung to open outwards and fall right back. When there are gates between two yards they must, of course, be hung at least 2 ft. up to clear the manure as it rises; and so, if the yards are ever to be used for pigs to run in, the bottoms must be fitted with elm slips, constructed like miniature gates, to work in grooves formed in the gate posts.

Palings make very bad fences between or around yards, but should they be necessary on the score of economy, do not point the tops, and let them be close, or an animal may get hung up and seriously damaged. For the same reason, keep the top rails of gates close enough to prevent animals ever gettisng their heads through.

Cowsheds.

In treating of cowsheds, we come, perhaps, to the most important buildings which go to make up a homestead.

Two kinds of sheds are in common use—those for single rows of cows and those where they stand double. No preference can be given to either system, except that in the latter, for a large number of cows, it will be cheaper if the building stands independently, as then one roof takes the place of two; but generally it is possible to arrange some of the sheds as lean-to's against a barn or some higher building on the north side, thus giving them welcome protection and making quite economical the roofing of a single shed.

In a shed in which there are two rows they may either be arranged head to head with the feeding passage in the centre, which is perhaps most convenient, as the stockyards naturally flanking the shed, the manure can then be thrown straight out into them (though this arrangement makes it difficult to get fresh air to the heads of the animals), or tail to tail, with the dunging passage in the centre and the feeding passage on either side, in which case, however, the manure has to be bundled all the way down the dunging passage to the open door; but as far as space in concerned, neither of these arrangements is more economical than the other, as may be deduced from the following figures:—

The feeding passage must never be less than 3 ft. in width, the manger will take up 2 ft., the standing 6 ft. 6 in. from manger to edge of gutter; the latter must be 12 in. wide, and the dunging passage at least 4 ft.

I know to some the above length of standing may seem short, but should you make it more the cow will be nearly certain to foul its bed, under which circumstances, not only is the litter wasted, but the milking carried on under unfavourable conditions, for I should think it would be difficult to find a man who would trouble to clean his cow before milking it. I would even advocate a still shorter standing for Alderneys or other small breed of cows.

It is usual to tie the animals in pairs, in which case the divisions need to be with 8 ft. centres; 6 in., or even 12 in. less, is often given this, but it leaves the cows very cramped and also hampers the milkers.

The divisions may be constructed in much the same manner as those described for stables; but the heel-post is better not so far back, or it will get in the way of the milker. It should certainly be 2 ft. in front of the gutter and only about 3 ft. 6 in. high, whilst if it rises to 5 ft. at the manger it will be ample.

The construction of mangers is important, but little understood, I am afraid. There is, in my mind, little question, however, that each cow should be provided with two bins, which means four bins in each of two-stall divisions, each bin capable of holding a bushel easily, and the bin next division in each case fitted with ventilated lid to hinge back and fix with button against it. This arrangement permits of the two feeds being put in at the same time, and allows of the cows being fed the first thing in the morning without delaying the milking. It will also be found that some cows will not let their milk down unless feeding, so that a bin one can open for a short time will be found convenient. At haysel, too, and harvest a double bin will allow of the men getting into the fields to help, when with a single bin only it would have been necessary for them to have been feeding their animals still.

The height should certainly not be more than 1 ft. 9 in., or the front piece will seriously incommode the cow's dew lap, and it will experience a greater difficulty in rising, should it not be able to get its head over it. As to the depth, the usual custom is, for its ease in construction, to use an 11 in. plank for the sides. They should be constructed of 1½ in. plank, and the back plank, at least, should be well canted. Of course, no chin-piece need be provided. There will, however, want to be a support half way between the divisions.

The food placed in the bins, such as brewers' grains, chopped roots, etc., assisted by the dripping of their noses, keeps them rather damp, so that the joints should be painted in. A canted fillet is often placed in the angles to enable them to clean their food up better.

How to prevent the cows pushing out the food into the feeding passages is a very difficult problem, and one which I have never seen satisfactorily solved. If you put a roll edge or projection at the back it would prevent a large-horned cow from getting at the bottom of the bin. I think if you can spare the room a ledge at the back with small curb or a canted plank, as shown on my section, is best. The cow will then be able to get at what is throws out. Of course, this difficulty does not arise where there is no feeding passage, a canted board against the well throwing the food back. In this latter case it must be remembered, however, that the bin must not be put close up to wall, or the large-horned cow would be in just as awkward case.

The cows are invariably chained up nowadays, but the chain should not be fixed to the front of the manger, or they might damage each other with their horns and get each other's food. It will be best with a running ring on a stout upright iron bar, fixed on division near manger. With quite a short chain, the cow then has perfect freedom when lying down, as the chain drops with it.

Far away the most common mistake in cowshed construction is the paving of the whole area up to the manger, and letting there be a continuous fall from manger to gutter. The whole of the cows' excrement falling behind, there is in the first case no need for it, and when, added to this, we consider how averse a cow is to lie on a slope, and that the best standing is rammed chalk or clay, it will readily be seen that the paving in front of the heel-posts should be level and of the latter substances.

If you have observed cows lying on a hillside you cannot fail to have noticed that they invariably lie across the slope, and should you go into a cowshed where the standing is sloped right up to the manger you will see the cows standing or lying as far back as the chain allows, vainly trying to get on a more comfortable level. Not only is this poor treatment for the cows, but poor policy as well, for lying over the gutter with their hindquarters unsupported is likely to bring about abortion. Of course, if by chance a single cow should be chained up in a double stall, it will lie across it close under the manger, and foul the standing above the paving, but this is a chance not worth reckoning with.

As to the paving of cowsheds, if it were not for the expense I should use V-grooved bricks, the grooves running only in the direction of the fall, as in economising litter it is very necessary that the liquids should pass rapidly to the gutters; but as a cheap paving, I do not suppose a good bed of cement concrete finely faced can be improved upon. The gutters are very important, as in all districts the local sanitary authorities are now empowered to control the construction of cowsheds, and they will not allow any covered drains, but insist on the open channel being carried right outside the shed a distance of 12 in. before the liquid manure is disposed with in any way. Long lengths are thus made necessary, which should clear themselves with a small flow as rapidly as possible. I have therefore adopted as the most satisfactory type that which I have shown in my section. The standing next gutter is terminated with a stone slab slightly rounded on edge; and the dunging passage, which is all at a lower level, is sloped to same with a steeper incline as it approaches it. This system has many advantages. It forms a platform of the standing, and the dung falling on a lower level, keeps the bed clean, whilst the litter falling from the platform is less liable to choke the channel. It is also easy to clean, conducive to a rapid flow, and easily detected. Of course, an ordinary channe' such as described for stables may be used; but the litter always bridges it, making a platform for the dung, which will foul the cow, and its presence is also obscured. The paving of the

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feeding passages may be of rammed chalk or clay, unless trolleys are to be employed, when a concrete floor is necessary. It might be here mentioned that it does not seem necessary to have an elaborate system of drainage connected all to one big tank. I should say its benefits are more than doubtful. It is the custom now to have liquid manure carts with a pump and length of hose attached, so that small cemented tanks near the separate buildings, with the channels flowing direct into same, are practicable. They should, however, not be made of too large a size, and should have a small pit at one end of the chamber into which to put the hose.

The width of the door to the cowshed should, I think, be about 3 ft. 9 in. to 4 ft. If you make it less, a cow forward in calf may be seriously injured, whilst should you make it more, it would probably be equally dangerous, as then two cows will try to push in at once. Doors must be provided from sheds into the stockyard, and then cattle will generally be let out this way, for voiding nearly always takes place immediately after they are loosed, and the roadways are thus saved being fouled.

The sheds will naturally be built adjoining the yards, and unless you have covered yards with only dwarf walls between them and the stalls (it is difficult to foresee the action of draughts with the arrangement), it will be found convenient to have low doors somewhere at the ends of the sheds, opening into the yards, for throwing out the manure (the space beneath the windows can generally be utilised), and here again it must be remembered that the manure is allowed to accumulate to a depth of 2 ft. or more, so that the floors of the sheds must be kept up from the yards and sloped ways made to the doors.

Provision for calves should be made in conjunction with the cowsheds. Very often a space at the ends of the stalls is partitioned off for this purpose, particularly now that the custom of weaning those young bull calves to be reared on their mothers is so much in vogue for the fine points they develop under that treatment. Calves, however, are very liable to scouring, and great care must be taken to ensure a dry bed for them. If the site is dry, they will no doubt do well on a well-drained floor, but if there is any possibility of damp, a stout slatted floor, with 1¼ in. spaces, will be necessary, and a dished floor beneath, all the voidings will then fall through. The slatted floor must, of course, be easily removable for cleaning purposes. Calving boxes should have at least 180 sq. ft., and, if drained, the floor should but slightly fall all one way to a gutter underneath one of the divisions kept up for that purpose, no gutter or other irregularity of the floor must be allowed, and a rammed chalk floor is preferable. The angles may have racks and mangers fitted across same.

Bull-houses should be entirely independent, and open into stockyard. Mention should be made of cattle-boxes for fatting beasts, 80 ft. to 90 ft. super is allowed for each box, and they should be built in ranges, divided by gate-like divisions capable of rising with the manure in grooves on either wall, and entirely removable. The beasts then rise on the manure they are making during the fatting period, and the manure generally attains a depth of about 3 ft. The end of the building should be capable of being opened, so that with the divisions taken away a cart can back right in and clear away the manure. Of course, ordinary stalls answer for this purpose, but these boxes are very useful, as should they not be required for fatting purposes, the division can be taken away and the shed used as a covered yard for young stock or any other purpose.

As to the desirability of covered yards, I know there is a wide divergence of opinion amongst those who should be the best judges, but when you think of the general use now made of cake foods, and the high manurial value of the excreta of animals so fed, it would seem to be most unwise to abstain from taking precautions to avoid the waste of it in rain-washed yards. Warmth, too, with stock takes the place of food, and one of the few disadvantages that can be urged against covered yards is the thinness of the coat on young stock engendered by their use. In constructing them, 160 ft. super should be allowed per animal, free ventilation should be provided in the roof, which should be of one span, and the gable ends should be covered in.

I will only further state that the average annual amount of manure produced by cattle is 16 tons per head, and that the estimated value of manure from 1 ton of decorticated cottonseed cake is 5*l*. 10s., from a similar amount of meadow hay 25s., and from roots about 5s. As fattening beasts are largely fed on cake, these figures will enable you to estimate the fine quality of the manure formed in the cattle boxes just mentioned.

Coming to what may be termed the administrative block, namely, that which contains the straw barn, food stores, etc., this is generally a two-storied building stretching east and west, with the stockyards, etc., grouped and sheltered under it on the south, and the stackyard on the north. The food factory thus comes in its rightful position, between the food to be consumed and the consumer.

The straw-barn now does not want to be of the size of the old threshing-barns, but only commodious enough to store about one day's threshing. It should be carried up the whole height, and have large doors 14 ft. high for access, whilst, if possible, I like to see it arranged myself that waggons can pass right through and out the other side through one of the stockyards. The floor may be of concrete, but the cartway would soon get broken up if of this material, and may best be made of wood. I have seen the sawn off butts of felled trees used with advantage. At the blank end, doors high up in the walls are useful for passing the threshed straw through.

Next the barn is generally placed the mixing-floor, with the root-store adjoining, and only divided by a dwarf wall, over which the roots can be served into the pulper which stands just inside the mixing floor. Both these departments should have wide doors, so that carts may back right in, in the one case to dump the roots, and in the other to load up the ready-mixed food when required about the farm. It will be very evident that the root-house must have blank walls opposite the doors, against which to stack the roots, and in the same way the mixing-floor should have a blank corner against which to stack the prepared food.

Over these departments are placed the cake-room with its crushing machine and chaff-cutting machine, with their shoots to the mixing-floor, and beyond the granary, all connected together for the convenience of trucking right through. The end next the barn should be open, and a cart under cover may then be loaded up with chaff, cake, or corn and meal from the granary, as may be required.

The floors of these upper departments should be grooved and tongued, any skirting should be in cement, and the end of all joists and the spaces above roof-plates filled up solid, and the ceilings should not be plastered, lest there should be any hidden harbour for vermin. The roofing to these buildings must be quite weather-proof, and I do not consider pantiles sufficiently so.

If a fall of the ground can be utilised, or by banking up, a cart may be drawn level with the floor of the granary, so that everything can be barrowed straight in and all mechanical or other lifting dispensed with, it will be found of the greatest convenience. It is difficult to give an exact rule for determining the size of a granary, but they are very useful of a good size, and 2½ ft. super per acre should be the minimum.

Dutch barns are very deservedly growing in favour amongst farmers, their cost of construction is so little, and their usefulness so great, that they must be a good investment. Not only is all the cost of thatching avoided by their use, but in wet weather loaded waggons can be drawn beneath, and it is said ricks dry much better under them owing to the free passage of air over the top. The waggons draw between the bays, so that these should not be less than 12 ft. in width, and as cost is the only thing which governs the length that they may usefully be made, any multiple of that figure will do; whilst to admit of topped-up waggons passing through, they should be 14 ft. high to the underside of plate, and to afford protection to the load, they would best be 20 ft. wide. As much space as possible should be left in the roof, and the whole fitted with gutters and down spouting, with the gable ends closed in.

Cartsheds should, if possible, have a north-east prospect, and the openings not less than 9 ft. in the clear, the height of these should be not more than 8 ft. in order to keep out the weather as much as possible. As to depth, a single waggon or two tumbrils will require 20 ft., but 30 ft. will accommodate two waggons or four tumbrils. Knocking stumps should protect the posts at entrance, and a guard-rail should be placed in front of the back wall.

An implement shed for the more expensive implements is necessary, and should have an opening 10 ft. wide, with doors to lock up, and provided with windows.

If a toolhouse is provided, and it is very useful for storing ropes, rakes, forks, etc., it may be best placed in conjunction with this.

Before designing piggeries some thought should be given as to whether they should take the old form of covered sty and run or, the more modern, box or pen. If the former is adopted the chief necessity is to keep the covered lodging well above the level of the run to ensure its being dry. But I would rather describe the boxes, as I believe them to be most useful. They should, if possible, be placed adjoining the stockyard, so that the manure may be flung out into the same, and the store pigs allowed to run when the cattle are at pasture. This practice will greatly improve the quality of the manure in the yards.

The boxes should have an area of from 80 ft. to 90 ft. super., with perhaps one or two rather larger as farrowing pens, and be separated by walls about 4 ft. 6 in. high. If a feeding passage can be provided at the back leading to the boiler-house at the end of the range, it will make a most compact department. A further labour-saving device will be to have the feeding troughs midway between the pen and the feeding passage, with a swinging shutter hung centrally above same so that it may be bolted on the pen side in filling the troughs, and then swung back and bolted next the passage, throwing the whole into the pen. It has a further advantage in not allowing the pigs so easily to get into the trough, fouling and wasting their food. The shutter, however, must be very strong. A guard rail 6 in. wide and 9 in. above floor should be placed round the farrowing pens to prevent the sow lying on her young.

Pigs will soon rout up a brick floor, and I believe the best is again concrete, cement faced, as this is more impervious, and will carry off quicker the large amount of liquid voided by these animals, and for which good drainage should be allowed into the yards.

The boiling-house should provide accommodation for several meal and swill tubs, and have a good-sized copper and furnace fixed in it.

One or two good-sized loose boxes on the premises will be found useful for foaling and to act as sick boxes, and perhaps in one of them may be fitted a beam capable of sustaining a ton for slinging an injured animal or slaughtering those past veterinary aid.

I think now I have mentioned all the more important buildings about a farm for housing stock, as I do not intend to waste your time with fowl houses, and, of course, permanent sheep-folding yards are now acknowledged as a mistake and become obsolete.

My paper, might not seem complete, however, without some slight allusion to dairies. I shall make it slight, for there would be almost enough matter for a separate paper did I discuss boiler-houses, refrigerators, separators, and all the complexities which go to the making of a modern dairy. I shall only, therefore, mention one of two details of a housewife's dairy, where butter is made but occasionally and in small quantities. Of course, it should have its main window north, but to get a fresher current of air I like another window east or west, which can be sheltered by bushes grown outside should it prove too hot. To maintain an even temperature, the walls should be hollow and the roof of thatch or plain tiles—certainly not slated.

A settling room should be provided with wide slate shelves around the walls, but not close up to same, a little space being left for the freer passage of air about the pans. It is customary to whitewash dairies throughout, but the whitewashing had better not extend down to the shelves, or, the pans being pushed carelessly back, will flake it off, and give you the real comic-paper article of milk with chalk in it. Two rows of any kind of tiles will obviate this. It is impossible, of course, without artificial heat to maintain a temperature of 58 deg., but this temperature should be striven for as nearly as possible, as at it milk gives off 30 per cent. more cream than the same quantity at 30 deg.

The butter-making department must have no drain inside the building, but the floor should slope to a channel outside, conducting into a gully. The ceilings in all cases

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must be ceiled, and everything conducive to the greatest cleanliness. The gauze should be on frames fixed outside the windows and easily removable for cleaning.

I feel that it hardly falls within the province of this paper to discuss farmhouses and their cottages, so will content myself with throwing out only two or three hints for your guidance. Do not waste your clients' money in providing a second sitting-room and laying on hot and cold water for a farm of a hundred acres. It will never win a tenant from the class of men who would wish for so small a holding. On the other hand, you will never get a tenant for a farm of larger acreage unless most of the luxuries to be found in a modern two sitting-room house are present.

Do not again, in striving after compactness, put your house so close to the stocksheds that after its erection one or other is proclaimed by the Sanitary Authorities uninhabitable. This may sound very superfluous advice, but I have known such cases, and remember that there is in this country a very tender bias towards progressiveness, so that in twenty years' time it may be deemed necessary to have the malodorous pig-sty fifty yards from the dwelling-house, instead of thirty, as at present.

Finally, in labourers' cottages do not put in less than a 24 gallon copper, or they will not be able to brew enough to fill an 18 gallon cask at a time, a serious inconvenience, and one which I feel the importance of, having had to remove in some cottages that I built the smaller coppers provided, and put in larger.

Mr. H. P. G. Maule, in proposing a hearty vote of thanks to the lecturer, said the paper was an exceedingly interesting and valuable one. He had had some experience of farm work, though not in the Eastern counties, and he agreed with everything which Mr. Cautley had said about so-called model farms. There had been a number of these model farms built, and in most cases they were absolutely unsuitable, and in one he had seen designed by an architect, every possible error was committed in it. That architect had turned and ornamented his elaborate heel hardwood posts, for instance, but he had made the floors of his buildings of perfectly smooth concrete, with no grooving, and the injury done to animals in consequence was very great. Mr. Cautley had not said anything about rain-water. In a new farm it was most desirable to catch the rain-water and provide a rain-water tank for the purpose, for in many cases farmers preferred to use rain-water for watering the animals to hard water, and a large supply could be obtained from the roofs of the farm buildings. It was easy to deal with this water if there was an oil engine plant on the farm, for then the water could be pumped from the tank into the storage cistern, and from there it could run by gravitation to the points where it was needed. It was a most important thing in choosing a site for a farm, to select a site which was sheltered by trees. Animals, like plants, needed protection; they needed all possible air, but they should be sheltered from the prevailing winds. Mr. Cautley mentioned 15 ft. for the total width of his stables; that hardly seemed sufficient. Mr. Cautley said that a harness-room should be provided in connexion with the stables, but most farm carters preferred to have the harness on the wall behind each horse, and if sufficient room was provided in the gangway, that was the best place, for it saved a lot of traffic in and out the harness-room, even if the harness were put in the middle. An argument against that was that the harness was more apt to decay in that position; if so, it showed that the stable was insufficiently ventilated. It was often convenient to have corn bins on the back of the wall in the gangway; it was not a good arrangement, perhaps, but it was often done, and perhaps Mr. Cautley preferred to avoid that by having smaller gangways. Mr. Cautley recommended hard brick for paving stables. Was not grooved granolithic preferable? The cost was not much more than hard brick, and granolithic made an exceedingly good floor. Mr. Cautley also advocated putting cows head to head in the cowsheds, but that was rather to be avoided. If a cow fell sick it was more likely to spread infection in that position than if placed tail to tail, with the dunging passage in the middle. As to Mr. Cautley's method of having the bottom of the manger off the floor, there was a good method in existence in the South of England. At the bottom of the manger there were three salt-glazed bricks; the bottom one was laid flat and the others were a little tilted and on edge, so as to raise them just off the standing. It was a very popular arrangement with farmers, it was cheap—for a first-class glazed brick was not needed—and it enabled the cow to feed in a perfectly natural position. Moreover, if the cows were small, the bottom of the trough should be kept as low as possible. In the standing cowshed, Mr. Cautley advocated a stone curb. In his (the speaker's) opinion an oak one was better. Animals were less likely to slip and hurt themselves on the wood than on the stone curb. A good 6 by 4 oak curb would last for many years. Surely the gangway ought to be grooved! He had heard many complaints about concrete, which so soon got wet, and if it was not well grooved it got slippery and made the cows slip about and injure themselves. The material should be rough in order to prevent that. If cowsheds opened on to a covered yard, he did not think it necessary to have any catch-pit for liquid manure; it should run into the covered yards. Then, as to Mr. Cautley's arrangements in the root-house; the cake-crusher was put upstairs, but in most cases it could and should be got on the ground floor, for cake was very heavy. On the ground floor it was handy for mixing, and the labour of carrying it up and down stairs was avoided. Where there was an oil engine plant with a cake-crusher and a corn mill, they should be arranged close together—the cake-crusher next the mixing-house and the corn mill next the plant, for these two machines had the hardest work to do, and should be nearest the power. The corn mill could stand quite well on the ground floor and the granary up above, the corn being brought down in a shoot. The piggeries ought to have a feeding passage. It was well worth the extra expense, for it saved labour. It was better to have a wooden gate than an iron one, for if the iron once got broken it was sometimes difficult to get it replaced. A well-made elm gate was practically indestructible, but if it did get broken it could easily be repaired. The great point with pigs was to keep them warm, and a concrete floor was not a warm floor. In his opinion, bricks were to be preferred, unless asphalt could be provided. Even if bricks did occasionally get worked up by the animals, they could easily be repaired, which was not the case with concrete. It was not quite as sanitary, perhaps, but its warmth made up for this. There was a good deal of difference of opinion amongst farmers on the point; some were all in favour of concrete and others were just as much opposed to its use. No mention had been made of a men's mess-house, which was very useful on a farm—a place where the men could have their meals, and which could very well be worked in near the boiling place; the same stack could be made to do, and such a place was greatly appreciated by the men, for they did not like to have to carry their meals about with them wherever they went. Mr. Cautley did not say anything as to the appearance of farm buildings. Farm buildings were not beneath the dignity of architecture. If one went about the country, we should see some of the most charming buildings of this class—some of the most charming things in English country work were the old barns and farm buildings generally. One got the most delightful effects in hipped roofs, boarded gable ends, etc., and if these buildings were put up in the proper way, in the right spirit, and without pretentiousness, a thoroughly architectural effect could be obtained. He knew of one such building near Basingstoke—an old barn—which was a most charming building, and every time he went from Waterloo he looked out for it. Farm buildings, treated in the proper way, could be made just as much architecture as more important buildings. He desired to express his obligation to Mr. Cautley for the valuable hints in his paper, and for the information contained in the paper read by Mr. Cautley before the Discussion Section—which information he had made use of in his actual work.

Mr. R. H. Weymouth, in seconding the vote of thanks, expressed his obligation to Mr. Cautley for the thorough way in which he had dealt with the subject and for the many little details which he had given, which could not be found in the handbooks, and also that he had not overlooked the necessity of simplicity in construction everywhere. He could not quite follow the speaker about the avoidance of a loft over a stable. It seemed to him very difficult now-a-days to make farming pay in this country, and any labour-saving arrangement, such as this undoubtedly was, was important, and a convenience, therefore, to counterbalance Mr. Cautley's objections. Open yards, or nearly open yards, seemed to be more sanitary than closed yards—the blowing through of air was most essential to the well-being of animals. He knew a man who said that because his stables were what might be called over-ventilated, he was able to keep away the veterinary surgeon. Anything in the nature of stuffiness was to be avoided, and the more open the farm the better for the stock. Mr. Cautley did not touch on the use of weather boarding. He did not know to what extent the by-laws were prohibitive, but he thought that within reason the more weather-boarding was used the better, but he thought that corrugated iron should be kept away altogether, as it let in too much cold and too much heat, and it was poor economy to put up anything which was in the nature of a temporary building. Thatch was old-fashioned, but it helped to make good architecture if properly used, and it had the advantage of keeping an even temperature within. Another point which ought to be mentioned in regard to farm buildings was the importance of providing suitable labourers' cottages, and that they must be considered as an essential part in a scheme. If labourers were not housed comfortably, they went to the towns, and they should be accommodated reasonably near their work. It was absurd to make such a fuss about housing the horses and cows, and putting the men who looked after them in some hovel or other which was completely worn out—picturesque for an artist to look at, but into which that artist would hardly care to enter.

Mr. C. H. Hooper said he expected all architects would like to see buildings entirely of brick or stone, but the kind of building was determined to a large extent by the kind of farming. There was a tendency to make buildings of brick footings with a good deal of weather boarding. In Canada he had seen some very useful farm buildings, which were of wood, painted white and red, and were most picturesque. As to cowsheds, it was important that the floors should not be slippery, and smooth concrete was not a suitable material where the animals ran in and out; rammed chalk floors, with oak sills, answered very well, but the gutter behind ought not to be put very deep for fear of cattle stumbling in it. One form of manger which was used a good deal was made of a half drain-pipe, with an oak ledge each side to keep the food in. It was a very clean arrangement, which was found to answer well in many places. Mr. Cautley's paper was a most instructive one, from which architects and farmers could learn a great deal as to the best way of constructing farm buildings. Unfortunately, few farmers and architects had the opportunity of putting up new ranges of farm buildings. It was now generally adding to or altering those that already existed. The paper would be a valuable one for students entering for the examination of the Surveyors' Institution.

Mr. M. G. Pechell asked the lecturer what he would do with old barns and sheds. They were often quite useless, but frequently could not be removed according to the terms of a lease.

Mr. W. A. Forsyth said that there had been great progress in scientific farming, but not such an advance in farm buildings. If one looked at most text-books on the subject, one would see interesting plans, but lamentable elevations. In the plan Mr. Cautley showed, in the cowsheds there were no cross-walls, and unless the main walls were very strong they would not stand the thrust of the roof. Moreover, cross-walls were very useful in preventing the spread of fire should it break out, and this was a great point where animals were concerned. Mr. Cautley did not say much about vermin—rats, etc.—which were a great nuisance on some farms, and it would be interesting to hear his views on the matter. Did not Mr. Cautley thing that 4 ft. 6 in. too high for the division walls of a piggery? Farmers seemed to think 3 ft. 6 in. sufficient. Space in roofs of farm buildings was very useful. In a cart-shed it should not be forgotten that if one covered in the roof and used it for a store, there should be a trap here and there with a pulley swung from the roof.

Mr. F. C. Mears said that farm buildings differed in various parts of the country in name and type, and especially was this the case in Scotland. In Scotland one seldom saw the model homestead; most homesteads were of the good old type, without very much regularity about them, but they had been found suitable for years by experienced farmers.

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The following communication by Mr. H. Lovegrove was then read by the Chairman:—

Mr. Lovegrove said that he expected that the paper would go more into the details of the erection of farm buildings, whereas it was chiefly concerning the arrangements to suit the animals. He considered that aspect was most important, and so he would place the farm buildings on three sides of a square, the open side being next the south. A good, deep well was very essential, as ponds often got very filthy. He suggested swing bales for cart-horses, as used in large stables in London. The overhead rack was justly condemned. The term "Dutch barn" was often applied to a wooden barn, but the real Dutch barn was a roof only, and the rising and falling roof was much used in Holland. That was a roof of corrugated iron, hung between four posts, so that a rick of 10 ft. was protected as much as a rick of 30 ft. Nothing was said of what might be the most profitable stock on a poultry farm. It had been the custom to feed fowls anyhow, and allow them to roost anywhere, but some farmers had now been driven to take advantage of every means of making money, and properly-arranged houses and runs had been found to increase the income. The great thing was to give shelter in bad weather; nothing so increased the supply of eggs.

The Chairman, in putting the vote of thanks to the meeting, said it was not because the Committee of the Association had forgotten the paper Mr. Cautley had read before the Discussion Section that they had asked him to read the present paper, but because they remembered what an interesting and instructive paper it was. He happened to know that Mr. Cautley did not neglect the picturesque in his farm buildings; his work showed that. There were some magnificent old barns to be seen in various parts of the country—at Basingstoke, as had been mentioned, at Glastonbury, at Tisbury, and elsewhere.

The vote of thanks having been heartily agreed to, Mr. Cautley, in reply, said he had been criticised for not saying enough; he was afraid to say more for fear of exceeding his time. He had not touched on construction, machinery, materials, altering old buildings, and other matters for that reason. He had been asked why he had not brought a perfect plan. Well, he did not think there was a perfect plan, and almost any plan could be found fault with in some respects. He was strongly of opinion that it was better to have separate buildings than to keep them grouped. He agreed as to the importance of aspect; and as to the open yard, he was quite convinced as to that. If he were keeping store or fat stock, he should have covered yards, but if he were dairying, he would not have covered yards. As to cows communicating colds or disease when placed head to head, he did not think that they did in any greater measure than with the dunging passage placed between them. He had been criticised for advocating a smooth cement floor, but it must not be thought that he advocated a cement floor that was so smooth that it made the animals slip; it should be smooth enough to carry off liquids. He did not like oak curbing, because it was bound to get slippery. Then as to cake-crushing, cake was very heavy, but the difficulty in having it on the ground floor was that it took up so much room, especially when it had to be crushed. It was often bought crushed, and when that was the case it did not deteriorate. They were all convinced of the great necessity and usefulness of having the administrative block two stories high so as to afford shelter. As to a meal place for men, he did not think it was wanted, but a warm place was wanted where a man could be when watching some sick animal in the night, and such a place was best provided in connexion with the boiler-house. He quite agreed that it was inadvisable to use nothing but masonry. He had just put up buildings for a farmer, and he had used weather boarding. As to corrugated iron, it could be got for 1s. 6d. a yard super, and they could not afford to neglect its use; still, it was not a nice thing to use; but there was a way of getting over its conductivity. When it was put on the rafters, wire was strained from purlin to purlin, and about 3 in. of straw was then inserted. Still, that arrangement harboured vermin, and that indicated the advantage of building in brick, etc., for where a farm was well-built there was no room for vermin. As to altering old barns, this became necessary in all alterations. Barns could be partitioned off to form the administrative block, or they could be used as double-row cowsheds, but old barns were never of sufficient width to get a feeding passage behind the heads of the animals. Old barns also made very good fatting boxes.

The Chairman announced that the next meeting would be held on December 4, when a paper by the Architectural Association Camera and Cycling Club would be read on the subject of "Photography for Architects," illustrated by lantern view.

The meeting then terminated.

THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, the following loans were agreed to:—Battersea Borough Council, 15,000*l.* for the erection of working-class dwellings; Bethnal Green Borough Council, 15,750*l.* for purchase of land; Greenwich Borough Council, 1,005*l.* for erection of a mortuary; Lewisham Borough Council, 2,250*l.* as contribution to cost of acquisition of open space; Shoreditch Borough Council, 806*l.* for dust destructor; sanction to a loan to Islington Borough Council for 849*l.* for electric light installation; and St. Pancras Borough Council 6,040*l.* for similar purpose.

Housing, Hackney.—The Housing of the Working Classes Committee reported as follows:—

"On 27th October, 1903, the Council referred to us the following tenders for the erection of Vallette Buildings, Jerusalem-square, Hackney, which are to be erected for the accommodation of persons of the working classes displaced by the Mare-street improvement:—

Messrs. Kirk and Randall	£17,884
Mr. Henry Lovatt	18,600
Mr. B. E. Nightingale	19,250
Messrs. Todd and Newman	19,413
,, Stimpson and Co.	19,438
,, Martin, Wells, and Co....	20,444
,, Watts, Johnson, and Co....	20,653

The architect's estimate comparable with these tenders amounts to 18,978*l.* We now submit working drawings, specification, bills of quantities and estimate in respect of the dwellings. The estimate is made up as follows—cost of buildings, 17,884*l.*; provision for articles to be bought direct, 190*l.*; architect's expenses, supervision, quantity surveyor's, and other charges and incidentals, 1,126*l.* The buildings will consist of one block of five-story dwellings, and will provide accommodation for 416 persons in 39 tenements of two rooms, 34 tenements of three rooms and seven tenements of four rooms. According to the terms of the re-housing scheme, approved by the Secretary of State for the Home Department, the buildings must be completed by 8th May, 1905. It will be seen that the tender of Messrs. Kirk and Randall is below the architect's estimate. . . ."

The Committee recommended that the tender of Messrs. Kirk and Randall be accepted, and this was agreed to. A member asked whether it was a fact that the work had been offered to the Works Committee, and had been refused, but no answer audible to our representative was given.

Small Open Spaces.—The following recommendation of the Parks and Open Spaces Committee was agreed to:—

That the reference to the Parks Committee of 30th November, 1897, to prepare and submit a scheme whereby the whole of the open spaces and churchyards in the country, kept in order and maintained by and at the expense of local authorities, should in future be maintained at the cost of the Council, be discharged.

Tramways: Car Sheds.—The following recommendation of the Highways Committee was agreed to:—

That the estimate of 35,000*l.*, submitted by the Finance Committee, be approved; and that expenditure on capital account of sums not exceeding that amount in all be authorised in connexion with the rebuilding of the car-sheds on the site of the Council's tramways depot, Streatham Hill.

The Committee also reported as follows:—

"The Council on 28th July, 1903, accepted the tender, amounting to 6,541*l.*, of Messrs. J. and M. Patrick, for the work of excavating and levelling the site of the car-sheds to be erected by the Council upon the site at New-cross, acquired from the Haberdashers' Company; and this work is now well in hand. The specifications and drawings of the superstructure of the car-sheds have also been prepared and submitted to us, together with the architect's estimate of the cost, including a sum of 3,500*l.* for clerk of works' salary and architectural and other expenses, of the erection of the car-sheds, namely, 84,030*l.* Being of opinion that the work was of a nature which could advantageously be executed without the intervention of a contractor, we consulted the Works Committee, who have informed us that they would be prepared to carry out the work for the amount of the architect's estimate of the cost of the erection of the buildings—namely, 80,530*l.* It will also be necessary for certain works inside, and in connection with, the car-sheds—including the laying-down of rails, the construction of conduits, and the paving of tracks—to be carried out, and it is estimated that the cost of these works will probably not exceed 7,000*l.* We propose, subject to the approval of the Council, that these works shall be executed by the Council's permanent-way staff under the supervision of the chief officer of tramways, this course having already been adopted, the Council will remember, in the case of the Clapham, Balham, and Rye-lane car-sheds. The total expenditure for which we have to ask the sanction of the Council in respect of the erection and equipment of the New Cross car-sheds amounts, therefore, to 91,030*l.*, which is covered by the estimate of 152,000*l.* approved by the Council on July 29, 1902, in respect of the erection of buildings at New Cross and elsewhere. . . ."

The Committee recommended accordingly.

Mr. A. O. Goodrich moved that the recommendation be referred back, and the Committee be instructed to advertise for tenders. He said the proposition of the Committee was a monstrous one. The contractor would do the work cheaper because of his individual enterprise and individual oversight.

Mr. E. White, in seconding the amendment, said strong reasons could be adduced why the job should be put out to tender. On a former occasion a contractor erected a car-shed at a cost considerably under the architect's estimate, and consequently there was a large profit for the tramways. At the present time material was cheap and labour plentiful, and if ever work could be carried out cheaply it was now. There had been instances of late where the tenders of contractors had been considerably below the architects' and engineers' estimates, and this was not surprising, because if the officers under-estimated they would be called to account.

Colonel Rotton supported the amendment, and remarked that, as for the contention that contractors' work was not so good as that of the Department, if such was the case it was the fault of the Council's officers.

Mr. Torrance (Chairman of the Committee) said the Council had spent large sums in connection with the establishment of the Works Department, and it was the duty of the Council to send whatever work it could to the Department, if the Department could satisfactorily carry it out, or otherwise there would be a dead loss on that undertaking. As Chairman of the Works Committee, he was not leading such a forlorn hope as some people thought, for in a few weeks' time he would make a statement on behalf of the Department which, he hoped, would be a very satisfactory one indeed. With reference to the question before them, the estimate put in by the certifying officer was an exceedingly close one, and the Department would have to work very carefully to make it pay. They were going to try to do their best, and surely Mr. White would admit that the Council could buy as cheaply as the contractor, and if there was a saving the Council would benefit.

Mr. Howell Williams said that the Department existed, and it should have sufficient work given to it to keep it going.

On a division, the amendment was defeated by 80 votes to 23, and the recommendation was agreed to.

The same Committee recommended, and it was agreed:—

That the resolution of 29th July, 1902, with regard to the erection of the sub-stations at (i.) Clapham, (ii.) Brixton, and (iii.) near the Elephant and Castle, be varied so as to provide for the work of erecting the Elephant and Castle sub-station being carried out by the Works Committee upon the basis of the priced bills of quantities under which the Clapham fire brigade station was erected, with an increase of 5 per cent. upon those prices.

Allotments Bill.—The following recommendation of the Small Holdings Committee was agreed to:—(*a*) That the standing orders relative to applications to Parliament be suspended so far as may be necessary in order that the Council may consider the following recom-

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mendation. (*b*) That the Parliamentary Committee be instructed to take the necessary steps for the introduction of the Allotments Bill in the next session of Parliament.

The Council soon after adjourned.

THE ARCHITECTURAL ASSOCIATION DISCUSSION SECTION:

PRACTICAL TRAVELLING ON THE CONTINENT.

THE following paper on "Practical Travelling on the Continent" was read by Mr. M. G. Pechell before the Discussion Section of the Architectural Association on the 18th inst., Mr. J. H. Pearson in the chair.

Mr. Pechell said: Some years ago a paper was read by Mr. A. T. Bolton* at the Architectural Association fortnightly meeting on the "Practical Side of Travelling." I have found it of the greatest value in two tours since undertaken, and Mr. Bolton has kindly allowed me to use his material in this paper, which deals solely with Italian touring.

First tours are often of the rush-round nature, taking in all the chief cities, and chiefly of value as giving a general idea of the different styles and types of work. They should, if undertaken at all, be followed by a long tour, giving an extended stay at all principal centres, with sufficient time at the smaller places to give one a clear idea of the more strictly local varieties of the main styles. A series of short holidays, taking up a fresh district each time, are almost equally good.

I think the best number for a working tour is one, unless it is intended to measure up with a view of publication. A party of two is then better, and at all times more pleasant, as touring by oneself is very lonely work. Larger parties of three or four are still pleasanter, but, as a rule, this tends to sightseeing rather than settled work. Also, in this case, a time-table must be arranged, and no great change from it is possible.

For locality, study "Anderson's Renaissance in Italy," well worth taking as an extra guide-book. Study Baedeker with Anderson, and make a list of things that appeal to you. Also read Mr. Theodore Fyfe's paper, "An Italian Tour," lately published in A. A. *Notes*.

The Best Time for Travelling.—Probably April, May, and June are the ideal months, as the days are long, and the weather settled and not too hot. In July and August the heat becomes excessive in the plains, while hill cities, like Siena, are still fairly temperate. In September the weather cools again, and both that and October are pleasant months. The days are, however, short, and the weather not always settled.

Mr. Bolton strongly advises adopting Italian hours during the hot weather, rising not later than 5 a.m., working outdoors from 6 to 10 a.m.; from 10 a.m. to 4 p.m. rest, and lunch, and with any work (like setting out and finishing) that can be done indoors; resume outdoor work at 4 p.m., and dine late. Evening chill is the chief danger after a hot day, and I am told that a cholera belt is the best precaution against this.

Money and Expenses.—Take Cook's *5l.* forms. They are issued in cheque book form, with accompanying voucher of introduction, and are useless without the latter. Therefore, if with a companion, exchange vouchers. Take with you a few pounds worth of Italian notes and silver, and also a small amount of French money for use *en route*. Two pistol pockets are useful for carrying change, cheques, and circular tickets in inner breast pocket, secured at mouth with a button. Beware of bad change in Venice, also of "touts."

Mr. Bolton gives the following summary of cost of tours:—

Nine months as far as Athens	£150.
Six months France and Italy	£100 to £110.
Three months	£60 to £70.
Two months	£50.
One month	£25 to £30.
Three weeks	£20 to £25.

"These figures involve comfortable travelling, second class on through journeys, good and fair hotels, photographs, and occasional excursions, a drive now and again, papers, cafés, etc.; but they mean that you must know something of the language, and in the longer tours must make some stays of three weeks to a month in smaller places, where you can live for 5s. a day."

Personally, I did three and a half months for 64*l.*, and recently twenty-six days for 24*l.*, this latter chiefly a trip with only a few days at each place at most.

During the first trip, my stay in Florence extended over three weeks, and total daily expenses came to 7 francs, so the advantage on trips giving a long stay at each centre of interest is easily seen.

Tickets and Routes.—For tours inside the time limit of tickets, I think the circular tickets *via* Dieppe and Paris are as good and economical as any. A second-class ticket from London to Turin, thence by Genoa, Pisa, Florence, Venice, Milan, and home by San Gothard, costs 9*l.* 4s. 4d., and is available for sixty days. In Italy, these allow of break of journey at any station on the route. The Italian section is a circular ticket, signed by holder, and presented at the frontier station to be *viséd* for first stop. After this, at each station of departure for next stopping-place. Get this done at Cook's where possible, this saves much tedious waiting at station booking-offices. The Dover and Calais route costs nearly 1*l.* 8s. more. Another route is by Dover, Ostend, and Bâle. Third-class express tickets between Dover and Bâle, available forty-five days, can be bought in London, then booking locally between London and Dover, and again (but second class this time) between Bâle and Milan.

Approximate cost, London, Milan, and back, 5*l.* 13s., while a second to Milan and back *via* Dieppe costs 7*l.* 19s. 7d. Certainly this is the cheapest route if a restricted tour in the north only is intended. For longer distance tours, the cost of circular ticket in Italy would make it exceed combined second class as above. Fast trains in Italy are only available for first and second class passengers, therefore use third class for local travelling only. For long tours, when time is not so important, travelling by sea is pleasant, and not much more expensive. Second class London to Naples by German Lloyd costs 8*l.* 7s. 6d.

Luggage can be left in *déposito* at all stations at 5c. per package per day. Bags must be locked.

In the north, especially about Milan, steam tramways are convenient and cheap. For example, both Pavia and Bergamo are connected with Milan in this way, and Prato with Florence. A timetable (Orario) of both rail and tram services can be bought at the newspaper stalls for 20c. and upwards.

Credentials.—A passport is advisable, if only for obtaining registered letters; a "*visa*" is not necessary.

The A.A. letter, issued on request to members, is excellent, as it looks official and important. The R.A. bone and R.I.B.A. travelling card are also useful; some form of credential is necessary to obtain free Government permit. The Italian Consul in London will put a *visa* on the R.I.B.A. card at a cost of 7s., which is in itself a free pass to the Government collections. The permits (*permissi*) issued by the Italian Government to students are useful, as they admit to all State galleries and museums. Among the latter, the Bargello at Florence is splendid; Pompei is also under Government charge. At Venice, the Ecclesiastical Authorities issue sketching permits for buildings under their charge. The office is at the head of the Giants' Staircase, and similar arrangements are in force in Rome for the Vatican.

Usually, in the smaller places, there is no need at all to ask permission, unless measuring on a large scale is involved. Work may even be proceeded with quietly during services, but always stop during the specially solemn parts of the service.

Outfit.—To quote Mr. Bolton, aim at the "absolutely necessary." For a tour of a month or so take two packages only, one a 20-in. Gladstone with a good lock, and the other a canvas sketching satchel, leather bound, in two compartments, to take a ½ imperial board. (This can be had by Pontifex and Wood, near Victoria Station, for about 15s.)

In the first take a spare tweed or serge suit, spare boots and thin slippers, shirts (flannel or soft cotton), collars (with one or two rubber ones and spare studs), change of underclothes, pyjamas, plenty of socks, hat, and thin travelling cap. Take sponge, tooth, nail, and shaving brushes, and soap in waterproof case; also razors, strop, shaving paper, and a small mirror. Perhaps brown polish and brush for boots, and spare laces. Take a "housewife," with darning material and scissors.

Guide-books.—Baedeker's is best, the latest edition, and have it cut up into sections and rebound in dark cloth. Dictionary and phrase book, if not fairly expert in Italian. Have a large inside or "poacher's" pocket put to your working coat; it is invaluable for sketch-books.

Take a light overcoat, umbrella in case, and pair of 5 ft. rods with connecting ferrule (rug not needed except for sea voyages.) These can all be strapped outside either bag by either loose or attached straps.

I am not an advocate for taking medicines with one; it is easy to overdose oneself. Take a tube of lanoline, as sore feet are easy to get in hot weather, while Keating's insect powder may be recommended to thin-skinned folk. I find one or two holland bags are useful for holding sundries. Paper, envelopes, and a fountain pen should be taken.

The sketching satchel is to contain a ½ imperial board (Stanley's steel-lined is best) with T square, in 1s. portfolio. Whatman and cartridge paper, a block (Mr. Bolton recommends 18 by 12 cartridge) and small, thin, pocket sketch or note-books (6 by 5, as used in studio). Small colour box, water-bottle and cup, instruments in roll, two set squares, pencils, flat rubber, knife, nibs and holder, ink, pins in flat cork, 2 ft. rule in pocket, 33 ft. tape and plumb line. A short level and wood calipers are often very useful, especially for Gothic work. Extra paper, colours, etc., can be had in all cities.

Sketching stool not necessary; a chair can always be borrowed. All these can be put into one pocket of satchel; the other will hold sufficient things for a stay of a night or two off the main route.

For longer trips a ½-imperial board, with T square, large set square, and portfolio, with paper of suitable size should be taken. These will all go in a big canvas case and leave room for extra shirts, socks, etc., needed for the longer trip. The board will only be needed for setting out important work, and so can be left with the Gladstone at headquarters when making short trips off the regular routes. It is as well to know that ½ metre is the limit of size for packages taken in carriages, and that, even then, 20 kilos is the limit of free transport. Any luggage not taken in the carriage must be registered and paid for.

Living.—Opinions vary much, so I cannot recommend any special hotels. In general, the hotels visited will probably be those classed by Baedeker as "second-class Italian, with *trattorié*." Charge per head, 1½ to 2 francs a night, to 2½ at the better houses. "Service" is not always included. Ascertain this and strike a clear bargain. Where service is extra, allow about 40 centimes a head for a party per night. Boots are also extra, where service is not included. Sanitation in these hotels is not usually up to date. Adopt Italian methods and hours entirely, and try all the distinctive dishes. Café and biscuit is a good substitute for afternoon tea, and very necessary when lunching at eleven, as one often does. Where a stay of a week or more is intended, lodgings can be had very reasonably. In Florence I paid 10 francs a week, service included.

Morning café is usually taken out of the hotel. The restaurants labelled in Baedeker as "unpretending" are often good and reasonable. Drink the country wine, and mistrust the water.

On the Question of Tips at Hotels, etc.—At the smaller restaurants 15c. to 20c. per head. Waiter at Café, 5c. Service at hotels, as suggested above, paid to head waiter, and to porters, etc., according to services rendered. Where service is charged, the only tips beyond those for meals are small sums to chambermaid and porter. Baedeker gives a list of tips for sightseeing, which are about right.

Various Hints.—A moderate knowledge of Italian, with civility, will go far to make one's stay pleasant and easy; as Italians are usually both polite and willing to help one. Study Italian before leaving home. This can be done at any of the language schools, or privately, with help as to pronunciation. In Italy, read the evening papers for practice. In most things bargaining is essential if a fair price is to be paid, and the Italian cabby or gondolier hardly seems to regard the tariff rate as an absolutely fixed one.

Photographs (silver prints) can be bought for about 5 francs a dozen, and a fine collection of detail photographs are available. Picture postcards give one a good general record, and cost 5c. each, often less. Remember these

* Mr. Bolton's paper here referred to appeared in our issue of June 2, 1894.

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require 10c. stamp for home. Tobacco, generally, is not good, except imported cigars, cigarettes, and tobacco, which are all expensive.

Letters are best sent "care of Cook's," at the various cities where there are Cook's offices. This is better than *Poste Restante* (*Ferma in Posta*), as Cook's people are naturally easier to deal with than any foreign official can be.

Study the preliminary pages of Baedeker carefully. Nearly every hint is invaluable. In each city a short summary of the chief sites is given. It is as well to work through this during the first day of your visit, taking notes of anything worth sketching or measuring. Also ascend any high tower in the town, and so get your bearings clearly in your head.

Often, too, you will see buildings from above that would otherwise pass unnoticed, from the closely built nature of Italian streets: cloisters, for example.

In conclusion, remember how readily Italian cities divide themselves into natural groups. The two lines from Milan to Venice, one by Verona, the other by Piacenza, each form the backbone of a characteristic series of towns. Venice is full of material for the longest possible holiday. The Adriatic coast, again, brings one to different and interesting work, and so with Perugia, the centre for the Umbrian cities. Bearing this in mind, it is not difficult to plan even a short summer tour, so that good and thorough work can be done, taking up a fresh district each time. But to do this with success from the first, a knowledge of ways and means is essential; and it is precisely this knowledge that I have tried to set before you to-night.

The paper brought out, in the discussion which followed, the views of some dozen members, who gave their experiences of travel on various parts of the Continent, and, indeed, even further afield. "Baedeker" was voted excellent, both as to general advice and specific information, although not necessarily exhaustive as to the smaller class of buildings of architectural interest in certain towns; "Murray" was, perhaps, better in this latter respect. The advantages and disadvantages of having company or in going alone on working tours were weighed, the general opinion being distinctly in favour of the former. Views and impressions could be exchanged and consolidated in the evenings after a day's work by each on his own bent, and points thrashed out, whether of architecture or of peculiarities of the local tongue. As regards a plan of operations, some men seemed to work all day. Others worked in the early hours, and saw sights in the latter part of the day. Again, picture galleries and museums might be kept in reserve for wet, cold, or dull days. The scale of expenses naturally varied with the tastes of the traveller, and also depended a good deal upon his knowledge of the language. We were told, for instance, that in Egypt every word of Arabic is worth a shilling. 1*l.* a day for twenty-eight days was an experience which agreed very closely with the author's—of twenty-six days for 24*l.*; while, in contrast to 50*l.* for two months mentioned in the paper, a six weeks' tour to Italy, going *via* Ostend and Bâle, had been done on 25*l.* Rooms might, after some bargaining, be obtained in Rome, Florence, and other towns at 30 francs a month; but to search out suitable rooms takes time, so unless the stay is to be a long one, it is as well to go straight to a hotel. A bicycle is good for France, but the distances are too great for any but strong riders. In France two bicycles are carried any distance by train for 10 centimes. Belgian roads are either cobbles or dusty, and therefore not very suitable for bicycles. In Italy, a bicycle might be of service if a long stay were being made in one town as a centre for a district. But walking, especially if a thorough knowledge of a given district were desired—combined with, perhaps, a little hiring—was probably the best way to get about. The Special Visitor—Mr. A. T. Bolton—recommended that the river valleys, especially in France, might be taken walking, and he pointed out that years ago Taylor and Cresy attained their knowledge of Greece in that way. As regards the camera, Mr. Bolton and others thought it were better left at home, although several of the speakers had evidently found it a great help. The pocket Kodak was praised, and also flatly denounced as useless. The more thoroughgoing photographers went in for Sanderson's camera. By taking a stool, if you could adapt yourself to its seat, you were independent of the good people who were for ever offering you chairs. But so far from a stool being at all necessary, one speaker thought you had better go without any sort of paraphernalia whatever, and indulge in nothing more harmless than the making of critical and analytical notes with your building before you. Mr. Bolton thought most cities had a sort of natural key to their architectural development, and if this could be found their study would be made easier and more interesting. Spain was for the artist rather than the architect; or, if for the architect, not until France and Italy had first been properly seen. One French cathedral was worth all the Spanish put together. But there was some good Romanesque work in Spain. Mr. Bolton characterised railway travelling in Spain as tedious, and sometimes disgusting. The hotels might be good, although it was necessary to see to it that you got a bedroom into which the sun had a chance of shining.

ENGINEERING SOCIETIES.

THE JUNIOR INSTITUTION OF ENGINEERS.—At the meeting of this Institution, held at the Westminster Palace Hotel on November 20, the chairman, Mr. Samuel Cutler, jun., M.I.Mech.E., presiding, a paper on "Fires on Shipboard, their Causes and the Methods for Prevention and Extinction," was read by Mr. George Canning. On the following day, by invitation of the Clayton Company, the Institution witnessed a demonstration of fire-extinguishing at Orchard-place, Blackwall. The apparatus shown in operation consisted of a sulphur chamber or generator, in combination with a blower and engine, and a cooler. Ordinary rolled sulphur is placed in the generator and set alight by means of a piece of waste. Two pipes are fitted to the generator, one for delivering the gas to where the combustion is taking place, and the other as a return or suction pipe. Air taken from the compartment to be treated enters the generator, and the oxygen combining with the sulphur vapours, produces sulphur polyoxide gas. This is then drawn through the cooler and forced by the blower through the discharge pipe into the holds or other compartments. The gas permeates thoroughly any substance, however closely it may be packed; but even after the fire has been extinguished the object in view is only partly accomplished, for it has been found that, if oxygen is admitted to a chamber above a certain temperature, combustion will ensue again. To avoid a renewal of the fire, therefore, the generator is cut out of circuit, the hot gas-laden atmosphere is passed direct through the cooler, and kept circulating until the hold or compartment is reduced to about normal temperature. Fresh air is then gradually admitted, thus obviating any danger of the fire breaking out again. The demonstration at Blackwall was conducted under the direction of Mr. J. D. Evans, the engineer, in connexion with a brick building erected for experimental purposes. The structure was filled with an atmosphere of which between 5 and 10 per cent. was sulphur polyoxide gas. Burning torches were thrust into the compartment through vent-holes provided for the purpose, and were immediately extinguished. A piece of metal heated to incandescence in a furnace was dropped into a bucket of petroleum placed inside the building, and although the oil was heard bubbling, there was no evidence of flame or fire. The structure was subsequently opened up, and the gas within it allowed to escape, when a pile of wood and shavings saturated with paraffin was set alight within the building. The fire having been allowed to burn freely, and the gas from the generator again turned into the compartment, in a very short time the flames were completely extinguished, and the cooling process was illustrated.

THE CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—At a meeting of this Society, held on the 5th inst., Baron H. T. H. Siccama, M.Inst.C.E., read a paper on "Foundations." Foundations obtain their greatest importance, he said, in alluvial soils, where their cost is sometimes equal to that of the superimposed structure. The author then described in some detail the growth of a delta at the mouth of a river, going on to say that in many of these marshy districts raft foundations were very extensively adopted in former times, and that on the alluvial plains of British Guiana, and in parts of Holland and Germany, many buildings still exist at the present day that are founded on a thick matting of branches and faggots, and some even on layers of dried peat. Concrete laid down in slabs was the best material for footings. Where a compact structure had to be carried, such as a tower or chimney, a few layers of cement mortar would be sufficient, but where long walls were concerned, iron rods, running lengthwise, bedded a couple of inches above the bottom in the concrete of the lower slab, and also a couple of inches from the top of the upper slab, gave great security against unequal settling and fissures in the walls. Sand foundations were a very ancient device, and some Egyptian temples built on such foundations were still standing. Another long-known system was that of piles. Even the lake-dwellings in prehistoric times were principally built on them. The same type might still be met with in some villages in the tropics. The author went on to say that, although it was generally thought that the driving of a sufficient number of piles consolidated the soil, it was just the reverse. The piles themselves and the shaking during driving destroyed the cohesion between the different strata and churned the whole into a quagmire. Also, in driving in a long pile, after it had become stationary and a hard stratum had not been reached, it was often left for twenty-four hours and then rammed again. If it took several blows before any impression was made, owing to the adherence of the soil to the surface of the pile, ramming was often stopped after a few blows, and it was thought that the pile stood on firm ground. But frequently, when the full permanent weight of the building was superimposed, a considerable and slowly progressive settling was observed to go on for years, till at last the platform over the piles compressed the subsoil sufficiently, and acted more or less like a raft. In every case the construction of the timber platform was of great importance, not only because it must be able to carry the weight of the walls between the piles, but it must bind these together so as to distribute the load evenly, and also prevent the upper parts of the long masts from bending sideways. Another error was the use of a pile foundation where a hard sand plate was met with at little depth beneath the surface. An old sand stratum was difficult to pierce, and even when the piles were not split up before half way down the sand was disturbed all round. Not much harm was done where the timbers were constantly submerged in fresh water, but where tôredo could get at it the sand disturbed during the operations ultimately settled down again, and left spaces filled with clean water, where the sinister worm soon entered. Where a sufficiently hard stratum was overlaid by soft stuff to such a depth that the longest procurable masts could not reach it wells might be used. There were instances in Venice where a wooden-cooped well barrel was used, hooped by iron bands and driven down by the weight of sandbags arranged round the top. When the well had gone down to the required depth it was filled with stones and other material. If this filling were not of itself cohesive there was danger that when the wooden barrel staves decayed the enclosed substance might spread and the building come down. Screw piles were much superior to driven ones where they had to stand in sand. A new kind of foundation was the sand pile. For this a hollow iron shaft was tipped at one end with a loosely-fitting pointed shoe and driven down to the proper depth. The shaft was then withdrawn and dry sand run down it. This filled the space left by the shaft as it was raised, the shoe being abandoned. In a breakwater, riprap was a part of the useful construction which began at the bottom. For quay walls, riprap mounds would give good foundations unless the bottom were too soft. In the construction of docks and in navigation works it was a mistake to make them too permanent and too costly. Nothing changed so continually as the needs of traffic by water, and the best policy was to provide what was needful at the moment at the least cost, the best foundation being one that served its end at the lowest cost.

CHRIST CHURCH, TUNSTALL.—A new reredos, which has been erected in Christ Church, Tunstall, to the memory of the late Mrs. Annie Street by her brother, Mr. George Wilks, J.P., was dedicated recently. A mural tablet was also unveiled. The reredos is fifteenth century in style. The design is carried out in cream-coloured Caen stone, with some rouge French marble columns, the whole embellished in English gold. There are three canopied bays in the work, each surmounted by carved cresting. In the central niche is a sculptured figure of the Good Shepherd. On his right, in the niche on the Gospel side, there is a statue of St. Chad. In the niche on the Epistle side is a figure of St. Alban. The reredos has been supplied by Messrs. Roddis and Nourse, Birmingham.

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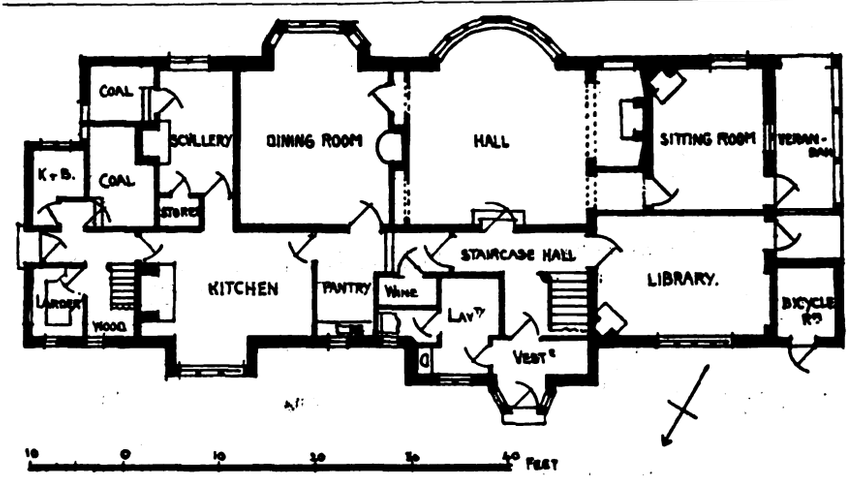

House at Limpsfield. Plan.

Illustrations.

THE R.C. CATHEDRAL, BENDIGO, VICTORIA, AUSTRALIA.

THIS building, which was commenced about six years ago, is situated on an eminence in the centre of Bendigo. The materials are granite for the foundations up to plinth level, a fine greyish-green freestone for walling, and a biscuit-coloured limestone for tracery, strings, and other dressed work.

The front half of the cathedral is now completed, and the footings are finished for the remainder. The cost of the front part up to central tower was about 33,000*l*. The full accommodation will provide space for 2,000 people.

Messrs. Reed, Smart, and Tappin are the architects, and Messrs. T. Cockram and Son the builders, both of Melbourne.

CAYTHORPE COURT, LINCOLNSHIRE.

WE gave in our issue of the 14th inst. a view of the exterior and of one of the rooms in this house, of which Mr. Reginald Blomfield is the architect.

The bird's-eye view published in this issue shows how the terraces and garden have been designed in relation to the house, the whole forming one architectural scheme.

HOUSE AT LIMPSFIELD.

THESE illustrations, one of which is from a drawing exhibited at the Royal Academy, give two views of a house built from the design of Mr. E. W. Marshall, to which we referred in reviewing the architectural room at the Royal Academy this year.

The house is to be built of brick, covered with white rough-cast, and roofed with green slate.

CHURCH OF ST. MARY, HILPERTON, WILTS.

THE only part of the old church remaining is the very simple and picturesque western tower, with stone spire, of fourteenth century work. The remainder of the church was pulled down in 1854, when the present nave, with chancel and south porch, was erected. In 1892 it was proposed to increase the accommodation by the addition of a north aisle, vestries, and organ chamber as shown in the view; the aisle still remains in abeyance. The part carried out consists of a gabled building of two bays, each with an arch opening into the chancel. The organ occupies the front part of the western bay; the rest of the space is occupied by vestries, which are divided from the chancel by an oak screen. At the same time the chancel was provided with oak fittings, as shown.

The works were carried out by Messrs. Light and Smith, builders, of Chippenham, Mr. C. E. Ponting being the architect.

MEMORIAL WINDOW, SOUTH SHIELDS.—A stained-glass memorial window was unveiled recently in the Archibald Stevenson Memorial Hall, South Shields. The artists were Messrs. Wailes and Strang, Newcastle.

THE SURVEYORS' INSTITUTION.

THE usual fortnightly meeting of the Surveyors' Institution was held at No. 12, Great George-street on Monday evening, the President (Mr. A. Buck) in the chair.

A Gold Medal for Papers.

Mr. J. W. Penfold, hon. secretary, having read a list of donations to the Library and Library Fund,

The President said that with a view to encouraging the reading of papers at the ordinary general meetings the Council had decided to award a gold medal for the best paper of sufficient merit read by a member of the Institution during the session. The Council ventured to hope that that might be an encouragement to members to write papers for discussion during the sessional meetings.

The President also thanked the members for the way they had received his address at the last meeting, and expressed regret at his inability to be present through illness He hoped to have health to attend the meetings to the end of the session.

Industrial Decentralisation and Housing.

Mr. H. T. Scoble, Professional Associate, then read an interesting paper entitled "Industrial Decentralisation: An Important Factor in the Solution of the Housing Problem." The author first reviewed past conditions, and referred to the literature bearing on the subject, and compared the present conditions of town and country in respect to factories and labour. References were made to instances of and to the effects of decentralisation, to trades unions, etc. In concluding his remarks on the Garden City scheme, the author said that many features of the original design had been eliminated, but there was still so much that was objectionable that he felt it his duty to state that the attempt to construct a garden city as detailed was, notwithstanding manifold improvements, but wasting time and money in the pursuit of a will-o'-the-wisp, and delaying and discrediting by its inevitable failure true progress in industrial decentralisation.

In a comparison of present conditions of town and country as regards factories and housing of labour, the author said, in regard to factories, that he would deal with the matter under three headings, *i.e.*, the disadvantage of towns, the advantages of the country, and exceptional cases. The contrast between urban and rural factories was so striking that any one at all interested in manufacturing could not fail to have noticed it. The cost of land in any of our big centres is so great that floor upon floor is built, until, by virtue of some Building Act or by-law, no greater height can be attained—in no other way was it possible to utilise a town site to the fullest advantage. It followed that the chief consideration in the erection of a town factory was to secure the largest amount of floor space, and this must often be done at the expense, so to say, of light and air, of convenience in the handling of the raw materials and finished articles, and also of time and labour in the different stages of manufacture. Nor was it possible to have extensive yards attached to town premises—the cost was prohibitive. Rates were too high, and must be paid on a rateable value of no mean figure; insurance premiums were calculated not only on the risks appertaining to any business itself, but on the danger from adjoining properties often of a hazardous nature, and were again necessarily high, as fire was likely to spread with rapidity in a many-storied edifice. Delays in transmission of goods, both in and out, were frequent, and might be attributed partly to the congested state of road, rail and water traffic, and the enlargement of premises to cope with increasing trade was often impossible, or could only be achieved at an expenditure out of all proportion to the intrinsic value of the additions secured. In old-established concerns, more or less primitive arrangements were still in vogue for the production and distribution of power, and although it might not pay to scrap them, yet, were a complete rearrangement possible, there was little doubt about the economy to be effected by the purchase of electricity and the employment of electric driving. Water, where used in any quantity, was an item of great expense, and the disposal of trade waste was often a matter of difficulty—in some cases they were admitted into the sewers of the Local Authorities, and in others excluded. The third Report of the Royal Commission on sewage disposal recommended, generally, that the local bodies should provide sewers of a capacity sufficient to carry trade effluents, and that the manufacturer should be granted the right to discharge his waste products therein, subject to reasonable safeguards and precautions.

As to the advantages of the country, the author said that the low figure at which land could be purchased in the country (and by that expression he meant land adjacent to small towns as well as strictly rural property) enabled a manufacturer to erect premises in every way superior to buildings in large towns. Instead of a many-storied, a ground-floor factory was coming into being, having ample light and abundance of air, and so arranged that no unnecessary, and therefore costly, handling of goods was required. Yards, often of the greatest convenience and value, cost next to nothing; the rates, though in places nearly as high, were on a smaller rateable value, and insurance premiums were greatly reduced on account of the absence of contingent risk and the improbability of fire, as a conflagration spreads upwards rapidly but sideways comparatively slowly. Delays in transmission could not be altogether avoided, but should be minimised, and an extension of any one branch or department of the works could be made at a moment's notice at a moderate outlay, and without interfering with the work in that or any other part. The site of a country factory would be chosen with some regard to the possibility of obtaining cheap power, and electric driving would be assumed from the outset. Water was generally obtainable either from wells or a local company, but the disposal of sewage, and in some occupations of trade wastes, might occasion difficulties, and must be taken into account.

The cases to which the foregoing comparisons did not apply, or in which, if pertinent, they were not of prime importance, partook of a special nature. Thus, for instance, where the expense of distribution was a weighty item in the cost of the goods, it might be more economical to have a factory, though subject to many of the disadvantages enumerated, yet by reason of its central position able to circulate its goods with minimum runs, and therefore easily and rapidly. Or extreme quickness in the execution of orders or repairs might be required, in which case a central site was clearly indicated. Again, where female labour was almost exclusively employed, and when the number of hands taken on was subject to great fluctuations, it might at present be essential to keep closely in touch with those districts wherein such labour could be obtained. Further, some industries were capable of assimilating quantities of surplus produce of a very perishable nature, and as our central markets were often flooded therewith an obvious advantage was secured.

As to the housing of labour, he said that his sole object was to show that it was "good business" for a manufacturer to secure labour which was housed under such conditions as make for the highest industrial efficiency. He again offered as a convenient arrangement the sub-divisions—(1) Disadvantages of towns, (2) advantages of the country, and (3) exceptional cases. The first point which merited special attention was that, owing to a variety of causes, which for his purpose did not need to be considered, it was difficult to obtain "rooms" in or near manufacturing districts—the use of the expression "rooms," by the way,

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was very instructive. From figures he had collected, it would appear impossible to secure accommodation at less than 2s. per room per week (3s. 9d. was the sum given him by a friend interested in social reforms as an average figure). In the buildings of the Peabody Donation Fund the rental per room was 1s. 11½d., or, with rates, 2s. 3d. Similar results appeared from a tabulation of figures given by certain workers at a factory in Bermondsey, and it would be admitted that in basing his remarks on this sum he was erring, if at all, on the right side. In overcrowded areas even a part of a room was made to suffice for a family, and rents went up at a much greater rate than the demand for rooms increased. That loss of stamina, physical debility, and a high death-rate, especially for infants, resulted should cause no surprise. When we examine the modern tenement building, and find a population of 700 or more to the acre, need we be startled at the general decline in physical powers? True, we were told that overcrowding was not permitted, but there were two sorts of overcrowding—per acre and per room—and though the evils of the latter were patent the insidious effects of the former, as far reaching in all likelihood, were not so easily detected. The time occupied in travelling and the amount expended thereon, together with absence from the family mid-day meal, all militated against the modern notion of dormitory towns. Even did no such objections exist, it must be plain that the opportunities for travelling by train, tube, tram, and 'bus were already used to the utmost extent, and that any further large development thereof might so overtax our already congested streets as to make "confusion worse confounded." In the meantime every increase in traffic facilities was helping to aggravate the evil, and the provision of workingmen's dwellings by the London County Council and other bodies only encouraged manufacturers to take advantage of labour cheapened by workmen's trains and by the utilisation of central building sites in a manner which should give serious thought to all. To erect workmen's dwellings on land valued at 30,000*l.* or more an acre was an economic error of no mean magnitude. It was argued that with such a scheme, for instance, as the Clare Market, Strand, clearance, where at a cost of over 220,000*l.* 750 people were housed (about 300*l.* per person), that the men must be near their work as they were required at such early hours. If a public body steps in to provide accommodation of a suitable character in a case of this nature, it should be an essential condition that a reasonable return be required on the *total* expenditure—otherwise the owners of labour-demanding premises in the vicinity are being unfairly subsidised.

As to the advantages of the country, the author said:—"A house to himself, which may be truly called 'home,' a garden or an allotment where pleasure and profit are combined, and the perpetual enjoyment of sunlight and pure air present a happy contrast with the lot of the town worker. Tram, train, or cycle place the artisan within reach of the amusements of town, and he has the satisfaction of knowing that his children are better off physically and morally in the country, than cooped up in some tenement building with only a paved yard to play in (and even then with flights of steps first to be negotiated) or in rooms whence they are turned into mean streets for their recreation. He himself can join the family at dinner, and by reason of proximity to his occupation saves many a fare and increases his leisure hours. From numerous inquiries I have made, it would appear that the majority of workers are only too glad of the opportunity of securing work at outlying factories. The owners or managers of many places I have visited agree that their hands do not want to return to town, and there seems to be a growing feeling that 'town life' is much overrated. Many of the dwellings erected by builders in the vicinity of large works do not show much improvement on the back streets of our towns, but the brief description of two well-known industrial settlements given under 'Instances of Decentralisation' will demonstrate that all the points of advantage detailed above can be secured, and that, be it noted, within the figure of 2s. per room per week. There will always be a percentage of human beings to whom town life has greater attractions than country life, and this percentage is naturally smaller in those classes whose town surroundings are more or less mean and squalid, but still it exists, and must not be overlooked. . . . But workers who have had experience of our large town and also of rural or semi-rural life, the majority prefer the latter."

The author then gave some instances of decentralisation. He said that an extensive list of removals to the country could easily be made, and one had only to think of one's own acquaintance to obtain (with most of them) a few examples. Printers and engineers had set the fashion, influenced largely no doubt, by the lower rates of wages prevailing outside London and other of our largest towns, and many industries had migrated in part or were "on the move." In treating of the erection and equipment of factories on sites where the value of the ground need not be taken into account, it was first of all necessary to divest the mind of the too familiar town structure, and to subordinate all other interests to the one of primary importance, namely, the economic handling of material. The principle of the sausage-machine as it might, not inaptly, be termed, was, to his mind, the one that should ever be kept in view. A one-floor structure would be the type usually adopted, but at times it would be more advantageous to raise the raw material in one operation, and take advantage of the fall thereby obtained to facilitate the working of the various departments required to evolve the finished product.

Mr. Scoble then gave a brief description of two factories he had inspected, *i.e.*; those of Messrs. A. Ransome and Co., Ltd., specialists in wood-working machinery, formerly of King's-road, Chelsea, and now of Newark-on-Trent; and Messrs. Elliott Brothers, Century Works, Lewisham, S.E., formerly of St. Martin's-lane, W.C. He also gave a description of the model villages of Bournville and Port Sunlight.* He then considered the effects of decentralisation as regarded (*a*) manufacturers, (*b*) workers, and (*c*) community.

As to manufacturers, he said:—"The most successful appeal will be made to the manufacturer, if it can be shown to him that the cost of production will be materially lessened by establishing his factory in the country. No one item alone would, as a rule, serve to demonstrate the advantage to be derived by the suggested change of habitat, but the number of small economies to be effected, coupled with the actual savings on large outgoings, will clearly indicate that if he wishes to keep abreast of the times he must move, and that right speedily. The land on which the buildings will stand is cheap or the rental is low, and the rates the manufacturer pays are, in consequence, less, as the local rates are probably lower, and the rateable value much less. Ample space permits of workshop design giving light and air, the economical application of motive power, the provision of most useful yards, and room for extension of premises. A ground-floor factory needs no expensive and unnecessary hoisting, etc., of goods, and if carefully designed can be relied on to entail but a minimum of handling both of raw material and finished products, insurance premiums will be greatly reduced, and a lower trade union rate of wages already prevails in the country. Increased efficiency in labour may be expected, for the country factory must needs be a more healthy place in which to work, and the attention paid nowadays to heating, ventilation, and the admission of daylight will be duly rewarded by the greater staying power of the hands employed. It will also be possible when making so far-reaching a change as a migration to rural districts to discard antiquated methods and machinery in favour of the most modern equipment. Too much has been made of the readiness of our Yankee rivals to scrap machines the moment a better model is in the market. Labour is more valuable there for one cause, but the chief reason for the procedure is the quality of the machines. They are made of soft metal, 'calculated' to last only a few years, and must in any case reach the scrap heap at an early date. The British manufacturer is very much alive to the possibility of introducing better machinery, but unless the improvements made are unusually great the old plant can, and will, give satisfactory results. Electricity by meter will, in many cases, supersede the more expensive and cumbersome production of power on the premises. Motor road traffic will have an important influence on many an industry. . . . The continued growth of electric tramway systems must also be taken into account as affecting both labour and the transport of goods. The opening of new works in the country will doubtless afford better opportunities for the introduction of some system of profit sharing, or the more modern 'premium system of remunerating labour,' to the mutual advantage of the factory owner and the worker. The chief result is that the manufacturer will be able to produce more cheaply. Less costly goods will compete in the home, colonial, and foreign markets with a greater measure of success, and it follows that in many cases business will increase. A more certain and quicker execution of orders can be relied on, as the factory will be capable of turning the work out more smartly, and will be practically independent of help from sources outside."

As to the workers, was industrial efficiency possible when labour was underfed and when far too much drink was consumed? Was it probable where the surroundings, both at home and at work, were of the meanest description? Would the coming generations have the necessary stamina to carry on the industrial battle? These and other questions must be faced, and it was his firm belief that no solution had yet presented itself other than removal to the country. In what respects would the workers at a suburban or rural factory be better off than their town brethren? Stated briefly, their homes would give superior accommodation at less cost, a garden or an allotment would be obtainable, affording healthy recreation and bringing in a substantial return; the time wasted and the money spent in travelling daily to and from work would be saved; the chief meal of the day would be taken with the family. The physical powers would be improved by better conditions of existence at home and at work, and the fascination of the public-house would vanish, as the various clubs, etc., and the vastly improved home life would be more attractive. It was not improbable that in the near future many very difficult problems would arise with regard to rating, and although he could not deal with that important point he ventured to suggest that its bearing on the subject must not be overlooked. What would happen at West Ham, for instance, if the Great Eastern Railway Company removed its workshops to some country site? It had been discussed, and might come at any time. The London, Brighton, and South Coast Railway Company had recently decided to move its works, and the London and South-Western Railway Company was engaged in building shops for the locomotive works department at Eastleigh, thus completing the scheme started many years ago. The reduction in the cost of manufacture, to be expected from decentralised factories, should result in larger demands at home and abroad, and therefore in increased production, which he took it was the chief concern of any industrial community.

The death-rate and infant mortality rate in many districts of London and other towns were far too high, and the body politic suffered in consequence. The total "time" lost through illness in any year was a very large amount (estimated figures had often been quoted), and this loss to the community was due in great part to unhealthy conditions, which would not obtain in country factories and villages. Then, too, the alarming increase in insanity noted of late was due in no small measure to drink; and in a recent lecture Dr. Forbes Winslow, who speaks with authority, said that quite one-fourth of the lunacy existing in the whole universe was caused by it. Whereas in 1859 there was one lunatic in every 536 of the population, on January 1 of this year the statistics showed that there was one person of unsound mind for every 203 of the population. London heads the list for this country with 18 per cent.; a reduction of such a high figure was a national necessity. It was not likely that the traffic of London would diminish to any extent, even though decentralisation of factories proceed apace, but many of the more obstructive vehicles would be withdrawn, thus making room for the inevitable expansion of passenger traffic. Estimated figures of the loss occasioned by the present congested state of affairs had also been published, and the sums named were almost incredible.

The grouping together of factory and dwellings on some new site, and the resulting increased intercourse between the employer and the workmen should convince both parties that their interests were really identical, and that their needs were complementary rather than antagonistic. The manufacturer who studied the well-being of his employees, not only in the works but in their own houses as well, would receive in turn a more willing, and therefore better, service. The introduction of the "pre-

* For a complete account of the Port Sunlight scheme see our issue for March 29, 1902.

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mium system of remunerating labour," whereby a certain amount of time was estimated for each operation, and the worker was paid a percentage on the hours saved, appealed strongly to the individual worker to put forth his best efforts, while "profit-sharing" schemes created a general "keenness" about the work, which was more effective than any amount of supervision. There could be no more fit occasion for the adoption of these practical indications of identity of interest than the starting of new works, and it was surely not unreasonable to expect more economical production in consequence. He anticipated that in this way the growth of trade-unionism, or at least of some of its more objectionable features so prominent at present, would be, if not entirely hindered, at least seriously checked.

In conclusion, he said it was his belief that a very considerable movement of factories from congested areas to suburban or rural districts might shortly be expected, and he would impress upon every one, upon the manufacturer more particularly, the enormous advantages to be derived from the housing of the workers in the best practicable manner. He was sanguine enough to believe that we as a people still retain our powers of adaptability to meet altered circumstances of competition, and that, given a fair field, we need fear no foe. And, finally, he held most strongly that the true solution of that most complex and confusing problem known as the "housing question" was to be sought, not by municipal or philanthropic effort, resulting in the erection of more and yet more dwellings in and about our large towns, nor by the increase of transit facilities, but by the establishment of country factories and model villages in connection therewith.

Mr. T. W. Wheeler, K.C., moved a hearty vote of thanks to the author for his interesting and valuable paper. The best compliment they could pay the author was to adjourn the discussion, and he moved to that effect.

Mr. H. Chatfeild Clarke seconded.

The vote of thanks having been heartily agreed to, and Mr. Scoble having briefly replied, the discussion was adjourned until January 11. The next meeting of the Institution will be held on December 7—an afternoon meeting.

ARCHITECTURAL SOCIETIES.

LIVERPOOL ARCHITECTURAL SOCIETY.—On the 16th inst. the third ordinary meeting of the fifty-sixth session of the Liverpool Architectural Society (Incorporated) took place. Mr. Woolfall (President) occupied the chair, and Mr. H. Chatfeild Clarke read a paper on "The Bill for Altering the Law of Ancient Lights." Mr. Clarke was a member of the Joint Committee of the Royal Institute of British Architects and the Surveyors' Institution which drafted the Bill. He said that the question of light in buildings was so essential an element that it was necessary that they should know something about the rights of light. The Act regulating ancient lights came in force in 1832, and it was now proposed to alter it, and the matter would be discussed in the next Session of Parliament. The Act gave an absolute right to access and use of light in any building if such had been enjoyed for twenty years. During the past forty years there had been very many legal actions arising out of the Act, and he thought it would be better for all parties if in their disputes they had less law and more open negotiation. With regard to ancient lights, trouble had greatly increased of late years, and in the new Bill many reasonable revisions were proposed, in some instances of a very important character, with the object of lessening the difficulties with which builders now had to contend.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—The annual meeting of the Leeds and Yorkshire Architectural Society took place on the 19th inst. at the Queen's Hotel, Leeds. In his third presidential address Mr. Butler Wilson referred in terms of praise to City-square. By the munificence of Colonel Harding and the genius of Thomas Brock, R.A., he said, Leeds now possessed one of the finest equestrian statues in the world. The subsidiary figures executed by Messrs. Drury, Pomeroy, and Fehr were also fine examples of the sculptor's art, but, taking the treatment of the square in its entirety, he was inclined to think that it was neither kind nor fair to the surrounding figures, however beautiful in themselves, to place them at such obvious disadvantage as their proximity to the principal feature entailed. Nor could it be pleaded that the equestrian statue was in need of their assistance. The value of the figures of Leeds worthies would have been greatly enhanced if they had been placed in some isolated and well-chosen situation. During the last few years Leeds had seen the sweeping away of vast blocks of dilapidated and insanitary property, and the upraising of structures, whether beautiful or not, at least fitted with every modern convenience and appliance. Broad thoroughfares had appeared, some of them leading to nowhere in particular. The electric tramways had created, whether legitimately or not, an inclination on the part of the authorities for rounded street corners; an inclination which had developed into a mania, born of a passion for the curve of beauty. Alluding to the making of new streets, Mr. Wilson said one was constrained to consider whether the arteries of traffic could be diverted by the tempting prospect of a broad thoroughfare which was even a little off the main line. The moral would seem to be that it was wiser to spend money upon widening the existing natural veins of traffic rather than upon the creation of new thoroughfares, in the midst of which one might stand, secure from harm, and listen, amid their spacious silence, to the rumble of traffic in the congested but natural artery only a few yards away. Piecemeal improvements were futile unless they formed part of a prearranged scheme. The Society had been twitted with the remark that it always raised its voice after the event, when it was too late to adopt its suggestions. But they could not suggest improvements of which they had no clear and definite knowledge. Alluding to the aims of the Society, Mr. Wilson said parents must be brought to see that for a youth to become an architect he must have a scientific course of training. But what experience or data had such mentors to judge of what qualifications an architect should possess? The status of the architect was less defined than that of a hansom-cab driver. Even students thought they knew a cleverer game than spending years in acquiring the groundwork of their art. "They go through a short, slipshod, aimless course of training," continued Mr. Wilson, "and are then pitchforked into the profession through the inexpensive medium of a brass plate and a terra-cotta catalogue." It would be a powerful incentive to the student to acquire a sound knowledge of the profession if he were not allowed to practice until he had proved himself efficient. On the motion of Mr. G. B. Bulmer, seconded by Mr. H. S. Chorley (the Hon. Secretary), a vote of thanks was accorded Mr. Wilson for his address.

BRISTOL SOCIETY OF ARCHITECTS.—At the opening of the session on Monday last the President (Mr. Joseph Wood, F.R.I.B.A.), entertained the members of the Council at dinner, after which a smoking "At Home" was held at the Fine Arts Academy, Clifton. There was a very large gathering of members and architectural assistants and pupils, who inspected with interest a large collection of sketches and measured drawings, the result of the work of a long period of years, by the President and his late partner, Mr. Foster. Many of the sketches dated from the early "forties," and illustrated bits of old Bristol that have now disappeared. Subsequently the President addressed a few words more especially to the student members, impressing upon them the desirability of maintaining enthusiasm in their studies by sketching and measuring good examples of old and modern work.

ARCHÆOLOGICAL SOCIETIES.

BRITISH ARCHÆOLOGICAL ASSOCIATION.—The first meeting of the session 1903-4 was held at the rooms in Sackville-street on the 18th inst., Dr. W. de Gray Birch, Hon. Treasurer, in the chair. Mr. Patrick, Hon. Secretary, announced that at the Council meeting that afternoon thirty-four new members had been elected. Mr. C. H. Compton, V.P., drew attention to various interesting archæological discoveries recently brought to light, including the Roman villa at Upton Pines, Dorsetshire (which contains some fine pavements), and the fragment of the Roman wall of London found during the recent excavations on the site of the new Sessions House in the Old Bailey. Mr. Compton also read some extracts from the registers of the parish church of Chesham, which is a fourteenth century building, restored by the late Sir Gilbert Scott. On the wall of the south aisle is an old painting of St. Christopher. He also exhibited several good photographs of the fine roof of the nave of South Creake Church, Norfolk. The Rev. H. J. D. Astley, Hon. Editorial Secretary, described for Mr. W. J. Nichols, V.P., who was unable to be present, an exhibition of "finds" recently made at Chislehurst in the close vicinity of the "caves," extending from prehistoric to modern times. They consisted of a palæolithic flint implement resembling a scraper, a flint ball for pounding grain, some fragments of Roman pottery, Samian and Upchurch, and a number of gun flints fabricated in 1800. Mr. Astley commented on the discoveries made at Delphi on the site of the temple of Apollo, which prove the Ionic character of the building; and on the recent discoveries of Messrs. Grenfell and Hunt in the Fayüm, Egypt, which included some more papyrus fragments of hitherto unknown "Logia" of our Lord. He then exhibited a series of nearly 100 photogravure reproductions (two reproduced in the original colours) of portraits discovered some years ago by Herr Theodore Graf in graves of the Ptolemaic period in the Fayüm. Some of these have been identified by Herr Graf, by the aid of coins, medals, and busts. Dr. Birch expressed some doubts as to the identification, but, apart from this, the series is one of very considerable interest from the lifelike character of the portraits, one or two of the younger women being especially beautiful, and almost modern looking. Altogether, we have here speaking likenesses of men and women who lived more than 2,000 years ago, and Herr Graf will meet with a warm welcome if, as he proposes, he should ever bring the original portraits to London. Mr. Patrick, Hon. Secretary, read, in the absence of the author, Mr. J. H. MacMichael, a paper dealing with "The Colour of the Sky in the Symbolism of Ancient Art and Folk Lore," a subject of a very interesting nature, and treated at considerable length with many references, showing that the writer had made it a study of much and useful research.

COMPETITIONS.

FREE LIBRARY, RAWTENSTALL.—In this competition, for free library, town hall, etc., Rawtenstall, the design placed first was by Messrs. Crouch, Butler, and Savage, architects, Birmingham. The second premium was divided between Mr. A. T. Butler, architect, Cradley Heath, and Messrs. Stones and Stones, architects, Blackburn; and the third was divided between Mr. E. Jenkins William, architect, Cardiff, and Mr. A. E. Dixon, architect, Leeds.

LONDON BUILDING ACT, 1894:

TRIBUNAL OF APPEAL AND GALLERY EXITS.

THE Tribunal of Appeal under the London Building Act, 1894, sat at the Surveyors' Institution, Great George-street, Westminster, on Friday, 20th inst., to hear an appeal by Messrs. Gerrard, James, and Wolfe, on behalf of the Royal Horticultural Society under Section 78 of the Act. The requirements of Mr. E. Dru Drury, the District Surveyor, which were now appealed against, were contained in a letter to Messrs. G. E. Wallis and Sons, and related to the construction of a public building intended to be used as an exhibition hall and office on a site situate on the north-east side of Vincent-square, and on the north-west side of Bell-street, in the City of Westminster, namely:—

(1) That the staircase to the gallery door, the entrance, and exits to and from the said hall from and to Bell-street aforesaid, must be supported and enclosed by brick walls not less than nine inches thick—Section 80 (a);

(2) That the width of the said staircase must not be less than 4 ft. 6 in., provided that if the gallery does not accommodate more than 200 persons it may be 3 ft. 6 in. wide—Section 80 (b); and

(3) That a separate means of exit (of the same width as the staircase) communicating directly with the street, must be provided for the said gallery—Section 80 (d).

The appellants further applied for the approval of the Tribunal of the construction of the staircase leading to the said gallery in the manner shown upon the drawings deposited with the said District Surveyor.

The members of the Tribunal sitting were Messrs. J. W. Penfold (Chairman), A. A. Hudson, and E. A. Gruning.

Mr. Clarke appeared for the appellants, and Mr. Andrews, from the Solicitors' Department of the London County Council, for the respondents.

Mr. Clarke explained that the Royal Horti-

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cultural Society were erecting, in Vincent-square and Bell-street, Westminster, a building in which they proposed to include an exhibition hall. Over this hall, at the end nearest to the Bell-street entrance, it was proposed to erect a gallery, the approach to which would be by a staircase leading from the hall. Requirements (1) and (2) had been complied with, but the appellants now asked the Tribunal to decide whether the separate means of exit suggested were necessary. The gallery was not, as the section of the Act contemplated, intended for the use of the public; it was intended for the use of musicians on such occasions as the users of the hall desired the services of a band. The plans submitted to the London County Council showed this clearly, but in the drawings dealt with by the District Surveyor it was not, unfortunately, specified. When, however, Mr. Drury made this requirement the appellants' architect called his attention to the fact that the gallery was not intended for the accommodation of the public but for a band of musicians, and he submitted that, this being so, the provisions of Section 80 did not apply. He (Counsel) could not help thinking that it was unfortunate that the purpose of the gallery was not shown in the original drawings. Section 80, Sub-section (d) laid down that an exit from a public gallery intended for the accommodation of the public must lead directly into a street. The appellants objected that such an exit would, in this instance, form an eye sore, that it was not necessary, and that the Society, which was depending on public subscriptions for the necessary funds to complete the building, had to proceed economically. The additional expense involved by the construction of an extra gallery would be a serious matter for the Society. Apart from that, however, he had to submit that, as the gallery was not intended for the accommodation of the public, there was no obligation upon the appellants to provide a separate exit. A band of musicians was in the position of employés. They would be engaged by the Society to add to the enjoyment of those who used the halls. He would try to assist the Tribunal by giving a definition of the noun "public." Dr. Johnson's Dictionary defined it as the general body of a state or nation, and a more modern dictionary as the general body of the people of a nation, state, or community. Used as an adjective in "public building," it meant a building to which the community at large was, or might be, invited either unconditionally or conditionally. There was, he submitted, a distinct difference between a building used for a public and a private purpose; and there was a distinct difference between persons who came to a public hall in pursuance of an invitation and paid for admission and those who were engaged in the place as employés in some form or other. He did not, for instance, think it could be suggested that an actor or an actress on the stage of a theatre belonged to the public in the sense that it was employed in Section 80. Tenants of or employés in a public building could not possibly be included in the term "public." Taking another point, Mr. Clarke said if it was suggested that the proposed gallery was so near the body of the hall that there was no saying that the public would not go there, his reply was that, all the same, it was not a structure by which the public, in the words of the Act, is "to be accommodated." But he was authorised to inform the Tribunal that at its last meeting the Society passed a resolution undertaking that the gallery in question shall not be used for the accommodation of the public, and that a barrier shall be erected preventing the public from obtaining access to the staircase. He asked the Tribunal to hold that the proposed gallery stood in the position legally of a minister's rostrum or a choir gallery, neither of which would be liable for separate means of exit.

Mr. Hudson said the question at issue was not altogether whether the gallery was for the use of the public or not. The Tribunal had wider powers than Mr. Clarke indicated. Assuming that the gallery was for the use of musicians only, the Tribunal had the power to decide whether the exit was sufficient even for them; in other words, whether the staircase proposed was proper under the circumstances.

Mr. Clarke said the District Surveyor had stated that he considered himself bound by Sub-section (d) of Section 80, but he asked the Tribunal to decide that Section 80 did not apply, because no part of the structure was intended for the accommodation of the public. But, apart from that, he pointed out that the gallery would accommodate only thirty-five persons, and that the staircase to the hall was ample for the purpose of exit.

Mr. Gruning: But we are bound to consider what would happen in an emergency. The staircase is not satisfactory as it stands.

Mr. Hudson, by means of a plan, suggested a scheme for utilising one of the exits for an extra staircase.

After some discussion the appeal was adjourned to enable the District Surveyor and the appellants to agree upon a plan of staircase on lines suggested by the Tribunal. The questions raised by Mr. Clarke were left undecided.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Wandsworth.—A one-story office building on the west side of Mitcham-road, Tooting, on land adjoining the London, Brighton, and South Coast Railway (Mr. H. Johnson for Messrs. Barry and Co.).—Consent.

Finsbury, East.—A warehouse on a site abutting upon the southern side of Moreland-street, Finsbury, and northern side of a footway known as Mason's-place (Mr. H. H. Tasker for the Finsbury Distillery Company, Ltd.).—Consent.

Haggerston.—A porch in front of Nos. 1, 2, and 3, Penn-street, Hyde-road, Hoxton (Mr G. H. Lovegrove for Messrs. H. and A. Mullord).—Consent.

Lewisham.—Pents over the entrances to three houses on the east side and one house on the west side of Oakcroft-road, Blackheath (Messrs. Kennard Brothers).—Consent.

Paddington, South.—Retention of an addition over the portico to No. 38, Gloucester-square, Paddington (Mr. A. E. Cockerell for Mr. M. A. Spielmann).—Consent.

Brixton.—A house with shop upon the north side of Landor-road, Clapham, to abut also upon Atherfold-street (Mr. W. Hunt for Mr. W. P. Goosey).—Refused.

Holborn.†—An iron and glass shelter over the entrance to the premises of The Balcony, Ltd., on the east side of Shaftesbury-avenue, next Vine-street, Holborn (Mr. R. J. Worley).—Refused.

St. George, Hanover-square.—An iron and glass hood over the entrance to No. 1A, Dover-street, Piccadilly (Messrs. G. Trollope and Sons for the Grosvenor Club Syndicate, Ltd.).—Refused.

Westminster.†—A one-story addition to the Princes' Skating Club, Knightsbridge, to abut upon Hill-street (Messrs. C. and W. H. Pertwee for the Princes' Skating Club).—Refused.

Lines of Frontage and Construction.

Hampstead.—An iron and glass carriage washing shed in front of No. 49, Maresfield-gardens, Hampstead (Messrs. C. Saunders and Son, Ltd., for Mr. J. E. Withers).—Refused.

Width of Way and Line of Frontage.

St. George, Hanover-square. — Projecting balconies and ladder at the rear of the Junior Constitutional Club, in Yarmouth-mews, Brick-street, Piccadilly (Messrs. Tubbs and Farey for the Junior Constitutional Club).—Consent.

Width of Way, Lines of Frontage, and Construction.

Hammersmith.—Permission to retain a wood, iron, and brick workshop at the rear, and to erect a covered way at the flank of No. 51, Cambridge-road, Hammersmith, abutting upon Glenthorne-road (Mr. A. Pascall).—Refused.

Line of Frontage and Space at Rear.

Paddington, North.—Buildings on the north side of Harrow-road, Paddington, westward of No. 474 (Mr. J. H. Bethell for the London and South-Western Bank, Ltd.).—Consent.

Formation of Streets.

Camberwell, North.—That an order be issued to Mr. W. Oxtoby, sanctioning the formation or laying out of a new street for carriage traffic, to lead from Wyndham-road to Hollington-street, Camberwell (for the Council of the Metropolitan Borough of Camberwell).—Consent.

Lewisham.—That the application of Mr. G. F. Darby for an extension of the period within which new streets out of the east side of Grafton-road, Perry-hill, Catford, were required to be formed and laid out be not granted.—Agreed.

The recommendations marked † are contrary to the views of the local authorities.

GUY'S HOSPITAL.—We are informed that Marble Arrolithic paving has been selected for the floor of the new operating theatre at Guy's Hospital. As there is a constant endeavour to find the most hygienic materials, and the most easily cleansed, for operating rooms, we note the fact that this flooring material has been approved for that situation.

TRADE CATALOGUES.

THE Edison and Swan United Electric Light Co., Ltd., have sent us copies of three of their November leaflets describing novelties in high-voltage accessories. An improved pattern of knife-switch is fully described and illustrated. It is stated that it is capable of breaking currents on 550 volt circuits. Every part of this switch is standardised and interchangeable, and full plans and tables of dimensions are given in the leaflet. A high voltage pressel pear switch is also described, which is made in two sizes. The larger size can break a current of 15 amperes at 250 volts. Personally, we should prefer fixed switches for such large currents, as there must be considerable sparking. Still, they may be useful on special occasions. A special leaflet describes a very neat form of high voltage wall socket.

Messrs. Veritys, Ltd., send us their 1903-1904 catalogue of electric-light fittings. It is a well-printed volume of nearly two hundred pages, admirably illustrated from photographs, and contains examples of fittings ranging in price from 7½d. to 75*l.* each. The fittings illustrated include brackets, pendants, standards, electroliers, portable standard and floor lamps, porch lamps, etc. Special brackets for drawing offices, dentists, and others are also shown. Many of the fittings are well designed, some of them being decidedly artistic; others, however, are overloaded with ornament. The materials include wrought iron, hammered and cast brass, copper, etc. Two illustrations of the "Aston" electric radiator, which is of the luminous type, are also given, and switches, wall-plugs, and ceiling-roses are not forgotten. The catalogue can be heartily recommended to architects and others interested in electric lighting. It contains about 1,000 illustrations of fittings of various kinds and in different styles, and is fully priced.

We have also received the "Supplementary Catalogue" of the Electrical Fittings Co. It is a twelve-page catalogue of brackets, pendants, etc., illustrated by photographic reproductions from wash drawings. The fittings are all of simple character, effect being obtained by means of graceful lines and not by elaborate ornament. Prices are given.

We have received from the New Expanded Metal Co., of York Mansions, York-street, Westminster, a large and interesting volume of 112 pages, showing the uses of expanded steel in concrete and plaster structures. It is a trade catalogue of an interesting kind. A short historical sketch of concrete construction is followed by an account of the Monier system of armoured concrete, of which the Expanded Metal Company's system may be regarded as a development. A detailed report of tests made by Messrs. Fowler and Baker in 1895 and 1896 shows the enormous increase of strength due to the use of expanded metal in concrete slabs and arches. More recent tests by Messrs. Idris and Co., by Mr. James Mansergh, and others are also included, together with extracts from the official reports of tests made by the British Fire Prevention Committee. Directions are given for ascertaining the correct proportions of steel and concrete, the general rule being that the sectional area of the steel should be 0.5 per cent. of that of the concrete. The system can be adopted for foundations, walls, floors, roofs, bridges, reservoirs, sewers, water-pipes, and other purposes. Attention should also be drawn to the use of expanded steel and concrete in conjunction with cambered steel channels, for floors, to sustain heavy loads. The volume contains a large number of illustrations of buildings and other works in which this system of construction has been used, among which may be mentioned warehouses for the Manchester Ship Canal Warehousing Co.; additions to the Elswick Works, for Sir W. G. Armstrong, Whitworth, and Co.; Gasworks at Granton; and reservoirs at West Kirby and Ipswich. More ornamental structures are those of the Salle des Fêtes and the Hungarian and Russian Pavilions at the Paris Exhibition, 1900, and an elaborate pavilion at the Delhi Durbar. Armoured concrete has undoubtedly a large future before it, and the Expanded Metal Company's system is of such a character as to be easily adapted to structures of nearly every kind. We can heartily recommend the new catalogue to architects and engineers.

We have received from Messrs. Foote and Milne, of 66, Victoria-street, Westminster, a well printed and illustrated book giving particulars of the installation of the electric light in country houses. To any one thinking of in-

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stalling the electric light in a country house this book will be useful, as it describes several alternative arrangements, some of which are more economical than others in special cases. The photographs of parts of actual installations which Messrs. Foote and Milne have put up give the reader very clear notions of how electricity can be applied for many practical purposes.

BOOKS RECEIVED.

THE BUSINESS ENCYCLOPÆDIA AND LEGAL ADVISER. By W. S. M. Knight. Vol. VI. (The Caxton Publishing Co.)

Correspondence.

THE QUANTITY SURVEYORS' ASSOCIATION.

SIR,—Mr. Wood, at the meeting of this Association, described my former criticism as a "blessing in disguise." Permit me to increase the obligation.

Mr. Wood's coy reluctance to answer my questions as to how he would realise his somewhat grandiloquent programme is explained. He clearly does not know, or he would adopt a different course.

We were told that none but qualified quantity surveyors should be admitted to membership. Apparently, no qualification has been insisted upon, beyond the calling oneself a quantity surveyor and the payment of a subscription. This complaisance as to admissions will deter competent surveyors, and they will probably not connect themselves with this belated policy.

The question of the admission of architects was also discussed at the meeting, and was (as might be expected) answered in the affirmative. Everyone who is familiar with quantity surveying knows that the specialisation of the two branches—quantity surveying and architecture—is a powerful element in the progress of both. The men who can do both well are rare, and those who profess to do so should be regarded with suspicion. The architect's quantities, as a rule, are contemptible, and a large proportion of building disputes are referable to their poor quality. On the other hand, *the quantity surveyor* should not practise as an architect. The quantity surveyor's architecture is about equal in quality to the architect's quantities. An association which professes—as this does—to be exclusive, and which hastens to withdraw itself from the contamination of land surveyors, land agents, and auctioneers, should only admit men who confine themselves to quantity surveying. Even the Secretary, I observe, is described in the "London Directory" as "quantity surveyor, architect, and valuer."

The argument for specialisation is pretty generally recognised. Moreover, the politic quantity surveyor refrains from the practice of architecture because he realises the fact that his employment mainly depends upon architects, and so soon as he becomes a competitor in their profession he is apt to lose on one hand as much as he gains on the other.

What will be the effect of a movement continued on these lines? It will be to confer upon a concourse of comparative incapables a certain distinction, which will probably mislead the public, and increase that great army of pretenders whose members are to be found in every business which is not regulated by stringent examinations. Here are, we are told, 150 men who are posing as regenerators of the quantity surveyor's business. A few of them have presumably passed the comparatively easy examination of the Surveyors' Institution; but the majority have never passed an examination, nor ever will. They have, however, paid a subscription, which is apparently the chief consideration. I do not think this is the way to "uphold the dignity and importance of the profession," or to "ensure the confidence of architects."

As to the Fellows of the Surveyors' Institution whose names appear in this connection, I find it difficult to understand their countenance of a rival association without any previous attempt to move the Surveyors' Institution to carry out their desires. The discouragement by that Institution of their reasonable aspirations might be cause for schism, but nothing of the kind has happened.

This scheme will be less obnoxious if conducted with judgment. Such an association should admit none but quantity surveyors. The ideal quantity surveyor should be an expert constructor, a good "taker-off," should be completely trained in office work (abstracting and billing), and besides this should have a thorough knowledge of prices and building law. These qualifications are what the employer expects in a man who calls himself a quantity surveyor, and are those which an association such as the one in question should insist upon. Other conditions of membership should be—independent practice as a quantity surveyor for a term of years (say five), and the passing of an examination much more severe than the present quantity surveyor's examination of the Surveyors' Institution.

The progress of an organisation like this would be slow but sure, and is the only way to realise Mr. Wood's programme.

Indiscriminate admissions to membership of an association with high professions such as have been published cannot be justified. In the case of the institution of a diploma for a profession, there is reason for the inclusion of persons who have practised that profession for a term of years; it would be a grave injustice to deprive such practitioners of their living. No such reason exists in this case.

In conclusion, I desire to disclaim any illwill in this matter; but I cannot but feel a strong interest in the prospects of a business which I have practised for a good many years, and I am jealous of any influence which shall injure its practitioners or detract from the credit which, in many ways, they so well deserve.

JOHN LEANING.

The Student's Column.

CONCRETE-STEEL.—XXII.

FOUNDATIONS (*continued*).

NOTWITHSTANDING the general convenience and efficiency of concrete-steel foundations as described in the preceding article, cases often occur in which either the load or the soil, or both, are such that it would be unwise to rely upon "floating" a building on a slab foundation. Two alternatives then present themselves for consideration, (1) to construct piers, or to sink cylinder foundations, down to some hard substratum; and (2) to increase the supporting power of the soil by piling.

The construction of concrete or masonry piers for a heavy building on soil of low bearing capacity involves deep and costly excavation, and the sinking of cylinder foundations is an equally expensive operation.

The driving of timber piles is quite easy, and timber is an inexpensive material. Further, the use of piles in the place of deep and difficult piers saves expense, obviates any risk of disturbing the foundations of neighbouring structures, and avoids any possible trouble from subsoil water or quicksand. Timber piles are generally connected with the superstructure by means of a steel grillage, or a foundation slab of concrete or concrete-steel, the object in each case being to distribute the weight of the building equally over the heads of the piles. When any such type of foundation is adopted, it is always desirable that, for their preservation, the piles should be permanently saturated with ground water. Hence, it often becomes necessary to cut down the piles and to commence the masonry at a low level, thus involving excavation that may be difficult, and is sure to be expensive.

Piles formed of concrete-steel possess all the advantages offered by timber piles and none of their disadvantages. By the combination of concrete with suitable steel reinforcement, piles are produced that can be driven in any moderately soft earth, and that are equally durable in dry or wet positions. Moreover, they offer exceptional facilities for through connexion with foundation slabs or superstructures of almost any kind.

In classes of foundation work not coming under the head of ordinary building construction, piles are practically indispensable. Thus, in the building of bridges, docks, wharves, piers, and jetties, piling is always necessary, except in the case of structures founded upon rock of solidity sufficient to support the weight transmitted through ordinary footings or piers. Timber piles are undoubtedly most satisfactory for works of such nature, their chief foe being the "teredo," but iron piles are liable to corrosion, and must be continually painted.

Concrete-steel piles cannot be attacked by worms, and require no painting. The only questions that can be raised as to their desirability, are (1) whether they are likely to prove durable in sea-water, and (2) whether they are strong enough to withstand fracture if unsuspected strata or masses of stone should be encountered during the process of driving.

With regard to (1), we know that the action of sea-water upon cement and concrete is a source of trouble, and sometimes of anxiety, to harbour engineers. But the fact remains that these materials continue to be used in all kinds of marine engineering work, and, on the whole, with considerable satisfaction. So far as embedded in the ground, concrete-steel piles are practically indestructible, and any parts exposed to sea-water and air can be repaired as may be found necessary, just as simple concrete walls are repaired. Therefore there does not seem reason for rejecting concrete-steel as a material for the construction of piles to be employed in harbours, docks, and coast protection works.

With regard to (2), we think the details of construction given below should afford sufficiently convincing evidence as to the capacity of concrete-steel piles to withstand any shocks that could be borne by timber piles during driving.

As the chief objection urged against concrete-steel piles is the assumed difficulty of driving, it may be useful to refer to the experience of Dr. F. von Emperger* in driving piles for the pier foundations of a small bridge in Elsass-Lothringen. The pier was supported on eleven piles from 14 ft. to 16 ft. long, and 16 in. square, each pile being moulded horizontally in one length. The soil was of marshy character to a depth of about 6 ft. 6 in., and below that was a stratum of coarse gravel.

The ram of the pile-driver weighed 8,800 lb., and, with a drop of 20 in., it drove the piles from 8 in. to 12 in. through the soft soil. On reaching the gravel, the drop was from 3 ft. 6 in. to 4 ft. 3 in., driving the piles about 2 in. at first, and finally to refusal by from 80 to 120 blows, with a penetration varying between 0.3 in. to 0.4 in.

From a lengthy report made by Dr. von Emperger as to the behaviour of the piles, it appears that good workmanship is absolutely necessary if satisfactory results are to be obtained. Very little trouble was experienced from fracture of the concrete in driving. In only one of the piles was the concrete broken away at the head, and this is believed to be avoidable if proper precautions be taken.

The details of an ordinary concrete-steel foundation pile are shown in Fig. 41, which illustrates in section and elevation the Hennebique method of construction. The separate cross-section is drawn to a larger scale for the sake of clearness. These piles are made in vertical moulds, and the concrete is reinforced by longitudinal bars connected at short intervals by transverse ties or stirrups. At the point, the pile is armed with a steel shoe having four side tongues, the extremities of which are bent inwards at right angles and bedded into the concrete. It will be noticed that the head of the pile is of smaller sectional area than the body, the object of this being to allow clearance between the heads of adjoining piles to facilitate driving.

In order to distribute the force of the blow uniformly over the entire head, and to prevent local injury to the concrete, a cap of cast steel is used during driving. This cap is filled with dry sand, and the joint at its lower end is made by pugging clay into the annular space, afterwards caulking it round with hemp or spun yarn. In this manner a sand cushion is formed above and around the head, which insures completely uniform distribution of the force applied by the pile-driving ram. Another advantage secured by the use of the sand cap, is that the longitudinal reinforcing bars can be allowed to project above the top of the concrete, as shown in the section, for connexion with other members of the structure, or the ends of one or more bars may be bent over to form eyes for the convenient attachment of hoisting tackle.

Fig. 42 represents two Hennebique sheet piles in elevation and partly in section, the small drawings beneath showing respectively a transverse section and one of the ties, both to a larger scale. The piles are reinforced by four longitudinal steel bars, connected at intervals with ties formed of steel wire, and these are braced by flat bars with split ends to insure a good bond with the concrete.

The point of each pile is protected by a steel shoe with tongues turned into the concrete as before.

As may be seen by the transverse section, the two narrow sides of each pile are moulded with semi-circular grooves.

The groove in the longer of these two sides extends from the shoulder of the pile down to a small projection with a semi-circular face, shown by a small square in the part sectional elevation, the remainder of this side and the whole of the shorter side of the pile being grooved. In ramming, the projection on one

* "Zeitschrift des Oesterreichischen Ingenieure und Architecten Vereins." Nov. 7, 1902.

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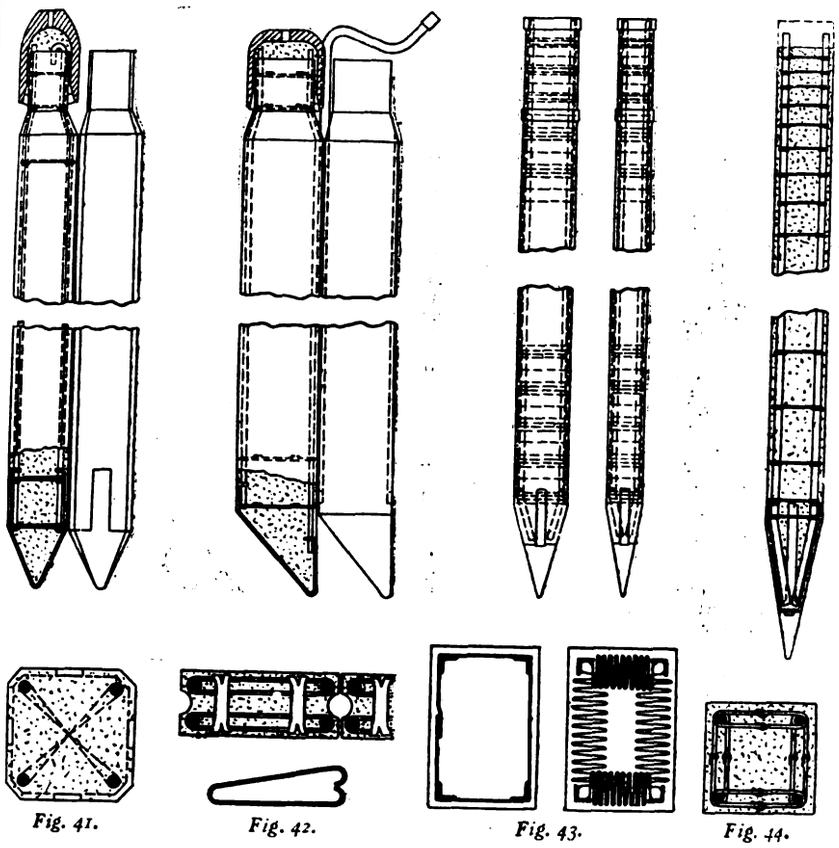

Fig. 41. Fig. 42. Fig. 43. Fig. 44.

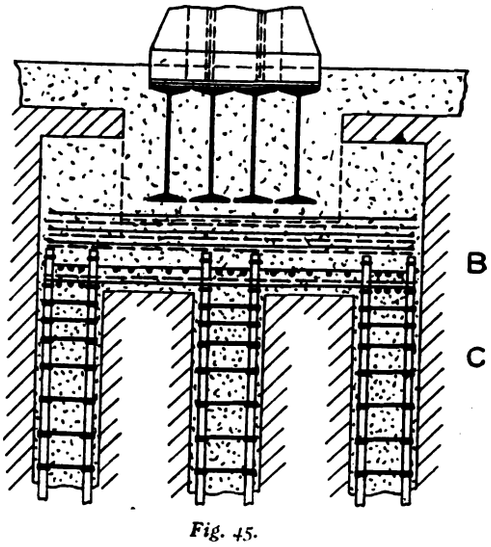

Fig. 45.

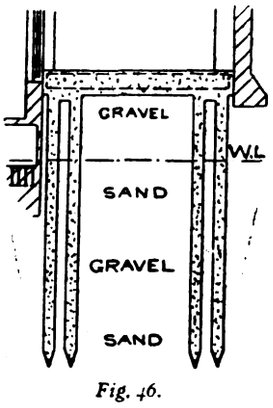

Fig. 46.

pile is fitted into the groove of the pile previously driven.

A cast-iron cap similar to that already described, is fitted to the head of the pile, and a device is provided for facilitating the operation of driving by means of a water jet. This arrangement consists of an iron pipe fitting the circular space formed by the grooves of the last-driven pile and of the pile to be driven. The pipe is connected by means of a flexible tube with a pump or tank at sufficient elevation to furnish water at the necessary pressure. The pipe also serves as a guide, and the water admitted through it forces out any entering sand that might have a tendency to choke or jam the grooves. When the pile has been sunk to the desired depth, the pipe is withdrawn, and the circular hole is filled with cement grout, thus ensuring a good joint, and keying the piles together so that the entire series constitutes a continuous watertight wall.

Hennebique piles are formed in vertical timber moulds, well white-washed or soaped, and supported in timber racks. The working face of the mould is left open, care being taken to see that the mould is fixed in a truly vertical position. The steel shoe is then placed in the bottom of the mould, and the vertical rods, together with their connecting stirrups, are next put in position and adjusted by gauges, so that they will be about 1 in. inside the surface of the concrete. Concreting is then commenced, and the working face of the mould is closed, as the work proceeds, with boards from 4 in. to 6 in. high, which are fixed into grooves on the side of the mould as the work proceeds. The concrete is thoroughly rammed as it is put in, about a bucketful at a time. About thirty-eight hours after the concreting has been finished, the mould is stripped, and the pile is seasoned for a period of about three weeks in summer time, and six weeks in spring and autumn, before use.

Vertical moulding is considerably more costly, as well as more troublesome, than horizontal moulding, but it ensures far better results. Piles are frequently moulded horizontally, but when this method is followed every possible care must be taken to obtain the proper consistency of concrete, and to avoid, as far as possible, inequalities of density in the piles.

Even with the greatest care, it is impossible to prevent the lower portion of the concrete in the horizontal moulds from being denser than the upper portion, and, moreover, when gravel concrete is used, the pebbles do not adjust themselves in the most suitable direction for resisting axial thrust.

The vertical reinforcement generally consists of round steel bars, varying in diameter from 1 in. to 1½ in., and the stirrups are of 3-16ths in. steel wire. The spacing of the stirrups varies from 2 in. at the bottom to 10 in. at the middle of the pile, and the proportion of the reinforcement varies from 2½ per cent. to 5 per cent. Piles of this description are made in various lengths, the maximum length hitherto used being about 60 ft.

Among other extensive buildings in which Hennebique pile foundations have been adopted, we may mention the Southampton Cold Storage Warehouse, a six-story building, measuring 400 ft. long by 120 ft. wide; some cargo sheds at Southampton Docks, 800 ft. by 150 ft.; and the Great Western Railway Grain Warehouse at Plymouth Docks, 163 ft. by 39 ft., built on quarry refuse overlaying a stratum of rocks.

The following are particulars of the piles used at Southampton:—

Cross Section.	Reinforcement.	Percentage of Reinforcement.
12 ft. by 12 ft.	4 bars, 1¾ in dia.	5
14 ft. by 14 ft.	,, 1¼ ,,	2½
15 ft. by 15 ft.	,, 1⅜ ,,	2¾
16 ft. by 12 ft.	,, 1⅜ ,,	4¼

The piles were driven by a Lacour pile-driver with a ram weighing about 3,350 lbs., and a 6-ft. drop. In some cases it is possible to sink the piles entirely by the hydraulic method, and in others a combined process may be best.

At Southampton Old Extension Quay, concrete-steel piles were sunk recently through 22 ft. of gravel and hard sand by the water jet in conjunction with the ordinary pile-driver, as it was found impracticable to carry out the work by the hydraulic method alone. Water was taken from the hydraulic mains through a ¾-in. pipe, terminating in a ⅜-in. nozzle at the point of the shoe, and the working pressure was reduced down to about 300 lbs. per square inch, each pile being sunk to the required depth in less than one hour.

Fig. 43 includes elevations of the broad and narrow sides, and two transverse sections, of some piles designed by Mr. Andrew Johnston, M.Inst.C.E., for use on the Thames at Rotherhithe. In this case, the longitudinal reinforcement is formed by steel angle bars, 2 in. by 2 in. by ⅜ in., connected horizontally with 1½ in. by 3-16ths in. flat bars, as shown in the left-hand cross section. Diaphragm bars of ⅛-in. steel wire are also provided as shown in the right-hand cross section The lower end of the pile is furnished with a steel point securely attached, as shown in the drawing. These piles are from 40 ft. to 50 ft. in length, the cross section measures 1 ft. 6 in. by 12 in., and the reinforcement is 2 in. from the surface of the concrete.

Fig. 44 shows the details of the concrete-steel piles used in the foundations of the Hallenbeck Building, New York. This is a ten-story steel frame structure, having wall columns carried on I-beam grillage foundations, embedded in the concrete caps of timber piles. The building has lately been extended by the erection of an addition measuring 102 ft. by 20 ft. in area. After several test borings, it was found that the use of wooden piles for the extension would necessitate excavation below the wall footings of an adjoining building, and that it would be necessary to underpin the foundations and to carry them down to a lower depth. The cost of this work, together with that of the timber piles, would have been greater than the expenditure involved in driving concrete piles, for which no trenching, no extra excavation, and no underpinning of the adjoining structure would be required.

Fig. 45 shows a section of the foundations in the old part of the building, and Fig. 46 is a transverse section of the new concrete-steel foundation. The latter consists of reinforced concrete piles extending to a height of about 6 ft. above the ground water level, where they are connected with the concrete-steel floor slab so as to form a monolithic structure, as shown in the drawing. These piles are 28 ft. long by 12 in. square, and are made with Portland cement concrete in the proportions of 1:2:4, rammed longitudinally into wooden moulds.

Each pile was calculated to carry a load of 80,000 lbs., which includes a load of 36,000 lbs., per square foot on the concrete as permitted by the New York Building Regulations for concrete piers, and an additional load of 44,000 lbs. assumed to be directly supported by the reinforcement, consisting of four 1 7-16 in. diameter vertical steel bars, the same regulations permitting this material to work in compression up to 7,000 lbs. per square inch.

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The vertical reinforcement is connected, as shown in the cross section of the pile, by horizontal hooked wires which are spaced 5 in. apart measured vertically.

At the lower end of the pile, the longitudinal bars are bent, as shown in the vertical section, and their ends are seated upon a solid cast-iron driving point, secured to the pile by steel strips bent inwards at an angle of 90 deg. at the top. Some of the piles were constructed with a central pipe to assist the sinking by means of a water jet. The concrete extended 2 in. above the upper extremities of the reinforcement, so as to form a seat for the driving cap; but after being driven, the upper portion of the concrete, shown by broken lines in Fig. 47 was removed, so as to leave the bars exposed for connexion with the foundation slab, the latter being 16 in. thick, and thoroughly reinforced by longitudinal and transverse bars.

GENERAL BUILDING NEWS.

CASUALTY DEPARTMENT, CARDIFF INFIRMARY.—New casualty wards have just been opened at Cardiff Infirmary. The new block has been erected on the southern side of the main corridor. The entrance is a broad corridor of full width for ambulance, with an easy slope from the outer roadway. The new wards were built from the designs of Mr. Edwin Seward by Messrs. C. Beames and Nephew, Cardiff.

MATERNITY WARDS, BETHNAL-GREEN.—New maternity wards have been erected at Bethnal-green for the Guardians. The buildings provide for dormitories and maternity wards, both of which are to be isolated from the Waterlooroad Workhouse and from each other on lands adjacent to the house. The dormitory block is to be 115 ft. long by 21 ft. wide. It will have three floors for 104 beds. The wards, 36 ft. by 18 ft., are to be six in number. Each floor is to be self-contained, having attendants' room, and two sets of lavatories. The buildings will be built externally of golden coloured bricks, relieved by bands of red bricks. Glazed brickwork will be used internally. In the wards salt glaze, green glaze, and plaster are to be used, finished with a chocolate band. The maternity block is a building of two stories, with dimensions of 90 ft. by 33 ft. Each floor will have its general ward for four beds, with bathrooms and lavatories adjoining. It will have a separation ward which can be divided off by a folding screen, an isolated labour room, and a separation room for infectious cases. It will have the usual kitchen, stores, larder, offices, etc., on each floor. All the fire appliances are supplied by Messrs. Merryweather, and there will be external escape staircases on each building in case of fire. A patent disinfector is also to be built by Messrs. Manlove and Elliot, supplied through Messrs. Fraser, Commercial-road, E. Adjacent to the female wards is a set of twelve latrines. The architect is Mr. W. A. Finch, Finsbury Pavement, E.C. Mr. Thomas *Shillitoe*, of Bury St Edmunds, was the builder. Mr. J. Martin was clerk of the works.

BANK, BELFAST.—The new branch of the Northern Banking Company, Ltd., situated in Donegall-square West, Belfast, was opened on the 16th inst. The new branch is situated between Howard-street and Wellington-street, having a frontage facing the City Hall of 45 ft., with a rear of 125 ft. The banking chamber is kept well back from the front, leaving space for large offices to let. Additional suites of offices are also provided on the first floor, approached by a stone staircase rising from the central vestibule. The façade to Donegall-square is executed in red bricks, with Yorkshire stone dressings, and the roofs covered with green slates. The base course is of specially-selected red Finland granite. The entire vestibule to the banking chamber is lined with stone resting on a polished Peterhead granite base. The ceiling is executed in fan groining of Bath stone, carried on granite columns, with carved capitals. The banking chamber measures 40 ft. by 60 ft. All the walls are lined with marble, and the floor is covered with black and white marble mosaic. Painted glass is introduced into the dome, which springs from a frieze of Derbyshire alabaster, supported by columns of verde antique. At each angle of the dome are carved the arms of the four provinces—Ulster, Munster, Leinster, and Connaught. The entire joinery, including the partitions, counter, and furniture, is of Austrian oak. Adjacent to the main office is placed a steel-lined strongroom, fitted with Messrs. Milner and Co.'s burglar and fireproof door, etc. Cloakrooms for the banking staff, heating chamber, and rear entrance are also provided. Messrs. Musgrave and Co., Ltd., have supplied their low-pressure hot-water system throughout this part of the premises. The building is constructed with fire-proof floors and inner walls, with stone staircase throughout. At the approach to the latter is a large oak newel post with an heraldic figure on top, carved from a model executed by Miss Praeger. The manager's private house is carried out in similar style to the rest of the fittings, with an electric automatic lift, supplied by Messrs. Waygood and Otis, through their agents, Messrs. William Coates and Son, who were also entrusted with the electric lighting contract, under the superintendence of Mr. John Woodside, M.E.E. The fire-place, hearths, tiling, etc., were supplied by Messrs. Riddel and Co., Ltd., and the hardware by Messrs. R. Patterson and Son and David Mitchell and Co., Ltd. The lead-glazing of dome and windows was done by Messrs. Ward and Partners; Messrs. W. F. Clokey and Co., supplied the plate-glass; Mr. John Dowling executed the plumbing and sanitary work; the entire contract for marble and the stone carving was carried out by Messrs. Purdy and Millard; Mr. G. Jones made the iron balustrade for the staircase, and the large collapsible gates at the entrance were supplied by the Bostwick Gate Company; Mr. W. J. Shaw supplied the mosaic pavement. The contractors for the entire works were Messrs. Laverty and Sons, Ltd., Belfast. Messrs. Young and Mackenzie were the architects.—*Belfast Evening Telegraph.*

WORK AT ST. MARK'S CHURCH, WEST GORTON, LANCASHIRE.—This church has been reopened, after being closed five weeks for redecoration and other improvements. The decorative work has been executed by Mr. W. R. Edmundson, of Oldham, under the supervision of Mr. Preston, architect, Manchester. In addition, the four Evangelists have been portrayed in the panelled recesses in the lower portion of the east wall, and in the middle behind the retable are "The Heads of Angels"—after Reynolds' picture in the National Gallery—all the gratuitous work of Mr. F. Bagley, a young artist who attends the church; and near the choir stalls are two mural paintings of angels by Mr. J. Hurley, one of the choristers. The lighting arrangements have also undergone alteration, the old gas standards having been taken out and pendants with incandescent burners substituted; a large ventilator has been fixed on the ridge.—*Manchester Courier.*

PREMISES, EDINBURGH.—The majority of the proprietors of the north side of Brown-square, which is situated at the west end of Chambers-street, Edinburgh, have, says the Edinburgh *Evening Dispatch*, agreed amongst themselves to bring forward their properties to the line of Chambers-street. Plans have been lodged in the Dean of Guild Court, and warrant asked by Mr. John Grant, bookseller, for the erection of buildings at the corner of George IV. Bridge, and operations will be begun as soon as authority has been obtained. The carrying out of these plans will efface Brown-square, one of the old city landmarks. The western side of the square disappeared when George IV. Bridge was formed. In 1874, when Chambers-street was formed, the City Improvement Trustees acquired, in connection with the formation of the roadway, from the proprietors of Brown-square, the pleasure ground in the centre of the square, and it was part of the bargain, it appears, between the proprietors and the Improvement Trustees that the former should be allowed to build forward to the line of Chambers-street, subject to approval of plans by the Town Council. The architects are Messrs. Lessels and Taylor, Edinburgh.

CARRINGTON HOUSE.—This lodging-house at Deptford, which has just been opened by the London County Council, is a building six stories in height, exclusive of basement. The elevations are of red brick facings, relieved with Portland stone dressings; the upper part of the main frontage is finished with cement rendering. The roofs are covered with green slates. The ground floor (lodgers' section) comprises:—Dining-room, reading-room, smoking-room, locker-room, barber's, tailor's, and bootmaker's shops, boot and clothes brushing-rooms, lavatory, feet-washing room, bathrooms, dressing-rooms, lodgers' washhouse, latrines for the use of lodgers. The ground floor also includes the administrative section. The five upper stories, comprising 814 cubicles (with sanitary offices on each floor), afford accommodation for 802 lodgers and 12 porters. In the dining-room fixed teak tables and seats are provided to accommodate 440 men at one time. In the centre of the room a spacious open chamber is provided for a large hot plate at which lodgers can, if they desire, cook their own food. Sinks are provided in two recesses off this chamber where food can be prepared for cooking; they are fitted with hot and cold water. A cylinder is fixed at each end of the hot-plate chamber with a constant supply of boiling water for making tea. Two electric fans are fitted for ventilating the space over the hot plate. The dining-room is further fitted with two large cooking ranges. The lavatory-room, situated centrally between the two main staircases, is fitted with eighty glazed fireclay basins, with hot and cold water supply to each, with rails overhead for hats and coats. Mirrors are fixed on the walls. The feet-washing room adjoins the lavatory, and is fitted with nine troughs, divided by glazed fireclay slabs; both hot and cold water are laid on. The bathrooms contain four glazed fireclay slipper baths, and two shower baths, with hot and cold supply to each. Two rooms are placed near the lavatory for the use of lodgers desiring to change their clothes during the hours in which the cubicles are closed. The lodgers' wash-house is situated at the south-east end of the building. It is fitted with twelve glazed fireclay washing troughs, with hot and cold water, for the use of lodgers desiring to wash their own garments. There is also a drying chamber fitted with four drying-horses, heated by steam coils, for rapidly drying the clothes. The latrines are approached through a disconnecting lobby at the end of the main corridor. There are forty water-closets and ten urinals. A top light, with efficient ventilating louvres, is fixed over this room. In the cubicles each floor is separated into sections, containing from fourteen to twenty-two cubicles, by division walls, which admit of the isolation and disinfection of sections in the event of contagious disease. These division walls would also check the spread of fire. Each lodger has an independent cubicle, having a minimum width of 4 ft. 10½ in., an area of 36 superficial feet, and lighted by a separate window. The height of the first four stories from floor to ceiling is 9 ft., and on the top floor 8 ft. 9 in. The partitions between the cubicles are 7 ft. 6 in. in height; that portion adjoining the corridor is 6 ft. 6 in. in height, thus ensuring ample ventilation. The cubicle partitions on the first floor are constructed of concrete slabs coated with plaster, and have been adopted experimentally. The partitions on the upper floors are framed wood. Each cubicle contains an iron bedstead with spring mattress, the whole of which can be folded back against the partition for the purpose of readily sweeping and cleansing the floor. Each cubicle floor is fitted with three fire hydrants with hose pipes, and there are four water-closets on each floor on the staircase landings for night use; two taps for drinking water are also provided. The whole of the floors and staircases are constructed of fire-resisting materials. A laundry fitted with modern appliances is to be constructed at the southern end of the building, the steam being provided by the boilers in the main building. Mr. W. E. Riley, the Council's Superintending Architect, prepared the whole of the plans, and the buildings have been erected under his supervision. The principal part of the furniture has also been designed under his direction. The lodging-house has been erected by the Council's present manager of works, Mr. G. W. Humphreys. The electrical work has been carried out under the direction of Mr. M. Fitzmaurice, C.M.G., the Council's engineer.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Messrs. W. James and Co., workers in stained glass, of Kentish Town, have opened a new show-room at 28, Berners-street, W.

PROPERTY SALES.—The sale of Lord Kensington's freehold property at Kensington (to some features of which we have already adverted) took place on 18-19 November current, and realised, at auction, nearly 215,000*l.* The interiors of Pembroke-square and Edwardes-square were sold privately by the auctioneers, Messrs. Walton and Lee, the total amounting to, it is said, about 300,000*l.* The properties extend over an area of from 40 to 50 acres, and yield altogether an annual ground-rent of, say, 2,500*l.*, with early reversions (beginning at Christmas, 1905) to rack-rents estimated at upwards of 40,000*l.* per annum. The upkeep of the beautiful garden of Edwardes-square was vested in a body of trustees by a private Act passed in 1819, which expressly reserves the freehold reversion to the owner who, when the lease expires six and a half years hence, will be able to deal with the land as he may deem fit.—Foley House, No. 8, Portland-place, which is placed on the market, was designed by James Wyatt for his own residence in or about 1786. The Doric portico is a later addition, made, perhaps, by Captain Charles Wyatt, who bought the house after James Wyatt's death in 1813 and built the adjoining house—the two houses have front gardens. Foley House must not be confounded with the earlier house bearing the same name which, with its large gardens, blocked the south end of Portland-place, and was built after S. Leadbetter's designs in 1740-1, for Lord Foley, and was acquired by Nash for 70,000*l.* for his improvements there.—The Addiscombe Park Estate, near Croydon, 144 acres, freehold, has been sold at auction for 70,000*l.* It formed part of the late Louisa, Lady Ashburton's estate, and was latterly a farm, which had belonged to Evelyn's son-in-law, William Draper, who inherited it from the widow of Sir Purbeck Temple.

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The manor-house, designed reputedly by Vanbrugh, and the home of Lord Chancellor Talbot, Lord Grantham, and Charles, first Earl of Liverpool, became in 1809 the Governor's residence for the East India Company's Military College, which was closed in 1862, when the house and the college buildings were pulled down.—No. 68, Pall Mall (New Oxford and Cambridge Club), recently bought at auction for 20,000*l.*, was built on the site of Kershaw's Hotel in 1873-4, after Mr. T. Dudley's plans and designs, for occupation by the Junior Naval and Military Club. The Crown lease for seventy-nine years from July 5, 1873, at a ground-rent of 550*l.*, was sold on August 8, 1887, for 30,700*l.* to Mr. Ashton Lever, who founded the Beaconsfield Club there. The house is let on an underlease at a yearly rent of 2,000*l.*, and adjoins the gates in Pall Mall of Marlborough House.

ROYAL COMMISSION ON LONDON LOCOMOTION.—At the sitting of the Royal Commission on London Locomotion, Friday last, Superintendent Cole, of the E Division, which covers the Strand, Holborn, and Clerkenwell area, gave evidence, and amongst other points, touched on the obstruction caused by building operations. He suggested that the unloading of heavy material should be prohibited between nine o'clock in the morning and six o'clock at night.—Mr. Cawdor (one of the Commissioners) pointed out that surely the building trade would object to interference in the way of preventing them carrying in bricks and girders, etc.—Witness thought there would not be a great deal of objection. In many cases now builders drew into the site to unload. If the streets were widened it would to a great extent solve the problem.—Superintendent Mann, of the C Division, dealt with the congestion of traffic in the Piccadilly district, and said a special difficulty was due to the large number of places of entertainment in the district. He suggested that no theatre should be allowed to be erected on a site that did not provide facilities for the accommodation of its traffic. Interference with the street traffic was caused by building operations. He was afraid that a great deal of such obstruction was unavoidable, but something might be done by the demolition of buildings during the night, while material might be taken in for new buildings in the early hours of the day.

INCORPORATED CHURCH BUILDING SOCIETY.—This Society held its usual monthly meeting, the first of the present session, on the 19th inst., at the Society's House, 7, Dean's-yard, Westminster Abbey, S.W., the Rev. Canon J. Erskine Clarke in the chair. Grants of money were made in aid of the following objects, viz.: Building new churches at Bristol, St. Aidan, 130*l.* for the first portion; Catford, St. Andrew, Kent, 200*l.*; Clydach, St. Mary the Virgin, near Swansea, 175*l.*; and Kippington, St. Luke, near Sevenoaks, Kent, 100*l.*; and towards enlarging or otherwise improving the accommodation in the churches at Bettws Evan, St. John, Cardiganshire, 15*l.*; Brechfa, St. Teilo, near Carmarthen, 20*l.*; Feckenham, St. John the Baptist, near Redditch, Worcester, 20*l.*; Haverfordwest, St. Mary, Pembrokeshire, 75*l.*; Hornsey, St. Peter, Middlesex, 50*l.*, making in all 175*l.*; Leicester, St. Mark, 50*l.*, and Thornham, All Saints, near King's Lynn, Norfolk, 40*l.* Grants were also made from the Special Mission Buildings Fund towards building mission churches at Aldersbrook, St. Gabriel, near Wanstead, Essex, 50*l.*, and Gorefield, near Wisbech, Cambs., 20*l.* The following grants were also paid for works completed: Cotteridge, St. Agnes, King's Norton, 200*l.*; Tilbury, St. Chad, Gravesend, 100*l.*; Darwen, St. George, Lancs., 143*l.*; Upton Park, St. Alban, Essex, 150*l.*; Saintbury, St. Nicholas, Broadway, Worcs., 10*l.*; Cardiff, All Saints, 100*l.*; Waverley Park, St. Silas, Surrey, 900*l.*, on account of a grant of 1,000*l.*; Muswell Hill, St. Andrew, Middlesex, 300*l.*; Weston-on-the-Green, St. Mary, near Bicester, Oxon, 10*l.*; Hartshorne, St. Peter, near Burton-on-Trent, 20*l.*; Haslemere, St. Christopher, Surrey, 120*l.*; Penrhiwceibr, All Saints, Glamorgan, 40*l.*; Gosberton, near Spalding, 30*l.*; Weaste, near Manchester, 40*l.*; and Tranmere, St. Paul, near Rock Ferry, Cheshire, 30*l.* In addition to this, the sum of 557*l.* was paid towards the repairs of twenty-eight churches from trust funds held by the Society. The Society likewise accepted the trust of a sum of money as a repair fund for the church of St. Columba, Bradford. The grants voted at this meeting have nearly exhausted the funds at the disposal of the Committee. Contributions are invited to enable the Committee to vote substantial grants, and to continue the work which the Society has carried on during the past eighty-five years.

RUBEROID ROOFING.—The Standard Paint Company send us specimens of "Ruberoid," a roof-covering material which is described as made of selected wool felt saturated with the compound called Ruberoid, a kind of artificially-prepared gum. The result is a roof-covering which is flexible, inodorous, and apparently quite impervious to wet. So far it appears an excellent material, but it is claimed for it also that it is non-inflammable, and there are testimonials from owners who say that their warehouses were saved from a general conflagration by the Ruberoid roofing. This we do not understand; at all events the specimens sent to us burned freely, even blazed up, when inserted in a flame. In other respects it seems a material to be recommended for hygienic and weather-proof qualities.

APPOINTMENT OF SANITARY OFFICER.—The Local Government Board has sanctioned the permanent employment of Mr. E. Q. Bilham as a sanitary inspector in Bethnal Green, at a salary of 120*l.* per annum.

PROPOSED WAR MEMORIAL, DEVONPORT.—It is proposed to erect a memorial to the men of H.M.S. *Doris* who fell in the late war, in Devonport Park, Devonport. Messrs. Harry Hems and Sons, Exeter, will carry out the work from a rough skeleton model prepared by Mr. J. F. Burns, the Borough Surveyor.

NEW LIBRARIES, LONDON.—At the meeting of the Lewisham Borough Council, on Wednesday, it was resolved to reply to a petition from Brockley for a new branch library, that steps would be taken to obtain designs when a legal difficulty which had arisen as to the site was settled. With respect to the proposed branch library at Lower Sydenham, it was reported that the lowest tender for the building exceeded by 178*l.* the limit of 4,500*l.*, which was to have included architect's and quantity surveyor's fees, fittings, fixtures, and other incidentals.

THE ENGINEERS' CLUB.—Under the foregoing title a new association has been formed for the promotion of social intercourse between members of the engineering and allied professions. The programme at present arranged includes a smoking concert at the Westminster Palace Hotel, on Friday, November 27, and a children's party, followed by a cinderella dance at the Caxton Hall, Westminster, on Saturday, December 12. An attractive list of other social gatherings to follow is being prepared. The club has been founded under the auspices of the Junior Institution of Engineers, but membership is open to the profession generally upon proper introduction. It is hoped, in the future, to be able to engage permanent rooms, so that members may enjoy the usual advantages of a club-house. Mr. Fred. S. Pilling, 20, Victoria-street, Westminster, S.W., one of the joint hon. secretaries, will be pleased to answer any inquiries.

CAPITAL AND LABOUR.

EMPLOYMENT IN THE BUILDING TRADES IN OCTOBER.—According to returns furnished by eighty-six employers' associations, whose members are estimated to employ about 98,000 workpeople, and by trade unions with an aggregate membership of about 187,000, employment in the building trades was dull and worse than a month ago and a year ago. In nearly all districts the state of employment has been adversely affected by the weather. The returns from employers' associations show that employment was good with 5.7 per cent. of the workpeople reported on, fair or moderate with 20.5 per cent., and dull or bad with 73.8 per cent. The corresponding figures for a year ago show that employment was then good with 16 per cent., fair or moderate with 33 per cent., and dull or bad with 51 per cent. Employment with bricklayers is dull, and about the same as a year ago. With masons it is fair, generally. With carpenters and joiners it has declined, and is worse than a month ago and a year ago. The percentage of unemployed trade union carpenters and joiners at the end of October was 5.6, compared with 4.0 at the end of September, and 4.0 at the end of October, 1902. With painters it is dull generally, and worse than a month ago and a year ago. With plasterers it continues dull. With plumbers it is also dull, and slightly worse than a year ago. The percentage of trade union plumbers unemployed at the end of October was 6.6, compared with 6.4 at the end of September, and 5.8 at the end of October, 1902. Slaters and tilers report employment as fairly good, better than a month ago and about the same as a year ago.—*The Labour Gazette.*

LEGAL.

A QUESTION OF WAGES.

AT Lambeth County Court, before Judge Emden, on Wednesday, the 18th inst., Mr. W. Smith, builder, 67, Denmark-hill, S.E., was sued by Mr. George Etherington, a carpenter, to recover 10½d., one hour's wages.

Mr. Johnson, who appeared for the plaintiff and the Amalgamated Society of Carpenters and Joiners, said that although the amount in dispute was small a point of great importance to persons engaged in the building trade was involved. Some time ago the carpenters and joiners and the London Master Builders' Association came to a working agreement. Rule 4 of this provided that after a man had been employed forty-two hours he was entitled to one hour's notice, the time to be used as far as possible in grinding his tools, and in addition to one hour's pay. In the present case wages were only paid for one hour. Plaintiff referred the case to his society, and the matter was considered of such importance that it was sent to the head offices at Manchester, where it was decided to take these proceedings.

Judge Emden: Do you say Etherington received pay for an hour's notice?

Mr. Johnson: I do not think the facts are in dispute. He received one hour's notice and received pay for that hour, but we contend that under Rule 4 he is entitled to two hours' pay?

Judge Emden: What do you say the second hour's wages is paid for?

Mr. Johnson: As compensation for summary dismissal. We rely upon the wording of the agreement. After the Amalgamated Society took up the case our solicitor received a postcard from Mr. Smith's legal representative stating he was making inquiries. Nothing further was heard from the defendant until this morning, when the 10½d. was paid into Court.

Judge Emden: Then there is nothing for me to try.

Mr. Johnson: If your Honour would bear with me a moment. We contend that the procedure adopted in this case may be part of a plan to put men claiming the second hour's pay to trouble and expense, and to wear out the Amalgamated Society so that the working agreement may be upset. We, therefore, ask you to award costs on the higher scale.

Judge Emden: I am afraid I cannot do that.

Mr. Johnson: There are 70,000 members of the union, and the point may become a very big one indeed. Your Honour can certify for costs on the higher scale in any case which involves a novel or particular point of law.

Judge Emden: But as the case stands no question has been settled.

Mr. Johnson: The money was paid in at the very last moment, when counsel was instructed and all expenses incurred.

Judge Emden: If the case had been fought out I should certainly have certified for costs on the higher scale, but as it is at present I cannot, although I consider it is hard on you, accede to your application.

THE TRIBUNAL OF APPEAL UNDER THE LONDON BUILDING ACT.

THE following is the award of the Tribunal of Appeal under the London Building Act (Messrs. J. W. Penfold, Chairman; A. A. Hudson, and E. A. Gruning) in the matter of the general line of buildings on the southern side of Fulham-road, Fulham:*

"Whereas, on the 3rd day of October, 1903, the Superintending Architect of Metropolitan Buildings made his Certificate under the provision of Section 22 of the London Building Act, 1894, by which he certified that the main fronts of the buildings tinted pink on the plan annexed to his Certificate, and signed by him, form the general line of buildings on the southern side of Fulham-road, Fulham, between Munster and Landridge roads, in which part of Fulham he further certified the building site in question coloured blue on the said plan thereto annexed, to be situate, and by which he further certified, in pursuance of the provisions of the 29th section of the said Act, that the said building site in question is situate in the road or street called Fulham-road, Fulham, and that such building site is also situate in the road or street called Landridge-road, as shown on the said plan, and whereas it appears to us, the above-named members of the Tribunal, that notice of the Certificate dated the 3rd day of October, 1903, was duly given to all persons to whom by the 24th section of the aforesaid act it is directed to be given,

And whereas Mr. Robert Roy, being the owner of the building site in reference to which the general line of buildings has been certified deeming himself aggrieved by the said Certificate, has appealed to us (by his Agent, Mr. Charles Botterill) as the Tribunal to which the said appeal is referred under the 25th section of the aforesaid Act.

And whereas the said Mr. Robert Roy appeared before us (by his Agent) on the 10th day of November, 1903, to prosecute the appeal,

Now we, therefore, the said Tribunal, having viewed the building site in question and the locality, and considered the said Certificate, and having duly heard Mr. Charles Botterill, Surveyor on behalf of the appellant, Mr. D. P. Andrews (of the Solicitor's Department, London County Council) in support of the Certificate of the Superintending Architect of Metropolitan Buildings, Mr. R. M. Prescott, Town Clerk, on behalf of the Metropolitan Borough of Fulham, and all other persons interested who deeming

* See our issue for November 14, p. 497.

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themselves to be aggrieved, have desired to be heard on the said appeal, and having also heard and considered the evidence adduced before us, do make and publish our decision herein as follows:—

We do hereby allow the appeal, and vary the Certificate of the Superintending Architect of Metropolitan Buildings, dated the 3rd October, 1903, and decide and determine that the general line of buildings on the southern side of Fulham-road, Fulham, between the point marked *a* and the point marked *b* on the plan annexed to this order is as defined on such plan by a strong green line.

And, further, we order and direct that the respondent pay the sum of ten guineas (10*l.* 10s. 0d.) to the appellant as the costs of his appeal.

In witness whereof the Seal of Tribunal is hereunto affixed in accordance with the resolution of the Tribunal of the 10th day of November, 1903. (Signed),

J. W. PENFOLD,
Chairman of the Tribunal.
CHAS. H. LOVE,
Clerk of the Tribunal."

ANCIENT LIGHTS:

COLLS *v.* HOME AND COLONIAL STORES.

IT has now been decided that the important appeal by Mr. John Howard Colls to the House of Lords against the decision of the Court of Appeal in favour of the Home and Colonial Stores, Ltd., which was argued some months back, when judgment was reserved, is to be re-argued. It will be remembered that Mr. Colls proposed to erect a building in the City on the site of some old premises on the opposite side of the road to that on which the Company's shop was situated. The new building would deprive the Company of a substantial amount of light, though light enough would be left for ordinary occupation of the premises as a place of business, and the evidence was that the value of the premises for letting or selling would not be affected. Mr. Justice Joyce held that the plaintiffs had no cause of action against Mr. Colls, and refused to grant the injunction they asked for. On appeal that decision was reversed, their Lordships holding that as the loss of light was substantial, the plaintiffs were entitled to protection, and if they did not choose to accept compensation, but elected to stand on their rights, the Court had no power to interfere. From that decision Mr. Colls appealed, and the arguments, which lasted nearly four days, were heard before the Lord Chancellor and three noble and learned Lords. It is understood that the reason the appeal is to be re-argued is that their Lordships are equally divided. At any rate it is to be re-heard, and this time before a full House, consisting of the Lord Chancellor and six Law Lords, though not before a special Court, which was the case when Allen *v.* Flood was re-argued, and several of the Judges of the High Court were invited to be present. No date has been fixed at present, and it is more than probable that it will not be taken before the Christmas vacation.

ACTION BY A HOUSE-DECORATOR.

THE case of Willett *v.* Stenning and Co. came before the Lord Chief Justice and a special jury on the 25th inst., an action by the plaintiff, a house-decorator, to recover from the defendants, a firm of timber merchants at Redhill, damages for personal injuries sustained by him owing to the alleged negligence of a workman of the defendants. The defendants denied that their workman had been negligent, and further pleaded that the accident arose through the contributory negligence of the plaintiff.

The plaintiff's case was, that on March 7, 1902, he requiring some lengths of deal for the purposes of his business, went to defendants' premises to purchase the same. He told a man named Edwards, one of the defendants' workmen, what he wanted, and Edwards took plaintiff to a timber shed, when a piece of deal was selected, which Edwards took to a sawing shed, accompanied by the plaintiff, and placed the timber on a bench. Edwards then cut off a length with a hand-saw. There was a circular-saw in connexion with the bench, which was at the time stationary, and which the plaintiff said he did not see. After Edwards had cut the length the plaintiff said that the piece had not been cut long enough, at the same time pointing with his hand, which he drew back and placed on the bench. The circular saw in the meantime had been set going and struck the plaintiff's hand, nearly cut it through, and it subsequently had to be amputated. The plaintiff's case was that the saw had been improperly put in motion, and that it was not properly guarded.

Evidence was called on behalf of the defendants that the guard was in position on the saw, and that the circular-saw was put in motion on the occasion when Edwards went with plaintiff to the sawing bench. Further, that after Edwards had cut two lengths with a hand-saw he used the circular saw, when plaintiff stretched out his hand, in which he had a stick, and suggested that Edwards should measure the wood. In doing this the plaintiff's hand was caught by the saw.

In the result the jury returned a verdict for the defendants, and judgment was given accordingly.

The case had been tried on two previous occasions, when the jury disagreed.

Mr. J. F. P. Rawlinson, K.C., and Mr. Macintyre appeared for the plaintiff; and Mr. H. F. Dickens, K.C., and Mr. Lochnis for the defendants.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

25,018 of 1902.—H. H. LAKE (A. E. J. Luckhurst): *Combined Drilling or Reaming and Countersinking Tools.*

As a new article of manufacture a hole reaming tool and countersinking tool, arranged in alignment, and connected by an intervening neck of very slightly smaller diameter than the greatest reaming diameter of the hole reaming tool, so as to act as a guide for the countersinking tool, and in which the smaller or entering part of the countersinking tool is of smaller diameter than the greatest diameter of the reaming tool, and in which further, the hole reaming tool, the neck, and the countersinking tool are formed of one continuous or integral piece of steel.

25,409 of 1902.—H. R. GREINER: *Radiators, Liquid-coolers and Heaters and Steam or Vapour Condensers and Producers.*

Apparatus for cooling or heating liquid, consisting of a number of superposed elements, such elements consisting of one or more corrugated tubes, the elements being placed on each other so that the corrugations of the superposed elements cross each other at an angle.

25,707 of 1902.—B. ADDICOTT and G. HOLLAND: *Manufacture of Fender Kerbs.*

Fender kerbs, characterised by a flange formed upon the back of the kerb, with a sheet iron angle secured to the back so as to form a groove between which and the front of kerb strips of casing are slid and secured.

27,812 of 1902.—G. P. WALLIS: *Steaming Chambers and Other Receptacles under Pressure, and in Removable Covers, therefore especially Applicable to Chambers for Steaming Bricks.*

In steaming chambers for treating artificial stone goods, bricks, and the like, which require to be frequently opened and closed, the construction of an enlargement on one side of the chamber in combination with an internally hinged door so that said door will open into said enlargement.

28,422 of 1902.—G. H. HEBBLETHWAITE: *Manufacture of Bricks.*

The manufacture of bricks used for building purposes, especially bricks which are in a great measure non-conductors of sound, are of less specific gravity than the ordinary brick, and are especially serviceable for lining and partition walls and for walls of the upper stories of buildings. The bricks are made from a combination of clay, sawdust, and stable litter, the latter being utilised for economy. The proportions are about equal—clay, 50 per cent., and sawdust, stable litter, 50 per cent. The ingredients are mixed and the bricks moulded in the ordinary manner, and when dried they are burnt in the usual way.

28,451 of 1902.—C. W. GARTH: *Movable Ladders, Staircases, and the like.*

A ladder, staircase, or the like which is mounted so as to run upon rails secured to a building in such a manner that it may be moved from side to side.

21 of 1903.—C. RICHARDS: *Bolts of Locks and Latches.*

This consists of means for varying two or more locks or latches by the use of guard plates carried by the bolts thereof.

2,761 of 1903.—J. PATTERSON and J. FERGUSION: *Domestic Fire Stoves, Ranges, and the like.*

In domestic fire stoves, ranges, and the like, the provision below the bottom grate of a hearth raised above the general floor level, and substantially coinciding in plan with the said grate so as to form a shallow chamber below the grate open in front or closable by doors, flaps, or the like.

13,284 of 1903.—W. WETRUDGET: *Device for Securing Hinged Windows in Open Position.*

A device for securing window wings in an open position, comprising in combination a sleeve pivoted to the bottom of the frame of the window wing, a rod linked at one end to the case of the window and passed through said sleeve, a clamping screw in a suitable boring of the sleeve and an abutment pin projecting from the sleeve arranged below the handle of said screw.

18,623 of 1903.—C. CANARIS, Jun.: *Process for Producing Cement or the like from Blast Furnace Slag.*

A process for producing cement and other hydraulic binding materials from blast furnace slag which consists in conducting molten slag as ordinarily obtained direct from the blast furnace and without any addition thereto, into water containing alkaline or other similar substances in weak solution, advantageously into milk of lime and then drying and grinding the resulting product.

15,724 of 1903.—R. MCALPINE: *Building Blocks.*

These consist of elongated moulded blocks of concrete, the two opposite sides of the block being provided with grooves of any desired shape. When building a wall, for example, such blocks are placed some distance apart with an intervening slab of concrete, slate, or other suitable material, the ends of which are inserted in the grooves of the respective blocks.

20,855 of 1903.—J. G. F. LUND: *Floorings and Roofings Formed of Interlocking Blocks.*

A flooring or a roofing formed of interlocking blocks, each of which has a groove and a tongue, and which blocks are so arranged in rows extending from one wall or buttress to another that the blocks in the adjacent rows break joint with one another, and that the blocks of each row present to those of the adjacent row on one side, a continuous groove, and to the row on the other side, a continuous tongue; the whole being characterised by a wedge-shaped formation of tongues, which latter fit into wedged-shaped grooves, the sides of which are of equal inclination in the adjacent rows, in such a manner that neither the edges of the blocks above and below the tongues and grooves touch one another, nor do the end faces of the tongues touch the basis of the grooves in order that the neighbouring rows may be strongly bound together without the use of any binding material.

20,893 of 1903.—P. N. ERICHSEN: *Artificial Stone Press.*

An artificial stone press wherein one of the sides of the pressing box or receptacle is provided with slots and partitions disposed at right angles to the same and adapted to move backwards and forwards through the same.

23,074 of 1902.—J. BRADWELL: *Machinery for Making Slate Ridge Roll Used on Tops of Houses.*

This relates to dead plates for making slate ridge roll, consisting of two separate plates of suitable material, in one of which are a number of rounded grooves and upon the other of which V-shaped ridges are arranged which correspond to the rounded ridges or V-shaped grooves cut into the slate slabs.

23,681 of 1902.—W. WALKER, F. WALKER, R. WALKER, and J. T. FREESTONE: *Disinfecting and Deodorising Gulleys, Traps, and Sewerage Chambers.*

The disinfecting or deodorising or disinfecting and deodorising of gulleys, traps, shafts, sewage chambers, spaces, or rooms, consisting of a block moulded or formed into suitable shape, and comprising as ingredients chiefly naphthalene with a substitute or substitutes incorporated in it.

24,689 of 1902.—T. C. FIDLER.—*Apparatus for Testing Materials.*

The use and construction of a hydraulic fatigue press for the testing of materials under alternating stresses by the application of hydraulic pressure transmitted to the test-piece through a flexible diaphragm while the pressure is made to alternate repeatedly between a maximum and minimum.

14,215 of 1903.—J. ROBERTS: *Trap for Surface Drains, Public Lavatories, and the like.*

A drain trap consisting in the provision of a removable cover having depending flanges dipping into water to form a seal against sewer gas, and which on removal provides direct access to the drain.

15,216 of 1903.—W. H. ARTHUR: *Paving Blocks Known as Rail Blocks.*

This consists in the combination with a railway rail, of a rail block provided with a reduced end extending into a toe to bear against the web of the rail and to leave a space between the under side of the head of the rail and the top of the toe.

18,484 of 1903.—J. M. PETERS: *Combined Sewer Pits and Traps.*

A combined sewer pit and trap cast integrally and having a pit at the bottom thereof and

* All these Applications are in the stage in which opposition to the grant of Patents upon them can be made

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integral flanges projecting horizontally therethrough, said flanges serving the double purpose of assisting in preventing the pit and trap from sinking and of forming a support for the walls, and concrete or similar walls resting on the aforesaid flanges.

18,858 of 1903.—J. THOMAS: *Means of Cleaning Pipes for Drains, Sinks, and the like Purposes.*

This invention relates to pipes in several parts, either vertical or horizontal (connecting pipes or sinks, drains and water closets, and for other purposes), and has for its object means enabling them to be cleaned without having to take the pipes apart as heretofore. For this purpose they are inserted at certain distances; for instance, in each story, special pipe pieces which can be opened laterally and through which a cleansing brush can be drawn from one story to another. The invention consists of piping in several parts, characterised by pipe-shaped pieces being mounted between the links or parts forming the piping, which pieces are provided with a closable lateral opening, for the purpose of enabling a brush attached to a wire or rope being introduced for the purpose of cleaning the piping.

19,827 of 1903.—W. H. BAXTER: *Machinery or Apparatus for Crushing or Breaking Stone, Ore, Bricks, Refuse Clinkers, and the like Materials.*

A machine for crushing or breaking stone, ore, bricks, refuse clinkers, and like material in which one or more of its moving or other parts are formed and provided with one or more compensating buffers or cushions inserted therein or attached thereto or interposed between the portions of the parts in such a manner as to keep the said parts in its or their working positions for imparting the required motion and power to the swinging jaw for crushing purposes, but at the same time to be capable of receding whenever the movement of the swinging jaw is arrested before it has completed its movement, thereby preventing breakage of the machine during the continued motion of the remainder of the working parts.

20,386 of 1903.—J. B. BLAW: *Devices for use in Constructing Sewers and the like.*

This invention consists of a mould composed of a cylinder formed of upper and lower segments for use in forming sewers and the like, being adapted to, be easily located in position, and firmly sustained. The operation is as follows:—The lower section of the cylinder is placed in a trench, on which is previously laid the cement or other material for the lower portion of the sewer. The upper section of the cylinder is then located on the lower section thereof, and the bolts are applied. The shoes, screws, and buckle are now inserted in proper position in the cylinder and said buckle operated so as to tighten the shoes against the inner faces of the sections of the cylinder, the slots permitting the sections to separate outwardly to a limited extent, while the sections are then subjected to pressure from within, due to the action of the buckle and screws, thus presenting a strong structure on which cement or other material is laid to form the upper portions of the sewer, the latter thus being moulded in an effective and convenient manner. As another cylinder is placed in position against the one previously located, the two cylinders are coupled by plates, which are rivetted or otherwise firmly secured to one cylinder, and the one cylinder enters the other cylinder, with which it is screwed or bolted. After the cement or material is set and the opposite cylinders are disconnected at the plate, the buckle is rotated, so as to relieve the sections of the cylinder of the pressure of the shoes when the mould is reduced in diameter in the direction of its height. Then the cables or chains are twisted or tightened by means of a stick or other suitable device, so as to draw in the side portions of the mould and reduce the diameter of the mould in the direction of its width, when the mould may be withdrawn through the sewer, and so entirely removed therefrom. As the working progresses the manhole and the pipe for escape of sewer gas are duly located.

26,944 of 1902.—A. W. COOKSEY: *Soil or Water Pipes or Conduits and the like.*

This invention relates more particularly to soil or water pipes or conduits such as are commonly employed for the purpose of connecting one or more water closets with the drain or sewer. According to this invention such pipes or conduits are formed with two separate ways or passages, one being for the soil or water, and the other for the air for ventilating and for preventing siphoning action in the traps of the closets, to the top of each of which it is connected by a separate branch pipe. These combined soil and air pipes may be made of a transverse section somewhat resembling the numeral 8 for example, the ways or passages being preferably of equal diameter, say 2½ in. The soil or water-way or passage is connected by branches to the outlets of the various closet traps, and at its lower end is connected to a suitable junction trap from which a horizontal drain conducts the soil and water to the sewer.

MEETINGS.

MONDAY, NOVEMBER 30.

Royal Institute of British Architects. — Business Meeting. 8 p.m.

London Institution.—Professor E. J. Garwood, M.A., on "Volcanoes—with special reference to the recent eruptions." Illustrated. 5 p.m.

Society of Arts (Cantor Lecture).—Mr. Bennett H. Brough on "The Mining of Non-Metallic Minerals." 8 p.m.

Society of Engineers.—Mr. Albert Gay on "Mechanica Stokers for Electricity Generating Stations." 7.30 p.m.

TUESDAY, DECEMBER 1.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Science). — Dr. J. C. Thresh on "Water and Water Supply." 7 p.m.

Institute of Builders (Society of Arts, John-street, Adelphi).—Mr. Charles Heathcote on "A Comparison of English and American Methods in the Erection of Buildings." 8 p.m.

Institution of Civil Engineers.—Paper to be further discussed:—"On the Distribution of Mean and Extreme Annual Rainfall over the British Isles," by Mr. H. R. Mill, D.Sc. 8 p.m.

WEDNESDAY, DECEMBER 2.

Institute of Sanitary Engineers, Ltd.—Mr. H. Harcourt Verden on "Sanitary Law." 7 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary meeting of the members. 8 p.m.

Architectural Association (Discussion Section).—Mr. H. T. B. Spencer on "Theatre Planning and Construction." 7.30 p.m.

THURSDAY, DECEMBER 3.

London Institution. — Mr. J. M. Bacon, M.A., on "Balloons and Flying Machines." Illustrated. 6 p.m.

Leeds and Yorkshire Architectural Society (Craft Evening).—1. Mr. E. C. Wallis on "Electrical Work as Affecting Architects." 2. Mr. G. Farrar on "Metal Casements." 6.30 p.m.

FRIDAY, DECEMBER 4.

Architectural Association.—Paper on "Photography for Architects," illustrated by lantern views, by the A.A. Camera and Cycling Club. 7.30 p.m.

Glasgow Architectural Craftsmen's Society.—8 p.m.

Junior Institution of Engineers (Westminster Palace Hotel).—Professor D. S. Capper, M.Inst.C.E., on "Recent Developments in the Construction and Working of Gas Engines." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. W. H. A. Robertson on "Artificial Draught, as Applied by Fans to Steam Boilers." 8 p.m.

SATURDAY, DECEMBER 5.

Sanitary Institute (Provincial Sessional Meeting, Town Hall, Leicester).—Discussion on "The Collection, Disposal, and Utilisation of Town Refuse in Leicester." The discussion will be opened by Mr. Frank W. Allen, A.M.Inst.C.E., to be followed by Messrs. E. George Mawbey, M.Inst.C.E., C. Killick Millard, M.D., D.Sc., Alderman T. Windley, J.P., Councillor A. Shaw, Leicester. The chair will be taken at 11.0 a.m. by Mr. William Whitaker, B.A., F.R.S., Chairman of Council of the Institute.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

November 9.—By HOWKINS & SONS (at Rugby).

Lilbourne, Northants.—Castle Hills Estate, 116 a. 2 r., f. £6,300
Six freehold cottages, y.r. 20*l.* 2*s.* 150
A freehold holding, 9 a. 1 r. 4 p. 825

November 12.—By PERKINS & SONS (at Southampton).

Southampton.—Royal-cres., The Lord Nelson, Hotel, u.t. 19 yrs., g.r. 8*l.*, p. with goodwill ... 2,150
129, St. Mary-st. and 143, Bevis-st. (S), f., e.r. 100*l.* 1,500

November 13.—By DYER, SON, & HILTON (at Eltham).

Eltham, Kent.—102, 104, and 106, High-st. (S), with yard and stabling, f., e.r. 180*l.* 2,200

November 16.—By B. BAILEY & Co.

Ilford, Essex.—The Boadway, beneficial lease of two s., u.t. 13 yrs., y.r. 44*l.* 550

By BARR & GREEN.

New Southgate.—11, 14 to 19, Lee-st., u.t. 80 yrs., g.r. 28*l.*, w.r. 168*l.* 4*s.* 1,065

By HENRY BOND.

East Molesey, Surrey.—Riverdale, f., y.r. 65*l.* 940

By ROBINS & HINE.

Piccadilly.—23, Ryder-st., beneficial lease for 11 yrs., y.r. 150*l.*, with goodwill 1,000

By W. GROGAN & BOYD.

Hyde Park.—70, Oxford-ter., u.t. 31 yrs., g.r. 26*l.* 5*s.*, p. 1,075

November 17.—By BEALE & CAPPS.

Westbourne Park.—9 and 11, Burlington-rd., u.t. 55½ yrs., g.r. 20*l.*, y.r. 105*l.* 1,000
97, 113, 123 and 125, Tavistock-cres., u.t. 65 yrs., g.r. 36*l.*, y.r 190*l.* 8*s.* 1,445
Notting Hill.—2, St. Mark's-rd., f., e.r. 50*l.* 640

By DEBENHAM TEWSON, & Co.

Clerkenwell.—Vine-st., f.g.r. 32*l.* 10*s.*, reversion in 34½ yrs. 80
Croydon.—Tanfield-rd., f.g.r.'s 67*l.*, reversion in 77 yrs. 1,320
New Southgate.—Avenue-rd., f.g.r.'s 68*l.* 10*s.* reversion in 75 yrs. 1,380
Battersea.—16, St. John's-rd., a profit rental of 30*l.* for 6¼ yrs. 115
Camberwell.—12, and 14, Cottage-green, u.t. 74 yrs., g.r. 13*l.*, w.r. 72*l.* 16*s.* £330

By HOLLIDAY & STANGER.

Streatham.—16 to 18 (even), Fairmile-av., u.t. 92 yrs., g.r. 45*l.*, y.r. 212*l.* 2,115

By RUTLEY SON, & VINE.

St. Pancras.—50, Johnson-st., u.t. 26 yrs., g.r. 12*l.* 12*s.*, w.r. 52*l.* 150
Hampstead.—17, Netley-st., u.t. 11½ yrs, g.r. 6*l.* 6*s.*, w.r. 71*l.* 10*s.* 325
Camden Town.—14, Georgiana-st., u.t. 37 yrs., g.r. nil, e.r. 55*l.* 500

By ED. SIMPSON.

New Cross.—28, Ventnor-rd., u.t. 55 yrs., g.r. 4*l.* 10*s.*, w.r. 36*l.* 8*s.* 320
Peckham.—12, Cicely-rd., u.t. 72 yrs., g.r. 6*l.* 10*s.*, y.r. 40*l.* 435
68, Moncrieff-st., u.t. 67 yrs., g.r. 4*l.* 5*s.*, y.r. 34*l.* 365

By CHINNOCK, GALSWORTHY, & Co. (at Newmarket).

Herringswell, Suffolk.—The Herringswell House Estate, 255 a. 1 r. 11 p., f. 7,000

November 18.—By MATCH & Co.

Pimlico.—11, Lupus-st., u.t. 30 yrs., g.r. 16*l.*, e.r. 95*l.* 885

By ERNEST OWERS.

Maida Hill.—16, Park-place-villas, u.t. 34½ yrs., g.r. 7*l.* 10*s.*, e.r. 75*l.* 600
Notting Hill.—36, Rackham-st., u.t. 72 yrs, g.r. 7*l.*, w.r. 63*l.* 14*s.* 270

By CHAS. P. WHITELEY.

Wallington, Surrey.—1, Danbury-ter. (S), u.t. 65 yrs., g.r. 5*l.*, y.r. 40*l.* 600

By PAYNE, TRAPPS, & Co.

Southend-on-Sea.—Cromer-rd., St. John's House, f., p. 465
Westcliffe-parade, two plots of land, f. 450
Edmonton.—Florence-rd., five plots of land, f. ... 140

By WALTER NEIGHBOUR.

Walthamstow.—30, Cranbrook-rd. (S), u.t. 76 yrs., g.r. 4*l.* 10*s.*, w.r. 41*l.* 12*s.* 230
Shoreditch.—Worship-st. (rear of No. 76), yard, workshops, and buildings, a profit rental of 20*l.* for 12 yrs. 110
Clapton.—1, 3, and 5, Dunlace-rd., f., w.r. 129*l.* 2*s.* 1,455
Woodford.—2 and 3, Milton-villas, f., y.r. 54*l.* 12*s.* 405
2, Lammas-villas, f., y.r. 24*l.* 310
1, 2, 3, 4, and 6, Augusta-ter., f., y.r. 147*l.* 1,515
Augusta-ter., Augusta House, f., e.r. 60*l.*; also two plots of land adjoining 805
Walthamstow.—16 to 26 (even), South-gr., u.t. 76 yrs., g.r. 18*l.*, y.r. 113*l.* 600

By WALTON & LEE (at Winchester House).

Kensington.—Leonard's-pl., Earl's Court-rd., &c., f.g.r.'s 604*l.* 6*s.*, reversions varying from 6¼ to 33½ yrs. (in one lot) £1,500
Pembroke-sq., &c., f.g.r.'s 169*l.* 19*s.*, reversion in 18½ yrs. (in lots) 25,650
Pembroke-villas, &c., f.g.r. 232*l.* 10*s.*, reversions in 18½, 38½, and 39½ yrs. (in one lot) 18,200

By A. DOWELL (at Edinburgh).

Ardchattan, &c., Argyllshire.—The Estate of Kilmaronaig (part of the Lochnell Estate) 4,464 a. 22,000

By HEPPER & SONS (at Leeds).

Leeds, Yorks.—Albion-pl., &c., 21 freehold shop sites, &c., area 2,273 yds. (in lots) 50,870
Beeston Hill, freehold building land, area 3,093 yds. 1,761
Beeston, freehold building land, area 184 yds. 414

November 19.—By CECIL HORDAY.

Putney.—7, Carmalt-gdns., u.t. 81 yrs., g.r. 11*l.* 5*s.*, e.r. 55*l.* 450
67, Chelverton-rd., u.t. 83 yrs., g.r. 7*l.* 15*s.*, q.r. 18*l.* 445

By JENKINS & SONS.

Brockley.—98, Tresillian-rd., u.t. 69 yrs., g.r. 12*l.*, p. 1,100
243, Malpas-rd., u.t. 57 yrs., g.r. 15*s.*, p. 380
Lewisham.—40, Limes-gr., u.t. 51 yrs., g.r. 5*l.*, p. 305

By NEWBON, EDWARDS, & SHEPHARD.

Barnsbury.—14, Richmond-rd., u.t. 38 yrs, g.r. 1*l.*, y.r. 45*l.* 490
Tottenham.—25 to 37 (odd), 43, 47, and 49, Beaconsfield-rd., u.t. 73 yrs., g.r. 54*l.*, e.r. 327*l.* 12*s.* 1,575
New Southgate.—4, Parkhurst-rd., f., y.r. 34*l.* ... 445
Tottenham.—12, St. John's-rd., u.t. 85 yrs., g.r. 5*l.* 5*s.*, w.r. 39*l.* 8*s.* 290

By RUTTERS.

Clavering, Essex.—Moat Farm, 100 a. 2 r. 21 p., f. p. 1,380
Great Wigborough, Essex.—Moulsham's Farm, 130 a. 2 r. 31 p., f., p. 1,300

By STIMSON & SONS.

Sydenham.—72, West Hill (Sydenham High School for Girls), u.t. 43 yrs., g.r. 20*l.*, y.r. 200*l.* 2,020
S. Byne-rd., u.t. 79 yrs., g.r. 8*l.*, y.r. 32*l.* 250
Kilburn.—1, Granville-rd., u.t. 60 yrs., g.r. 7*l.* 10*s.*, e.r. 40*l.* 290
Chelsea.—29, Walton-st., u.t. 38½ yrs., g.r. 6*l.*, w.r. 71*l.* 10*s.* 550
Brompton.—9, Hollywood-rd., u.t. 59 yrs., g.r. 8*l.* 10*s.*, y.r. 56*l.* 550
Canonbury.—15, Grosvenor-rd., u.t. 45 yrs., g.r. 8*l.* 10*s.*, e.r. 55*l.* 545

By VENTOM, BULL, & COOPER.

Fulham.—36 and 38, Mimosa-st., u.t. 78 yrs., g.r. 14*l.*, y.r. 76*l.* (including mortgages) 630
St. John's Wood.—Abbey-gdns., f.g.r. 72*l.*, u.t. 36 yrs., g.r. 6*l.* 930
Homerton.—Mandeville-st., f.g.r. 120*l.*, reversion in 97 yrs. 2,100

By WALTON & LEE (at Winchester House).

Kensington.—Pembroke-sq. (interior of), &c., peppercorn g.r., reversion in 19½ yrs. 1,400
Edwardes-sq., &c., f.g.r.'s 120*l.* 5*s.*, reversions in 6½ and 7½ yrs. (in one lot) 36,600
Warwick-gdns., &c., f.g.r.'s 139*l.*, reversions in 17⅞, 34½, and 44½ yrs. (in one lot) 10,500
Pembroke-gdns., &c., f.g.r.'s 276*l.*, reversions varying from 41 to 58½ yrs. (in one lot) 13,000
Warwick-gdns., f.g.r.'s 519*l.* 4*s.*, reversions varying from 2 to 48⅞ yrs. (in one lot) 23,500
Warwick-rd., &c., f.g.r.'s 89*l.*, reversions in 17⅞ and 44⅞ yrs. (in one lot) 9,500
Kensington-cres., f.g.r.'s 205*l.*, reversion in 17½ yrs. (in one lot) 12,700

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By WORSFOLD & HAYWARD (at Dover).

Dover, Kent.—4 and 5, Victoria-cres., f., p.	£760
21, Marine-parade, u.t. 21½ yrs., g.r. 1*l.* 16s. 9d., y.r. 8*l.*	470
1, Chapel-st., f. w.r. 15*l.* 12s.	140
Ewell, Kent.—Yew Tree Cottage, and cottage adjoining, f., w.r. 18*l.* 17s.	184
November 20.—By BLAKE & DANNATT.	
Greenwich.—44, East-st., f., p.	380
By ROGERS, BROS.	
Peckham.—50, Rye Hill-pk., u.t. 93 yrs., g.r. 7*l.* 7s., y.r. 30*l.*	380
Clerkenwell.—62, Gt. Percy-st., u.t. 8 yrs., g.r. 4*l.* 10s., y.r. 44*l.*	140
Peckham.—13, 15, and 17, York-gr., u.t. 74 yrs., g.r. 15*l.* 15s. p.	1,295
By E. & S. SMITH.	
Clerkenwell.—12, Woodbridge-st., and 15 and 16, Sekforde-st., u.t. 10 yrs., g.r. 3*l.*, y.r. 85*l.*	315
Hampstead.—Kingsgate-rd., f.g.r. 28*l.*, reversion in 82 yrs.	735
Clerkenwell.—26 and 28, Lloyd-sq., u.t. 18 yrs., g.r. 20*l.*, y.r. 112*l.* 10s.	580
11 to 14, 18, 22, 23, 25, and 26, St. Helena-pl., u.t. 12 yrs., g.r. 65*l.*, w.r. 376*l.* 7s.	550
Northfleet, Kent.—London-rd., Pantavon, u.t. 46 yrs., g.r. 6*l.*, y.r. 36*l.*	335

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold gound-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 6	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 10 0	" at railway depôt
Red wire Cuts	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire	4 4 0	" " "
Do. Bullnose	4 10 0	" " "
Best Stourbridge Fir Brick	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime	21 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s. 6d. per yard, delivered.
Stourbridge Fire Clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "

PORTLAND STONE (20 ft. average)—

Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt
Beer in blocks	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

PRICES CURRENT (*continued*).

STONE.

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)	0 11½	"
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube. deld. rly. depôt.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly.dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	"
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green	15 2 6	" "
20×12 best Eureka unfading green	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16×8 "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000 at rly. depot.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and Valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. Ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0	0 less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard. £ s. d.	£ s. d
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0

PRICES CURRENT (*continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
Petersburg: second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	34 10 0	36 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¼ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube	0 4 0	—

	Per square.	
Prepared Flooring—		
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 8
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards	0 11 0	0 13 6
¾ in. by 7 in. do. do. do.	0 14 0	0 18 0
1 in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders, " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	—
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 5 0	9 10 0
" " galvanised	17 10 0	—
" (*And upwards, according to size and gauge.)		
Sheet Iron (Black)—		
Ordinary sizes to 20 g.	9 15 0	—
" " 24 g.	10 15 0	—
" " 26 g.	12 5 0	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0	—
Ordinary sizes to 22 g. and 24 g.	13 5 0	—
" " 26 g.	14 5 0	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0	—
" " 22 g. and 24 g.	16 10 0	—
" " 26 g.	18 0 0	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	—
" " 22 g. and 24 g.	13 5 0	—
" " 26 g.	14 0 0	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0	—
" " " 26 g.	14 0 0	—
Cut nails, 3 in. to 6 in. (Under 3 in., usual trade extras.)	9 5 0	9 15 0

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	14 0 0	—
Pipe in coils	14 10 0	—
Soil pipe	17 0 0	—
Compo Pipe	17 0 0	—
ZINC—Sheet—		
Vieille Montagne ton	26 0 0	—
Silesian	25 15 0	—
COPPER—		
Strong Sheet per lb.	0 0 10½	—
Thin "	0 0 11½	—
Copper nails "	0 0 11	—

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PRICES CURRENT (*continued*).

LEAD &c.

		£ s. d.	
BRASS—			
Strong Sheet	per lb.	0 0 10	—
Thin „	„	0 0 11	—
TIN—English Ingots	„	0 1 4	—
SOLDER—Plumbers'	„	0 0 6	—
Tinmen's	„	0 0 8	—
Blowpipe	„	0 0 9	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered
„ fourths	1⅝d. „ „
21 oz. thirds	3⅛d. „ „
„ fourths	2⅜d. „ „
26 oz. thirds	3⅝d. „ „
„ fourths	3⅛d. „ „
32 oz. thirds	4⅛d. „ „
„ fourths	4⅜d. „ „
Fluted sheet, 15 oz.	2⅛d. „ „
„ 21 oz.	3⅛d. „ „
½ Hartley's Rolled Plate	1⅝d. „ „
⅝ „ „ „	2d. „ „
¾ „ „ „	2¼d. „ „

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 9
„ „ „ in drums	„	0 2 1
Boiled „ „ in pipes or barrels	„	0 2 0
„ „ „ in drums	„	0 2 4
Turpentine, in barrels	„	0 3 8
„ in drums	„	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	„	19 0 0
Best Linseed Oil Putty	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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*** Stamps *must not* be sent, but all the sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Cath rine street Covent Garden, W C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post*.

TO CORRESPONDENTS.

C. S. W., H. B., E. & C. (Amounts should have been stated.) J. E. (Below our limit).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ABERYSTRUTH (Wales).—For additions to schools Nantyglo, for the School Board. Mr. R. L. Roberts, architect, Abercarn. Quantities by the architect:—

Smith Bros.	£1,060 0	Morgan & Son,	
W. Jenkins	1,020 0	Nantyglo*	£963 12
J. Jenkins	979 0		

ANTRIM.—For alterations to First Presbyterian Church. Mr. W. D. R. Taggart, architect, 51 and 52, Scottish Provident Buildings, Belfast. No quantities taken out:—

R. Ewing	£467 0	James Kidd, Duncaim-st., Belfast†	£254 15
John Frew	450 0	R. Hewitt	248 0
W. & G. Armstrong	426 0	R. Calwell	230 0
K. G. Walker	279 0		

BASINGSTOKE.—For the construction of sewers, &c., Worting-road, for the Corporation. Mr. Reginald Phipps, C.E., Town Hall, Basingstoke:—

J. Harris	£397 10 0	Cunningham,	
Free & Sons	396 4 0	Forbes, & Co.	£305 0 0
Musselwhite & Sapp	328 0 0	M. A. Wilcox, Andover*	252 10 6
A. G. Osenton	319 4 0		

BECCLES.—For the erection of an engine shed at pumping station, Pudding Moor, for the Waterworks Co. Mr. Ernest A. Brine, engineer, Elmcroft, Ashwood-road, Woking, Surrey:—

G. Elsey	£241 5 0	G. Johnson	£207 17 6
C. C. Betts	236 10 0	John Gaze	205 0 0
H. A. King	229 7 0	J. E. Pestell, Yarmouth*	204 15 0
Boddy & Son	218 5 0		

BRIDLINGTON.—For the erection of five cottages, North Back-lane and Long-lane, for Mr. E. H. Rudd. Mr. A. T. Martindale, architect, 66, Wellington-road, Bridlington. Quantities by architect:—

J. Stork	£930 8 6	Smallwood & Shaw	£821 2 6
J. H. Hudson	893 10 0	F. Kneeshaw	821 0 0
J. Rennard	838 15 0	H. Hoggard	788 5 0
E. Wilson	835 10 0	J. Sawdon	773 0 0
F. Flintoff	830 0 0	W. Barnes*	740 0 0

[All of Bridlington.]

BEXHILL.—For the supply of 4,500 tons of Kentish rag or other macadam, for the Corporation. Mr. G. Ball, A.M.Inst.C.E., Borough Surveyor, Town Hall, Bexhill:—

		Per Ton. s. d.	s. d.
Chittenden & Simmons	Sevenoaks stone	9	11
	Kent rag	10	11
Cliffe Hill Granite Co., Granite		15 9	17 6
Constable, Hart, & Co.	Kent rag L.B.& S.C.R.	10	10
	Kent rag S.E.R.	9	9
Dixon, Brummer, & Co., Quartzite		12	10
Forest Rock Granite Co., Ltd., Granite		14	9
Fry Bros., Granite		14	8
C. G. German, Quartzite		15 1	14 7
Griffiths & Co., Ltd., Granite		14	6
W. Hudson, Brighton, Kent rag*		9	8
Hall & Co.		10	7
Jees Granite Co., Granite		15	0
A. & F. Manuelle, Granite		14	6
Paramors, Granite		11	11
V. Parker, Kent rag		10	9
Quartzite Co., Ltd., Quartzite		13	2
Rowley Regis Granite Co., Granite		16	8
Runnalls & Sons, Penlee Basalt		13	0
L. Sommerfeld	Devonshire rag	10	8
	Scotch Granite	12	6
Watson & Co., Granite		13	6

CROYDON.—For alterations to Nos. 72 and 74, Church-street. Mr. A. Broad, architect, 22, George-street, Croydon:—

Bulled & Co.	£877	Akers & Co.	£817
W. Smith & Sons	862	Hanscombe & Smith	694
H. Smith & Sons, Ltd.	857	D. W. Barker	694

CROWBOROUGH (Sussex).—For Fire Brigade station, &c. Mr. A. Broad, architect, 22, George-street, Croydon:—

D. Wickens £413 5

DARTFORD.—For the execution of sewerage works, Fulwich-road to Bow Arrow Hospital, for the Hospital Committee. Mr. W. Harston, C.E., 8, High-street, Dartford:—

Parsons & Parsons	£3,150	J. Jackson	£2,282
J. Adams	2,964	W. H. Wheeler, 235, Blackfriars-rd., S.E.*	2,193
Davis, Ball, & Co.	2,550		
G. Bell	2,391		

ENFIELD.—For the execution of road works, St. Andrew's and other roads, for the Urban District Council Mr. Richard Collins, Surveyor, Public Offices, Enfield:—

St. Andrew's-road.—G. J. Anderson, Poplar* £630 0 0
Enfield-road.—G. J. Anderson, Poplar* 530 0 0
River Front.—J. Rowley, jun., West Green* 368 15 0

GILLINGHAM (Kent).—For the erection of twenty-six cottages, Burnt Oak-terrace, for the Burnt Oak-terrace Building Club. Mr. E. J. Hammond, C.E., 21, Balmoral-road, Gillingham, Kent:—

J. A. Davison	£7,100 0	A. S. Ingleton	£4,875 0
H. Philby	6,500 0	W. W. Hammond	4,823 0
Gann & Co.	6,295 0	J. Wilford, Snodland, Kent*	4,810 0
Enness Bros.	5,888 0	E. W. Filley (withdrawn)	4,485 0
H. J. Galer	5,623 10		
H. Harris	5,434 0		
C. Jordan	5,070 0		

GLEMSFORD (Suffolk).—For boring works for water supply, for the U.D.C. Mr. J. T. Eayrs, C.E., 39, Corporation-street, Birmingham:—

Henderson & Sons	£640 15 6	H. C. Smith	£213 1 6
T. Matthews	350 13 0	Cheeld & Co.	206 9 6
Duke & Ockenden	290 5 6	Fred Bennett	202 15 6
Timmins & Sons	271 17 6	Brown Co.	201 8 6
Matthews & Co.	270 10 6	Barnes & Sharpe	194 15 0
Potter & Co.	254 15 6	Le Grand & Sutcliffe, Bunhill-row, London, E.C.*	192 0 6
Frank Smith	243 11 0		
Tilley & Sons	227 0 6		
Samuel Clarke	225 5 6	Isler & Co.	189 5 6
John Thom	218 3 0		

GODSTONE (Surrey).—For the execution of road works, Salisbury-road and Barfields-road, for the Rural District Council. Mr. J. George Powell, C.E., Godstone:—

Salisbury-road.

H. S. Watling	£1,760 0 0	Mott & Sons	£510 0 0
G. S. Faulkner	558 5 6	A. C. Soan, Streatham*	470 5 0
S. Kavanagh	539 0 0		

[Engineer's estimate, £433, engineer carrying out works.]

Barfields-road.

H. S. Watling	£2,850 0 0	S. Kavanagh	£994 0 0
Mott & Sons	1,059 0 0	A. C. Soan, Streatham*	930 0 0
G. S. Faulkner	1,017 6 4		

[Engineer's estimate, £758, engineer carrying out works.]

LANCASTER.—For the construction of sewers, Fairfield Estate, for Dr. W. Wingate-Saul. Messrs. Harrison Hall, & Moore, surveyors, Lancaster:—

R. L. Dilworth	£1,350 0 0	R. Escolme, Blackpool and Morecambe*	£1,122 2 11
Joe Johnson	1,127 11 6		

[*See also page 563.*

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COMPETITION, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITION.

Nature of Work.	By whom Required.	Premiums.	Designs to be delivered
*Public Library and New Municipal Buildings	Torquay Town Council	50 guineas and 30 guineas	No date.

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Butcher's Premises and House, Radcliffe	Radcliffe Co-operative Society	J. G. Crone, Architect, 26, Cloth-market, Newcastle-on-Tyne	Nov. 30
Driving Stone Drift in Hutton Seam	Wheatley Hill Colliery Owners	Manager, Wheatley Hill Colliery Office	do.
Cast-Iron Spigot and Faucet Pipes	Edinburgh Gas Commissioners	W. R. Herring, M.Inst.C.E., New-street Works, Edinburgh	do.
3,000 tons of Pitch	Tramways Committee, Manchester	J. M. M'Elrey, Tramways Manager, Manchester	do.
Sewerage Works (Contract No. 11)	Thornton, &c. Sewerage Committee	A. Hindle, A.M.Inst.C.E., 44, Abingdon-street, Blackpool	do.
Cast-Iron Pipes (Contract No. 12)	do.	do.	do.
Sewerage Scheme, Silverdale	Newcastle-under-Lyme R.D.C.	A. E. Jones, Engineer, Brunswick-street, Newcastle-under-Lyme	do.
Electric Lighting Generating Station, Longport	Burslem Borough Council	A. Bremner, Borough Electrical Engineer, Market-bdgs., Burslem	do.
Out Offices, Ashley-street Schools	Carlisle Education Committee	H. C. Marks, M.Inst.C.E., 36, Fisher-street, Carlisle	do.
2,000 square yards Concrete Flags	Warrington Borough Council	T. Longdin, Borough Surveyor, Warrington	do.
Alteration to Premises, Commercial-street, &c.	Royal Insurance Co.	T. Kershaw, A.R.I.B.A., Lancs and Yorks Bank Chambers, Halifax	do.
*Alterations to Centre Tower, Rochester Cathedral	.....	C. Hodgson Fowler, The College, Durham	do.
Street Work, Crofton	Cowpen U.D.C.	R. Grieves, Surveyor to Council, Seaforth-street, Waterloo, Blyth	do.
Maternity Hospital, Union Workhouse	Ecclesall Bierlow Guardians	J. R. Wigfull, Archt., 14, Parade-chambers, East Parade, Sheffield	Dec. 1
Rebuilding House & Shop, High-st., Berwick-on-Tweed	.....	W. Gray, Architect, 2, Ivy-place, Berwick-on-Tweed	do.
Alterations, Bakery Store-Rooms, &c. Pear-st., Halifax	T. Quinsey	T. Kershaw, A.R.I.B.A., Bank Chambers, Halifax	do.
Alterations, &c., Eton Lodge, Paradise-rd., Richmond	Richmond Town Council	J. H. Brierley, Borough Surveyor, Richmond	do.
Alterations, &c., to House, Londonderry	R. J. Adams	R. E. Buchanan, Architect, Castle-street, Londonderry	do.
Materials (Stone, Gravel, Pipes, &c.)	Worcester Corporation	T. Caink, A.M.Inst.C.E., Guildhall, Worcester	Dec.
A Rulley Repairing Shop, York Carriage Works	N.E.R. Co.	W. Bell, Architect to the Company, York	do.
Steel Rails and Fish Plates	G.N.R. Co.	Engineer to the Company, King's Cross, London	do.
400 yards of Sewer, Back-street, Northallerton	Northallerton U.D.C.	Surveyor to the Council, Northallerton	do.
Making-up Private Streets, Chester-le-Street	Chester-le-Street R.D.C.	G. W. Ayton, Highway Surveyor, Chester-le-Street	do.
Street Works	Middleton Corporation	W. Wellburn, Town Hall, Middleton	do.
Sale Shops and Artisans' Dgs., Infirmary-rd. & Lock-st.	Sheffield Counl. Surp. Lands Comm.	C. & C. M. Hadfield, Architects, 19, St. James'-street, Sheffield	do.
Main Sewers	Girvan Town Council	J. & H. V. Eaglesham, Wellington Chambers, Ayr	do.
42 Houses, Penrhiwceiber	Park-place Building Club	T. Richards, 1, Foundry-terrace, Mountain Ash	do.
Hotel and 31 Cottages, Merthyr Vale	D. Moran & Co.	T. Roderick, Glebeland, Merthyr Tydfil	do.
12 houses, Penrhiwceiber	Park Place Building Club	W. T. G. Marsh, Architect, Oaklands, Mountain Ash	do.
350 lineal yards Cast-Iron Hurdles	Warrington Borough Council	T. Longdin, Borough Surveyor, Warrington	Dec. 3
House and Business Premises, Llanberis	.....	H. Thomas, Architect, 7, Castle-ditch, Carnarvon	do.
Lavatory, Elgin Lunatic Asylum	.....	J. Wittet, Architect, Elgin	do.
Librarian's House, Cymmer, Porth	.....	W. Thomas, Secretary, The Library, Cymmer, Porth	do.
Sewage Tank and Filter, Cogenhoe	Hardingstone R.D.C.	Sharman & Archer, Architects and Surveyors, Wellingborough	Dec. 4
Pipes, Castings, &c.	Birmingham Corporation	E. Antony Lees, 44, Broad-street, Birmingham	do.
Auction Mart, Offices, Pens, and Roofing of Cattle Mkt	York Corporation	A. Creer, City Engineer, Guildhall, York	do.
Three Dwelling Houses, Golcar	.....	A. Shaw, Architect, Golcar	do.
Painting, &c., Chapel and Schools, Luddenham	.....	R. Horsfall & Son, Architects, 22a, Commercial-street, Halifax	do.
*Glazed Roofing and Drainage Works	St. George-in-the-East Guardians	The Clerk, Raine-street, Old Gravel-lane, E.	do.
Rebuilding Five Rangers Inn, Deal	.....	W. J. Jennings & J. F. Duthort, Architects, 6, Claremont-pl., Dover	Dec. 5
Main Sewers, Scalby	Scalby U.D.C.	C. H. Gott, A.M.Inst.C.E., 8, Charles-street, Bradford	do.
Stores, (Bar Iron, Plates, &c.)	N. E. Railway Co.	E. H. Clark, Stores, Gateshead	Dec. 7
Telegraph Stores	do.	C. H. Ellison, Telegraph Superintendent to the Co. York	do.
Steelwork for Renewing 3 Bridges on Western Divsn.	Caledonian Railway Co.	Divisional Engineer, 3, Germiston-street, Glasgow	do.
Iron, Castings, &c.	South Hetton Coal Co.	J. R. Lambert, South Hetton, Sunderland	do.
Iron, Castings, &c.	East Hetton, &c., Colliery Owners	Storekeeper, Trimdon Grange Colliery, Co. Durham	do.
Bakehouse, Slaughter-house, Stables, &c.	Ynysybwl Co-operative Society	D. D. Jones, 45, Robert-street, Ynysybwl	do.
Cottage, Boat of Garten	Miss M'Bain	P. M'Intosh, Ardchattan, Craigellachie	do.
Two Artisans' and ten Labourers' Dwellings, Clonmel	The Corporation	Borough Surveyor, Clonmel	do.
*Alterations and Additions to Town Hall, &c.	Herne Bay U.D.C.	Surveyor to the Council, Council Offices, Town Hall, Herne Bay	Dec. 8
Repairing Engines, Bishop's Stortford	The U.D.C.	B. S. Scott, Surveyor, Bishop's Stortford	do.
Boardroom and Offices	Haltwhistle Guardians	J. M. Clark, F.S.I., Haltwhistle	Dec. 9
Drainage Works, Whitletts	Ayrshire County Council	A. Stevenson, Civil Engineer, 14, Cathcart-street, Ayr	do.
Outfall Sewer, Addison	Ryton U.D.C.	J. P. Dalton, Surveyor to Council, Ryton	do.
*Making-up and Paving Doncaster-street	Fulham Council	Borough Surveyor, Town Hall, Fulham, S.W.	do.
Wooden Barge for carrying Priestman's Dredger	Swansea Harbour Trust	J. W. Shotton, Marine Engineer, 32, Mount Stuart-square, Cardiff	Dec. 10
Stores, Powell Duffryn Steam Coal Co.	Directors of the Company	Stores Manager, Aberaman Offices, near Aberdare	do.
*Extension of Post Office, Peterborough	H.M. Office of Works	H.M. Office of Works, Storey's Gate, Westminster, S.W.	Dec. 11
*Coast Guard Station at Littlehampton	The Admiralty	Superintending Engineer, H.M. Dockyard, Portsmouth	do.
*New Coastguard Station at Queenborough	do.	Director of Works Department, 21, Northumberland-avenue, W.C.	do.
Exhauster House, &c., Rochdale-road	Gas Committee, Manchester	C. Nickson, Superintendent of Gas Department, Manchester	Dec. 12
Swimming Baths, Wigan	The Corporation	J. B. & W. Thornley, Library-street, Wigan	do.
Portland Cement, Granton	Edinburgh Gas Commissioners	W. R. Herring, M.Inst.C.E. New-street Works, Edinburgh	Dec. 14
Double-headed Steel Rails, Granton	do.	do.	do.
Repair of Pier, Inverary	Inverary Town Council	R. S. Corrigall, Town Clerk, Inverary	Dec. 15
*Construction of a New River Wall, &c.	H.M. Works and Public Buildings	H.M. Office of Works, Storey's Gate, S.W.	do.
Private Street Works	Levenshulme U.D.C.	J. Jepson, Surveyor to Council, Tiviot Dale, Stockport	Dec. 16
*Erection of Superstructure of Parcel Office	H.M. Office of Works	H.M. Office of Works, Storye's Gate, S.W.	Dec. 19
Montagu Hospital, Mexborough	.....	J. E. Knight, Architect, 33, College-street, Rotherham	No date.
Stores and House, Beighton	Woodhouse Industrial Co-op. Soc.	H. L. Paterson, A.R.I.B.A., 19, St. James-street, Sheffield	do.
Hotel, Kildare	Miss E. Talbot	F. Bergin, 36, Westmoreland-street, Dublin	do.
Sixteen Houses, Headingley	.....	C. F. Wilkinson, Architect, 25, Park-sqare, Leeds	do.
Clay for One Year (3,000 to 4,000 tons)	R. Maclaren & Co.	R. Maclaren & Co., Eglinton Foundry, Glasgow	do.
*Alteration and Additions to Forest Farm, Windsor	Newcastle Estate Office	J. Haslam, Newcastle Estate Office, Worksop	do.
*Desks and Furniture for New School	Reading Education Committee	Education Office, Blagrave-street, Reading	do.
*Police Station, Wokingham	Berks Standing Joint Committe	County Surveyor, Broadway Buildings, Reading	do.
*Nautical School, Portishead	Training Ship "Formidable"	E. Gabriel, Architect, 42, Old Broad-street, E.C.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
*Foreman Brickmaker	Government of Northern Nigeria	250*l.* per year	Dec. 7
*Road Foreman	West Ham Council	200*l.*	Dec. 14
*Head of Building Trades Department	Northern Polytecnic Institute	250*l.*	do.
*Assistant in Building Trades Department	do.	100*l.*	do.
*Assistant Lecturer, &c. (Chemical Department)	do.	90*l.*	do.
*Assistant Examiners in Patent office	Civil Service Commissioners	Not stated	Dec. 17
*Assistant Civil Engineer, Admiralty	do.	Not stated	Jan. 7, '04

These marked with an asterisk (*) are advertised in this Number. *Competition*, iv. *Contracts*, iv, vi. viii. x, & xx. *Public Appointments*, xvii.

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TENDERS *(Continued)*:—

LEEDS.—For laying water main (2 miles), Wortley to Beeston, for the Corporation :—

B. Roberts.....	£1,535 0 0	R. Littlewood	£602 17 3
Schofield & Co.	794 4 0	T. Young,	
J. Ellis	639 5 4	Wakefield*...	598 0 6

LIVERPOOL.—For the execution of sewerage works, Blundellsands, for the Trustees of the late Nicholas Blundell. Messrs. Mellard, Reade, & Son, C.E., 2, South John-street, Liverpool. Quantities by engineers :—

Keating & Son	£2,880 11 1	Executors of	
P. Balmer	2,360 0 0	the late W. F.	
Marr & Son ...	2,350 0 0	Chadwick ...	£2,197 3 6

LLANWRTYD WELLS (Brecon).—For the construction of a storage reservoir, for the Builth Rural District Council. Mr. R. L. Bamford, surveyor, Wildemarsh-street, Hereford :—

F. M. Willis ...	£5,488 5 5	Johnsone Bros.	£4,434 5 6
Celtic Acety-lene Co.....	4,757 17 1	Fitzmaurice & Co. Birmingham	4,177 5 6
N. Bridgman...	4,718 2 10		

LONDON (Greenwich).—For paving works, Swallowfield-road, for the Borough Council :—

A. E. Etheridge	£378 9 6	Griffiths & Co....	£360 0 0
Fry Bros.	376 12 5	Mowlem & Co.,	
W. Pearce.....	376 0 0	Westminster*	348 0 0
Woodham & Sons	367 0 0		

LONDON.—For the erection of a block of flats, Roundwood-road, Willesden, N.W., for the Enterprise Building Syndicate, Ltd. Mr. James W. Hall, surveyor, 13, Priory-park-road, Brondesbury, N.W. :—

Bricklaying and Carpentry	£583 19 10
Drainage, &c., materials, cartage, &c.	133 15 0
Joinery	100 2 6
Slating.....	20 8 4
Plumbing (labour only).....	30 8 6
Ironmongery and Finishing.....	185 13 9
Lathing	14 14 9
Plastering (labour only)	76 12 6
Masonry	26 10 0

LONDON.—For superstructure of new police-court and station at Shoreditch. Mr. J. Dixon Butler, Architect, of New Scotland-yard, Surveyor to the Metropolitan Police. Quantities by Messrs. Thurgood, Son, & Chidgey, of Charing Cross-chambers, Duke-street, Adelphi :—

Greenwood, Ltd. ...	£40,435	Holliday & Green-wood	£38,247
Lascelles & Co.....	39,447	Holloway Bros.....	38,230
Clarke & Bracey ...	39,241	H. Lovatt.....	38,200
H. T. Williams	39,175	F. G. Minter	37,970
Lathey Bros.	39,032	F. & H. F. Higgs ...	37,840
Killby & Gayford ...	38,986	Grover & Sons	37,832
Mowlem & Co., Ltd.....	38,983	Ashby & Horner ...	37,095
Lawrence & Sons...	38,278	Leslie & Co.....	35,635

LONDON.—For the execution of road works, Priolo-road, Greenwich, for the Borough Council :—

A. E. Etheridge	£775 5 6	Mowlem & Co.,	
W. Pearce.....	762 0 0	Greenwich* ...	£686 0 0
Woodham & Sons	749 0 0	Fry Bros.	679 14 10
Griffiths & Co....	729 0 0		

LONDON.—For alterations, &c., to Nos. 1 and 2, George-street, Hanover-square, for Messrs. John Broadwood & Sons, Ltd. Mr. Henry Tanner, junr., architect, Carlton Chambers, 12, Regent-street, S.W. Quantities by Messrs. W. H. & P. B. Strudwick, 2, New-court, Carey-street, W.C. :—

Carmichael.....	£9,108	A. Webber.....	£8,150
Holloway Bros.	8,490	Patman & Fotheringham*	7,973
Wills & Sons	8,465		
Grover & Son	8,436		

LONDON.—Accepted for alterations to No. 12, Charles-street, W., for Lord Savile. Mr. F. W. Foster, architect, 41, Bedford-row :—

Aldis Davis £1,316

LONDON.—For guide-pulleys for driving ropes, Lots Road pumping-station, for the London County Council :—

		Time
Easton & Co., Ltd.....	£598 0	10 weeks.
Arnold, Goodwin, & Co.	556 0	8 "
The Thames Ironworks, &c., Co., Ltd.....	510 0	12 "
Horn & Co.	427 0	6 "
Oswald & Son	398 0	8 "
Morsland & Son, Ltd....	384 0	8 "
Hunter & English*.....	340 0	6 "
Flavell & Churchill.....	348 10	12 "

LONDON.—For alterations to No. 12, Queen's-gate, W., for Lord O'Neill. Mr. F. W. Foster, architect, 41, Bedford-row, W.C. :—

Gillow* £1,031

LUTON.—For factory at rear of warehouse, George-street, for Mr. J. Eustace. Mr. A. Wilkinson, architect. Quantities by Messrs. R. E. Carpenter & Son, Leicester :—

T. & E. Neville ...	£1,530 0	G. W. Pryer	£1,470 0
Foster	1,526 0	G. Kingham.....	1,455 10
G. Angel	1,521 0	Saunders & Son...	1,455 10
G. Buckingham‡	1,500 0	A. Attwood*	1,398 0
Mallet & Wood ...	1,489 0		

[‡ Too late.]

MARGATE.—For the supply of road materials and broken granite (600 tons), for the Corporation :—

	s.	d.
The London Basalt Stone Co., London, basalt stone, per ton*	12	0
W. Sayer, Margate, flints, per cubic yard *	6	10

MENSTON (Yorks).—For the erection of two pairs of villas, for Mr. Jabez Cole. Mr. W. H. Sharp, architect, 239, Rooley-lane, Bradford :—

Masonry.—Cowling & Son, Menston ...	£1,100 0
Joinery.—Scott & Jeffray, Menston.....	559 0
Plumbing.—J. H. Clapham, Bradford..	231 17
Slating.—R. & T. L. Nelson, Ilkley	139 0
Plastering.—Walsh Bros., Guiseley.....	120 0
Decorating.—A. Bramley, Weeton.....	37 0

NEYLAND (Pembroke).—For additions to the Hephzibah Baptist Chapel, Little Honeyborough. Mr. Thomas Williams Evans, architect, Charles-street, Neyland :—

Williams.....	£496 0	Levi Davies, Ney-	
J. H. Cummings ...	489 19	land*	£423 10

POOLE.—For making up a portion of Springfield-road, Parkstone, for the Town Council. Mr. John Elford, engineer, Poole :—

H. C. Brixey ...	£270 7 6	Grounds & New-	
W. P. Saunders	262 0 0	ton	£242 0 0
Gates & Gulliver	255 0 0	Budden, New-	
G. Maidment ...	246 17 11	town, Poole*	238 7 6

[Surveyor's estimate, £254.]

ST. AUSTELL (Cornwall).—For the execution of water-supply works, Tywardreath to Tresare Reservoir, Fowey, for the Rural District Council. Mr. T. H. Andrew, engineer, Trevarick Villas, St. Austell :—

T. Doney.....	£488 13 4	W. H. Smith &	
Oliver & Menear	276 0 0	Son, Bristol*	£179 3 4
		J. H. Mitchell ...	134 17 0

Pipes.—Shaw, McInnis, Glasgow (per ton) £5 7 6
Valves.—J. Blakeborough & Sons, Brighouse

SOUTHWICK (Sussex).—For the execution of sewerage works, for the Urban District Council. Mr. G. W. Warr, Surveyor, Council Offices, Southwick :—

Parsons & Sons	£449 0 0	J. Whittington	£379 0 0
Ernest King.....	421 15 6	Charles May.....	371 0 1
Saunders Bros...	402 0 0	Woolgar Bros.,	
W. Whiteman...	389 0 0	Southwick* ...	359 5 10

SOWERBY BRIDGE (Yorks).—For the execution of purification works at Asquith Bottom Dyeworks. Messrs. Spinks & Pilling, engineers, 20, Park-row, Leeds :—

Henry Wilson	£1,740 16 11	Schofield, Sons,	
Ben Riley	1,618 17 5	& Co., Ltd,	
Freeman & Sons	1,580 18 6	Leeds*	£1,338 1 11

STRAWBERRY HILL.—For proposed additions to the Metropolitan City Police Orphanage, Strawberry Hill, S.W., for the Board of Managers. Mr. Fred. W. Foster, architect, 41, Bedford-row, W.C. Quantities by Mr. Ernest Ide :—

Campbell Smith & Co.	£6,990	Oldridge & Sons	£6,668
Messum & Co.	6,802	J. C. Richards.....	6,565
Frank Bush.....	6,765	Lane & Sons*	6,375

SWADLINCOTE.—For the erection of a fire station &c., Darklands-road, for the Urban District Council. Mr. Thomas Kidd, Borough Surveyor, Swadlincote :—

J. Grey.....	£2,732 19 2	Charles Jones	£2,118 14 7
W. Goole	2,578 7 6	Cartwright Bros.	2,060 18 0
T. Barlow.....	2,381 7 3	Brown & Son ..	2,047 0 0
Thomas Boss...	2,237 8 7	Cuthbert	2,043 17 11
J. T. Price.....	2,226 0 0	C. Clarke	2,004 6 5
J. Waterfield...	2,190 15 3	Lowe & Sons,	
G. Hodges	2,149 0 0	B'ton-on-Trent*	1,967 0 0
Clarke	2,145 7 10		

SWINDON.—For the execution of road works, Ferndale-road, from Cricklade-road to the Brook, for the Corporation. Mr. H. J. Hamp, Borough Surveyor, Town Hall, Swindon :—

Free & Sons ...	£1,383 5 5	Free & Co.....	£1,163 13 10
E. Ireland.....	1,375 13 2	Free Bros.,	
G. Whitehead	1,295 6 6	Marlborough*	1,049 10 2

[Surveyor's estimate, £1,144 4s. 8d.]

TONBRIDGE.—For alterations to Gt. Fishall Hall stables, Tonbridge, Kent, for Mr. G. à Beckett Terrell. Mr. Delmé G. Mootham, architect, 1, Arundel-street, Strand :—

H. C. Vinten	£239 15	Punnett & Son	£222 0
Martin & Co.	238 0	M. Warren	175 17

[Architect's estimate, £200]

TUNBRIDGE WELLS.—For the execution of private street works, Denbigh and Dynevor Roads, for the Town Council. Mr. W. H. Maxwell, C.E., Town Hall, Tunbridge Wells :—

Dixon & Co. ...	£2,290 2 1	Jarvis & Son	£1,386 9 5
Leney & Son...	1,599 17 0	Arnold & Sons,	
Mott & Sons...	1,520 19 7	East Peck-ham, Pad-dock Wood*	1,370 18 11
Lawrence & Tracker.....	1,428 0 0		

TURNBERRY (N.B.)—For the erection of a hotel, for the Glasgow and South-Western Railway Co. Mr. James Miller, architect, 15, Blythswood-square, Glasgow. Quantities by Messrs. Barr & Fyfe, Glasgow :—

Morrison & Mason, Ltd., Glasgow* £37,751 4 11

WADHURST (Sussex).—For alterations to Greyhound p.h., for Page & Overton's Brewery, Ltd. Mr. A. Broad, architect, 22, George-street, Croydon :—

G. Luck £401

WARE (Herts.).—For the supply of broken granite road metal, for the Urban District Council :—

Griffiths & Co., 35-37, Hamilton House, Bishopsgate-street, Without, E.C. :—2in. 13s. 9d. ; 1½in. 14s. 3d. ; 1¼in. 14s. 3d. ; 1½in. 14s. 3d. ; ¾in. 10s. 6d. ; ½in. 10s. 9d.

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following list of tenders :—

"ASHBURNHAM" NEW SENIOR MIXED SCHOOL (Chelsea).—Heating apparatus :—

Wenham & Waters, Ltd.	£466 0	G. Davis.....	£360 0
Stevens & Sons	450 0	J. Wontner-Smith, Gray, & Co.	352 18
Wippell Bros. & Row	425 0	Kite & Co.	350 0
Palowkar & Sons ...	384 5	Bates & Sons	329 10
Paragon Heating Co.	370 10	G. & E. Bradley*...	329 0

BELVEDERE-PLACE SCHOOL (Borough-road).—For additional heating in Girls' Department :—

Whippell Bros. & Row	£205 10	J. Grundy	£140 0
Palowkar & Sons...	173 0	Cannon & Sons	139 0
J. & F. May	166 0	Rosser & Russell, Ltd.	135 0
Defries & Sons, Ltd.	165 0	Esson & Son*	129 0

CANTERBURY-ROAD BOYS' AND GIRLS SCHOOL (Old Kent-road).—For additional heating :—

Teale & Somers	£117 0 0
Sloper & Co.....	104 15 0
Brightside Foundry & Engineering Co., Ltd.....	69 0 0
J. C. Christie	65 0 0
Esson & Son.....	64 10 0
W. Simmons.....	58 13 6
Cannon & Sons	56 0 0
G. & E. Bradley*	55 10 0

HATFIELD-STREET SCHOOL (Blackfriars).—For enclosing, draining and tarpaving land in connexion with, for building a new boundary wall, forming an entrance gateway, filling in site, &c. :—

H. Line + 20% on schedule		J. F. Ford	£434
Greenwood, Ltd.	£533	Belcher & Co., Ltd....	422
Maxwell Bros., Ltd.	523	Appleby & Sons.....	412
W. Downs	477	W. Hooper	350
W. V. Goad	455	Marsland & Sons*.....	355

PROSPECT-TERRACE SCHOOL (Gray's Inn-road).—Sanitary Works :—

Barrett & Power	£297	Stevens Bros.	£223
T. Cruwys	258	R. P. Beattie	218
Durbin & Katesmark	247	F. Bull*	205
J. Peattie.....	239		

SCIENCE CUPBOARDS :—

	Each.		Each.
Spencer & Co. ...	£19 0 0	Hammer & Co., Ltd.	£12 15 0
Shoolbred & Co.	15 13 6	General Builders, Ltd.	12 7 6
Atkinson & Co.	13 19 0	Educational Supply Association, Ltd.	11 17 6
Garvie & Sons ...	13 15 0	H. Bouneau	11 15 0
Brake & Co.	13 2 9	London School Furniture Co.	10 14 6
Goodall, Lamb & Heighway, Ltd.	12 18 6	A. Duncan ...	10 10 0
Waring & Sons, Ltd.	12 16 0		

North of England School Furnishing Co., Ltd.* £10.

[See also next page.

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SOUTH GROVE NEW SCHOOL (Mile End).—Heating apparatus:—

Adams & Son	£993 0 0
Defries & Sons, Ltd.	928 2 9
J. & F. May	910 0 0
Brightside Foundry & Engineering Co., Ltd.	893 0 0
Kite & Co.	850 0 0
Comyn Ching & Co.	808 10 0
Harlow & Son	787 0 0
Williams & Sons, Ltd.	788 0 0
J. Grundy	650 0 0
Truswell & Son*	644 15 9

TELFERSCOT-ROAD NEW SCHOOL (Balham).—Heating apparatus:—

Sloper & Co.	£890 19 0
Stevens & Sons	763 0 0
Adams & Son	692 2 0
Werner, Pfleiderer, & Perkins, Ltd.	658 0 0
Defries & Sons, Ltd.	648 7 1
R. H. & J. Pearson, Ltd.	647 0 0
Wontner-Smith, Gray, & Co.	619 15 0
Cannon & Sons	598 0 0
Brightside Foundry & Engineering Co., Ltd.	597 0 0
Eason & Son	596 0 0
Paragon Heating Co.	496 10 0
G. & E. Bradley*	481 0 0

TORRIDON-ROAD SITE (Catford).—For erecting three brick structures for temporary school accommodation in the first instance:—

Smith & Sons, Ltd.	£4,758	Bulled & Co.	£4,047
Thomas & Edge	4,310	F. & H. F. Higgs	3,946
T. D. Leng	4,197	W. Downs*	3,787
J. & C. Bowyer	4,052		

For structural alterations at Schools during the Christmas holidays:—

CHELSEA (Sirdar-road):—

Thompson & Beveridge	£709 0 0	W. R. & A. Hide	£606 15 0
London School Furniture Co.	684 10 6	F. T. Chinchen & Co.	597 15 0
Cowley & Drake	654 0 0	G. Neal	574 0 0
W. Hammond	640 0 0	Marchant & Hirst	569 0 0
General Builders, Ltd.	609 0 0	E. B. Tucker	503 0 0
Stevens Bros.	608 0 0	E. Triggs*	497 0 0

The following is the analysis of the lowest tender:—

Alterations generally, including provisional sums	£439
Two new skylights in Girls' department	58

EAST LAMBETH (Sayer-street)—Special School:—

Maxwell Bros., Ltd.	£757	Marsland & Sons	£545
W. Downs	713	E. Triggs	535
General Builders, Ltd.	592	W. V. Goad*	497

FINSBURY (Newington-green):—

Parrott & Isom	£796	A. Porter	£513
Lawrance & Sons	671	L. H. & R. Roberts	507
Williams & Son	642	Sheffield Bros.	497
Grover & Son	573	Dearing & Son*	474
McCormick & Sons	532		

FINSBURY (York-road):

H. Line +15 % on schedule		London School Furniture Co.	£291 11
Sheffield Bros.	£351 0	General Builders, Ltd.	274 0
Williams & Son	346 0	Densham & Sons*	265 0
Dearing & Son	330 0		
McCormick & Sons	322 0		
M. Pearson	310 0		

HACKNEY (Chatham-gardens):—

H. Line +15% on schedule		Vigor & Co.	£580 0
Parrott & Isom	£762 0	J. Stones	522 0
North of England School Furnishing, Co., Ltd.	710 0	H. Bouneau	520 0
Spencer & Co.	588 0	W. Martin	414 0
		Haydon & Sons*	406 8

TOWER HAMLETS (Baker-street)—

Parrott & Isom	£227	G. Barker	£149
A. J. Sheffield	155	H. Bouneau*	142
A. E. Symes	154		

TOWER HAMLETS (Gill-street):—

Parrott & Isom	£561 0	A. E. Symes	£399 0
Vigor & Co.	435 0	A. J. Sheffield	388 0
H. Bouneau	430 0	J. F. Holliday*	314 10
G. Barker	418 0		

WEST LAMBETH (Battersea Park-road):—

North of England School Furnishing Co., Ltd.	£450 0	R. A. Jewell	£247 10
Williams & Sons	295 0	Lathey Bros.	203 0
R. S. Ronald	250 0	E. Triggs	199 0
		E. B. Tucker*	199 0

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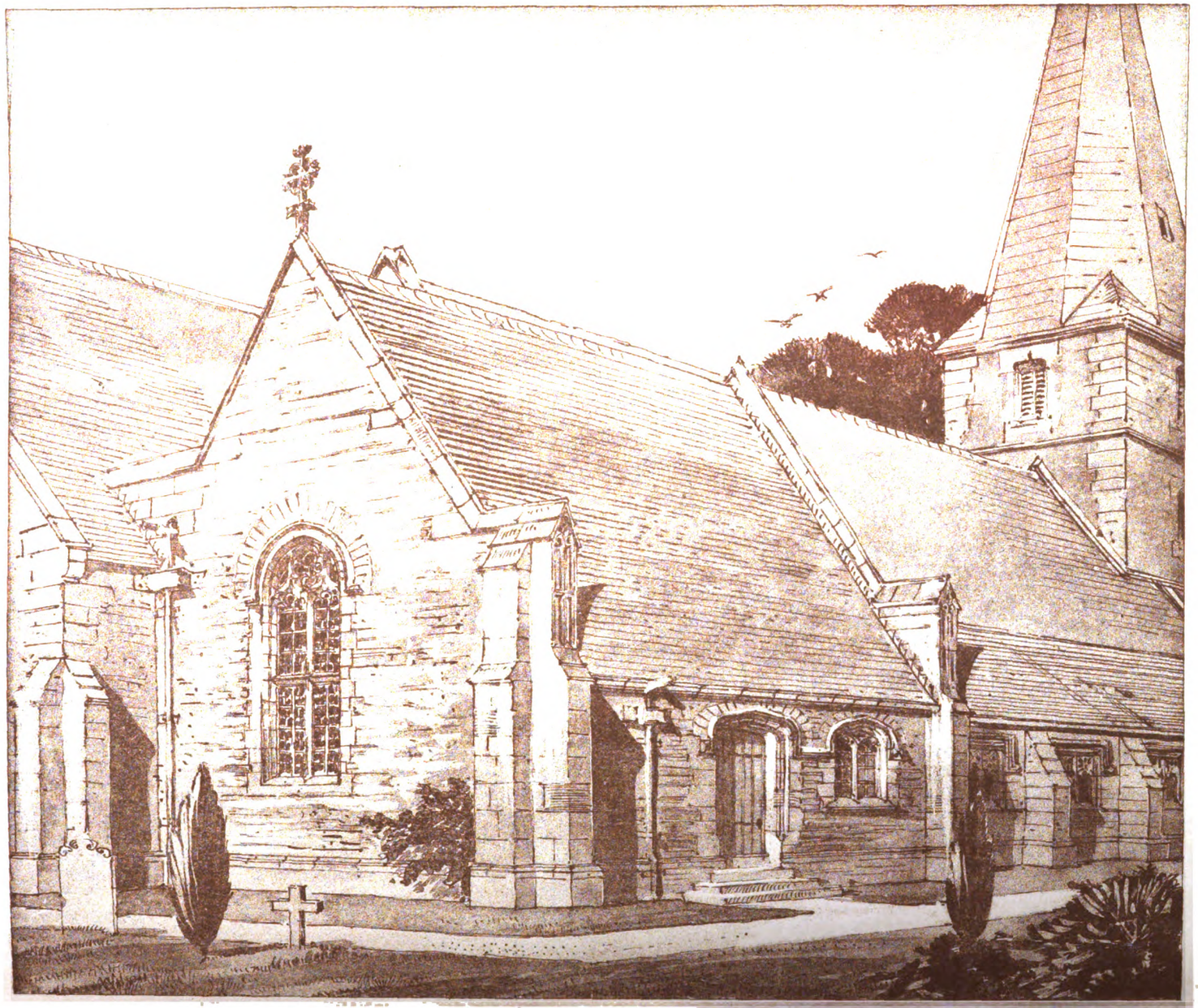

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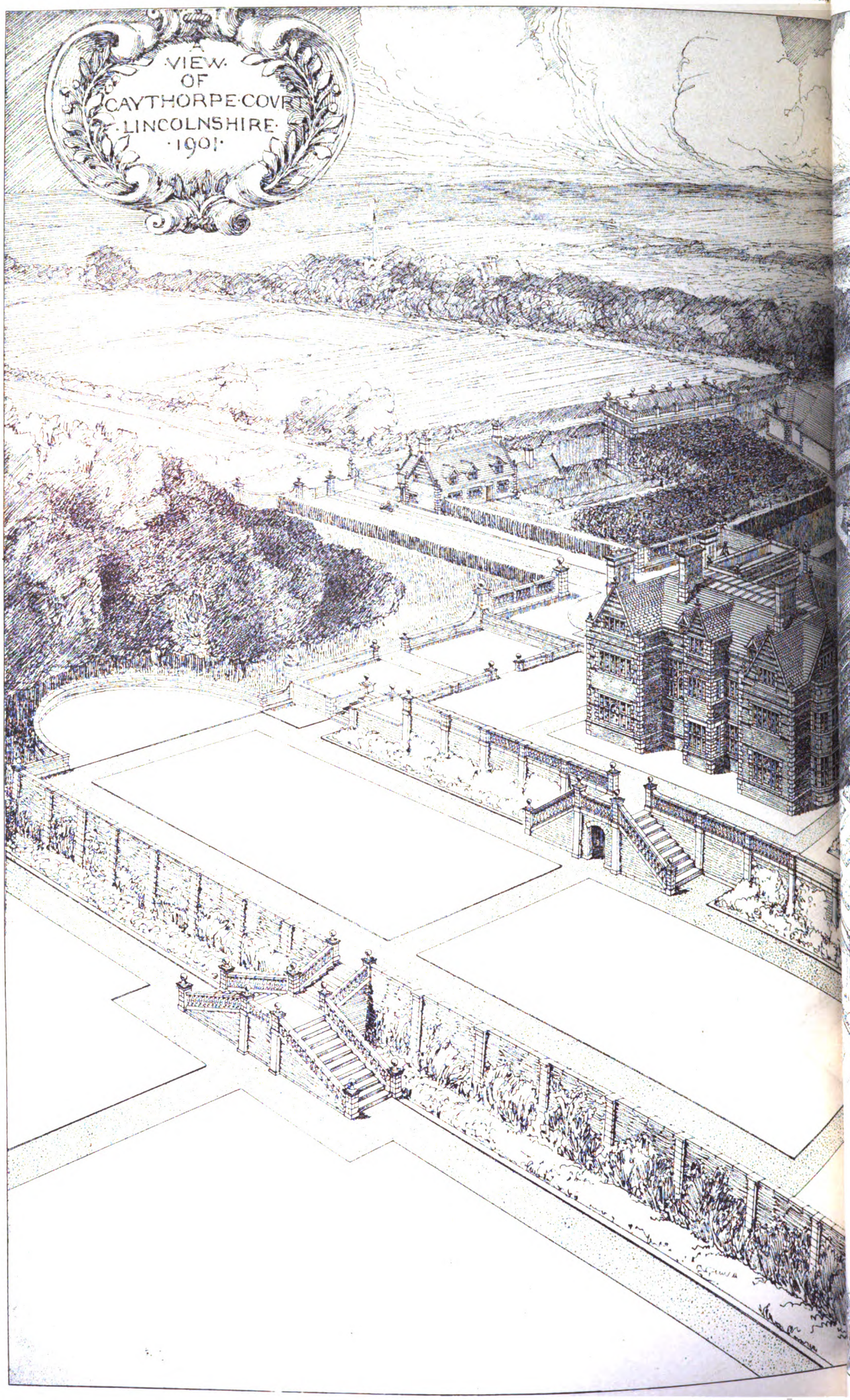

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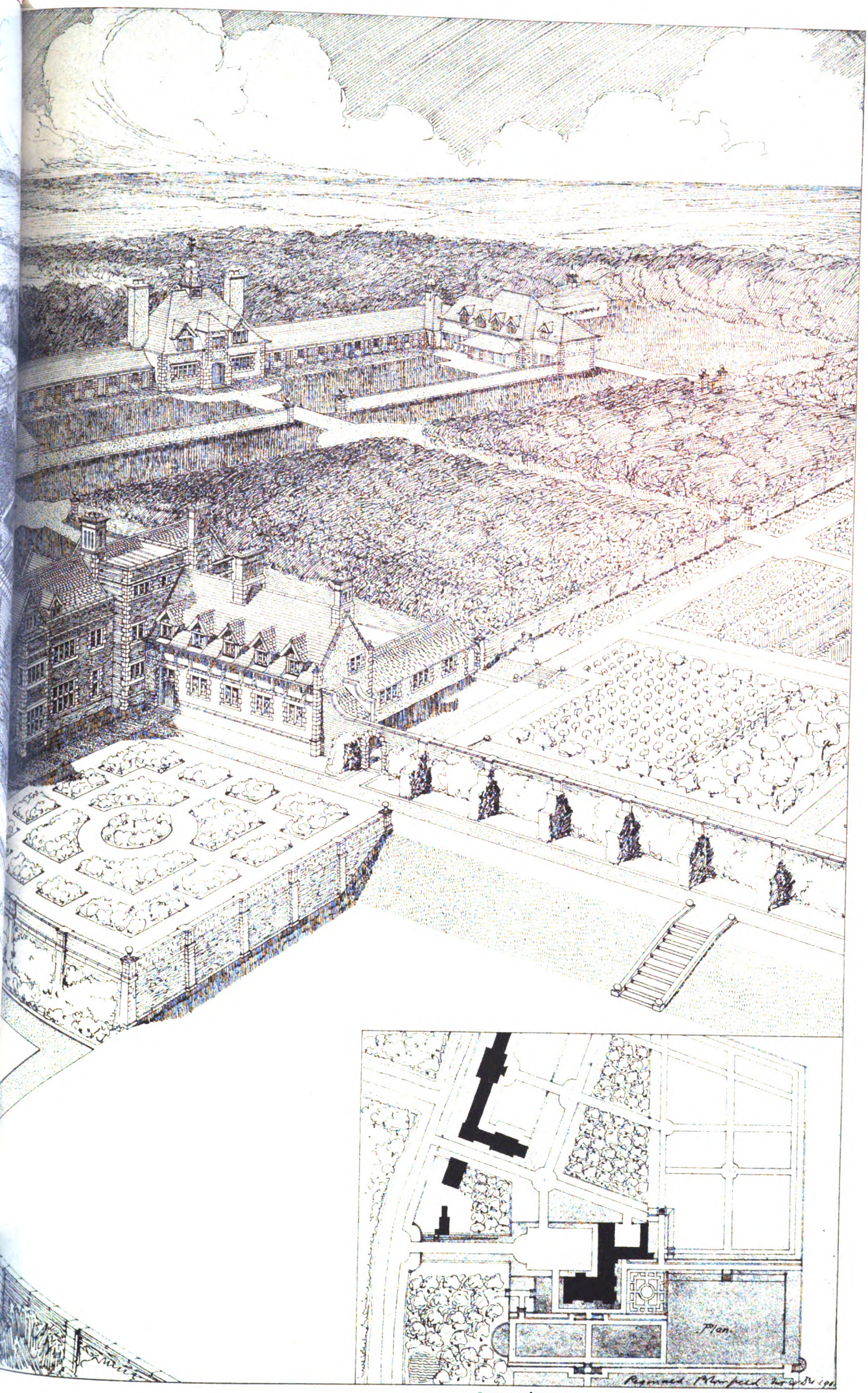

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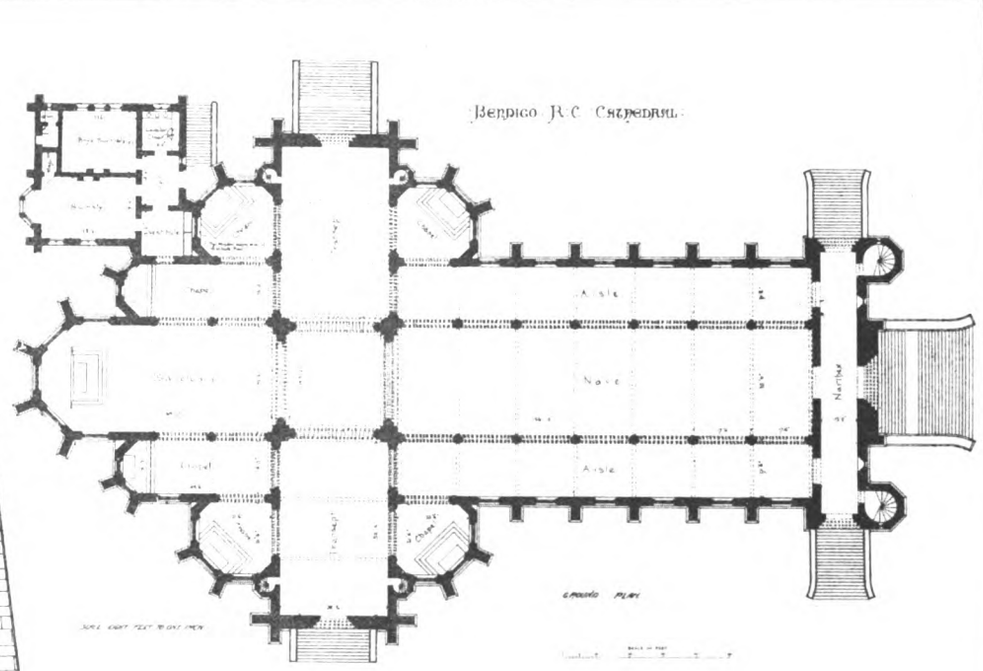

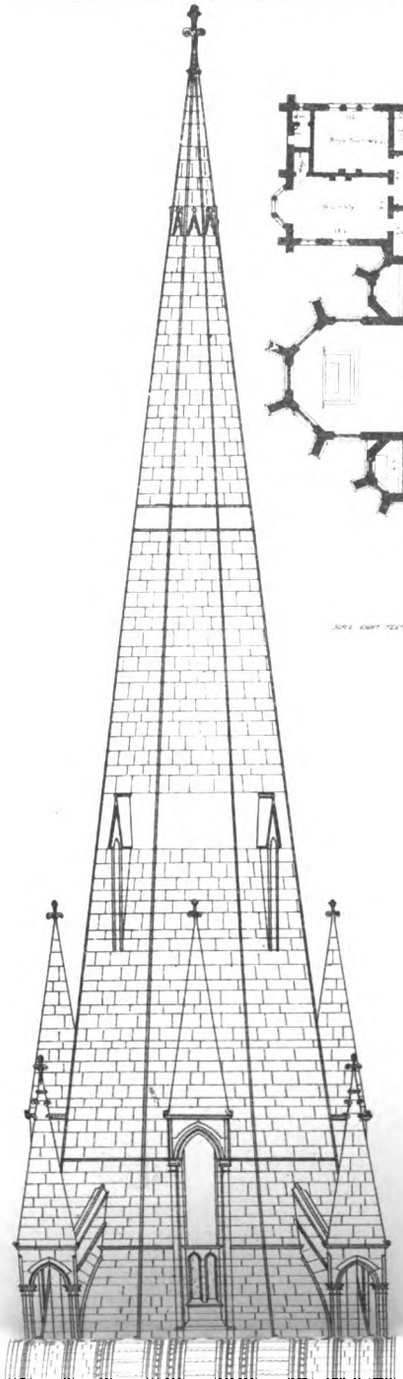

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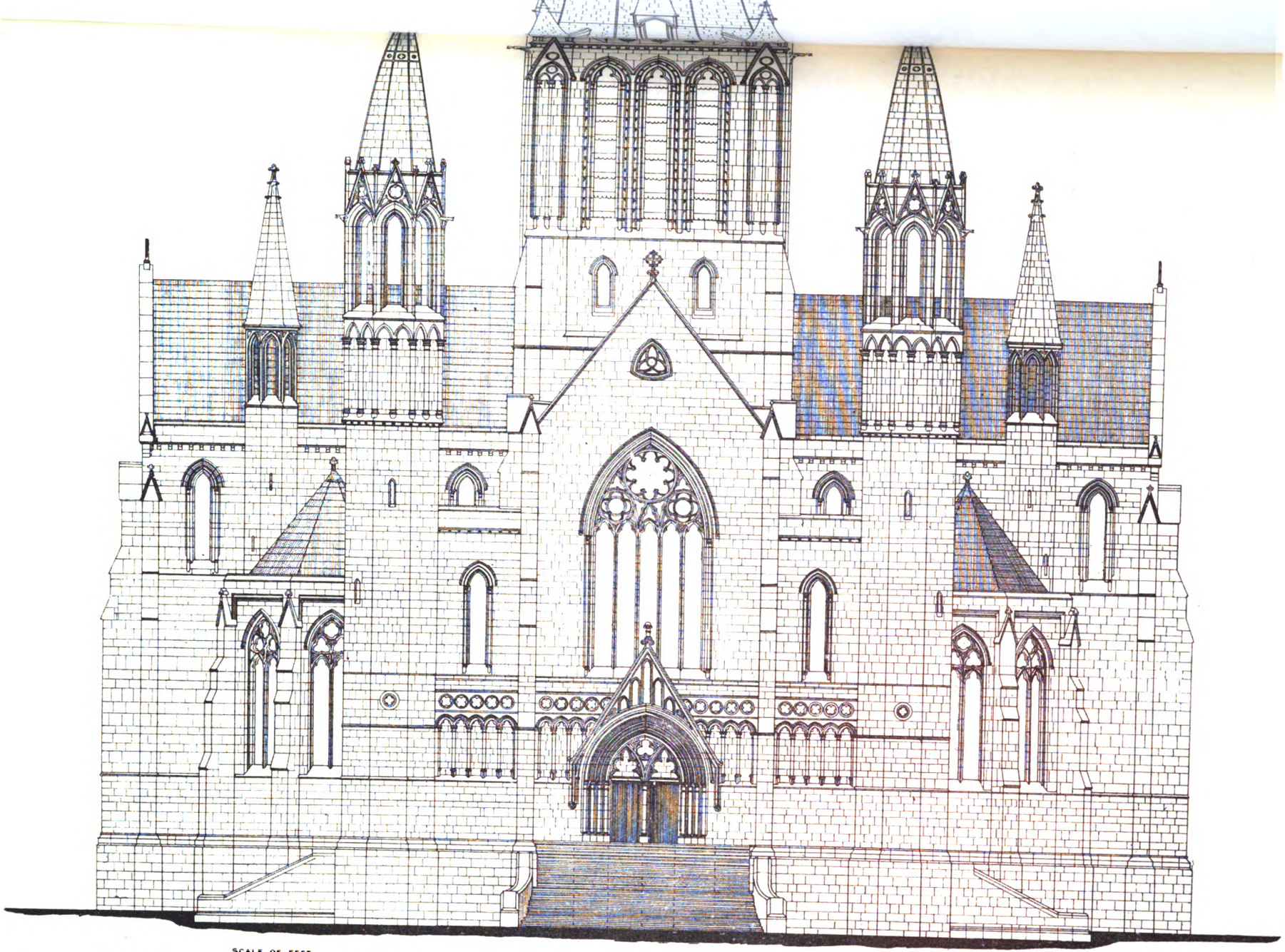

Front Elevation

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The Builder.

VOL. LXXXV.—No. 3174. DECEMBER 5, 1903.

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Maesycrugiau Manor, Carmarthenshire ..... Mr. Arnold Mitchell, F.R.I.B.A., Architect.
Proposed Hotel, Churston, Devon ..... Mr. G. B. Carvill, Architect.
Portion of Design for Municipal Buildings ..... By Mr. Thomas Davison, A.R.I.B.A.
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The Sanatorium Question.

ON Friday, November 27, there was held, in the Guildhall, Westminster, a meeting of representative men of the County of Middlesex, to consider a proposal for the necessity of an open-air sanatorium for the county, as distinct from London. It is probably not too much to say that, though somewhat late in the day, this meeting will be instrumental in inaugurating a saner system for the effective and inexpensive treatment for the prevention and cure of tuberculosis, by the means of public institutions in this country. The origination of the idea is due to Colonel Gerard Clark, who has been for some months past collecting all available data bearing on the subject. He has satisfied himself that the cure of tuberculosis can be best furthered, not by enormous buildings conceived on hospital lines, and erected at a cost of from 500*l.* to 1,000*l.* per bed, but rather on the simpler and far more economical method of separate huts surrounding the executive buildings. This method, or the pavilion method, has been constantly advocated by such practical pioneers as Dr. Philip, of Edinburgh, and Dr. Charles Reinhardt, but has been so far almost entirely overlooked in the public sanatoria, whether erected through private munificence or by public bodies.

Sir W. Broadbent, who opened the discussion on the occasion referred to, emphatically stated that the best and most effective way of dealing with pulmonary tuberculosis is by a sanatorium arranged on a system of detached sleeping huts or chalets, and that he cordially gave his approval to the scheme as outlined by Colonel Clark; to which the Chairman, Sir Ralph Littler, added that since, in the opinion of so great an authority as Sir William Broadbent, the hut system was preferable, from a medical point of view, for an institution of this nature, there was no longer any reason for a heavy outlay on buildings which were not required. Dr. Sykes, the Medical Officer of Health for St. Pancras, said he was present at the recent Tuberculosis Conference, and described briefly the conflict of opinion between the German and French authorities, the former preferring a sanatorium treatment, while the latter were in favour of home treatment. Dr. Sykes gave it as his opinion that there was room for both methods, but that a course in a sanatorium, during which time the poorer class patient is educated up to the system, must precede any effective home treatment; and he also strongly expressed the opinion that while careful attention should be given to executive buildings, patients themselves should be housed in buildings of the slightest and most economical construction.

The interesting point for architects to note is that at length weighty medical opinion is pronouncing in favour of a system which is the antithesis of the German hotel-like sanatoria and the great hospital structures which have been, and unfortunately still are being, erected in this country; and as sanatoria are being built all over England, it is essential that the greatest care should be exercised in planning them on the most economical and effective lines.

It is perhaps labouring the question to refer to the huge palatial sanatoria now being built at Northwood and Midhurst, or to that erected at Frimley for the Brompton Hospital, and the London Sanatorium at Pinewood, not to mention many others; but it should be clearly understood that if the hut system is more effective from the medical point of view, and is less costly, grave waste of public and private money has taken place, and architects who have the designing of sanatoria have a heavy responsibility if they do not keep themselves in touch with the trend of affairs.

The whole question is one which must be dealt with on its own peculiar grounds, and, as has been already pointed out in the *Builder*, in an article* on two papers read before the Architectural Association, the architectural arrangements of sanatoria must be freed from hospital lines, while the attack on this "entirely curable and preventible disease" must be general, and not a series of isolated engagements. To be thoroughly general, it must be economical, for an expenditure on the scale of the King's Sanatorium, or the Sanatoriums at Northwood, and the others previously mentioned, is entirely beyond the means of county or parochial authorities, even when assisted by private donors. In a criticism on the awards of the King's Prize,* it was pointed out that the publication of such schemes as those placed first and second, schemes full of mistakes in planning, might have a most prejudicial effect on the development of sanatorium construction for this country, and although the writer of the third premiated essay gave it as his opinion that "the ideal sanatorium consists of a series of isolated huts, with windows on all four sides" (as advocated in Colonel Clark's scheme), he went on to say that "for a sanatorium of 100 beds the difficulties of heating, of carrying meals, and of supervision over so large an area, render the scheme impossible, with due regard to economy." In view of the fact that these essays were only published at the beginning of the present year, the recent declaration of Sir William Broadbent is therefore the more striking and significant.

That there will be prejudice, both medical and architectural, in favour of "hospital lines," is not to be wondered at, but a careful consideration of both methods will show that the difficulties referred to by the writer of the essay above quoted can be overcome by a practical grasp of both the medical and constructional requirements.

Considering the vast area covered by the King's Sanatorium, and the distance from patients' rooms to dining hall and kitchen, objections which we believe obtain in an almost equal degree at Northwood, it is a little hard to see why they should be greater in a hut system sanatorium; and if the hut

* The *Builder*, December 6, 1902: "Open-air Sanatoria."

* The *Builder*, April 18, 1903: "The King's Sanatorium Scheme."

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system is the best for treatment and economy, it is for architects to overcome the difficulties, and see that this great work of national importance is not hindered and kept back from any want of initiative or knowledge on their part.

HOISTING MACHINERY.

FEW classes of machinery are more widely used than the various types of lifts, hoists, and cranes available in the present day. Much time and ingenuity have been devoted to the improvement of such apparatus, and to its application to domestic, industrial, and other purposes. The all-pervading influence of the lift is felt in one way or another by most of those who dwell in cities and towns, while the benefits conferred by the hoist and the crane are appreciated by those engaged in the most varied industries and occupations throughout the whole land.

So universal has the use of lifting and hoisting machinery become that the latent element of danger is seldom remembered by lift passengers and attendants, or by workmen and foot passengers, who walk unconcerned beneath dangling loads of material or merchandise on the site of works or in the public streets. Comparative immunity from misadventure has had the further effect of rendering the owners of lifting and hoisting appliances somewhat negligent, so that the first intimation of dangerous wear or disorganisation of the machinery is often given by a breakdown of more or less serious character.

Quite recently we have heard of lifts being used with badly-worn ropes, and of cranes being worked when imperfectly erected. In every case responsibility has been shuffled from one person to another, giving rise to the inevitable conclusion that none of the persons concerned could have given any thought as to the safety of the apparatus or to its maintenance in a state of efficiency. Reprehensible negligence of this kind is clearly indicative of such ignorance as ought not to exist in the present enlightened times. The element of danger can never be wholly eliminated from the use of lifts, and it must always be present in a more marked degree in the case of hoists and cranes, where no safety appliance can be devised to prevent a hanging load from falling if the rope or chain should break. For these reasons it is very important that all who make use of hoists and cranes should have reliable knowledge as to the general principles governing their design, and as to the details of their construction. To such we commend the perusal of a recently-published treatise* more especially devoted to the subject of crane construction. Mr. Joseph Horner, the author, has had a long and varied experience in the work of crane building, and being quite familiar with all the details of design and construction he is properly qualified to impart useful and reliable information to others. So numerous are the types of cranes now made that it would scarcely be possible to deal with all of them fully in a volume of ordinary dimensions. After all, it is less important to have long descriptive accounts of different varieties of apparatus belonging to the several families than to have adequate particulars of constructive details more or less common to all varieties. The author has chosen wisely in devoting the greater portion of his treatise to an account of the primary elements of cranes, and in describing the leading types more briefly.

It may appear to be a somewhat anomalous condition of things that the design of cranes should be more largely based upon practical experience than upon pure theory. This fact is the more remarkable for the reason that in no structures is a closer relationship demanded between strength and stress than in cranes. Some elementary calculations are always made, involving questions of leverage, compressive and tensile stresses, or instead of calculations the methods of graphic statics may be adopted. In either case, the determinations are valuable for fixing the proportions of the members constituting the framework, and of chains, ropes, hooks, and snatch blocks, But the main frame castings are difficult of calculation, and the author tells us that in practice they "are almost invariably copied or modified from previous designs that have stood successful service." There are plenty of examples in engineering work where practice has outstripped theory, and in many departments theory has necessarily been based upon the accumulated records afforded by practical experience. Even in the manufacture of machines, when scientists profess to be able to solve all essential problems by pure theory, the practical engineer is obliged to qualify results very considerably by his personal experience. So far as concerns the design of cranes, it is the fact that new patterns are evolved with but little direct calculation, because previous records are very largely relied upon. The tendency in the present day is towards specialisation in crane building, and the more this condition is approached by any firm the more easy is the production of modified designs. From previous records it is a simple matter to prepare tables and diagrams giving safe loads for chains, hooks, bars and rods; standard gears of different sizes, each of known capacity, will often suit cranes of different types; while jibs, posts, trucks, truck wheels, and crane housings are standardised, and may be applied to cranes differing in general design.

It is not altogether satisfactory that practice should have such a basis, chiefly because pupils and assistants in the drawing office have little opportunity of acquiring theoretical knowledge, or even of becoming familiar with the use of empirical formulæ; and, what is still more undesirable, they have no facilities for comparing calculated results with the proportions demanded by actual service. In justice to theory, we ought to say that calculated stresses can be obtained with absolute accuracy for many parts of a crane, and with a close approach to accuracy for others. But, unfortunately, the working conditions involve the establishment of stresses and strains that vary in such uncertain fashion as to baffle the mathematician. Large and very ample factors of safety are invariably used by crane builders, except perhaps in the case of some competitive tenders, but even these factors are frequently proved to have been quite inadequate. Apropos to this point, we may quote the experience of the author. He says that "there is no single section of a crane which has not failed under stress, whether checks, posts, jibs, chains, tie rods, trucks (both cast and plated), traveller girders, toothed wheels, drums." And he adds that "these accidents happen not always by reason of want of sufficient strength such as is fairly warranted by past experience, but they are due to the fact that duties of too severe a character are systematically imposed on cranes."

The last sentence here quoted is particularly significant. We all know how careless some workmen are—probably it is safe to say all workmen are—with tools and machines belonging to their employers. Crane attendants are notorious offenders in this respect, and as—to use a graphic American expression—it is impossible to make cranes "fool-proof," we must expect failures, until attendants can be persuaded or compelled to exercise commonsense. In the treatise to which this article refers the author has intentionally abstained from the introduction of formulæ for calculations, thinking it better to omit them altogether than to attempt a small selection. We think he is not far wrong in this, for the special value of his book is in the essentially practical nature of the details, and of the treatment generally adopted. Formulæ can be obtained from several well-known treatises on machine construction and structural engineering, but the experience of an engineer well versed in crane construction is rarely set down in writing.

Before plunging into practical details, Mr. Horner briefly points out the nature of the problems to be considered by the crane designer, these problems being interesting to the crane user as well. Crane framings embody applications of the parallelogram and triangle of forces, suggesting diagrams from which, when the nature, direction, and magnitude of one force is known, the characteristics and dimensions of the others can be measured off. Travelling and similar cranes exemplify beams supported at the ends and carrying loads at intermediate points. Balanced cranes afford interesting problems in statics, as the moment of the load, and that due to the overhang of the jib, must be counterbalanced by a load of equal moment. Portable cranes present still more interesting problems of similar character, as the conditions necessary for equilibrium cannot be satisfied without considering the stability of the truck as well as that of the crane carried thereon. The length of the wheel base and the gauge of the rail track must both be taken into account, and when the gauge is too narrow to insure stability of the truck, rail-clips or other auxiliaries must be applied. Some members of a crane are exposed to direct tension or compression, as the case may be, while others may be subject to a combination of compressive, shearing, and bending stresses.

In Chapter I., the author deals with the elements of triangular-framed cranes, giving a series of outline diagrams, which are sufficiently explanatory of the simple frame with raking jib, the horizontal type of jib crane, and jib cranes with side frames for carrying engines and shafting. Thenceforward, and up to Chapter XIV., we find fully detailed descriptions of the parts used in the construction of practically

*"An Elementary Treatise on Hoisting Machinery." By Joseph Horner, A.M.I.M.E. London: Crosby Lockwood & Son. 1903.

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all varieties of cranes, and the letterpress is illustrated by a large number of figures, evidently reproduced from working drawings. Commencing with the mast, or post, which is the vital element in all triangular framed cranes, the author discusses other members in proper sequence, mentioning the essential members of travelling and kindred cranes, and finishing up with hooks, snatch blocks, and chain anchorages. The matter contained in this section of Mr. Horner's book is too minutely technical for appropriate consideration in a general review, and we must refer our readers to the work itself for full details.

A subject of universal interest is the most advantageous method of crane operation. Hand power will always be employed to a certain extent, but it is now retained in many cases where steam, water, or electric power would be more economical, and more serviceable in every way. Steam power has fully justified its past employment, and it is used for driving cranes of every type, and will probably be for many years to come. But we quite agree with Mr. Horner that steam power has filled a wider place in crane driving in the past than it is likely to do again. Water power is chiefly useful for fixed cranes, although flexible pipes or other connexions frequently facilitate the application of water to some special types of portable cranes. For heavy fixed cranes and for riveting cranes in structural work water is an admirable source of power. The motion imparted is extremely regular, and is under perfect control. Perhaps the chief objection to the adoption of hydraulic power is the liability of the water to freeze in severe weather. This may be minimised by laying the pipes at a sufficient depth beneath the surface, by covering pipes above ground, and by the admixture of glycerine with the power water. The last-mentioned course can only be adopted with economy in cases where the water is used over and over again.

Within recent years compressed air has come forward as a serious rival to water as a source of power, chiefly for cranes of the lighter types. The author says the great objection to the air crane was, and still is, that the elasticity and compressibility of the air causes a jerky motion in the piston, which is fatal to precise and safe lifting. Recent improvements have largely obviated this drawback, and very extensive use is made of small air-driven hoists, especially in American factories and warehouses. Compressed air can be conveyed from point to point very readily, it cannot freeze like water, and one advantage of a compressed air service is that it can be used for pneumatic tools, and for various other appliances when these are employed in establishments where cranes and hoists are required.

Electricity is undoubtedly the most convenient agency for the operation of cranes of all kinds, if we omit from consideration the special circumstances under which other sources of power commend themselves for adoption. The great advantage of electricity is that small copper wires can be run in any direction, and for any distance, conveying energy from a central generating point for working the smallest hoist with a lift of a few pounds, or the largest crane with a lift of many tons. The wasteful expenditure of human strength, the unnecessary extravagance of fuel, and the complicated pipe systems inseparable from other methods of crane driving are obviated. Reversible motors working at moderate speeds have conduced largely to the present popularity of the electric crane, and by adopting the enclosed type of motor the injury formerly caused by dust and dirt is no longer to be feared. A most advantageous feature of the electric drive is that no current is consumed, and none of the mechanism is running idly, in the intervals of work. The author does not enter into the details of engines, hydraulic pumps, air-compressors, and electrical machinery for use in conjunction with hoisting machinery, his efforts being directed almost exclusively to the task of demonstrating the mechanical features of cranes and hoists.

Not the least useful section of his treatise is that in which various types of cranes are classified and illustrated. The system of classification adopted by the author is quite intelligible, but it appears to involve a certain amount of repetition and cross reference. This is because the various types of cranes are grouped in two main divisions—Hand Cranes and Power Cranes. It is quite evident that the essential characteristics, let us say, of a derrick are the same, whether operated by hand, steam, water, air, or electricity. Therefore a classified description becomes somewhat cumbrous if the derrick has to be described in five different places, and as other forms of crane construction are similarly treated by the author the reader may find it a little confusing to have his attention diverted so frequently to and from the different types of apparatus. We think it would have been better if each variety of crane had been treated in chapters wherein the reader might trace progressive development from the hand crane of every class to the most modern power crane of the same class. This treatment would not necessitate such passages as we find, to pick one out at random, on p. 197. It is here said, under the heading of Hand Cranes: "A description of Goliaths will be found at p. 236, in the account of Travelling Cranes, and at p. 112." Turning to p. 236, we find the only explanatory remark is the following: "The steam Goliath has been, and is still, a valuable machine. It resembles and fulfils the same functions as the hand Goliaths, but with the difference due to the nature of the motive power employed." No doubt this is quite correct, but it is just as unsatisfying as the elusive spelling book definitions with which many of us were tantalised in early youth. We turn next to p. 112, and there, in the chapter devoted to the Frames of Travelling Cranes, we find the missing definition. But it is not nearly so good as the definition given on pages 204 to 206. After all, these little inconveniences do not detract to a very serious extent from the valuable collection of notes presented by the author in this section of his treatise. He has given an excellent description of practically all forms of hoisting machinery, including triangular-framed cranes, derricks, sheer legs, Goliaths, Titans, gantry cranes, overhead cranes, and Fairbairn cranes. Adequate reference is also made to such special machines as coal tips, excavators, Temperley transporters, and floating cranes. A few words are added upon lifts, but these might just as well have been omitted, as the subject is too large and much too important to be discussed incidentally with any advantage. The various types of power cranes are treated in a very satisfactory manner, and sufficient particulars are given of the methods adopted for the application of motive power.

The general impression to be gathered from perusal of this excellent book is that the crane-building industry is on the eve of developments even more important than those already experienced. Pneumatic and electric cranes will probably be brought to still greater perfection. In factories and engineering shops the air-driven crane presents features recommending it to those who make use of compressed air for other work, but for general applicability the electric crane is to be preferred, and the rapid progress now being made in the equipment of electricity supply stations, and in the installation of private generating plant seems to show that the electrically-driven crane has a great future, and will ultimately supersede other types of hoisting machinery hitherto thought to be almost indispensable.

NOTES.

Insanitary Elementary Schools.

THE Education Committee of Hampshire has recently had under consideration an important Memorandum prepared for them by Lord Northbrook on the condition of the elementary schools in Hampshire, which number more than three hundred. Lord Northbrook states that the condition of many of these schools is very bad; some have a bad water supply, some no water supply at all, in the majority the ventilation is bad, and in nearly every school the drainage is defective. Obviously this state of things will account for much of the disease which is found in our rural districts, for we have little doubt that the Hampshire elementary schools, more especially the Church schools, are typical of the same class throughout England. Lord Northbrook suggested the appointment of a sub-committee to consider further the sanitary state of the schools, and the enforcement of the provisions of the Public Health Act. Clearly this Act ought to have been applied to these unhealthy buildings long ago. This state of things is a good example of the necessity, which has before now been referred to in these columns, of the periodical inspection of all schools, elementary and secondary, by sanitary inspectors appointed by Government. It has been customary for the inspectors of the Education Department in their annual visit to make a cursory inspection, after the examination of the scholars, of the school premises, and to refer to any obvious defect in their Report. But the light now thrown on the condition of the Hampshire schools shows how little use this amateurish inspection has been, and indicates the necessity for a complete change of system in regard to the sanitary inspection of the elementary schools throughout the country.

Historic Homes in London.

LORD ROSEBERY is in his happiest vein when discoursing on historical subjects, and he has a capacity (very uncommon in Englishmen) for uniting the particular amount

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of criticism and praise which forms a eulogy, a kind of oratory well known in France. The occasion of this particular eulogy was the unveiling of a national tablet at Holly Lodge, Campden Hill, commemorating the fact that Macaulay lived there in his last years. Holly Lodge is, however, so secluded that this tablet will be less interesting and suggestive to most men than those which will presently be placed in more crowded parts, to keep green the memories and the homes of other great men. Shortly the homes of Hallam, the historian (67, Wimpole-street), of Dickens (45, Doughty-street), and of Lord Beaconsfield's birth (22, Theobald's-road) will be thus commemorated. This work of the London County Council is admirable, for nothing is more important than to stimulate the historical imagination of the man in the street. When he sees the place where a great man has lived he is able to realise his personality better, and the occurrences in which he has taken a part acquire additional interest.

Road Maintenance in Kent. From a Report recently presented to the Kent County Council by an expert commissioned to inquire into the system of repairing and maintaining the main roads of Kent, it appears that the departmental system is recommended in preference to the contract system hitherto adopted. We have no hesitation in supporting this advice, for experience shows that the interests of the community are always better safeguarded by a competent engineer surveyor, whose only object is to promote and secure efficiency, and to whom is given full authority over the work to be executed. In the opinion of the consulting engineer, the Council have sustained a loss of between 200,000*l.* and 300,000*l.* by adherence to the contract system. After such an expression of opinion, the Council could scarcely do less than decide to give a thorough trial to the departmental system after the termination of existing contracts, and we understand that an engineer surveyor will be appointed to devote exclusive attention to the important work of road maintenance in the county.

The German Technolexicon. This important work, the compilation of which was commenced in 1901 by the Verein Deutscher Ingenieure, will be published in English, German, and French, and we are glad to find that it has met with general approval and assistance from individuals as well as from professional bodies in all parts of the world. Up to May last 341 societies were taking part in the work, 42 in English, 272 in German, and 27 in French speaking countries, either by the systematic collection of technical expressions or by furnishing catalogues and handbooks of machines and other manufactures. Further assistance has so far been promised, and partly rendered already by 2,185 industrial firms and individuals. Research in technical dictionaries and thousands of industrial catalogues and other publications has already yielded 1,200,000 words, and to these will be added the hundreds of thousands of other terms to be furnished by collaborators. Handy notebooks are supplied, each with three indices, for the use of collaborators, and these books will be called in by the chief editor in the course of 1904. Contributions from all technical branches of work are invited, and we hope our readers will show their practical sympathy with the object aimed at by the promoters of this new technical dictionary. Full information may be obtained from Dr. Hubert Jansen, 49, Dorotheenstr., Berlin, the editor-in-chief.

The Late Sir Frederick Bramwell. By the death of Sir Frederick Bramwell a most familiar and striking personality has been taken away. Although Sir Frederick was not born quite early enough to witness the evolution of civil engineering as a distinct profession, he was almost a connecting link between the old-time millwright and the modern civil engineer. Being gifted with a natural taste for all things mechanical, he took the keenest interest during his long life in this particular department of civil engineering. Having had few facilities in his youth for the acquirement of scientific knowledge, and never finding in study a congenial occupation, his varied and almost boundless fund of information upon engineering matters was acquired chiefly by observation and practical experience. Perhaps the most remarkable triumph of his career was that he became an eminent engineer and an acknowledged authority upon engineering practice without having been associated with any really great engineering works, and his reputation was made as a "consulting," rather than as a "constructive," engineer. Gifted with keen insight, sound judgment, and a prophetic instinct, his counsel was always wise and rarely at fault. His advice, given thirty years ago, when President of the Institution of Mechanical Engineers, that the extravagant waste of coal should be reduced, and that the heat of the sun should be utilised by the planting of quick-growing trees on barren hillsides for use as fuel, is still of interest to thinking men; and his prophecy that the steam engine would ultimately be unknown except in public museums, seems to be fairly on the way towards realisation. His advocacy, when President of the Institution of Civil Engineers, in 1884, of the hydraulic press for the treatment of large steel forgings is another instance of his foresight. Sir Frederick Bramwell took a great and earnest interest in all movements having for their object the advancement of mechanical science. He was a regular and welcome attendant at the meetings of the professional societies to which he belonged, and his opinions were always valued for the shrewd common-sense with which they abounded.

Railway Progress. Speaking the other day at Gateshead, Mr. Wilson Worsdell, chief mechanical engineer of the North-Eastern Railway Company, said that railways in this country were making more rapid progress in electrification than in America. This statement is probably correct so far as it goes, but it does not go nearly far enough. English railways are woefully behindhand with regard to electrification, and it is only natural that the progress now commenced should be more rapid than in a country where electric traction has been practised for several years. Although efforts are being made by a few of our railway officials to atone for slothful conservatism in the past, there is no reason for boasting. Nevertheless, it is very satisfactory to learn that the North-Eastern Company is now engaged in the electrification of forty-seven miles of branch roads. This railway is perhaps the most enterprising of any in Great Britain, and is to be commended for having taken the lead in necessary reform. Other companies are doing a little in the same direction, but their energies are chiefly devoted to the easy task of watching the practical experiments of the North-Eastern Company. Railway companies are almost always averse to improvements except those literally forced upon them by legislation and the equally potent influence of competition. We should like to see all of them animated by the spirit and vigour displayed by the North-Eastern Company.

Stroboscopic Methods in Engineering. A remarkable paper on the observation and recording of rapidly varying phenomena, by M. Hospitalier, has been published recently in the "Mémoires" of the French Society of Civil Engineers. The need in electrical engineering of being able to study phenomena which go through all their phases in less than the hundredth part of a second has led to the invention of the oscillograph. This instrument gives a clear record of all the variations in the electric pressure during the hundredth, or even in some cases the thousandth, part of a second. The principle of this instrument depends on the fact that a ray of light possesses no inertia, and hence instantaneously records any change of position of a microscopic mirror fixed on a stretched strip of metal in a magnetic field. M. Hospitalier applies this principle successfully to the steam indicator, and he shows perfect diagrams obtained from a thermal engine making 2,200 revolutions per minute. He thinks, however, that notwithstanding the great progress that has been made in the direct methods of observing these phenomena, yet indirect methods will be more useful in the workshop. Perhaps what he calls the "stroboscopic monocle" will be the instrument which will be found the most useful in practice. It consists of a minute electric motor supplied from a battery which can be carried in a pocket. This motor turns a disc pierced by radial windows through which we look at the rapidly vibrating object the motion of which has to be studied. When the speed of this disc is properly adjusted the object can be made to appear stationary or to move very slowly, and hence all the phases of the motion of the piston of a high speed motor, for example, can be examined carefully, and any necessary adjustment of the valves made. This method of studying these problems seems to us to be a particularly convenient one, and we think that stroboscopic methods of testing might be employed with advantage by electricians and manufacturers of high-speed machinery.

The Edison Cell. With the exception of a short paper by Dr. Kennelly, read to the American Institute of Electrical Engineers, more than a year ago, very little trustworthy information has

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been available about the Edison cell. The Institution of Electrical Engineers was therefore crowded last week when Mr. Hibbert gave an abstract of his paper on "The Edison Accumulator for Automobiles." Mr. Hibbert, who is one of the leading authorities on accumulators, stated that he had submitted individual Edison cells to very severe laboratory tests, and had also tested a battery of cells in a motor car during a run of 500 miles, in very trying weather, with very satisfactory results. The figures he gave show that this cell is better than any of the lead accumulators in the market, and that it can stand the roughest treatment. The car he used, when fully loaded, weighed nearly a ton, and the thirty-eight cells in their wooden frames weighed 700 lbs. The energy consumed by the motor during a run of fourteen miles was two Board of Trade units. Taking the cost of a unit as twopence, and the efficiency of the cells as 50 per cent., this would mean that a fourteen miles run cost eightpence for power, or slightly more than a halfpenny per mile. Unlike ordinary lead accumulators, the Edison cell is practically undamaged by being left for weeks uncharged, and this is a very great point in its favour. The complete cell stands 13 in. high, and measures 5.1 in. by 3.5 in. horizontally. It weighs nearly 18 lbs., and is sealed in a steel case. Five cells have a capacity of a Board of Trade unit, and they can be charged very rapidly with a current of 200 ampères. The lecturer stated that he had the cells under close observation for some months, and that he had noticed no signs of deterioration. If these cells can be obtained on the market at a reasonable price, they will be a valuable and permanent addition to the resources of electrical engineers.

Lighting Motor Cars.

IT was only on November 14 that we drew attention to the serious risk to the public caused by the excessive brilliancy of the lights used on motor cars, and the justice of our observations has been confirmed by the fatal accident which occurred on Sunday, the 21st, and which was solely attributed to this cause. The effect of those lights is to dazzle those meeting them, rendering them unable even to appreciate their own position in the road, and also to leave them blinded after the car has passed, and unable to distinguish objects following the cars. The new Act and Regulations do not touch this question, but it is apprehended that the Local Government Board is vested with abundant powers under the former Acts, and it is to be hoped this omission may yet be remedied by a supplemental Order, otherwise the separate County Councils will have to move in the matter.

Hyde Park and Kensington Gardens.

THE Office of Works have enclosed a space situated near the leaf-yard, between the Magazine and the new Police Barracks in Hyde Park, for the construction of a raised earthwork, to be covered with turf and planted with trees and shrubs, which will serve as a screen for some new greenhouses and forcing-frames. The houses and frames, used for the supply of plants to the Palace Garden, Kensington Gardens, and the Royal Parks, will replace those that are now in Kensington Gardens, between the Palace grounds and the Orangery or Banqueting House, which have become decayed, whilst their re-construction on that site is not contemplated. The latter, besides, were erected from time to time upon land that really belonged to Kensington Gardens. We understand, however, that after the removal of the present houses, etc., the ground will be restored to the gardens, so the public may reasonably expect to recover the pleasant lawn which, until some years ago, lay along the south side of the Banqueting House. Recognising how the attractiveness of our parks is enhanced by their plantations and flower-beds, we cannot on this occasion make much complaint, still, in view of the tendency we have observed of late to rail-off and enclose portions of ground within the parks, we think that the public might justly resent any undue curtailment of their privileges.

Milton-street, E.C.

IN the last number of the *Antiquary* is a brief notice of Milton's associations with Cripplegate and the immediate vicinity. Citing the bust (by Bacon) of the poet in the church of St. Giles, Cripplegate, our contemporary says:—

"And another tribute to his memory is to be found in the name of Milton-street, hard by, in which not everyone recognises the once notorious Grub-street."

We could wish that were the case. But Elmes, a no mean authority upon such matters, records that Grub-street was renamed Milton-street for a different and more prosaic reason. It derived its new style from—as Stow would have said—one Milton, the builder thereof. We may add, too, that for our more certain knowledge of the exact situation of Milton's "pretty garden house" in Aldersgate-street we are indebted to the careful labours of Professor David Masson, aided by a coadjutor who was well acquainted with the spot many years ago. The garden, now built over, stood in the second precinct of the parish of St. Botolph, near the Alders Gate, and on the north side of the main street.

Messrs. John Broadwood & Sons' New Premises.

LAST week were sold at auction the furniture and effects of "Limmer's" old-established hotel, Nos. 1 and 2, George-street, Hanover-square, preparatory to the removal thither from Great Pulteney-street, Soho, of Messrs. John Broadwood and Sons, who will make some extensive alterations to their new premises. That firm reckon their settlement at No. 33, Great Pulteney-street from 170 years ago. Burkhardt Tschudi, the founder of their house, had been an apprentice, with Jakob Kirschmann (Kirkman), of Tabel, a Fleming. Tschudi started in business as a harpsichord maker in Meard's-street, Soho. In 1732, or not long afterwards, he removed into a house, since No. 33, Great Pulteney-street, by the sign of the "Plume of Feathers." He adopted that sign after his introduction by Handel to Frederick, Prince of Wales, for whom he made in 1740 the double harpsichord that subsequently belonged to Queen Victoria. In 1769 Tschudi retired from business on the occasion of the marriage of his daughter Barbara to John Broadwood, a native of Scotland, who was his apprentice and afterwards his partner. Mr. Henry Fowler Broadwood, who became a partner of the firm in 1836, and died in 1893, was a grandson of John Broadwood. Haydn was a frequent visitor at Great Pulteney-street, where is still preserved the private room to which he used to retire to compose. Limmer's hotel (re-built in or about 1895) at the corner of George and Conduit streets was a fashionable resort in the days of the Regency. It was originally, we gather, known as the "Prince of Wales's" tavern, wherein at a meeting presided over by Benjamin Franklin, in 1773, David Williams founded the Literary Fund, for we have read in the *Gentleman's Magazine* of May, 1807, the following announcement: "May 2, died, aged 58, Mrs. Limmer, of the 'Prince of Wales's' coffee-house in Conduit-street, Hanover-square."

Illustrations of the Holy Land.

AT the Fine Art Society there is a very good collection of water-colour views, chiefly of places in the Holy Land, the result of a year and a half's work there by Mr. Stanley Inchbold, who is a nephew of the late eminent painter of that name. Mr. Inchbold has an excellent style and handling in water-colour, and his drawings, in their strong characterisation of the bare and arid Palestine landscape, give internal evidence of truthfulness of representation derived from careful and conscientious study on the spot. The views of many places whose names are familiar in our ears—Bethany, Jaffa, Mount Hermon, Nazareth, etc., are so convincing in their realism (we do not mean realism in the objectionable æsthetic sense), that one has the impression of having made acquaintance with the scenery of the Gospels, without the drawbacks and inconveniences inseparable from an actual visit. Baalbec also comes into the series of drawings, and the illustrations of this, and of the Dome of the Rock and other buildings at Jerusalem, show that the author can treat architecture as well as landscape.

Paintings at the Dutch Gallery.

THERE has been a small exhibition, opened last week, at the Dutch Gallery in Brook-street, of paintings by Mr. Charles Conder, an artist who has a genius for colour, which shows itself in nearly all the works exhibited, but whose drawing, of the figure at all events, is unfortunately not equal to his colouring, and seem in some instances to be almost wilfully careless. Such figures as the nude one in "The Land of Dreams" (29), and the figure seated by the edge of the basin in "Poppied Sleep" (39) are, as figure-drawing, quite inexcusable. The best thing in the collection is the small picture entitled "Fête Antique" (2), which is quite a symphony in colour, though it only suggests the idea of a sketch or study for a larger picture. The various pictures for fans exhibited are not all suitable for fans, the treatment of which should be decorative rather than realistic; the best in this series is the "Wreath Fan" (8). The one called the "Corridor Fan" is really vulgar, and a painting such as no lady would wish to have on a fan; and the same may be said

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of the screen-painting supposed to illustrate "Fifine" (7), which is quite a burlesque of Browning's poem. "Au Bord de la Mer" has good pictorial character, and two landscapes called "Blossoms" (15) and "The Haystacks" (36) have real merit, the latter especially. The general impression is that the author of these works is somewhat unfixed in his aims, and has not quite made up his mind what to try for in art; and that, if he means to paint the figure, he has much need of a steady course of study from the life.

SOCIETY OF PAINTERS IN WATER-COLOURS.

THE Forty-second Winter Exhibition of the Society of Painters in Water-colours is quite an exceptional one for the amount of excellent work exhibited. Generally speaking, the winter exhibition is not quite equal to the May one, for which the leading members seem to reserve their most important work; but this reservation cannot be made in the present case, save in one or two instances.

There is a distinction, however, to be made between those members who keep endeavouring to put new life into their work, and those who contentedly repeat the same artistic formula in the same language. The latter are to be found both among older and more recent members. One veteran member still paints just as he did at the earliest time of our recollection of the Society; his effects in the painting of scenes in old German cities (chiefly) are just what they always were, as if made by rote; they may have seemed original and effective at first, but he has stood still and Art has advanced. There are much more recent members who are or will be in the same boat. They may seem new at present, but they repeat a convention which loses its interest with familiarity. Mr. Bulleid is one of these; he showed a great deal of refinement and finish in painting scenes in which marble masonry and decorations and classic draperies were the elements, and his work seemed, as workmanship, to justify his election; but nothing more ever comes of it; it is the same thing over and over again. Too decided a manner is a snare. Mr. North, an artist of higher calibre, will suffer for this in the future; the novelty and brilliancy of his manner in treating nature has not yet ceased to interest; but it is not nature, it is an artist's fantasia, so to speak, on nature, and the time will come when it also will be old-fashioned. This year, to be sure, he has only one small work (19), which is an extreme instance of his manner, and is very fascinating for those who see it for the first time; but when you get familiar with it the charm is much weakened. Fortunately, every now and then he produces a drawing on a large scale and in a grander style which rises above mannerism. But these smaller works, with their curious and intricate tricks of colour and texture, will have their day. It is broad truth to nature which keeps its place and does not wear out.

The first number in the catalogue is attached to a perfectly exquisite little landscape by Mr. Cuthbert Rigby, "Hayeswater," a very highly-finished little drawing looking like a large picture reduced to a small scale. Among the other contributions by the same artist, "A Sheltered Bay, Ullswater" (212) has the same kind of charm. Among the ten drawings whose titles fill the first page of the catalogue we find "Chartres" by Mr. Herbert Marshall—the south spire not quite truly vertical, which one does not expect with so experienced a painter of architectural subjects; a fine study of "A Sunset" by Mr. Alfred Parsons; "Rus in Urbe," a familiar corner in Glebe-place, Chelsea, by Miss Rose Barton; "Mist Effects after Rain—Loch Lomond," one of Mr. Colin B. Phillips broadly painted Highland scenes; "The Mill Stream" by Mr. Walter West, an entirely different style of work to those which he has hitherto contributed—a small landscape study remarkable, as are the artist's interior scenes, for its individuality of colour effect; a small landscape study "A Field-path in Middlesex," by Mr. Robert Little, with a very fine sky; and a figure and landscape picture of great interest by Mr. Lionel Smythe, founded on a verse of Rossetti's. To come on all this without having turned the first page of the catalogue is, it will be admitted, a pretty good promise for the rest of the show.

Mr. Eyre Walker's small work "Hillside Pastures" (11) with a moon rising, may be grouped with Mr. Cuthbert Rigby's drawing just mentioned; this and other drawings of his representing the class of work in which the object is realism in landscape, but realism of a very delicate and poetic type. For you may treat nature in water-colour either with the object of approaching as near as possible to the actual effect of nature, while eluding mere hard and over-acted realism; or you may use water-colour as a means of broadly expressing certain qualities of colour, etc., without making any attempt at realism. Each is interesting and valuable in its own way; the impressionist type is the most popular among artists and art critics at present; whether the other, the finished type of landscape painting, will not out-last it, remains to be seen. Among the impressionist class are Mr. R. W. Allan's broad and powerful studies of colour and atmospheric effect, more numerous than usual this year, and all good, the finest being his study of a wild leaden-coloured sea on the "North Sea Coast" (130), singularly fine and true in colour and effect, though as to the sea we do like to see a little more indication of wave forms, instead of merely wave-tones. Mr. Robert Little is another of the artists who arrests our interest as much by his methods as his results; a translator rather than an imitator of nature; unlike Mr. J. W. North in that he inserts nothing that is not in nature, he only omits what does not subserve his main artistic purpose. Mr. Little, as various works in this exhibition show, has a remarkable power of conveying an impression of grandeur of effect in works painted on a small scale. An impressionist *pur sang* is Mr. Paterson, one of the Society's later acquisitions; his "Golden Autumn" (75) represents trees by so many blots of colour with little predominant form; this passes for being an intellectual manner of painting, but, though clever, it will not hold its place permanently; his small sketch of "Orotava" (175) is a good bit of work of its class.

Among the realist artists Mr. Wilmot Pilsbury and Mr. Gregory retain their old style of treating landscape. Mr. Pilsbury's best powers are shown in such a work as "A Sussex Cottage" (123), in which his delicate and painstaking treatment of detail has full scope, and which does not profess to give the poetry of landscape. In pure landscape we feel that in these works we rather lose the poetry of the scene, in spite of (or because of?) the very delicate and painstaking treatment of detail, admirable in its way. Mr. Gregory, though in a very different manner, oppresses one with too much detail; his style is what we may call 'bristly," and in his clever drawing entitled "Where silence reigns" (118) we feel a want of repose which is out of keeping with the title and with the associations it suggests; the colour and character of every tree and shrub is so definitely insisted on that nothing is left to the imagination. In this how different to the realism of Mrs. Allingham, in her country scenes, which are the more real exactly because the detail is more broadly treated, rather suggested than definitely made out. This admirable artist, whose pictures of English rural houses, scenery, and personages one is never tired of, has, however, with great spirit, entered lately on a new class of subject, and has taken to painting Venice. As yet there is not the same charm of perfection in them that there was in her English scenes, yet one cannot but admire an artist who, after a long series of successes in one field, can turn from these to enter on a new task. Her most important work of this class is the "Venetian Fruit Stall" (295) on one of the screens, but we may also note the small picture of "S. Georgio Maggiore by Moonlight" (148) as a very successful study of a special effect.

Among pictures which represent the class of work usually associated with the names of their authors, Mr. Tom Lloyd in "The Evening Bell" (133), a garden scene with two figures who are as important to the subject and as highly finished as their surroundings, is at his best in his favourite class of subject; he interests us, however, by another work which at first sight would hardly be taken for his—"Ploughing on the Sussex Coast" (14), a landscape in broader and more poetic style than is usual with him. All of Mr. Colin B. Phillip's Highland landscapes are fine, in his usual broad and built-up style. A fine landscape in the Academic style of landscape is Sir E. Waterlow's "Sheltered Pastures" (160), a picture which illustrates this artist's feeling for composition and unity of design in landscape. Mr. Napier Henry, in "On the Crabbing Ground" (141), shows a sea and boat picture in his best style.

Figure pictures are (naturally) never so prominent as landscapes at these exhibitions. Water-colour is pre-eminently a medium for landscape; but there are two or three things of special interest. We have Mr. Holman Hunt's original study for the painting of "Claudio and Isabella" (174), not properly water-colour, but of great interest nevertheless; and two very finely painted heads by Mr. E. R. Hughes—"Idle Tears" (35), a girl bending over an illuminated book, and "Master Tony Freeman" (173), a head of an exuberant red-haired boy in a blue dress, and relieved against a broken-up background of green; all in the strongest colour, and a most effective performance. It reminds one a good deal of some of the earlier work of Mr. Holman Hunt, and it is possibly with a recognition of this that it has been hung just over the Claudio and Isabella study. Mr. Louis Davis exhibits two very well designed circular cartoons for proposed paintings at Welbeck Abbey, "Love Active" and "Love Passive" (207 and 229); these are in black and white, so that one cannot judge of them as paintings, but they are capital decorative drawings. Mr. Elmslie has given a lovely face to his figure called "Songs of Spring" (243), and Miss Rose Barton shows her feeling for childhood in her charming drawing of a very small person "Selecting her Buttonhole" (124) from a flower-bed. Mr. Walter West is prominent in the middle of one of the srreens with his admirable picture "Shuttlecock" (277), as remarkable for the subtle colour pervading the whole as for the grace and vivacity of the figure. Her partner or antagonist in the game is seen reflected in a mirror at one side of the picture. He has also, on the other side of the same screen, several interesting pencil studies of figures.

Among works which are marked by a special character is a large one by Mr. Matthew Hale "The Passing of Arthur" (87), a much more ambitious work than is usual with this artist, in which the mystic barge is seen crossing a lake dimly lighted by the last gleams of a red sunset. There is a weird and solemn effect in the scene, only a little spoiled by the fact that the dimly-seen water does not look watery enough. Under any light in which water surface can be seen at all it will surely assert itself as water; it is true that the dull glow of the sky is more or less repeated in the water, but not sufficiently with the appearance of reflection, and thus the effect of what is in the main a poetical work is rather weakened. Mrs. Stanhope Forbes's "Under the Greenwood Tree" (251), with the vertical lines of the tree-trunks running up it, and a figure in Elizabethan costume singing to a lute at their feet, is, like all this lady's productions, a very clever and original work.

Architectural subjects are pretty largely represented. In subjects which may be called purely architectural Mr. Reginald Barratt is predominant; among half a dozen admirable works we may mention especially "A Venetian Bridge" (43); "Gondolier's Shrine, Venice" (138), showing a very careful painting of part of the Ducal Palace; "The Piazzetta" (108), with an equally careful painting of part of Sansovino's Library; and "Holy Water Basin, Siena Cathedral" (206), an admirably executed piece of detail. Mr. Rooke, besides some smaller studies at Vézelay, exhibits a large drawing of the "West Front and Tower of the Church of St. Père sous Vézelay" (242), one of a series, apparently, which he is executing for the Birmingham Museum; this is purely and professedly an architectural drawing, and admirable as such. Mr. Albert Goodwin's architectural subjects may rather be said to be architecture treated as landscape, and somewhat idealised into a visionary aspect, as in "The Citadel, Cairo" (50) and "Venice—Blue Twilight" (167), the latter a very successful treatment of a difficult subject. He also exhibits several small landscapes, including a study of Niagara (92). His vignette-like treatment of city scenes receives the compliment of imitation in Mr. Herbert Marshall's "Rouen" (122) and Mr. Matthew Hale's "Bristol—Evening" (166); Mr. Marshall has also a fine drawing of "Grey Saumur" (301). Mr. S. J. Hodson exhibits several architectural pictures, of which the best is an interior of "St. Bartholomew's the Great" (42); his large drawing of "St. Paul's, as seen from the roof

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of St. Bartholomew " (59), is not satisfactory in that the proportions of the dome and the drum beneath are not right—somewhat too high and narrow. There is hardly any structure about which so many mistakes are made by painters as the dome of St. Paul's.

A special feature in the exhibition is a set of small drawings presented by members of the Society to the King and Queen on their Coronation. These, all framed in white, make a pretty show at the end of the room. There are 59 of them, all small drawings, and not exactly important productions of the various artists, in an artistic sense, but this could hardly be expected; they formed a very appropriate gift from an art-society, and contain many interesting and pleasing artistic suggestions.

NOTES AT A DORSET WATERING-PLACE.

IN 1722 the authorities of Bridport obtained an Act empowering them to restore and rebuild the haven and piers of their port, to make sluices, wharves and landing-places at or near Bridport mouth, described as an open and level piece of land lying between the east and west cliffs which bound the sea there. The preamble of the Act sets forth that it was made in order to bring the town to its ancient flourishing state: that by reason of a great sickness, " and other accidents," the wealthy inhabitants had been swept away, one consequence of which was that the haven had become neglected and choked with sands. The pier, however, was not built till 1742, and in 1756 a sea-wall was built, and the pier and harbour enlarged. Something of the intended prosperity seems to have followed, for it is on record that in 1794 there were eleven vessels belonging to the port, and making regular trading voyages.

All this kind of prosperity is at an end now. A stray coasting schooner or two is generally in the harbour, and that is all, though boatmen living there say they remember when the basin was nearly always filled up with ships. The railway has altered all that. Before it was made, the small port and the slow river Bride (or Bridy) meandering through the flat meadows between the town and the harbour, formed the real channel of commerce, a fact expressed in the very name, Bridport. Now the river is permanently barred from the harbour basin by sluice gates, through which the high tide fills it, when the sluices are closed and the water held up till low tide, to be then let out in a rush to scour the entrance to the harbour; for the old difficulty of the sand silting it up is still urgent. And now the " open and level piece of land between the east and west cliffs " has become a sea-side holiday resort, and taken on it the name of West Bay, its ameliorations being supposed to be promoted by a company entitled " West Bay Improvements, Limited "; but except as to the provision of exceedingly convenient and well-kept bathing cabins, the improvements seem decidedly " limited " and in some cases doubtful. What West Bay chiefly wants is to be let alone; but there is probably little chance of that; as soon as a quiet and unobtrusive watering-place gets to be at all known and liked, the next step is to spoil it by building it up and introducing the promenade and band element.

The first impression of West Bay to the visitor is probably in most cases rather depressing; there is a faded and gone-to-pieces look about it, owing to the existence of various disused stone buildings, probably warehouses of some kind built at the time when the port had an active trade. Something might perhaps usefully be done in removing these and laying out the ground where they stood. But further acquaintance shows that the place has many recommendations, for those who do not want the promenade and band style of entertainment. On each side of the little port rise steep and beautiful windswept grass downs, extending for some miles along the coast each way—open, fresh and unspoiled nature; especially the downs in the west direction after passing Eype Creek. Then the bathing, in fine weather, is simply ideal, the beach being a steep one of small shingle, always clean and giving deep water almost close to the margin, as if the sea were one great swimming-bath. The drawback is that when there is anything of a breeze on shore it sets up a surf on the steep beach which renders bathing rather dangerous: you may go in easily and safely enough, no doubt—*sed revocare gradum;* but can you get out again? the under-rush of the receding water being so great; so that last summer a lady came near being drowned in sight of her friends on the beach through mere inability to make head against the undertow, and was with difficulty got ashore by two men who were in considerable danger themselves. This is a thing to be guarded against, and if " Improvements, Limited " devoted a small portion of their funds to hiring a man and boat to be in readiness to give help to bathers, it would be money better laid out than in some other ways. For their bathing accommodation however—substantial and roomy cabins, clean and well kept and not disfigured by advertisements, they do deserve praise. It may be added that in windy weather there is safe bathing to be had by a walk of a mile and a half or so over the west downs to Eype, where there is a much flatter beach.

The entrance to the basin at West Bay is by a narrow channel between two long parallel jetties, like Boulogne and Dieppe entrances on a smaller scale, and built for the same reason—to get an entry which it may be possible to control by the scour of the tidal water. In the lithograph sheet of sketches in this number, " West Bay from the Jetty " shows the east jetty, the sketch being made from the end of the west one. Except in the finest weathers it is a ticklish place to get in and out of in a sailing boat; the scour from the sluices at low tide does not avail to prevent a considerable bar forming at the mouth, and often, when the sea is quite safe outside for a well-handled sailing boat, the exit between the jetties is too risky to be attempted; then, when the wind is blowing right inshore it is impossible to sail out through the opening, and if it is blowing straight off shore it is impossible to sail in again; so that pleasure of sailing is beset with certain difficulties. Parallel with the east pier runs the only important new building. Pier-terrace, which is seen in the distance in my first sketch, and of which a view of what may be called the land front is given in another sketch. This is a very picturesque row of houses built by Mr. E. S. Prior, and which seems to be a puzzle and bewilderment to the surrounding inhabitants. Any one with an eye for character in architecture would, we imagine, see at once that the architect's idea was, considering that the terrace is close on the sea, to give a kind of ship-like character to the architecture, which is done in a very clever and original manner; but no one seems to understand this. Each of the arched openings on the land side gives access to two front doors, but the two houses intercommunicate on one or more floors, a special planning adopted with the view of rendering them available, as lodging-houses, for either large or small parties of tenants. The whole thing is admirably suited to its purpose, and very well constructed in principle; but unfortunately it had to be cheaply built, and the effect of this sad necessity is beginning to show itself. On the opposite side of the green before the terrace is the long, rambling, picturesque old inn, the Bridport Arms, shown in a sketch in one corner of the plate. The original intention, we believe, was to carry Pier-terrace round three sides of the green: if this is done, we hope the Bridport Arms, and the quaint characteristic little houses between the green and the beach, will be respected; they are an important part of the picturesque character of the place. One improvement which might very well be carried out would be to build a terrace of nice houses behind the short promenade walk which extends from the basin to the foot of the west downs. A broad asphalted terrace has been formed here, running along the top of the beach, at the cost of a wealthy inhabitant of the neighbourhood who bears a name known in Bridport annals for centuries back; behind this is a metalled road, but on the landward side of the road is a strip of unsightly waste land. Here would be the place for a real improvement on land that seems waiting to be built upon, and where the houses (if they were such as Mr. Prior would build) would not only spoil nothing, but somewhat add to the general appearance of the place, besides providing house-room which seems to be wanted, since the demand for houses in Pier-terrace was quite beyond the supply of this season.

Bridport, with its wide main street with trees down the centre, is a very pleasant little town. The chief industry is still rope-making; once upon a time Bridport supplied all the cordage for the Royal Navy, but those great times are gone long ago, and must have gone now at any rate in these days of wire rigging and steam. There are rope manufactories doing a large business still, however, with modern methods and machinery, and an inspection of one of them fills an interesting afternoon. Some two or three of the old buildings in the town are sketched in our lithograph. In South-street, which is at right angles to the main street and forms the commencement of the road leading down to West Bay, is the prim stone front of the eighteenth century almshouse, apparently in former times a private residence; a Parliamentary return of 1786 describes it as " one messuage, burgage, or tenement, situate on the west side of South-street, now on lease to William Bearn for the residue of a lease of 99 years." On the opposite side of the street is the interesting late Gothic house shown in another sketch, now I believe some kind of workmen's club; of its original purpose there seems to be no record. Then on the west side again, and further down the street, is the grim-looking bit of late mediæval front, recessed between two modern houses, which is connected historically or traditionally with St. Leonard's chapel in the Parish Church, and was perhaps the Priory.

Among objects of architectural interest outside Bridport is Mr. Prior's fine solidly designed little modern Gothic church of Bothenhampton, on a rising ground a little way off the road between Bridport and West Bay; and, further eastward, Burton Bradstock shows us a picturesque village and an interesting late Gothic church, in the interior of which the visitor may notice the excellent decorative effect obtained by Mr. Prior's simple but effective treatment of the window-glass and leading, and the restored polychromatic decoration of the roof timbers. Walditch Church, a little church a mile or two from West Bay, is entirely rebuilt in revived Gothic, but retains an interesting Norman font.

Abbotsbury, some ten miles off eastward along the coast, is reached by a beautiful drive along the downs, and is celebrated, as nearly every one knows, for its great swannery formed at the head of the Fleet inlet, a kind of backwater behind the Chesil beach, running up from Portland to Abbotsbury; interesting also for some remnants of the former monastery, chief among which is the large barn just outside the little town, still in use in connexion with the present farm. It has an open timber roof, not however so fine as some old English barns can show; it is somewhat skimped in its scantlings. St. Catherine's Chapel, at the top of a bare rounded hill, is one of the most peculiar mediæval buildings in England; it may be doubted whether there is anything like it anywhere else in the country. Its exterior appearance is shown in the sketch; it is one of the windiest situations, one would think, in the county, and the old lady who keeps the key is to be looked for on the lee-side of the building—in this case the east, as there was a west wind on the occasion of my visit. Hutchins (" History of Dorset ") suggests that it may have been one of many chapels built in the reign of Edward IV. as a kind of expiation of some of the bloodshed between the houses of York and Lancaster; it may be so, but its exposed position and extensive range of view over land and sea, as well as its peculiarly fortress-like aspect, suggest the idea that it was a kind of combination of a church and a stronghold. The general style of the architecture externally agrees with the assumed date, though some of the interior details, if taken by themselves, would look like an earlier date. The roof is a pointed stone barrel vault, with bold transverse ribs some four or five feet from centre to centre. The walls are very thick, more than four feet, but the springing of the roof, as an additional precaution against thrust, is weighted by the heavy parapet wall built up externally, and with round-headed openings on to the space between the inner and outer roof. I see that the old engraving in Hutchins's " History " shows these openings in all the four bays; but as my sketch was deliberately and carefully made, and does not show them in the farthest bay, I believe they are not there. They may have been closed up in some repair and refacing at this point. The second buttress is without its capping, as shown in the sketch. It is worth notice that the massive buttresses correspond to no visible structural feature in the interior vault, the ribs of which are the same section from end to end. The interior is now a mere shell, but a great deal of carving—bosses, etc., in the roof—is still in fair preservation.

The train, or a walk of some six miles if preferred, brings you to Powerstock—" Poor-

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A Farm-shed near Chideock.

stock" in Hutchins's history, perhaps more correctly, since it is "Povrestock" in Domesday, and "Purstock" in a later mediæval document. There is nothing of particular interest at Powerstock, save that it is the way, or one way, to Eggardon Hill,* with its ancient encampment on the summit, known all over the neighbourhood as the "Roman Camp," but certainly not that, whatever it is. It used to be the fashion to derive the name from *agger*, a rampart, and *dun*, a hill; a kind of lawless marriage of Roman and Saxon words which was probably prompted by the idea of its Roman origin: the *dun* we may admit, but the *agger* seems very doubtful. Hutchins mentions that in a "perambulation of Purstock Forest," *temp.* Edward I., it is spelled "Ecredon," which takes us further away from *agger*. It is pre-Roman, and therefore may be called "British" for want of a better name; but it has been a most remarkable piece of work for its probable period, of the highest interest even to those who, like the present writer, do not profess to be experts in ancient earthworks. It shows, all round the platform on the top of the hill, a continuous double rampart and ditch—the rampart is triple in part of its length, with some lines of outwork defences at the principal gates, which seem much more scientifically laid out for defence than might have been expected from a barbarous people. Inside the camp area are traces of a number of pits; Mr. March and Mr. Solly, in their careful paper on the subject, enumerate 123—of which some four or five have been explored, and which are believed to have been pit dwellings, sunk to a certain extent and with a conical roof formed over them. In the days of the "Roman" theory of the camp the explanation was that the hill had been inhabited before the ramparts were made; but Messrs. March and Solly point out that no pit is cut through by the walls of the camp, there is no pit near to them and none between them. The place was, in fact, an early fortified town; it is only on account of the supposed necessity of crediting the ramparts to the Romans that any doubt about the connexion between the ramparts and the dwellings need have existed. One reflection made on the subject by Mr. Solly in a previous paper on the subject is worth quoting:—

"The Roman road which runs west from Dorchester and passes through Bridport comes tolerably near to this camp on Eggardon, but does not come to it, leaves it instead contemptuously on one side as a place of no importance. Herein lies the human interest connected with these ancient ramparts and the old road. They tell of a state of things existing before the advent of the Roman power, and of the civilisation introduced by those whose mission it was 'to spare the conquered and war down the proud.'† The mounds of earth, and yonder road leaving them on one side, tell what a blessing was the Roman conquest."‡

Four miles west of Dorset, the high road to Charmouth and Lyme Regis passes through the pretty old-fashioned village of Chideock (locally pronounced "Chiddock"), containing some nice old road-side houses and a pretty but not important late Gothic church, partially restored. What interested me at Chideock, or near it, however, was the farm shed shown in the subjoined sketch, which stands in a lane not far from the village. The short cylindrical stone columns look as if they had formerly carried something different from the comparatively modern brick arcade which is now built on them. The whole, however, as it now stands, forms a curiously picturesque structure to come upon suddenly by the side of a country lane.

From the steep road going down into Chideock from Bridport there is a fine view of the most prominent hill on this part of the coast, known as "Golden Cap," from the yellow appearance of the upper strata on the side towards the sea. It is a steep hill rising direct from the beach, halfway between West Bay and Lyme Regis, in a conical shape, and with a flat top, as if the upper portion had been cut off; a character which is repeated, in a less marked manner, in other hills in the district, and no doubt records the work of the ice-plough or plane of an ancient geological epoch. Golden Cap ought to be reckoned as one of the attractions of West Bay, as it is within six miles and reached by a most beautiful walk over the downs.

A word about the people as well as the places of this part of Dorsetshire may conclude these rambling remarks. In no district in England have I been so struck with the natural courtesy and pleasant manner of the inhabitants towards strangers. One day, when caught in heavy rain during a long walk, I asked to stand in a cottage porch for shelter, but was immediately invited into their best room (about eight feet square) and requested to make myself "as comfortable as circumstances permitted," and when the rain showed no signs of relenting, they must lend the stranger an umbrella and merely ask him to leave it at a certain shop in Bridport where they could call for it another day. (They were not put to *that* inconvenience, at all events.) Another day, when our party were doubting as to which of two roads would take us home, from a small cottage a little way off there came a young woman in plain attire, but with the manners of a lady, to ask if she could be of any assistance to us. In a Bridport shop a man who had not exactly what I wanted, instead of trying to persuade me that what he had was better, came out on to the doorstep to point out to me the shop (in the same trade) where he thought I could get it; and a Bridport banker changed a cheque for the stranger who presented it, without even accepting a reference to his London banker, politely replying that "he was sure it was all right": perhaps the most remarkable instance of all! It is pleasant to recall this kind of trustful and courteous habitude as characteristic of the country side generally. H. H. S.

* For a walk to Eggardon, however, it is better to avoid Powerstock and bear round to the eastward of the hill, where there is a very pleasant route over fields and through a farmyard on the side of the hill.

† "Parceresubjectis et debellare superbos."

‡ Those who mean to visit Eggardon would do well to look in advance at these two papers: "Eggardon Hill, its Camp and its Geology," by H. S. Solly; and "A critical and material examination of the Hill-Fortress called Eggardun," by H. Colley March and H. S. Solly. They are to be had, I believe, from Dorchester publishers. Mr. Solly is the minister of the Unitarian Church at Bridport.

BRIGHTON AND HOVE HOSPITAL FOR WOMEN.

THE assessor's award in the competition for the new women's hospital for Brighton and Hove was announced last week. There were sixty-six sets of designs submitted in this competition, which seems to have been satisfactorily conducted, with the exception of a single indiscretion. Several competitors being dissatisfied with irregularities they were unable to explain, we took the trouble to make inquiries as to what had actually taken place since the drawings had been sent in. It seems that on the arrival of the designs they were immediately unpacked and hung up in a hall specially hired by the Committee at the request of their assessor, Mr. G. T. Hine. Mr. Hine wished to see them altogether to facilitate making his award. The indiscretion referred to lay in an "at home" given by the hospital authorities to view the drawings before the award had been made, to which competitors were invited. On representations made by the Royal Institute of British Architects of the undesirability of such a function before the award had been made and published, the function was not abandoned, but competitors were informed that they would not be admitted.

Such action is to be regretted, for it is obvious that there is very little possible harm in the competitors seeing one another's designs, while admitting the public to view them *before* the assessor and Committee have made their choice gives opening to suspicion of unfair influence brought to bear by any member of the outside public who may feel interest in the result. We do not suggest that this is what took place in this instance, but we think that all right minded people must see the advantage of conducting a public competition, for however small an undertaking, on lines that admit of no possible outside influence. And to the architects who have given much time, and money, and brains for no return whatever, common politeness alone would suggest a little consideration for their feelings.

The four premiated designs were on view in Brighton last Wednesday. It is a very great pity under the circumstances that funds would not allow of hiring the hall before-mentioned for a public exhibition of all the designs. If the assessor's awards gave satisfaction to the majority, it would have disarmed further criticism.

The roads surrounding the site, which has three frontages, are from 10 ft. to 15 ft. above the surface level of the site, and the conditions require that full advantage of this be taken in light and airy basements. The accommodation required comprises a general ward for fourteen beds; maternity, private, and isolation wards; operating theatre; out-patients' department; staff rooms; administration and nurses' quarters.

The first premium has been awarded to Mr. John L. Denman, of Brighton. In describing the plans it is necessary to bear in mind the difference of level between the street and the site. The ground floor is practically that on a level with the road, the floor below being a basement which also is above the level of the site. Mr. Denman's plan covers the greater part of the site, and shows no means of future extension. His ground plan is well disposed, containing the staff and board rooms in the centre of the main block; on the right, to the west, the matron's rooms; on the left, to the east, the house surgeon's, connected by corridor with a separate block containing the out-patients' department, thus getting the out-patients on the ground floor, which is a convenient arrangement; beneath the staff rooms in the basement are the kitchens, connected with the upper floors by service lifts, which are situated rather far from the kitchen. The first floor shows a good deal of south sun and light shut out by the projection of various blocks, such as the isolation wards, the lavatories, stairs, and the roof of the out-patients' department. The general ward gets light on the north, east, and south. The operating theatre shows too many recesses and doors, no less than five opening out of it. The maternity and labour wards are well arranged on the west. The second floor

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shows nurses', pupils', and night nurses' bedrooms.

Design No. 46, by Mr. E. P. Howard, shows a good grip of the problem in mass. The accommodation is given in blocks; on the north the administration block, on the east the wards and out-patients', on the west the nurses' home; a space on the south suitable for a future extension of wards, etc. These three blocks are connected together on each floor by corridors only. So good is the arrangemen' that in our opinion it might have been worthy of more than a second place, but we must add that the omission of the proper staff accommodation asked for ought to have debarred it from consideration by the assessor.

No. 25, by Messrs. John S. Quilter and F. Anderson, is a very economical plan of considerably less cubical contents, we should say, than any of the others. One reason for this is that the wards are placed upon the ground floor, great use being made of the basement, and thus no grand staircase is required. The out-patients' department is shown in the basement, reached by an inclined approach, and also the staff rooms, as well as the kitchens, etc.; on the first floor are situated the nurses' rooms.

No. 11, the other third premiated design, shows no title to this distinction, unless complexity and covering an immense amount of ground, with many exceedingly ill-lit corridors and rooms, be one, which we cannot imagine. Can the assessor have been attracted by the elevations?

No limit was fixed by the conditions regarding cost, an estimate of which had to be provided by each competitor; it would be interesting to compare the reports of the successful and unsuccessful candidates.

THE PEDRAIL.

In an article published last December on "Transport on Roads" we described and illustrated the essential features of the invention known as the Pedrail. This device is intended for application to the wheels of traction engines and waggons. A wheel constructed on the Pedrail system consists of a disc carrying round its periphery sliding spokes with ankle joints to which feet are attached. When the disc is revolving three feet are always upon the ground; above these feet is a short rail resting on small wheels or rollers, connected with the ankles, and the rail is connected with the axle-box of the vehicle. The complete arrangement constitutes the equivalent of a wheel, which places feet on the ground, one in front going down as one behind goes up, and levers along the rail carrying one end of an axle. The principle is practically that of an inverted railway, for the rail is run over the small wheels attached to the feet, instead of being run over by them.

As before stated, the Pedrail is equally applicable to traction engines and to waggons. When four wheels are fitted to a vehicle each wheel is arranged so that it can act separately, while all four continue to do their work. Each foot and each wheel can adapt itself to the surface to be traversed, and the axles are pivoted so that either wheel of a pair can travel at a higher level than the other, or lift itself over a higher obstacle. In a four-wheeled vehicle the two pairs of wheels can adjust themselves so that the axles may be at different angles with the horizontal, and in a traction engine all four wheels are driven simultaneously, without hindering the universal adjustment of any wheel to suit the inequalities of the ground. It would not be easy without a number of drawings to describe the mechanism by which these various movements are accomplished, and such a description is not necessary, as full particulars may be obtained from Mr. Diplock's book.*

In our previous article we expressed the opinion that the great number of working parts would render the Pedrail unsuitable for adoption except at low rates of speed. Since then, we learn that the inventor has devoted his attention to the simplification of the mechanism, and that a considerable advance has been made in this direction. In fact, it is now believed that the Pedrail engine is quite capable of being run at speeds up to 15 miles an hour without involving excessive wear or strain on the working parts. If this anticipation should be justified by practical experience there will undoubtedly be a great future for the invention. It would then be perfectly suitable for the expeditious transport of merchandise from town to town, as well as for the more leisurely duties ordinarily expected from a traction engine, and, further, it would offer an admirable substitute for tramways under circumstances in which rail tracks might be either a hindrance to traffic or unjustifiably costly.

Last week we had an opportunity of witnessing a series of cinematograph pictures demonstrating the practical usefulness of the Pedrail engine for various purposes. In one set of pictures the machine was shown first in the act of drawing a long train of heavily-laden waggons, and then, being detached from the train, in operation as a stationary hauling engine, pulling the waggons up to itself by means of a wire rope. Other views showed an engine fitted with a jib crane bringing cases of merchandise up to a railway waggon and lifting them in; an engine turning a complete circle with a radius of no more than 15 ft.; and the same engine "walking" over an obstruction consisting of timber baulks piled to a height apparently of more than a foot above the ground.

Professor H. S. Hele-Shaw, who has taken great interest in the invention since its first realisation in a practical form, delivered a lecture upon it last Saturday under the auspices of the Liverpool Self-Propelled Traffic Association, at the Walker Engineering Laboratories, Liverpool University. He then said that the wheel had reached its utmost limits both in regard to weight and speed on ordinary roads, and expressed the belief that we must look to the Pedrail for any future development of the carrying power of the traction engine. In this lecture Professor Hele-Shaw confirmed the favourable reports previously made upon the Pedrail, saying it would climb the steepest hill, walk over large stones and baulks of timber, while laughing at ruts and soft ground.

An opinion such as this, coming as it does from a recognised authority on road traction, certainly strengthens belief in the feasibility of this extremely ingenious invention, which, we may add, has also received the thorough approval of Lieut.-Colonel Crompton, C.B., a retired officer of the Royal Engineers with considerable experience of road locomotion in India.

* See the *Builder*, vol. lxxxiii., p. 545.

LETTER FROM PARIS.

THE question of the construction of a new legislative palace is still before the Committee in an undecided state. Three schemes have been selected for discussion from amongst the many which have been put forward, and these are:—First, the construction of a large parliament hall in the courtyard of the Palais Bourbon; secondly, the construction of a new building on the site of those of the Tuileries which were destroyed in 1871, joining the Pavilions of Marsan and Flore; and, thirdly, the erection of a large building in the garden of the Tuileries, on the axis of the Rue Castiglione, on the site where existed the famous Salle du Jeu de Paume. The first scheme consists in the construction of a parliament hall from the design of M. Buquet, architect to the Palais Bourbon, covering a surface of a little over 9,000 superficial feet, with a height of 60 ft., and to contain 600 numbered seats for the members. The hall would be lighted by a large cupola glazed with decorative coloured glass, and at night time the electric lighting would be 30,000 candle-power. The second scheme, of erecting a building on the site of the old Tuileries, meets with considerable opposition, as it would certainly tend to spoil the remarkable vista extending at present from the Place du Carrousel to the Arc de Triomphe. Another proposal which does not lack interest has been put forward, and this would consist in the re-arrangement of the buildings of the Palais Royal into one vast palace, reuniting into one the Chambre des Deputés and the Sénat, to be called the "Palais de la République."

The Committee of the old Salon is to be re-elected in January. The re-election takes place every three years, and includes the choice of a president, and it is now therefore a question who shall be the successor to M. Bouguereau. Since the death of M. Bailly it has been the custom to elect a painter; but as MM. Bonnat, Detaille, and J. P. Laurens have successively filled the office the list of candidates among painters who are members of the Institut is now rather restricted. M. Paul Dubois, the sculptor, appears to be the candidate most in favour, but he is Directeur of the Ecole des Beaux-Arts, a position which is no sinecure, and it may be doubtful, therefore, whether he will be able to accept the presidency of the Salon in addition.

There is again talk of reconstructing or enlarging the Luxembourg Museum, where the demand for more space is continually increasing. This has been talked of for so long however, without anything being done, that it is rather as a matter of curiosity than of practical interest that we refer to two schemes now under consideration, which will probably meet with much opposition from the inhabitants of "rive gauche."

One of these is a proposal to build a new museum on the site of the ancient Pépinière, bordering on the Rue Auguste Comte. The surroundings will certainly be satisfactory and the light perfect, but it will take away a great piece out of the public garden. The other proposal is to rebuild the museum on a site to the right of the existing one, adjoining the Rue de Vangirard, which would necessitate the destruction of many fine trees in that part of the garden. There is a general wish on every hand, however, that some definite scheme should be decided on, as the Luxembourg Palace, besides its want of space, is quite unsuited for an Art Museum.

In the garden in question a monument is to be erected to the memory of the late regretted Secretary of the Academie des Beaux-Arts, M. Larroumet, and another, now being completed by M. José de Charmoy, to Alfred de Vigny. This consists of a statue of the poet, above life size, on a lofty pedestal, the four faces of which will be decorated with figures representing some of the principal personages in his works.

It is hoped that by the end of December the Champ de Mars may at length be rid of the remains of the Exhibition which still encumber it, and be delivered up to the Service des Promenades for its decorative aspect to be reconstituted. At present the spectacle, to a visitor proceeding from the Invalides to the Champ de Mars, is a most melancholy one. Those who witnessed the splendours of the 1900 Exhibition find on the site now only a desolate piece of waste land with the remains of some of the exhibition buildings still unremoved. When these are once cleared off, it is intended to make a new park of the ground, divided by a cross road into two distinct portions. On the side next the Seine there is to be a "Jardin Anglais" with basins of water and alleys of trees; and on the side next the Ecole Militaire will be a "Parc à la Française," with lawns and parterres. Then Gabriel's fine façade will again be seen with a fitting foreground.

The well-known building journal *Le Bâtiment*, which took a principal part in the initiation and the organisation of the "Exposition de l'Habitation" lately held at the Grand Palais des Champs Elysées, has decided to install in the large building which contains the offices of this journai a permanent exhibition of drawings, models, materials, and plant relating to the construction, decoration, and fitting up of private buildings and public works, and to organise periodical competitions amongst architects, decorators, tradesmen, and specialists in the arts and industries pertaining to private and public architecture. The exhibition will comprise plan types of the systems of allotting large properties for building purposes, plans and models of houses, workshops, works, etc., capable of construction and purchase on the annuity system; all the usual and special materials employed for building; specimens of objects and materials for decoration, furnishing, heating, lighting, and sanitation, and the usual plant employed for building purposes.

A proposal has just been made to the Paris Municipal Council to consider the question of allowing a first application of the Cassalonga system of subterranean rolling platform for passengers to be made on a circular line between the Place de la Concorde and the Place de la Bastille, at a depth of 17 ft. by a width of 17 ft. The cost is estimated at 35 million francs. The Council has appointed a committee to examine and report on this proposal.

Parliament has before it a new law proposing the use and fitting up as hospitals and sanatoriums for consumptives of the various buildings seized from the non-authorised religious associations which have been expelled.

The work of constructing the cellars and basement of the new building for the Imprimerie Nationale is now terminated, and the

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important steel and masonry construction which will form the large printing halls and offices will be commenced immediately.

A most interesting archæological discovery has just been made by M. Redon, the architect of the Louvre, who some short time back, owing to an idea which entered his mind that a portion of the old buildings constructed by Lemercier under Louis XIII. and Louis XIV. was wanting in correct proportions, and having also noticed that the windows of the present ground floor of this portion were more suitable in design to upper windows, made some excavations in the garden bordering the building occupied by the Minister of Finances, and discovered that the Louvre building rests on a dressed and ornamental basement 24 ft. deep. It was evidently the intention of Lemercier to surround these buildings with a moat of this depth, similar to that which surrounds the Château of Saint Germain, and this work was continued and completed by Claude Perrault when he constructed the three façades and his remarkable colonnade. The Louvre would have been approached by means of three bridges crossing the moat opposite the present three entrances, but owing to the quantities of stone which then encumbered the ground around the buildings, the moat was left in abeyance, the excavated portion filled in, and the very existence of the lower front wall forgotten until the present discovery made by M. Redon. It is a curious fact that the celebrated Colonnade of the Louvre has always been praised for its fine proportions, but no thought was given to the possibility of there being a high basement wall below. The Vieux Paris Committee is taking a great interest in this discovery, but it is scarcely to be hoped, for the present, at least, that the originally proposed moat will be formed, and the Louvre buildings appear in the full height of their façades as intended by Lemercier and Perrault.

The much-discussed question as to a site suitable for the construction of a new Mairie for the Eighth Arrondissement of Paris, appears to have been solved by M. Bouvard, who suggests that the building should occupy the garden opposite the Eglise St. Augustin, on the Avenue Portalis.

The Société des Amis des Monuments Parisiens at its last meeting made known its regret that the Municipality had not been able to come to terms with the owner of the Parc de la Muette, so as to secure the preservation of this remarkable property, and passed a vote that the preservation of the two central avenues be considered on the allotting of the property for building purposes, for these two avenues are the last remaining vestiges of the work of Le Nôtre at Paris.

The competition for designs for a monumental fountain to be called "Fontaine Subé," at Rheims, has been decided in favour of M. André Narjoux, architect, to whom the first premium has been awarded. The sculptors are MM. Gasq and Auban.

The administration of the Paris Opera has opened a competition for designs for the cover of the official programme to be issued at the beginning of the coming year. Premiums of 40*l.* and 20*l.* will be awarded, and similar competitions will take place each year.

A society composed of some well-known architects and men of letters has been formed at the Mairie of the Palais Bourbon for the purpose of studying the history of persons, monuments, and streets connected with the Seventh Arrondissement of Paris, and the grouping of all documents and information likely to be of interest for the purpose of founding a local museum and library special to this artistic quarter of Paris.

The Académie des Beaux-Arts has appointed the Committee to prepare the list of candidates for the chair left vacant by M. Roujon, who has been made Perpetual Secretary. This Committee is composed of MM. Gérome, painter; Jean Thomas, sculptor; Daumet, architect; Chaplain, engraver; and Rever, musician. The chosen candidates are in the order following:—MM. Georges Berger, Bouchotte, Georges Leygues and Jules Comte *ex æquo*, Camille Bellaigue, Dr. Richer, Clausse, and Charles Normand.

The Société du Nouveau Paris has just held its first annual meeting at the Grand Palais, presided over by M. Frantz Jourdain. After the election of the Committee, the President made an eloquent speech exhorting the Society to put into hand at once the study of the scheme of work proposed for the practical embellishment of Paris. This scheme comprises chiefly the completion of the principal streets and boulevards, such as the boulevards Haussman and Raspail, the Rue de Rennes, and the transformation of the Palais Royal.

On November 19, after several years of work accomplished under considerable difficulties of all kinds, the second sheet of water was encountered in the work of piercing the artesian well at the Buttes-aux-Cailles at Paris, at a depth of 1,900 ft. The water rises at the rate of 15 gallons per second at a temperature of 28 deg. centigrade, and contains arsenic and iron. This work was commenced in 1866, and abandoned in 1870, but continued in 1892 by the firm of Paulin Arrault, when a tube of a diameter of 35 in., weighing 180 tons, was sunk. M. Henry Rousselle, the Municipal Councillor of the Maison Blanche quarter of Paris, to whose energy is due the carrying out of this important work, proposes to persuade the Municipality to construct a large piscina at the Buttes.

The Société des Ingénieurs Civils de France has addressed to the public authorities a protest against the proposed destruction of the Eiffel Tower and the Galerie des Machines. They ask that if it is considered absolutely necessary to demolish the Eiffel Tower, another site should be chosen for its re-erection. The Council, however, has confirmed its decision that the tower shall be demolished at the expiration of the concession, and that a date should be fixed for the demolition of the Galerie des Machines; in the meantime, this latter building will be installed for bicycle races.

The French Pavilion at the Exposition of St. Louis, the construction of which has been entrusted to M. Bouvard *fils*, is to be an almost exact reproduction of the Grand Trianon, a perfect specimen of French architecture at the time of the French occupation of Louisiana. The interior decoration and furniture will be pure Louis XIV., and M. Marcel, the new Directeur des Beaux-Arts, is engaged with M. Locquet, the Curator of the Garde-Meuble National, in choosing the furniture and art objects. Some of the finest specimens of Gobelins tapestry will decorate the wall panels.

The death of Dalou prevented the realisation of two schemes which he had undertaken and for which he had only made first sketches. One of these was the decoration of the façade of the Crematorium which M. Formige had been commissioned to build at Père Lachaise. Since the loss of Dalou, no sculptor has seemed so fitted the replace him in such a work as M. Bartholomé, whose "Monument aux Morts" at the cemetery will always remain one of the most remarkable sculptural works of the XIXth century. The other work projected by Dalou was the completion of his "Triomphe de la République" in the Place de la Nation by groups of animals placed around it and forming fountains, as in the basins at Versailles. If this is carried out, it will probably be done by M. Gardet, the well-known animal sculptor.*

The English members of Parliament who have been visiting Paris went to see, among other things, M. Rodin's studio at the Depôt des Marbres, where they saw a replica of his fine group "Le Baiser" and the fantastic and still unfinished "Porte de l'Enfer," and other works; and a strange production suggested by Hugo's "Légende des Siècles, and which the sculptor calls the "Main de Dieu." It consists of a gigantic hand rising from a block of marble, and holding in it two small figures representing Adam and Eve.

At Tarbes on Sunday last a monument to Danton was inaugurated, the work of a sculptor of the Pyrenees country, but well known at Paris, M. Desca. His work, done many years ago, ought to have had the first premium in the competition opened by the Municipality of Paris some fifteen years ago, but an inferior work was put over it for reasons of official politics, and M. Desca only received the second premium. Now the town of Tarbes has done him justice and erected his powerful and original work in one of their public squares. The statue is in bronze, with a pedestal adorned with two bas reliefs representing "The Departure of the Volunteers in 1792," and "Danton Haranguing the People."

MM. Monchablon, Biron, Jaussely, and Lappara, the winners of the Grand Prix de Rome in painting, sculpture, architecture, and music, respectively, of this year, have, according to the usual custom, been the guests of the President and Mme. Loubet at a lunch given in their honour at the Elysée before their departure for the Villa Médicis.

* It is a question whether the monument is not much better as it is, without the addition of this *bizarrerie*.—Ed.

MOTOR-CAR REGULATIONS.

The Regulations, 22 in number, made under the Motor-car Acts, 1896 and 1903, have just been issued, and are accompanied with an explanatory circular. The fees for registration are 1*l.* for a motor-car and 5*s.* for a motor-cycle, and it is to be noted that a change of ownership, if the registration is continued, involves a fee of 5*s.* for motor-cars and 1*s.* for cycles. The marks indicating the registration on the cars have to conform to the order in shape, position, number, and lettering, but the order permits of variation in the design, and designs, painted or otherwise, may be substituted for plates, so the artistic faculty in motor manufacturers will be encouraged. A very important provision is contained in Article XI., as it provides for the lighting of the identification mark in the hour that elapses between sunrise and sunset and lighting-up time for the car. General identification marks can be assigned to manufacturers. Copies of entries in the Register are only to be supplied to the general public on their showing "reasonable cause" for requiring such a copy and on payment of a fee of 1*s.*

The fee for licences to drivers of motor-cars and cycles is 5*s.*, and it must be noted the licence remains in force twelve months from the date it is granted. If lost, the licence can be renewed for a fee of 1*s.* These licences are subject to suspension on conviction of any offence in connexion with a motor-car other than a first or second offence in relation to speed only. It is somewhat curious that a motor-cycle has not been defined in the Act, and the explanatory memorandum can only suggest that the term includes motor-cars on not more than three wheels and of a weight not exceeding 3 cwt. The reading in the memorandum of Section 8 of the Act, relating to specified roadways not exceeding 16 ft., that this indicates the width from hedge to hedge and not the width of the metalled surface, will give dissatisfaction, and, we submit, is erroneous. This section was intended to allow the authorities to deal with second and third class roads, and such roads, being of a rough class, have often wide ditches or rough turf by the hedges, over which it is impossible to drive, and this reading tends to make the section a dead letter. The memorandum is most instructive, however, as a whole, and should be carefully studied by motorists.

ARCHITECTURAL SOCIETIES.

Edinburgh Architectural Association.—At a meeting of the Edinburgh Architectural Association, held on the 25th ult., in the Association's Rooms, 117, George-street, a paper was read by Mr. David M. Nesbit, Leicester, on "Warming and Ventilation." Architects everywhere, said the lecturer, insisted inflexibly that the schools they were about to erect, the colleges and universities, the theatres, the places of worship, etc., should now and for the future be placed under the best hygienic conditions, and, more important still, that the hospitals for the sick and injured and all places devoted to the great science of healing should have unfailingly the essentials of pure air and an even, genial temperature. School buildings, he said, required special treatment, and he was sure that not less than 1,800 to 2,000 cubic feet of air per hour should be given to each child in public schools, so as to ensure the maintenance of a healthy atmosphere. Having spoken of the advantage of the plenum and vacuum systems, Mr. Nesbit referred to the cabinet system, an invention of his own, which he had called the "Unplenumette," the novel feature of which was that a recess was built in the wall above the floor line, and the heating surface was fixed within. The whole of the apparatus was out of the reach of the occupants, and yet gave ready access for adjustment of heat and ventilation. It could be readily dealt with for repairs, could be kept scrupulously clean, and, in a word, it might be regarded as strictly hygienic. His desire for a wide adoption of the cabinet arrangement was founded upon the vital necessity of cleanliness in the apparatus that directly conveyed air to the lungs. Warming and ventilation, he maintained, should go together. These matters, as far as regarded churches and chapels, had not in the past had the consideration needful,

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but he noted that those responsible for the health and comfort of their congregations were gradually overcoming the defects. He strongly advocated the plenum system for public buildings, and pointed out that the overhead plenum system, to force the air downwards from above the ceilings, had already been carried out with successful results. The lecturer dealt with a number of other matters, and spoke of the waste by steam traps, hot wells, etc., and showed how that waste could be prevented and economies obtained. A vote of thanks was accorded Mr. Nesbit.—*Scotsman.*

SHEFFIELD SOCIETY OF ARCHITECTS AND SURVEYORS.—A meeting of this Society was held on the 26th ult. in the rooms of the Literary and Philosophical Society, Leopold-street, Mr. Thomas Winder (President) in the chair. Mr. J. R. Wigfull, A.R.I.B.A., gave a lecture on "A Short Tour in Warwickshire and Gloucestershire," illustrated by lantern slides. The lecturer described a few of the many places of interest to architectural students in the counties of Warwick and Gloucester. He drew attention to Ford's Hospital, a fine half-timbered building at Coventry, erected 1529, and still used as almshouses. The castle and old buildings in Warwick were also described, together with St. Mary's Church, which contains the celebrated Beauchamp Chapel. The contracts relating to the erection of the latter are in existence, and show the business-like manner in which building operations were conducted in the fifteenth century. To Stratford-on-Avon, where the birthplace of Shakespeare and other buildings were noted, the lecturer passed in review a number of old Cotswold villages with their simple stone houses, many of which are as perfect and clean as when erected three to four hundred years ago, except that time had added many charming effects of colour to the roofs and walls. Passing from these to Tewkesbury the Abbey Church was fully described. This was erected in the beginning of the twelfth century, and is a fine example of Norman work. In the fourteenth century a beautiful series of chapels were erected round the choir. These contain many fine monuments.

NORTHERN ARCHITECTURAL ASSOCIATION.—At a meeting of the Northern Architectural Association, held in Newcastle on the 25th ult., the Rev. Canon Savage, of South Shields, read a paper entitled "The Distinctively English Type of Church." He said he would take the subject from a historical point of view, and he had two things in mind. First of all, he wanted to see what evidence they could get from English architecture as to the sources of religious life in England. In that sense, it was historical in a very remarkable way. Side by side with that—and perhaps even more distinctly—he wanted to bring out some points which showed the characteristic English national character. At the present time the fashion was a sort of Little Englander fashion—to decry everything in English architecture. But he held that there had been a very distinctive national character in church buildings right through—a sturdy, common-sense character. That was no conglomerate—not a mixture of Celtic, Norman, French, and German, and Italian and Byzantine, which all had differences. Canon Savage began with the Augustine Mission at Canterbury in 597 and the Northumbrian in 635. For forty years, in the Northumbrian Mission, there were nothing but wooden churches. Then they commenced to build in stone, the first churches being at Monkwearmouth and Jarrow. They got an entirely new type of church, with rectangular nave and chancel. The Northumbrian Mission spread all over England, and, with the exceptions of Brixteth and Wing, they had in all the early churches over the whole country this rectangular east end. The Anglian churches were almost always built in one position—protected by water; and that was, ultimately, the cause of their destruction, when the Danish corsairs came. The western towers were probably refuge towers, and served a further purpose of being a lookout. This was characteristic of the period between the early Anglian and the Norman. From the prevalence of the Northumbrian form they had evidence that it was from the Celtic mission and not from the Italian that this country got its conversion. The lecturer dealt with the influence of the Norman invaders, who put down everywhere their almost brutal form of architecture. They were a heavy-handed, heavy-footed people, who built heavily. There were beauties in Norman architecture, but the architecture, generally, was brutal, coarse, and heavy. Their idea of Church government was strong monastic centres. But it was a curious thing that, within a century, the Norman apsidal churches had to give way to the normal national type of rectangular east end. Then, from 1175 to 1195, they had the most rapid development of architecture in all the centuries of the past. Thus they came to the distinctively early English style, and here they had the strong assertion of the English restraining taste and common sense. At the end of the twelfth and the beginning of the thirteenth century, all over the country, they had in almost every parish indications of church building. There was the uprising of the English as a nation. After that the style tended to become fantastical, in the Decorated period. That might be accounted for by the national life; for it was the age of chivalry. Canon Savage brought his lecture down to the period from 1345 to 1355. The wars had broken down the power of chivalry, and gave the English a national life and gave them the idea of a national army and navy. There was a great commercial development, and the Commons became the dominant partner, and the national life struck out in many ways. English was adopted as the national language; and there was the influence, also, of a black death. All this was translated into the church building, and they got developed the purely English type—the Perpendicular, which was the type of the plain, common-sense, average Englishman. So they got a complete preponderance of the Perpendicular everywhere except in Northumberland—partly because of the crushing influence of Durham Abbey and partly because of the fear of the Scotch. The Perpendicular style was the expression of free national life. From first to last they had continual importations from abroad; but from the very first the national type remained, built upon the old wooden churches of Northumbria.—*Newcastle Chronicle.*

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—At a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, on Monday, Mr. J. Patten Barber, President, in the chair, a paper was read on "Mechanical Stokers for Electricity Generating Stations," by Mr. Albert Gay, M.I.E.E., and of which the following is an abstract:—After referring to the general desire and the various attempts to bring about the more economical utilisation of energy in general, and of electrical energy in particular, the author proceeded to show that in order to obtain the best results from coal, perfect combustion was essential. He pointed out, however, that though that result might be possible in the laboratory, under ideal conditions, the means of obtaining it in every-day practice had yet to be discovered. He observed that good work, however, had been done, and he proceeded to describe the necessary requirements of an ideal mechanical stoker. He then described various appliances of the kind, the aim of the makers of which was to approach the ideal as nearly as possible. He divided the different kinds of mechanical stokers into two main types, viz., top-feed and underfeed; the former being divided again under the sub-divisions of sprinklers and cokers. As their names imply, the fuel in the former is fed above the bars. In the case of the sprinklers, small quantities of fuel at a time are sprinkled into the furnace, and in the case of the cokers the fuel is dropped just inside the furnace door on the dead plate, and allowed to coke before being pushed forward into the furnace. The under-feed type is fed with fuel below the bars, the fuel being forced up through the fire. The advantages claimed by makers, and the disadvantages claimed by some users were also dealt with, and the opinions of central station engineers of experience were quoted; and while the author generally indicated his appreciation of the improved economy of mechanical over hand firing, he is not at present satisfied with the reliability and cost of up-keep.

WESLEYAN CHURCH, CARK.—A new Wesleyan Church is to be erected at Cark. There will be sitting accommodation for 250 people. There will be a sliding partition so that part of the room can be used as a school, where 150 children can be accommodated. Plans are being prepared by Mr. Henshaw, architect, Barrow.

THE BUILDERS' BENEVOLENT INSTITUTION:

ANNUAL DINNER.

THE fifty-sixth annual dinner of the Builders' Benevolent Institution was held on Thursday last week in the Whitehall Rooms, Hôtel Metropole, Charing Cross, W.C. The chair was occupied by Sir Weetman D. Pearson, Bart., M.P., the President, and there were a large number of friends and supporters of the Institute present, including Mr. Aston Webb, R.A., President of the Institute of Architects; Mr. W. F. King, President of the Institute of Builders; and Messrs. H. H. Bartlett; R. B. Brown; A. Burton, J.P., Mayor of Bermondsey; B. C. Cass; S. Collins, L.C.C.; J. H. Colls; J. Carmichael; B. P. Ellis; T. Gregory; C. Gude; F. Higgs; H. F. Higgs; W. Higgs, J. Hill; A. Howard; C. G. Hyde; W. Lawrance; J. W. Lorden, Mayor of Wandsworth; E. W. Moir; H. Northcroft; A. E. Parker; E. E. Pearson; P. Preston, Master Carpenters' Company; J. Randall; A. Ritchie, J.P.; G. Gilbert Scott; T. Stirling; R. H. H. Stranger; B. Tabberer; C. Wall; E. White, J.P., L.C.C.; S. Young, F.S.A.; and T. Costigan, Secretary.

The loyal and patriotic toasts having been honoured (Mr. Clarendon G. Hyde proposing, and Captain T. Stirling responding to, the toast of "The Imperial Forces"),

The President proposed the toast of the evening, "The Builders' Benevolent Institution." Which of them, he said, had not felt at some period of life—either as a beginner or as one carrying on a large work—some anxiety as to his financial position? The man who had not felt that was devoid of imagination. He felt sure that had contractors such an institution as this Builders' Benevolent Institution there would be plenty of funds, for all contractors would be providing for the days when they might have to go to it for help. Builders were very much better off than contractors. Why, contractors were absolutely at the mercy of the engineers, whereas the builders had their arbitration clause. Contractors had never had the perseverance or ability to put themselves in such a position. The Builders' Benevolent Institution ought to be heartily supported by builders, for it had done a noble work. It was an old Institution, but it had not reached the zenith of its usefulness. If, instead of granting pensions, which, he was glad to say, had been increased from 39*l.* to 42*l.*, they were able to grant 142*l.* per annum, how much happier would many of them feel than they did to-day? In the vigour of youth and the strength of manhood they might feel independent of this Institution, but one never knew what the exigencies of trade or work might bring them to. He appealed to them in all sincerity to support such a deserving Institution—not on account of good trade and an overflowing exchequer, but on precisely opposite grounds: an empty exchequer and the possibility of being beneficiaries of the Institution. That was appealing to very low motives, and to those present the possibility he referred to might seem a very remote one, but it was not so to the hundreds outside. Many a home would be made happier—and no home needed to be made more happy than that of the man who endured all the troubles and trials of a builders' life—if there was an assurance of protection from absolute want. The merits of the Institution were known to most of them, but probably few of them knew that the total expenses of management amounted to only 6¾ per cent. of the income. No institution could be more economically administered, no charity receive more careful scrutiny; and yet the funds of no charity were more generously bestowed. At the present time there were twenty-six male and twenty-nine female recipients of the charity, and the number was far too small. Still, it was the maximum that the funds permitted, and he earnestly appealed to them liberally to support the Institution.

Mr. William F. King, President of the Institute of Builders, then proposed the toast of "The Worshipful Company of Carpenters." The Carpenters' Company stood foremost among City companies, not only for its benevolence, but also for its work in regard to technical education. In their schools at Titchfield-street and Stratford, and in their examinations, the Company showed what could be done by such a body for education. One of the chief reasons of the success of the Company in regard to technical education was the character of the men who had filled the office of Master. He

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had much pleasure in coupling with the toast the name of the present Master, Mr. Percy Preston.

Mr. Preston, in response, said that according to a distinguished guest that evening, carpenters could be rather easily dispensed with, and timber could largely be replaced by iron, steel, and concrete. Even if that were so, he did not think the Carpenters' Company would "go under" as long as they maintained the work they were doing in their schools. At Stratford they had nearly 1,000 students during the day and evening—those attending in the evening studying to advance themselves in the work they had been engaged on in the day. At Titchfield-street they did not admit any student who was not engaged in some workshop during the daytime. He wished that he could induce builders to get some of the classes more adequately supported than they are. The carpentry and joinery classes were admirably supported, but the smithing and plastering classes were not supported in the way they should be. The plasterers' class did not number more than five or six students. He thought that builders might get better attendances for these classes. The instruction students received would be to the advantage of themselves and their employers.

Mr. J. Howard Colls then suitably proposed "The President." They were proud of their past presidents, of whom many were present that evening. The large attendance that evening was due to the fact that they had such a distinguished President this year, and, he must add, also to the energy and ability of their Secretary, Mr. Costigan. The President had done work which was of great benefit to the Empire, and he could not but remember his work at Dover; they were proud to think that they had as their President a man who was carrying out such a work, which would hold, when completed, the whole of the fleet of England.

The President, in the course of his reply, said he was blessed with partners who took much of the burden of work off his shoulders. It was owing entirely to their prodigality of expense in the initial outlay on the Dover works that those works did not suffer any serious damage in the recent great storms. The top of each staging was 26 ft. above high water, and those terrible seas, instead of washing the staging away, went between the piles and under the staging. Works of this magnitude were of such a serious character that they were really undertaken, if he might say so, by madmen. They had on that contract a capital outlay of close upon 400,000*l.* before they began to receive as much money monthly as they were spending, and when they paid such a heavy premium for safety, they had a right to expect that safety which fortunately they had when the stress came.

Mr. H. H. Bartlett then proposed "The Architects and Surveyors." When he thought of the duties of modern architects he often wondered how they coped with the requirements. There had been a great improvement in architecture, and there were many modern architectural works which would live through the ages to testify to the ability of their designers. Architects were men of high standing, who deserved the respect of builders, for, as a rule, they held the balance between employers and builders in a just and satisfactory way. It was a pleasure to most builders to be associated with architects, and to put into stone, etc., their ideas and conceptions. As to surveyors, they suffered, as compared with architects and builders, by the fact that there was no evidence to the public of the onerous work they carried out. When one thought of the complicated matters which a quantity surveyor had to deal with, one could not fail to be surprised at the success and accuracy of his work, and one could not but regret that that work did not come more before the public. He hoped that quantity surveying would be kept in the proper hands. Some of them had had experience of some architects' quantities, and he thought that architects would be well advised to leave that work to the surveyors. With the toast, he coupled the names of Mr. Aston Webb, R.A., and Mr. H. Northcroft.

Mr. Aston Webb, in responding for the architects, said he had long been persuaded that they could not go on without architects, and he was equally persuaded that they could not possibly go on without builders, and therefore they could not do better than support that Institution. The Navy had a saying, "It is on the Navy, in the good providence of God, that our wealth, prosperity, and peace depend." He thought they might paraphrase that, and say that it was on our Builders, in the good providence of God, that our health, prosperity, and lives depend. They all wished the Institution success. There was a class of men from whom they could learn some useful lessons on charity and help to each other, *i.e.*, working men. They knew that sometimes the working man worked too little and drank too much, but, on the other hand, the working man was ready to pay the last item he had in order to help his friend. That sympathy he had in trouble was no doubt due to the fact that the working man felt more often than others the pinch of want and the pain of sorrow, but the fact remained as an example to ourselves.

Mr. Northcroft, in replying for the surveyors, said that if there was one thing more than another that a good quantity surveyor prized, it was honesty, and that they endeavoured to obtain. If there was one thing they put before honesty, it was truth, or what Mr. Bartlett called conscientious accuracy. One of the difficulties of the quantity surveyor was the inaccuracy of the architect sometimes. In a recent issue of the *Builder* was a design for a village church. If the north elevation is correctly described, the altar is at the west end of the church, which was a little unusual, but this was probably not so, as was seen by the west elevation, which was perhaps correctly described. The position of the font was singular, not to say unclassical, and some architects might show the projection of the baptistry or of the curious annexe at the east end if their west elevation were really serious. The door into the vestry shown on the west elevation was 5 ft. wide by the scale, and as it only admits the clergyman, it need not be wider than that used by the people. It was also to be observed that the clergyman must be an athletic Christian to jump 4 ft. from the ground to his doorway. The meaning of the steps shown in section on the so-called north elevation was not at all clear, as they apparently brought one to the top of a slope which runs down again to the same level below the cill of the vestry door as that at the foot of the steps. One entrance and exit only is shown for the people at what would be in an ordinary church the west end of the north side, and this was shown at about the same width as the vestry door on plan. If the level on the west elevation was any indication at all, several steps would be required to reach it from the ground, which are not shown on the plan. It would be perfectly fair to inquire why the *Builder* or the Royal Academy, for that matter, could take notice of such an inconsistent piece of work.*

Mr. Basil P. Ellis, in proposing "The Vice-Presidents, Committee, and Stewards," said that unfortunately a large number of master builders in London did not contribute to the funds of the Institution. He hoped that the words of their President would be seen by those masters who did not contribute.

With the toast was coupled the name of Mr. T. F. Rider, who suitably responded.

During the evening subscriptions were announced to the amount of 1,250*l.*, the President's list, the total of which was 876*l.*, including the following:—The President, 105*l.*; the President's firm, 105*l.*; the Institute of Builders, 50*l.*; Messrs. John Aird and Sons, 25 guineas; and the Associated Portland Cement Manufacturers, Ltd., 15 guineas.

Australian Patents.—The Parliament of Federated Australia has passed a Patent Act to cover the six States forming the Commonwealth, namely, New South Wales, Victoria, Queensland, South Australia, West Australia, and Tasmania. New Zealand is excepted. The Bill, which was introduced into the Australian Senate and received its first reading on June 26, has now been assented to, and the commencement is to be fixed hereafter by proclamation. The cost of a patent under this new Act to cover the six States comprising the Commonwealth will be about one-sixth of the cost of taking out patents at the present time to cover the same area. There is, however, a fee of 5*l.*, payable before the actual issue of the patent, and a renewal fee of 5*l.* before the expiration of the seventh year.

* Mr. Northcroft's remarks would be more to the purpose if the drawings referred to had been working drawings, which they were not. They were merely sketches, on a very small scale, showing a picturesque treatment for a village church, not for a special building to be actually carried out; they were hung at the Academy as a picturesque sketch, and published by us on the same ground. Unfortunately picturesque quality does not appeal to some people.—Ed.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The third general (business) meeting for the present session of the Royal Institute of British Architects was held on Monday at No. 9, Conduit-street, Regent-street, W.

The minutes of last meeting having been agreed to,

The following gentlemen were elected:—As Fellows: Messrs. L. Kitchen, Hull; B. T. Kitchin, Architect to the Local Government Board, Whitehall, S.W.; S. Perks, P.A.S.I., Cheapside, E.C.; B. A. Slade, Berkeley-square, W.; M. Seth Ward, Westminster, S.W..

As Associates: Messrs. E. P. Archer, Finchley; O. M. Ayrton, London; H. A. Battley, London; T. J. Bee, Sidcup; H. T. Bill, Birmingham; H. Black, Cape Town, South Africa; Gur Church, Warlingham; J. D. Clarke, Wimbledon; W. E. Couch, Westminster, S.W.; P. B. Dannatt, Blackheath, S.E.; H. E. Davey, Horse Guards, S.W.; R. R. Gall, Aberdeen; J. Green, Birmingham; T. F. Green, Cricklewood, N.W.; E. M. Joseph, London; A. E. Lacey, Ashford, Kent; T. E. Richards, South Wales; T. Simpson, Strawberry Hill; H. B. Smith, Port Elizabeth, South Africa; G. Walker, Richmond; S. Warwick, London; and R. Wylie, Gateshead.

As Honorary Associates: Lord Balcarres, M.P., F.S.A., Junior Lord of the Treasury; the Right Hon. Lord Windsor, P.C., D.L., First Commissioner of his Majesty's Works.

As Hon. Corresponding Member: Mr. C. F. McKim, President of the American Institute of Architects, Royal Gold Medallist 1903, of New York, U.S.A.

The results of the November Examinations were then announced, as follows:—

Preliminary: J. R. Adamson, Glasgow; E. Ainsworth, Blackburn; G. A. S. Atack, Blackburn; R. W. Atkey, Bournemouth; J. A. Baskerville, Manchester; E. E. Beaumont, Sidcup, Kent; F. W. Beech, Wolstanton, Stoke-on-Trent; D. Bell, Scarborough; C. H. Blacka, Todmorden, Yorks.; O. A. Bloxam, Rugby; A. H. Boss, London; W. Boyes, Pontefract; A. Bracewell, Keighley, Yorks.; R. O. Bridger, South Hampstead, N.W.; S. T. Brittain, St. Annes-on-Sea; G. D. Burgess, Ealing; A. C. Burlingham, Edgbaston, Birmingham; F. W. Burnett, Tondu, Bridgend, Glamorganshire; K. Cameron, Eccles, Lancashire; D. J. Campkin, Sutton, Surrey; C. F. Cargill, London; H. P. L. Cart, Upper Norwood, S.E.; J. W. Carter, jun., Rugby; C. D. Carus-Wilson, Rugby; R. W. Cash, Aberdeen; C. Catchpole, Ipswich; H. Cherrington, Tipton, Staffs.; H. Clarke, jun., Chelmsford; H. H. Clarke, Weston-super-Mare; G. B. Clay, Hyde Park, W.; G. D. Clunies-Ross, London; K. A. Cockrill, Gorleston, Great Yarmouth; P. J. L. Collins, Wembley, Middlesex; J. A. Cook, Cardiff; E. Cooper, London; F. R. Cooper, Kettering; F. J. Daniel, Clapham; O. Davies, Walthamstow, E.; G. L. Day, Taunton; J. J. Dobson, Wingate Station; E. F. Duncanson, Bickley Park, Kent; R. B. H. Ebbs, Bromley, Kent; L. W. Edmonds, Balham, S.W.; R. Evans, Bloomsbury; J. S. Ferrier, Edinburgh; L. J. Finning, Exeter; H. W. Flanagin, Summer Hill; J. G. Flanigan, Belfast; W. S. Flockhart, Hyde Park, W.; E. H. Forster, Doncaster; P. Fraser, Streatham Hill; H. French, Hedon, near Hull; L. Furniss, Regent's Park, N.W.; F. H. J. Gabbatt, Burton-on-Trent; J. Gillespie, St. Andrews; E. B. Glanfield, Slough, Bucks; B. M. Goodwin, Croydon; J. W. Green, Pitsmoor, Sheffield; E. Haley, Manchester; H. Hall, Leicester; S. Hall, Withington, near Manchester; W. Harvey, Hastings; T. L. Hastie, Dennistoun, Glasgow; N. Hawkins, St. Leonards-on-Sea; J. Wilson Hays, Wingate, Durham; F. H. Heppel, Worcester; L. J. Hicks, Egham Hill, Surrey; E. E. Hodder, Thornton Heath; G. Hollins, Newcastle, Staffs.; T. G. Jackson, Clapham Common, S.W.; H. G. Jefferies, Chelmsford; A. W. Johnson, Sheffield; C. M. Jones, Swindon, Wilts; S. Kaye, Alnwick; G. G. King, Belfast; R. Knoop, Lancaster; A. N. Knox, Glasgow; M. B. Lawson, Camden-square, N.; C. H. Lay, Ipswich; B. Legge, St. Albans, Herts; D. C. Leigh, Winsford, Cheshire; J. G. Martin, Oldham; F. C. Mason, Banstead, Surrey; D. J. Moir, Perth, N.B.; T. S. Moore, Maryport, Cumberland; H. A. Munnion, Clapham, S.W.; B. O. Nash, Brighton; H. Neimann-Smith, Lewisham Hill, S.E.; H. Nurse, Wakefield; C. R. Orchard, Exeter; H. W. Parnacott, Penge, S.E.; E. Parr, Sunderland; A. J. Perrin, Dulwich, S.E.; T. Pickmere, Liverpool; J. V. R. Porteous, Lytham, Lancashire; L. J. Prest-

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wich, London; J. H. Ravenscroft, Liverpool; W. A. Rigg, Carnforth, Lancashire; C. W. Roescher, West Bridgford, Nottingham; P. W. Rollin, West Kensington; W. Rose, Bedford; F. Scatchard, Castleford; J. F. Schofield, London; E. A. Scott, London; J. A. Seaton, Lytham; G. B. Selleck, Plymouth; G. P. Smith, Tonbridge; R. I. Smith, Weston-super-Mare; S. P. Smith, B.A., Oxon.; H. Southon, Putney, S.W.; J. W. Stanley, Manchester; W. L. Stephens, Liskeard, Cornwall; E. Stevens, Newcastle-on-Tyne; T. M. Swales, Wigan; W. W. Tasker, North Shields; R. H. Taylor, Perth, N.B.; D. H. Thomson, London; T. W. Thompson, Trimdon Colliery, R.S.O., Durham; H. Thorne, Barnstaple; S. H. Thorpe, Tufnell Park, N.; H. C. Tomkins, Newport, I.W.; A. Travis, Littleborough, near Manchester; L. Velasco, Kensington, W.; A. L. Wade, Dulwich Common, S.E.; C. P. Walgate, Beverley, Yorks.; J. L. Warry, Wood Green, N.; G. Waterhouse, Leytonstone, N.E.; W. C. Watson, West Hartlepool; S. J. Wearing, Leicester; H. S. Webber, Public Works Department, South Africa; S. J. Webber, Maidenhead, Berks; T. G. Welburn, Campbeltown; E. Weston, Blackpool; E. A. Weston, London; A. R. Westworth, Sydenham, S.E.; W. A. Whiddington, London; J. E. Whitehead, jun., Sheffield; T. H. Whittaker, Nottingham; W. S. Willan, Kettering, Northants; H. H. S. Willey, Reigate, Surrey; A. G. Wilson, Tayport, Fifeshire; G. C. Wilson, Streatham, S.W.; C. R. Winter, Hucknall Torkard, Notts; N. Worsley, Blackpool; G. H. Yeoman, Streatham, S.W.; A. M. C. Young, Lambeth, S.E.

Intermediate: L. T. Moore, London; C. Batley, Brentwood, Essex; A. H. Lamont, Edinburgh; D. L. Solomon, London; W. Stockdale, North Shields; H. Shackleton, Keighley; H. W. Humphry, Bournemouth West; H. H. Golding, Woolwich, S.E.; O. H. W. Hillerns, Hessle, East Yorks.; A. H. Atkinson, Clapham Common, S.W.; E. C. M. Willmott, Cardiff; F. Dyer, Manchester; A. C. Goulder, Woodford Green, Essex; I. N. Horsfield, jun., Kingston-upon-Thames; W. Turpin, Sunderland, T. L. Dale, Marlborough, Wilts; E. B. Muff, Bexley Heath, Kent; P. B. M. Hope, Clapham-road, S.W.; F. W. Tempest, Sutton-in-Ashfield, Notts; R. A. Thomas, Southsea; H. C. Swindells, Fairfield, near Manchester; C. C. Durston, Weston-super-Mare; D. Bamford, Manchester; W.T. M. Barrett, Stoke-on-Trent; R. J. Buck, Horsham; Archibald Bullock, Streatham Hill, S.W.; H. Clay, Gainsborough; I. Cocker, Timperley; J. Davidson, Loughton, Essex; A. C. M. Edwards, Rickmansworth; D. A. Forster, Chertsey, Surrey; D. P. Hayworth, London; W. W. Hitchins, Plymouth; A. P. Hohnfeldt, Hull; C. E. Hewitt, Nottingham; T. F. Ingram, Wakefield; S. Jaques, London; R. Johnston, London; A. S. Killby, Highbury, N.; S. H. J. Murch, Loughton, Essex; J. Myers, Maida Vale, W.; L.W. Myers, Cambridge; W. E. Paterson, Cheltenham; G. E. Peto, Bath; A. P. H. Pierce, Hampstead, N.W.; A. H. Robinson, Birmingham; C. K. Roe, Kensington, W.; H. F. Tasker, Hampstead; A. N. Tucker, Plymouth; T. W. Watkins, South Kensington; A. F. Wickenden, Hull; J. A. Wilson, Bayswater, W.; C. W. Wood, London.

Exemptions from the Intermediate Examinations: The following Probationers who have attended the full two years' course in architecture at University College, Liverpool, and have obtained a first-class certificate at the College Final Examination, were, on the recommendation of the Board of Examiners, exempted from sitting for the recent Intermediate Examination, and have been admitted as Students R.I.B.A., the work done by them during the session having been approved by the Board as testimonies of study: L. Barmish, Birkdale, Southport; J. G. C. Birch, Chester; E. H. Honeyburne, Southport; J. N. Lewis, Waterloo, Liverpool; K. Cameron, Eccles, Lancs.

Final: H. W. Asman, Bradford; L. L. Bright, Nottingham; M. N. Castello, Sydenham Hill, S.E.; H. W. Cubitt, London; W. R. Davidge, London; W. J. Delbridge, Greenwich, S.E.; G. Dykes, jun., Glasgow; H. T. Fowler, Barrow-in-Furness; E. G. H. Gunn, Cricklewood, N.W.; H. A. Hall, Southgate, N.; W. Hemingway, Bolton; H. W. Hobbiss, Kensington, W.; F. G. Johnson, Hampstead, N.W.; J. S. Lee, London; H. B. Mackenzie, Cardiff; F. W. Newman, Hampstead, N.W.; H. M. Pritchard, Cardiff; T. H. Robinson, South Kensington, S.W.; A. Rollo, Westminster, S.W.; G. L. Russell, Hackney Common, N.E.; H. W. Stone, Taunton; J. J. Wood, Leeds.

Liverpool Cathedral.

Mr. William Woodward then directed attention to the proceedings of the two Assessors in the recent Liverpool Cathedral Competition, and moved the following resolutions:—

1. "That this meeting condemns the action of the Assessors in giving the first place in the final competition to a set of drawings which did not comply with the essential condition of the competition."

2. "That this meeting views with the greatest disfavour the action of one of the Assessors in allowing himself to be associated with the selected competitor in the carrying out of the work."

After discussion on the first resolution, the meeting agreed to pass to the second, which was eventually withdrawn by the proposer, who expressed himself satisfied with the explanation given.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend Battersea Borough Council 1,430*l.* for purchase of hydraulic press and erection of buildings; Bermondsey Borough Council 10,000*l.* for erection of working-class dwellings; Greenwich Borough Council, 2,200*l.* for construction of conveniences; Shoreditch Borough Council, 1,670*l.* for paving works; Southwark Borough Council, 36,000*l.* for purchase of a wharf; Stepney Borough Council, 17,930*l.* for purchase of property, and 5,895*l.* for street improvement. Sanction was also given to Camberwell Borough Council to a loan of 8,725*l.* for paving works, and St. Pancras Borough Council, 23,960*l.* for electric light installation.

Flooding of Premises.—The General Purposes Committee reported that at a conference of representatives of the Councils of the Metropolitan Boroughs of Battersea, Bermondsey, Camberwell, Deptford, Greenwich, Lambeth, Lewisham, Southwark, and Wandsworth, which was held on October 15th last, a deputation was appointed to wait upon the Council for the purpose of pointing out the danger to the health of the inhabitants which was likely to arise through the periodical flooding of their premises, and of urging the Council to take steps to deal with the question. The deputation was subsequently received by a joint meeting of the General Purposes and Main Drainage Committees on November 16, when it was informed that their representations would receive the most careful consideration of the Council in dealing with the question of providing relief for the districts affected at times of heavy rainfall.

The Closing of Great Queen-street.—In answer to Captain Swinton, Mr. Davies (chairman of the Improvements Committee) said that in connexion with the Holborn to Strand Improvement, and the tramway subway, it had been found imperative to close the portions of the public streets forming the junction of Great Queen-street with Little Queen-street for about three months, and not two years, as stated in the circular recently distributed by residents in the locality. A sewer in Great Queen-street would be intersected by the tramway subway, and this sewer had to be diverted into a sewer at a deep level, with which also the new sewers in the new street north of Great Queen-street had to be connected. The existing sewer and pipes in Little Queen-street had to be removed, the tramway subway had to be constructed, and also a subway for pipes and wires on each side of the tramway subway. To do that work the whole of the street had to be excavated, and it was impossible to keep any part of it open for vehicular traffic. The work was being pressed on rapidly, however, in order to allow the vehicular traffic to resume three months hence the use of the portions of the thoroughfares now closed.

Main Drainage: Crossness to Catford.—On the recommendation of the Main Drainage Committee, the estimate of 2,500*l.* in respect of the cost of borings and other preliminary expenses incidental to the construction of the Plumstead to Catford section of the proposed Crossness to Catford high-level sewer, was approved. It was agreed to invite tenders for the work.

Fire at Artillery Theatre, Woolwich.—The Theatres and Music Halls Committee reported as follows:—

"We have to report that our attention has been drawn to the destruction, by fire, on November 18, of the Artillery Theatre at Woolwich, and we think it well for us to state, for the information of the Council, the facts of the case so far as they can be ascertained, as an illustration of the necessity for the regulations which the Council has made with respect to the building of theatres and music-halls. The fire, which originated on the stage, was discovered shortly before 1 a.m., and by 6 a.m. the theatre had been quite destroyed. We are informed that the building was erected in the early part of last century, and for some years, it is understood, was used as a church, but for the last thirty-five years or thereabouts it has been used regularly for theatrical performances. The site was a good one, as the building was almost isolated, but the internal arrangements were such as would not be allowed in a theatre built under the regulations of the Council. The stage and auditorium were practically in one fire risk, the only separation between them being a screen of wood, plaster, and canvas, and the stage was enclosed by the dressing-rooms and stores for scenery and properties. The stage and auditorium were under one roof, and the premises were lighted throughout by means of gas. Hydrants were fixed in various parts of the house, but we are informed that the pipes with which they were connected were not charged with water, and that it was three-quarters of an hour before a proper supply could be obtained. Had there been a brick proscenium wall, fitted with an efficient fire-resisting screen such as is required for modern theatres, there is little doubt that the fire might have been confined to the stage."

Mr. Yates hoped it would not go forth that the Council had any responsibility at all in the matter of this fire, as this was one of those buildings which were expressly excluded from the jurisdiction of the Council by the Army Act, 1889.

Mr. Squires said that he had had the opportunity of seeing some of the people in authority at Woolwich, and had every reason to believe that in the event of the rebuilding of the theatre they would be quite willing to adopt the Council's regulations for the protection of theatres from fire.

Waldorf Hotel, Aldwych.—The Theatres and Music Halls Committee reported that they had considered plans submitted by Messrs. A. Marshall Mackenzie and Son, of the Waldorf Hotel, which it is proposed to erect in Aldwych. It is desired to obtain a licence for music for the grill room and the conference room in the basement, and for the lounge on the ground floor, and a licence for music and dancing for the masonic temple or dancing hall on the seventh floor. The grill room and conference room are shown to accommodate 400 people, the lounge 300, and the masonic temple 200. The Committee saw no objection to the arrangements, so far as regards the basement and ground floors if it be only desired to have music during meals, but they were of opinion that, as the room on the seventh floor will be about 85 ft. above the street level, it was not one which they could recommend the Council to allow to be used for the purpose mentioned. They recommended accordingly, and the Council agreed.

Holborn to Strand.—Sale of Land.—The Corporate Property, Charities, and Endowments Committee reported as follows:—

"We report that the sale, to the trustees of the Duke of Bedford, of the land on the northern side of Aldwych, between Catherine-street and Drury-lane, has been effected in accordance with the arrangements referred to in the report of the Improvements Committee to the Council on November 17, 1903, and that the sum of 79,952*l.* 8s. has been paid into the county fund."

Building Conditions.—The same Committee also reported to the following effect:—

"It will be remembered that at the auction held on October 13 last certain valuable plots in the Strand, Kingsway, and Aldwych were offered on lease, but no bids for them were made, and it is in consequence of this result that we have carefully considered whether the building conditions relating to the leasing of the Council's surplus land acquired in connexion with various improvement schemes should be modified, with a view to the letting of the land more expeditiously. As the conditions stand at present there is no provision made for arbitration. No. 13 of the conditions provides that in the event of any dispute arising between the Council and the lessee in connexion with the erection of the buildings such dispute is to be settled by the Council's architect, whose decision shall be final. The point, therefore, which

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we have had chiefly to consider is whether any modification of the condition in question should be made so as to provide for an appeal to an independent arbitrator in the event of any failure of agreement between the Council and the lessee. We have made enquiries as to the practice which obtains in regard to the letting of land on the estates of the large ground owners of London, and we are advised that the conditions in force on these estates are generally more onerous than those imposed by the Council, and make no provision for arbitration. It does not appear that the Council's conditions have hitherto restricted building operations on its land, and we are of opinion that the inability to dispose of more surplus land is not due to the conditions, which have been practically the same for many years past. We are further informed that while the standard of work insisted upon is sufficient for its purpose, the Council does not press this beyond what is believed to be consistent with the circumstances of the case. That the tendency is towards leniency rather than the strict letter of the conditions is in a measure confirmed by the large increase in the building work on the Council's land.

We may remind the Council that on May 26 last, when reporting on the question of the elevation of the buildings to front on the Strand, Aldwych, and Kingsway, we recommended that, in the event of disagreement, the lessee should be allowed to consult with certain architects with a view to his submitting an amended design, and that should the amended design not be approved, the designs should be submitted to the Senior Architectural Academician for his decision. The Council did not adopt our recommendation, but decided that the design should be such 'as the Council should approve as worthy of the position'; thus, in effect, allowing no appeal against its decision.

During our consideration of this matter we received a memorandum from the Finance Committee asking to be furnished with estimates of the probable recoupment that may be anticipated by the letting of the surplus land in connexion with the Holborn to Strand improvement; calling attention to the existing burden on the ratepayers on account of the expenditure on the improvement, which can only be lessened by the letting or sale of the surplus land; and asking us to consider without delay as to the best method for ensuring the early disposal of the land on satisfactory terms. After careful consideration, we are of opinion that, although there were no bidders for the plots of land in connexion with the Holborn to Strand improvement at the last auction, the Council will not experience any difficulty in eventually disposing of the plots under the existing conditions. We are, however, impressed with the point raised by the Finance Committee, as to the desirability of securing a speedy recoupment in connexion with the improvement, and we think the Council will be well advised to make some concession so as to facilitate the letting of the surplus land We propose, therefore, that condition No. 13 referred to above should be modified so as to provide for arbitration on any matter not provided for by the plans and specifications, after the plans and specifications have been approved. We do not ask the Council to fix the exact terms of the clause, because the drafting of the building conditions has been left in our hands, but if the Council adopts our recommendation it will become our duty to give effect to its decision in all future building conditions drawn up in connexion with the letting of the Council's surplus land.

We recommend that condition No. 13 of the building conditions attached to the leasing of the Council's surplus lands in connexion with improvement or other schemes be modified, so as to include therein the following provision:—If and so often as the same shall happen, any dispute shall arise after the plans and specifications have been approved between the Council and the lessee as to any matter connected with the erection of the said building or buildings, or the foundations or drainage thereof, or the preparation, laying out, fencing, or otherwise dealing with the said land, which matter is not provided for by 'the approved plans and specifications,' or any additions to, alterations in, or omissions from the same authorised as aforesaid, or by these conditions or conditions of approval, every such dispute shall, if the parties do not agree, be decided by an arbitrator, appointed by the President of the Royal Institute of British Architects, whose decision shall be final."

This gave rise to considerable discussion.

Mr. Piggott said that in regard to the arbitration clause, it should be generally known that an alteration had been made which was generous to those who took the Council's land.

Mr. H. Ward said he was afraid that Mr. Piggott had not understood the effect of the alteration. The Architect to the Council had still to approve; arbitration might ensue afterwards. What builders complained of was still in the conditions.

Mr. Leon said it was the opinion of the valuer that an independent arbitrator should be allowed to act. Until that was permitted, the Council was not likely to dispose of its land in the way it desired. He was sorry that a more satisfactory change had not been made. Although private owners did not allow arbitration by contract, yet, when there was any dispute the large owners permitted it.

Mr. Howell J. Williams said he was glad that a concession had been made in regard to the arbitration clause, but Mr. Ward had already indicated that the concession did not go far enough. The arbitration clause should be final, and refer to everything that might be in dispute. The Council ought to encourage people to take up plots quickly, for it was the object of the Council to develop as quickly as possible the Holborn to Strand estate. There was no reason why the Council should perpetuate the eighty years' system, and it would be well to give people some continuity of tenure, and be prepared to extend the term at the end of ninety-nine years. In regard to low-lying land, it seemed to him extraordinary that having let any one a piece of land they should demand that permission be obtained to build upon it.

Mr. J. Burns, M.P., supported the Committee, but Mr. E. White said he thought they had not gone far enough.

After further discussion, the recommendations were agreed to.

Tramways.—The following recommendations of the Highways Committee were agreed to:—

"(*a*) That the underground conduit system of electrical traction, approved by the Council on November 10, 1903, for the construction of the new tramways along St. John-street, St. John-street-road, and Rosebery-avenue, be adopted for the reconstruction of the first sections, about 22¼ miles in length, of the Council's (Northern) tramways.

(*b*) that the drawings of the system of electrical traction proposed to be adopted by the Council in connexion with the reconstruction of the 22¼ miles of tramways referred to in the foregoing resolution, together with a statement of the materials to be used in such reconstruction, be submitted, when ready, for the approval of the Board of Trade, as required by the London County Tramways (Electrical Power) Act, 1900."

Taxation of Land Values.—Dr. Napier moved:—"That the Council refers to its resolutions of March 18, 1902, relating to the equalisation of rates, and of March 4, 1902, relating to the taxation of land values, and is of opinion that the time has arrived when, in the interests of London ratepayers, these two subjects should again be brought before Parliament without further delay.

Mr. H. P. Harris moved an amendment to the effect that the question of what proposals for the equalisation of rates should be laid before Parliament should be considered by the Local Government and Taxation Committee, who should be asked to submit a scheme on the subject; and that, in view of the ever-increasing charge on the London ratepayers, the Government be invited to take into immediate consideration the proposals contained in the Report of the Royal Commission on Local Taxation for the relief of rates, and to introduce measures of reform without delay.

Colonel Rotton seconded the amendment, which, on a division, was negatived by 59 votes to 17; and, upon a division, the motion was carried by 58 votes to nine.

District Surveyors and Salaries.—The following notice of motion has been placed upon the agenda paper by Mr. Dew:—

"That it be referred to the Building Act Committee to report whether it is advisable that the Council should exercise the powers, conferred upon it by section 158 of the London Building Act, 1894, to pay fixed salaries to the district surveyors instead of their being remunerated, as at present, by fees; with due regard to the statutory responsibility of the district surveyors for the stability of buildings, etc., being in no way lessened."

The Council adjourned at 6.30 p.m.

New Entrance, Bushey Park.—In response to representations made to them, his Majesty's Board of Works have consented to the erection of a new entrance into Bushey Park at Hampton Court, which will consist of a cradle gate for foot passengers and a larger gate for vehicular traffic. It will be constructed near to Hampton Court Green.

DISTRIBUTION OF RAINFALL IN THE BRITISH ISLES.

The following is a *résumé* of the paper on this subject read before the Institution of Civil Engineers on the 24th ult., by Mr. Hugh Robert Mill, D.Sc., LL.D.

For the purpose of discussion of the subject the author had employed the large collection of records of rainfall brought together by the late Mr. G. J. Symons. The record of rainfall kept up for seventy consecutive years at Chilgrove, Nash Mills, Orleton, Boston, and Kendal were discussed so as to compare the mean rainfall of various periods with that of the whole. The averages of the variations of the means of all possible groups of ten, twenty, thirty, and forty consecutive years from the mean of the whole, expressed as a percentage of that mean, were as follows:—

10 years.	20 years.	30 years.	40 years.
4·7	3·4	2·2	1·7

The mean of thirty years thus appeared to be subject to very little more variation from the mean of seventy years than was the mean of forty years; and therefore a period of thirty years was sufficient to give a close approximation to the mean rainfall of a much longer period. It was also shown that the thirty years, 1870 to 1899, gave, on the whole, a mean rainfall nearer to the true mean in all parts of the country than any other group of thirty years available for the purpose.

The 380 stations yielding perfect records for the thirty years, 1870 to 1899, were not sufficiently uniform in their distribution to serve as the basis of a rainfall map, and were therefore supplemented by the records of 668 stations, which were complete for at least twenty years out of the thirty, these values being reduced to the equivalent thirty years' means by the usual method. A very few shorter records, also reduced to the thirty years' means, were used for parts of Scotland and Ireland. The accuracy of the individual records was secured by using only those which had been tested and published in "British Rainfall" year by year, and also by the critical examination of the figures as set out in their proper places on a map.

Isohyetal lines, or lines of equal rainfall, were drawn upon the map strictly in accordance with the figures, and without making any use of any hypothesis, *e.g.*, as to the effect upon rainfall of the height or exposure of the land. These lines were drawn for every 5 in. of rainfall up to 40 in., for every 10 in. from 40 to 60, and for every 20 in. for higher falls. With the exception of a few small specified areas, the resulting map gave as full and accurate information regarding the distribution of mean annual rainfall over the British Isles as its scale admitted. Its value lay in that it was based exclusively on definitely ascertained facts of observation, so that it might be used for the purpose of deducing the relation of rainfall to the altitude and configuration of the land, or to any other physical features.

The map showed that a mean rainfall under 25 in. occurred in three places:—(1) a very narrow strip round the Moray Firth, (2) a triangular area about the Thames estuary, and (3) a large portion of east central England south of the Humber. A rainfall between 25 and 30 in. prevailed over more than one-third of the surface of England, occupying the whole centre of the country, also over a strip along the east coast of Scotland, and in a small patch around Dublin. The rest of Scotland and Ireland received more than 30 in. of rain, and more than 30 in. also prevailed in four large and several small isolated portions of England. The larger of these were:—(1) the whole north-west of England, including all the land more than 500 ft. in elevation from the Scottish border to beyond Derbyshire, (2) all Wales, together with a strip of the bordering districts of England, (3) the peninsula of Cornwall and Devon, with prolongations eastward along the Cotswold Hills, along the Marlborough Downs, and over Salisbury Plain, and (4) the higher land and the edges of the plain to leeward of it in the Weald district of Kent, Surrey, and Sussex. The smaller patches of rainfall over 30 in. occurred on the Cleveland Hills, the North York Moors, and the Yorkshire and Lincoln Wolds. In all these cases there was a distinct, though not an identical, relationship between the amount of rainfall and the height and configuration of the land.

The parts of England receiving a rainfall of 40 in. and over included (1) the Lake District, with the east of Lancashire and the west of the North and West Ridings of Yorkshire, the

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centre of maximum fall exceeding 100 in. around Seathwaite; (2) the whole of Wales except Anglesea, culminating in an area with over 100 in. round Snowden; and (3) almost all of the peninsula of Cornwall and Devon, centres of heavier fall occurring on Exmoor, Bodmin Moor, and Dartmoor.

The data were rather less satisfactory for Scotland and Ireland. In Scotland it was clear, however, that a rainfall over 40 in. was confined to the western half, the maximum (which exceeded 80 and sometimes 100 in.) occurring in the Western Highlands, but not extending to the coast, except, perhaps, in Skye. In Ireland, the mountain groups of the east, and the whole of the country west of the Shannon and the Foyle, received more than 40 in., and the fall exceeded 50 in. in the west of Kerry, Galway, and Mayo.

While a distinct relation appeared between the amount of rainfall and the configuration of the land, taken in conjunction with its elevation and exposure, the author thought that no definite numerical relation between amount of rainfall and mere height above sea-level could be made out.

The average annual rainfall had been calculated by measuring the areas between successive isohyetal lines on the map: multiplying the area of each zone by the average fall within it estimated from the figures on the map, adding all the resulting volumes together for each of the great divisions, and dividing by the total area of each.

The extremes of annual rainfall were discussed by taking out the figures for the driest and wettest year of the period 1870-99 from the records of 290 stations, selected so as to be as nearly as possible uniformly distributed over the country. At 145 of these stations 1872 was the wettest year, at 92 stations 1887 was the driest year, no other year having anything like so many extremes in either case. The average of the wettest years at all stations was 3.5 in. higher than the average of the year 1872 at the same stations; the average of the driest years was similarly 2.5 in. lower than the average of 1887. It is shown that 1872 was probably the wettest and 1887 probably the driest year of the nineteenth century for the British Isles as a whole. Rainfall maps of 1872 and 1887 were prepared, and found to show a relative distribution of rainfall substantially similar to that for the thirty years' mean.

The average rainfall of each of the two years had been calculated from the maps for each of the great divisions, and the results, to the nearest ½ in., together with that for the thirty years' means, were as follows:—

Period.	England.	Wales.	Scotland.	Ireland.	British Isles.
	in.	in.	in.	in.	in.
Mean 1870-99..	31·5	49·5	47·0	42·0	39·5
Year 1872	45·0	74·0	62·5	52·0	53·0
Year 1887	23·5	36·5	39·5	32·0	30·5

The excess of rainfall in 1872 was 34 per cent., and the deficiency of rainfall in 1887 was 23 per cent. of the average fall for the British Isles as a whole. The rainfall of 1872 for England and Wales was almost exactly double that of 1887.

BUILDING BY-LAWS REFORM ASSOCIATION.

AT a meeting of the Council of this Association, held at 45, Parliament-street, Sir Wm. Chance in the chair, the following resolutions were passed unanimously:—

"1. (*a*) That a Bye-laws* Committee, to consider and report on the amendments needed in the existing bye-laws be, and is hereby, appointed, consisting of the following members: Mr. W. M. Acworth, Lord Robert Cecil, Mr. A. H. Clough, Mr. A. Graham, Mr. W. Henman, Mr. Mark H. Judge, Mr. E. L. Lutyens, Mr. Arthur Newbold, Dr. G. V. Poore, Mr. H. A. Powell, Mr. Lacy Ridge, Mr. R. W. Schultz, Mr. J. St.-Loe Strachey, Mr. E. D. Till, Mr. Thackeray Turner, Mr. C. Turnor, Mr. H. G. Willink, the Hon. Percy Wyndham, together with the Chairman and Honorary Secretary.

(*b*) That the Report of the Special Committee appointed on May 14 last, as adopted by the Council, be referred to the Bye-laws Committee with a view to the work being continued on the lines therein laid down, especially as regards the following points:—

(i.) For the purpose of securing, with as little delay as may be, some relief from the more oppressive of the Bye-Laws now in force in rural districts, the Committee to approach the Local Government Board and endeavour to secure their publishing a new set of Model Bye-Laws for these districts, embodying amendments which the Committee may suggest to the desired end. Further, to urge District Councils to amend existing Bye-Laws accordingly.

(ii.) Following on the above, to prepare a set of Draft Building Bye-Laws carrying out the recommendations of the Special Committee that 'the Bye-Laws should lay down principles' and that 'each Bye-Law should provide that, unless the principle it enunciates is otherwise given effect to to the satisfaction of the local authority, it shall be considered to be given effect to if the requirements set out in the Schedule to the Bye-Law are complied with."

(iii.) As soon as practicable, to deal with the Bye-Laws of Urban Districts in like manner.

2. That the above Resolution be forwarded to the members of the Association in a circular letter, requesting them to inform the Bye-laws Committee of any cases of hardship under existing bye-laws, and asking them to make the Association known to their friends, in order that the number of members may be increased as much as possible before the annual meeting in February next."

* The spelling "Bye-Laws" is that adopted by the Association and therefore we give it in quoting the words of their resolution; but we decline to adopt it.

SANITARY LAW.

THE third meeting of the session of the Institute of Sanitary Engineers was held on Wednesday evening, at 19, Bloomsbury-square, W.C., under the chairmanship of Mr. Dove.

Mr. H. Harcourt Verden (of Davies and Verden, solicitors) read a paper on "Sanitary Law," in the course of which he said that the law relating to sanitation being of a complicated and intricate nature, it was only possible for him to dwell upon the points of the utmost importance to sanitary engineers in the ordinary course of their profession. There was no doubt that many volumes could be written on this important branch of the law. He would divide his paper into two parts, the first dealing with the law relating to sanitation as laid down by statute, and, secondly, the law relating to sanitation as settled by the courts. With regard to the first point, the important Act was of course the Public Health Act of 1875, which, with its amending Acts, formed the basis of their sanitary laws. Mr. Verden proceeded to deal with Part 3 of the Act, which deals almost exclusively with sanitation, and which defines what are drains and what are sewers. The definition of a drain and a sewer was the same under the Metropolis Management Act as under the Public Health Act, with the qualification that the word "drain" also includes a drain for the draining in groups or blocks of houses by a combined operation under the order of any Vestry or District Board. The definition of a sewer does not include a cesspool, reservoir, or deposit bed for collecting sewage for purposes of disposing of it. Having referred to the different sections of the Act, the speaker went on to glance at the amending Acts and their chief objects, viz., (1) the Housing of the Working Classes Act, 1890; (2) the Private Streets Works Act, 1892; (3) the Local Government Acts of 1888 and 1894; and (4) the Factory and Workshops Act, 1895. He considered that these statutes were useful to sanitary engineers and architects on many occasions, and he strongly advised those gentlemen who had not studied these Acts to do so at their leisure. The most important branch however, of sanitary law, so far as sanitary engineers and architects are concerned, was undoubtedly that which was laid down and settled by the Courts of Law and known as case law. He had been carefully through some hundreds of interesting cases, all of which were more or less important, and he had had great difficulty in sifting out the most important of them, from an engineer's point of view. In the case of the Hornsey Local Board v. Davis (Court of Appeal, 1893) the local authority had duly accepted a sewer made in a private road, which, although it had no outfall, was at the time of acceptance incapable of being used as a sewer. It was held that the road had once been sewered to the satisfaction of the local authority; the expense of constructing a new and more efficient sewer was not chargeable on the frontagers. In the case of Vowles v. Colner (1895) Vowles was a landowner who made a sewer in the half of a road adjoining his land, which he disposed of in building lots, charging the purchaser for connecting the drainage of their premises with his sewer. Colner, who had a house on the other side of the road, connected his drain with Vowles' sewer. It was held by Lord Justice Romer that Vowles was not entitled to an injunction to restrain Colner from connecting with the sewer. With regard to sewers and drains passing through private ground it has been held that a drain passing through private ground but receiving the drainage of more than one building is a sewer within the meaning of Section 4 of the 1875 Act (Treves *v.* Utley). Rather an interesting point cropped up in the well known and important case of Hill v. Hair (1895), where adjoining houses were, previous to 1848, drained by a brick construction on A's land, which conveyed the drainage into an adjoining ditch; in 1853 a public sewer was laid down in place of the ditch, and the brick construction was connected with it. It was held that the brick construction was not a single private drain, but had become a sewer vested in the local authority and responsible by them on the passing of the Public Health Act, 1848. The question had not been before the Court of Appeal, although it was disapproved by the Divisional Court in Bradford v. Eastbourne Corporation. Under Sec. 16 of the Act of 1875 a local board proceeded to carry a sewer across the plaintiff's pleasure grounds on such a level that the bottom of the sewer would be only slightly below the surface, and a permanent embankment about six feet high would be made. It was held by the Court of Appeal that the Board were authorised to do so, for that the Act did not confine them to carrying a sewer underground (Roderick v. Aston Local Board). In the case of Swanston v. the Twickenham Local Board it was decided that a manhole is part of a sewer, and may be made without purchasing land for the purpose, the owner of the land being only entitled to compensation for the damages arising from making it. With regard to the question of lateral support, although the Local Board may make the sewers, they do not, as it seems, from Metropolitan Board of Works v. Metropolitan Railway, acquire any right against the owners of adjoining lands to a lateral support. This therefore must be purchased if it is considered to be requisite. A case of much interest was the Tynemouth Rural District Council case. Here an owner of land in a rural sanitary district, who proposed to lay it out as a building estate and to erect on it blocks of houses arranged in streets, deposited with the local authority plans of the proposed buildings, from which it appeared that each of the houses was to be drained with a separate drain, ending in the middle of one of the proposed new sites. The local authority refused to approve the plans unless the owner would undertake to construct at his own expense the sewers with which the drains were intended to communicate, and also the necessary main outfall sewer. It was held that the local authority were not entitled to attach such a condition to their approval. Mr. Verden next dealt with the question of nuisances and dilapidations, with regard to which he said the books were full of the law. He quoted the decisions in the cases of "Lyon *v.* Greenhorn" and "Smith *v.* Robinson," and said it had been held that drainage expenses are not repairs unless the agreement specifically states that they shall be. Any contract whereby the parties agree that a certain sewer shall be called a drain for their own purposes, and to take themselves out of the Act, is invalid. In conclusion, Mr. Verden said he would read six important points which practically was an outline of sanitation well summarised, if he might use the expression:—(1) The District Council is required to cause to be made such sewers as are necessary for effectually draining their particular district; (2) owner or occupier is entitled to connect with any sewer, on condition that he gives notice to comply with the Council's regulations, and subject to control by Council's appointee; (3) every owner without the district has the same rights, subject, however, to such conditions as may be agreed to or settled by law and arbitration; (4) if a house has no sufficient drain, the occupier may be required to provide one, and to discharge into sewer if there is one within 100 ft., or otherwise into a cesspool, as Council may direct; (5) new houses in urban districts must have sufficient drainage as the Council requires; and (6) in an urban district no building is to be newly erected over a sewer without Council's consent first being had and obtained.

Considerable discussion followed on the reading of the paper, and Mr. Verden answered a number of questions put to him.

Mr. Cecil moved a hearty vote of thanks to the reader of the paper, and said he thought the Institute ought to express an opinion as to

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the necessity for some codification and simplification of the sanitary laws of the country.

Mr. Smith seconded the motion, and it was supported by the chairman, and heartily agreed to

Illustrations.

CHRIST CHURCH, NORTH BRIXTON.

IN our issue of November 22, 1902, we published a plan and description of this church, and a drawing of the exterior of the chancel.

We give here illustrations of the exterior from the western point of view, and an interior of the chancel, showing the pulpit and lectern and other details, including the method of inscribing the Commandments on the wall-spaces, instead of enclosing them in a special frame or tablet. Whether this is or is not preferable from a decorative point of view may perhaps be a question; it certainly has the advantage of rendering them more legible to the congregation, should any of them have the misfortune to be ignorant of the Decalogue.

To the information given on the former occasion it may be added that the internal oak fittings of the chancel have been carried out by Mr. A. Webber (the general contractor) and by Messrs. Farmer and Brindley and Mr. J. E. Knox; and the lettering on the walls is by Mr. E. Johnston.

Professor Beresford Pite is the architect.

MAESYCRUGIAU MANOR, CARMARTHENSHIRE.

THIS house is in course of erection upon the site of an older one now pulled down. It is built of local stone, the roofs covered with local slates, and the marble work is also of local production. The drawing was in this year's Royal Academy Exhibition. The contractors are Messrs. Stephens and Bastow, of Bristol, and the architect is Mr. Arnold Mitchell.

PROPOSED HOTEL, CHURSTON, DEVON.

THIS elevation, by Mr. G. B. Carvill, was exhibited at the Royal Academy some time back, and we commented on it at the time as a praiseworthy endeavour to treat a hotel in a simple and unpretending manner, without the element of showy architectural embellishment which generally characterises hotel architecture; and is apparently supposed to constitute a kind of advertisement.

The original drawing was a small one, but larger than this reproduction, so that the memorandum "$\frac{1}{8}$ in. scale" on the corner of the plate is of course incorrect in its present form. As we have often said, it is always better to draw out a scale on a drawing than merely to write on it what scale it is.

PORTION OF A DESIGN FOR MUNICIPAL BUILDINGS.

THIS drawing was prepared from a design submitted in competition for Darlington Municipal Buildings, and was exhibited at the Royal Academy in 1898.

One of the Yorkshire sandstones was proposed for the walls, with red tile roofing, the windows being glazed, with leaded lights.

THOMAS DAVISON.

A COMPARISON OF ENGLISH AND AMERICAN METHODS IN THE ERECTION OF BUILDINGS.

A MEETING of the Institute of Builders was held on Tuesday evening in the hall of the Society of Arts, John-street, Adelphi, W.C., when a paper on English and American Methods of Building was read by Mr. Charles Heathcote, F.R.I.B.A., of Manchester.

Mr. W. F. King, President, occupied the chair, and briefly introduced the lecturer.

Mr. Heathcote said: We have met together this evening to consider, in comparison with our own, the methods adopted by our cousins across the water in the erection of buildings, and to gather therefrom anything useful to ourselves. I am not dealing closely with the constructional designing of buildings although that has considerable bearing upon our subject, but with the methods adopted by the erectors of the work. In any references to "English" or "American" it must, please, be distinctly borne in mind they are not personal, but are solely made in general terms of either as a nation. As in architecture or in sculpture when we refer to the beauties and skill of the ancient Greeks we do not imply there were no instances of bad Art produced by them in the same era, so when speaking of the pushfulness of the American it is not to infer it a universal possession, or, on the other hand, to imply that all Englishmen lack great energy, which would be ridiculous. I speak of each only as a body—as a nation. . . . .

It is a healthy exercise, and if the advent of Americans into our local business enterprises universally results in this their coming is not to be regretted. But in the Press, or elsewhere, only one superiority in building matters has been claimed by or for the Americans—the claim of speed. In the most picturesque of the Press comments no claim has been put forth for better work, better finish, less settlement of walls, less cost, or any other advantage over the English contractor than the one of acceleration of speed in the erection of the work. It is an important claim, however. Is it a just one? In my opinion it is, only qualified by the remark that, all other things being equal, it has been an exaggerated claim.

What are the methods adopted by the Americans which are not in general vogue with English contractors whereby this acceleration is obtained? Several factors are necessary, and in a parenthesis it may be added that there are many Englishmen possessing every one of them, who have worked with them in full play, achieving much, although, like Englishmen, they have done so quietly, quite oblivious of the fact that they were doing anything deserving special comment or in any way out of an ordinary quick, bright, business life. But my point is this, that these speeding-up qualifications are not as widespread amongst us as with the Americans. Again cautioning you I am only referring generally, and not individually, let me come at once to the "practical politics" and give you a summary of these factors of successful rate and progress. The American is:—

Firstly.—More keen upon his work than we are. Of him it cannot be said, as of some Englishmen, that his business occupies his spare time. It is more true of him than of us that business comes first and pleasure afterwards.

Secondly.—The American architect is more generally alive to rapid completion of the drawings and details of the approved scheme in order to enable the contractor to know at the start virtually the whole of what he has to do. He also, if the work is such that it can be introduced, schemes his construction in such a manner that quick speed is attainable. Coupling-up steel stancheons tends to more rapid progress than endeavouring to provide polished granite from a Scotch quarry in winter.

Thirdly.—Based on being provided with the drawings, the contractor is enabled to perfectly organise his work. Every contractor here will know the extreme benefit and help this is to him, and would appreciate always being provided with early full settled information, clear and definite.

Fourthly.—This is one of the principal factors, if, indeed, it be not *the* principal one. Why should American architects work early and late, employing wider assistance to enable them rapidly to complete their drawings and instructions? Why should the American contractor spend much more on superintendence, on labour, on overtime, on earlier delivery of material? They do it because the American proprietor, more fully appreciative of the fact that the rapid building of his works means money to him, is willing to pay the necessary additional expenses such services involve. It is a pecuniary advantage to him, and he does not hesitate to pay in order to gain it. By his paying for it the costs of the acceleration are met, and the incentive provided for the greater exertion on everyone's part.

Fifthly.—The American values more the power of work in his employees than the amount of the minimum wage, and to save time will more eagerly seek the latest hoisting and other machinery. The attitude of the working man is also in his favour. An American workman seems to recognise that the more cheaply an article can be produced through economising labour the more the trade as a whole will be benefited, and, as a natural result, the labouring classes must be also. I have seen the matter expressed thus: "We know we are the gainers in the end if a new machine is introduced which does the work of ten men by the help of one. American employers always pay better wages to the men employed in their labour-saving machinery, and this has a tendency to advance wages all round, and find more and more employment."

On the other hand, it seems to be the deliberate suicidal policy of some trades unions in our country to compel their members to do as little work as will pass muster. This is a hard saying, but letters to this effect to the *Times* failed in getting any denial from the Union leaders. I should like to know this was a mistaken impression. It does not obtain, however, so much in the provinces at the present time as it did five years ago.

In this summary you have the whole matter. It is application and devotion to work, with profit as the incentive and reward. Let us deal with these factors in greater detail, and not to be too conservative, too splendidly isolated, too sensitive, to benefit from them. An American is keenly alive to the necessity of work, thought, application in his business. The American air seems to exert upon him a stimulation to new exertions and fresh enterprise. Add to this the great incentive of self-interest in the object to be attained, and you have the most potent of causes working in him. These direct him to the provision of everything to save time. Anything tending to this direction is worthy his consideration.

He commences his business education early. The system of education of the youth of America is founded more with the object of the ultimate business life than is ours. It is of more importance with him to know the history and to study the causes of American industrial progress than to be imbued with the knowledge of a dead language. The American University takes more the direction of a Technical Institute than it resembles our ideas of higher education. A youth is expected and directed to go through this course, which is a considerable portion of his actual business training. He is in his early manhood being properly fitted for his career, and his interest is thus bent towards his business pursuit. He has every opportunity for being trained in the right direction. Technical education implies in teaching some concern for the practical prospects of those taught. Practical experience goes with the theoretical. An American, by a common-sense education, does not enter upon his trade with a suspicion he is demeaning himself. Hopeful enterprise is the spirit in which he begins; he believes in the thing he has to do, and is proud of it. Can this be said to be the general drift of our higher educational systems at present?

It must be remembered America is a huge new country, and for a century there have necessarily been continually new developments, widening industries to meet the needs of an increasing population still further enlarged by constant immigration, and consequent urgent demands in ordinary times for labour and material of every kind in building operations. These young industries were fostered by Protection. The price of the nation's manufactures and the wages of the people continually increased. The cost of home productions being thus generally enhanced, the absolute necessity arose for the seeking and adoption of every feasible method for the reduction of that cost if trade were to be increased at home, and still more if there were to be any weighty business in exporting manufactured articles to a country where Free Trade at any rate kept down their cost. Necessity was again the mother of invention. The natural outcome with an energetic people was the introduction of labour saving machinery. For this competition labour saving machinery was not the only thing needed, but improvement in the manufactured article where such could be obtained. The necessity found the incentive and motif, without which nothing important will be done. Similar results follow here where necessity has driven home the incentive. For the moment some of our trades have been overtaken, but in many all efforts have been in vain to exceed the excellence of our manufactures. Great Britain is still easily first in certain textiles and textile machinery. No other country can approach the productions of Lancashire and Yorkshire. Recent indiscriminate eulogies of almost everything foreign compared with our own work and methods have given a very erroneous impression. It has become the fashion to so depreciate ourselves that people are beginning to believe it. An American, on the other hand, makes a point of praising his own country on every possible opportunity.

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We seem almost eager to belittle the industrial efforts of our island. We are unjust to ourselves. Our carpets, our cotton, our cloth, the precision of our machinery, our shipbuilding, our pottery, cutlery, are still unbeaten. Abroad our goods hold their own in quality and finish, although in some directions there is certainly great need for new ideas and improvements of design. When staying at one of the New York largest modern hotels, I was much struck with the beautiful finish of the bath and lavatory appointments and general plumbing work. Being naturally desirous of gathering information wherever possible, I asked for the name and address of the firm who did the work, intending whilst in America to visit their establishment to see their goods. The whole hotel, it turned out, had been fitted up by a London firm. If this had been reversed every newspaper in England would probably have contained an article upon American enterprise, with braggadocio accounts, possibly paid for, about the decadence of the sleepy English sanitary engineer before the young American invader. Gentlemen, in matters of self-advertising we are as Babes in the Wood compared with our cousins. This system of pushfulness at all events, is totally opposed alike to the sentiment of Englishmen and of the better class of Americans.

I have named incentive as the lever for real progress. It has not been very strong with us. The supremacy of our old country for many years in manufactures, industries, wealth, seems to have induced in us the habit of thought that we were by nature and a good providence the only possible first, that our very success indicated there could hardly be room for improvement, that what was good enough for our fathers, and made their fortunes, was good enough for us, who were doing very well, and there was no apparent need for strenuous endeavours for other methods, increased knowledge, new markets; but for those wishing to compete with us, and to effectively attack our position, an opposite state of things obtained. Their necessity, circumstances, and environment have called forth increase of energy and application, whilst we have been in many ways generally content to remain as of old, having formed our habit of believing we were unassailable as the workshop of the world. But this is quickly changing. The working force does not appear to be a matter of race at all. A Britisher going to the States soon adopts the quicker actions of the country, and overcomes the conservatism of his old ways. The best brickwork, for instance, in New York, has been done by English bricklayers.

There is no one definite reason that can be given for this quickening of activity. The work is done under a different organisation, and follows methods of economising human labour. These combined, when acting in conjunction with exactly similar machinery to ours, produce a greater result. And the workman himself recognises this.

Americans have many methods ahead of ours, in others they have as much to learn from us as to teach. There is this great difference, as I have been endeavouring to show—the greater desire to learn, and to take advantage of what they see to effect improvements in their work and methods. They are, in a word, more keen to find out and adopt good new ideas, for the solid, sensible reason that it is to their all-round advantage to do so. And if you find on one side a young man imbued with this spirit in his business, and on the other one who does his work as drudgery, with an eye to leaving it behind at the first moment, which is likely to gain the business, other things being equal? Excessive railway and canal charges may have been in our island largely responsible for decline in some trades, but there have been causes of deeper significance. Have the sons and successors of the founders of our industries generally been actuated by the genius, pluck, and untiring energy as their fathers? The inducement was not there for the same old strenuous life.

We are a very conservative people. A great statesman lately referred to our pedantry and self-conceit of former years with regard to foreign politics. The same faults have been with us in some branches of business. The Prince of Wales, a great thinker, gave his advice to the nation to "wake up" out of this position. We are doing this, and we have made an excellent start towards "speeding up" by owning to ourselves that it is really possible we can be beaten.

There are many events of the past few years that have borne upon us relentlessly that we have not been doing our best, that we have not acted up to our capacity, that we have been too self-satisfied. I need not refer to them in detail, but we know them. Some have come upon us from South Africa with the sharp sudden pain of a blow to our self-conceit—some have hit our self-complacency nearer home. Nothing less would seem to have had real power to move us. We *are* waking up. If we of the building community will but carry forward this resuscitating process and speed up to our work, we shall be acting wisely. We have everything in our favour if we will but overcome our old self-satisfied conservatism of thoughts and methods. The English quiet, self-respecting determination, coupled with greater keenness for quicker work and better organisation, is all we need. It is not entirely the highest speed that is wanted, but the old good workmanship, better speed and progress, well-organised methods.

I was recently asking an Englishman, who had lived twelve years in Melbourne, his opinion of American competition there. He illustrated his answer by saying that if one heard of a good prospecting locality and went to see it, one would be sure to find either a Scotchman or Englishman there already, pegging out claims; but if one went into an ironmonger's store probably half the goods would be American, the remaining portion being English of the same pattern exactly as ten years ago, strong and durable as ever, whilst the American productions of the same class, not as strong and durable as the English make, but improved in style and pattern two or three times in the period. This illustration very clearly explains our respective positions.

I am, with your permission, spending some of your time upon this portion of the subject, for it forms a large part of the principle from which all springs. We are getting more alive to the necessity of speeding up our ways. Allow me to take an instance from some other trade than the building trade: take the boot and shoe trade. It illustrates the principle alluded to. Some years ago this trade was greatly assailed by American manufacturers. They had with skill and ingenuity brought labour-saving machinery to great perfection, and had considered carefully the needs of the trade, the requirements of the people, their customeres. They invaded this country without let or hindrance, causing much trouble to our work-people in that industry. But our shoe manufacturers are dropping their comparatively conservative ways and adopting the latest machinery, and are, as they should do, recovering their position. If they formerly had had the incentive to be improving their methods the American trade would not have come here at all. Now they have to fight it, which they are doing, and are winning. It will be the same probably in every other industry that has been attacked if we will only in earnestness and reality rise to the occasion. From what has fallen within my experience, I have not the slightest pessimism about our trade, our businesses, if we are only true to ourselves and our capabilities. The words "English Manufacture" are a hall-mark the world over for excellence and finish. I have seen in the shops of America such words as "All the goods in this establishment guaranteed of English manufacture," which is another side of the shield to that usually presented to our view.

There is not the remotest claim that American buildings are better built than ours. Work rushed by flares and at night, for instance, cannot be as good as that accomplished by daylight. I am a believer also in the sober section of our working men and women, whose skill has no equal, and I very much doubt if in times of stress and difficulty their quiet, determined courage has, either.

In some sections of industrial activity it will be very difficult to regain our former position, and it will only be accomplished by long, patient study and application. But it is not only this in many cases. I am thinking at the moment of the chemical industries. The German manufacturers are said to have succeeded in obtaining a wider grasp of this business than would have been possible if we had had the inclination and the foresight to have provided thorough training easily within reach. But our Patent Laws are answerable for a great deal of it. Every other nation but ours makes it conditional to work or license a patent if granted in their territory, but we allow a patent to be taken here without this. Although aniline dyes, for instance, were first made in England, the effect is that Germans patent their chemical improved methods in both countries, working it in their own country and stopping anybody doing it here. Surely such a law should be altered if we complain about bad trade. We are deliberately helping the foreigner in many cases against ourselves. There are scores of inventions made by Englishmen thus patented and credited to other peoples by the action of these Patent Laws, and among them many connected with the building trade. This is my excuse for naming them. Even the most fiscally upsetting Conservative or the most commercially reposeful Radical could not object to freeing us from such prejudices as contained in our present Patent Laws.

There are more drones here than in the American hive. This is not very healthy if we are to retain our position. The only way to effect an improvement is to provide inducements. A young American will work and study in his business because he is assured of remunerative employment at the end of it, and the more he knows and the smarter he is the better he will be paid. That inducement does not hold good here to the same extent. If a man is a labourer he will not be allowed to lay bricks, however clever he may be at it, until he has served many years of apprenticeship. What inducement, then, has he to learn to lay bricks? Further, are our new magnificent Technical Schools filled with eager youth striving to extend their knowledge in the particular line of their calling? Many there are who industriously and commendably apply themselves to it, but there is not the eager, hearty entering-in of the great mass of the people because the inducement is not there. Can the desire for knowledge of building construction in the average builder's clerk be compared to his anxiety for a football match?

The second factor mentioned was the position and work of the architect. The great body of architects are greatly interested in their calling, and are keen in their business application, with great capacity for work. They possess, among other reasons, a strong inducement for the due fulfilment of their duties in the fact of the fascination and joy in the work itself. But we have not, as a body, sufficiently risen to the fact that a month saved in the preparation of drawings and data probably means a month's interest and a month's profit to our clients. We have not, also, as a body, sufficiently educated ourselves in modern advance in those forms of construction and the use of materials leading to saving of time, with its attendant advantages. And, if we had, possibly the County Council by-laws would prevent their employment.

It is not fair to a contractor, ready with his plant, his office, his desire to please, to be hampered in his progress by want of drawings, which are his illustrated instructions, his directions. He is a wise architect who will learn that by saving time he is assisting his client and strengthening his own reputation. I am fully aware of the delicate ground I am now crossing. There are many men in my profession as much to the fore in all this as any American, but it is not the average. And in speaking of assisting the speed of execution I am as fully aware as any one that speed is not everything, that in some cases it is a distinct disadvantage in construction and stability, that there are circumstances in which it would be decidedly detrimental to the structure and averse to the interests of one's clients, and in other cases it would be impossible to build quickly; but as a body we do not furnish the contractor as quickly as we should with the drawings if we are expecting him to exercise all he can in forwarding matters. I once knew an architect who obtained estimates for ten different designs for a dining-room dado before he could make up his mind, and I have no doubt many in this room could give some amusing anecdotes of a like character.

Further, we in England—architects and builders—do not as fully fill the ranks of superintendents of the works as we advantageously might. We can most of us learn something here from the Americans. A clerk of works—capable, worthy man though he be, whether formerly a joiner or of any other trade—is considered generally to be performing the whole duty of man by watching material as it arrives to see if equal to the contract requirements, by keeping data as to weather, number of men employed, etc. This, in any work above a small one, needs augmenting. By all means retain the clerk of works for these necessary duties, adding to them the keeping of progress plans, but in any more important work another, and a more highly-trained assistant, or half a dozen such may be added. It is impossible to carry out a large work with

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expedition without the aid of plenty of superintendence. If there is much steel employed a qualified engineer is needed at the steelworks to test the materials and to personally see that the proper rolling is done, and that the beams, stanchions, and work generally, as first needed, are being put together well in time for delivery before they are actually needed for placing in position. Capable men are needed on the building itself to supervise sections of the work, and personally see that the rate of progress is maintained, that whatever materials are needed in succession are on the spot. There must be a system of organisation, and each individual supervisor must know his position in it, and undertake that his individual section lacks nothing by want of foresight. These superintendents, under the control of the architect, must look forward in their work, and convince themselves all is ordered well ahead and to be in time. Organisation by a capable, practical head is needed, and the architect is the man appointed to be that head and director. On my own buildings I have progress plans, with the dates upon which certain parts of the work are expected to be completed, it being the duty of the superintendent of any one part to see that such instructions are carried out. He has a defined work to see to. In a building we have now on hand in the North, and covering some 5½ acres of land, this is done, and every part of the work mapped out. It is organisation. It saves time and is methodical. It is what an American would also do. You probably do it also, but it is not universal. In one building we were doing there was a large amount of timber necessary which we bought in America, and we had an inspector in our own pay at New Orleans to inspect the timber before being put on board, in order to ensure proper material and despatch. An American would act similarly.

There is in all new buildings a certain speed of erection which forms the most lucrative rate to the contractor. If on the one hand he gets too slow the cost of erection is enhanced, and the same remark applies if he is excessive in speed. Consequently, if an architect (and the proprietor through him) asks for tenders for the execution of certain works with the intention of placing the contract with the firm submitting the lowest prices, he can, in equity, only expect that rate of speed at which the contractor makes most profit, for that is all he tendered to do and is all the proprietor is paying for. The great majority of contracts are let in this country on this understanding, for the date of completion which is named on the contract is calculated on this footing. Neither an American nor any other contractor tendering on this basis would spend his money on accelerated speed if he reaped no benefit thereby. This part of the matter resolves itself into a small compass. If a proprietor wishes a very quickly-erected building he must pay the necessitated additional outlay enabling the contractor to effect it at a reasonable profit. Herein is the germ of the whole matter, and herein comes the American greater keenness at once. We do not, or have not, fully risen to the fact in the great bulk of our contracts that if a proprietor saves 1,000*l.* in interest on his land value by quickened construction it is a very good business to spend 750*l.* in order to obtain it. It is, of course, no new thing to us, but we have not as fully realised it as we should. An American proprietor not only does appreciate this, but he acts on it, and will spend more than the thousand pounds actually saved in interest, because he makes money by having his works and premises as a going profit-making concern all the sooner. There are many in this country who see all this and act on it, but it is not general. Given the same rate of payment and the same conditions, an English contractor will work as quickly, as well, as thoroughly, and as satisfactorily as an American, and better in some manners and ways which we in this island prefer. I will presently give you an instance of this.

In making a contract, my sons and myself give a penalty for non-completion, with an exactly similar bonus for earlier termination. We find the result just as anticipated, and that we often have to certify for a substantial bonus. It gives us much pleasure when this occurs, for it is an extra payment due for diligent service, good business organisation, and a gain to both proprietors and contractor. If, however, a very speedy work is desired, bonuses are given the sub-contractors for the acceleration.

If some imaginary buildings were worth 100,000*l.* to erect in eighteen months, and the builder were offered 10,000*l.* or 15,000*l.* if completed in fifteen months, there would be a strong inducement to pay extra wages for a choice of good workmen and plenty of them, to find bonuses of 1*s.* 6*d.* per 1,000 for bricks for earlier delivery, to provide many a half-crown or five shillings to men to complete a certain thing by a given time, to pay 2,000*l.* for early delivery of steel or stone, to put down the speediest machine, to berth additional superintendents to hustle things up. An American would take greater risks in addition, for they do not put scaffolding like you do in London. Herein, I reiterate, lies the germ of the whole matter, the readiness of the proprietor to pay for the extra speed or advantage.

Having thus dealt with the factors making for the American methods, let us now consider whether in England we have been doing anything very similar. I can only speak of building in the North, where we are accustomed to work harder, longer hours than in the West End, shall we say? And in entering upon this phase of our subject, I can only speak with authority upon those buildings coming under the jurisdiction of my own firm.

[The remainder of Mr. Heathcote's paper, together with our notes of the discussion which followed, will be given next week.]

COMPETITIONS.

TOWN HALL, STOCKPORT.—The design sent in in this competition by Mr. A. Bramwell Thomas, London, has been placed first by the assessor, but it has not yet been decided that this design will be adopted. It is stated that there are members of the Stockport Council who favour the plans submitted by Messrs. Willoughby and Langham, of Manchester, which have been placed second. The cost of the building will be 70,000*l.*

COUNTY SCHOOL, ACTON.—The first premiated design in this competition is by Mr. A. H. Tiltman, 51, Russell-square, W.C.; the second by Mr. Pywell, of Hanwell; and the third by Messrs. Giles, Gough, and Trollope, Charing Cross.

WOMEN'S HOSPITAL, BRIGHTON.—Sixty-two sets of drawings were sent in in this competition, and the assessor, Mr. G. T. Hine, of Westminster, has made the following awards:—First, design marked No. 44; second, design marked No. 46; and third, Nos. 11 and 25. The assessor suggested that the Committee should either divide the third premium between Nos. 11 and 25, or, in consideration of their equal merit, award each of them a premium of 20*l.* No. 44 is Mr. John L. Denman, 8, Clifton-terrace, Brighton; No. 46, Mr. E. P. Howard, 30, Cursitor-street, London, E.C.; No. 11, Mr. T. F. Pennington, Tivoli House, Hounslow Heath, W.; No. 25, Messrs. John S. Quilter and F. Anderson, 1 and 2, Adam-street, Adelphi, W.C.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Lewisham.—Nine houses with bay-windows upon the site of "Walmer House," Perry-hill, Catford (Mr. W. Burrell for Mr. Leech).—Consent.

Finsbury, Central.—A four-story building with a one-story addition in front on the site of Nos. 1, 2, and 3, Clerkenwell-green, Finsbury (Mr. S. E. Adams for Mr. W. H. Adams).—Consent.

Lambeth, North.—An addition to St. Thomas's Hospital, Lambeth Palace-road, to abut also upon Westminster Bridge-road, Lambeth (Mr. P. Currey for the Governors of the Hospital).—Consent.

Lewisham.—One-story shops upon part of the forecourts of Nos. 64 and 66, Brockley-rise, Lewisham (Messrs. Norfolk and Prior for Mr. W. Betts).—Consent.

Strand.—A projecting sign in front of No. 124, Long-acre, Strand (Mr. H. E. Pollard for Messrs. Salsbury and Co.).—Consent.

Strand.—A projecting balcony at the Gaiety Restaurant, Strand, upon the first floor level (Messrs. E. Runtz and Ford for the New Gaiety Restaurant and Hotel Company, Ltd.).—Consent.

Finsbury, East.—Buildings on the site of Nos. 152 and 152A, City-road, Finsbury (Messrs. Cluttons for the Ecclesiastical Commissioners).—Consent.

Strand.—That the Council do not accede to the request of Mr. J. H. May on behalf of the Illuminated Advertisements Company for permission to retain twelve projecting illuminated signs in front of No. 48, Cranbourne-street, Westminster.—Agreed

Wandsworth.†—The retention of wood and tile porches to four houses on the west side of Thrale-road, Streatham, southward of Ribblesdale-road (Mr. H. Bignold for Messrs. Crunden and Co.).—Refused.

Chelsea.—An iron and glass portico at the entrance to Grilles Private Hotel, No. 149, Sloane-street, Chelsea (Mr. R. S. Robertson).—Refused.

City.—A three-story oriel window in front of a proposed building on the site of Nos. 90 and 91, Wood-street, City (Mr. G. Vickery for Messrs. W. and H. Smith).—Refused.

Holborn.—An iron and glass shelter at the rear of Nos. 216 to 219, Tottenham Court-road, Holborn, to abut upon Alfred-place (Messrs. Read and McDonald for Messrs. Bartholomew and Fletcher).—Refused.

Kensington, South.—Buildings on a site abutting on the north-western side of Kensington-road and the eastern side of Melbury-road, Kensington (Messrs. Drivers, Jonas, and Co. for the Earl of Ilchester).—Refused.

Norwood.—A one-story shop on the west side of Rosendale-road, West Dulwich, adjoining No. 67 (Mr. W. G. Loe for Mr. L. E. L. T. R. Durant).—Refused.

Width of Way.

Poplar.—That the application of Mr. R. Robertson, for the Housing of the Working Classes Committee, for an extension of the periods within which the erection of buildings and boundary fences on the south side of Leicester-street, west side of Gaselee-street, and south side of Norfolk-street, Preston's-road, Poplar, were required to be commenced and completed be granted.—Agreed.

Hackney, South.—A two-story dwelling-house on the west side of St. Thomas's-place, Well-street, Hackney, with a forecourt fence at less than the prescribed distance from the centre of the roadway of the street (Messrs. Hodson and Whitehead for Messrs. Smith and Howe).—Consent.

Width of Way and Line of Frontage.

Marylebone, West.—A one-story addition in front of No. 11, Gloucester-mews West, Marylebone (Messrs. C. Brown and Sons for Sir J. Walton).—Consent.

Marylebone, East.—An iron and glass shelter at the rear of No. 1, Albany-street, St. Marylebone, to abut upon Albany-mews (Messrs. Brown and Barrow for Messrs. Friswell, Ltd.).—Refused.

Line of Frontage and Construction.

Islington, East.—A portable photographic structure at the flank of No. 1, Electric-parade, Seven Sisters-road, Islington, to abut upon Thane-villas (The Flashtype Company, Ltd.).—Refused.

Space at Rear.

Kensington, South.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a building, to be known as Warwick-mansions, on the west side of Cromwell-crescent, Pembroke-road, Kensington (Mr. P. E. Pilditch for Messrs. J. Barker and Co., Ltd.).—Consent.

Kensington, South.—Deviation from the plans approved for the erection of a building on a site on the north side of Oakwood-court, and east side of Addison-road, Kensington, so far as relates to an increase in the height of such building (Messrs. Rolfe and Matthews for Messrs. Jones Brothers).—Consent.

Line of Frontage and Space at Rear.

Wandsworth.—The retention of the buildings Nos. 2 and 42, Oakmead-road, and No. 2, Ravenstone-street, Balham, with irregular open spaces at the rear, and the retention of projecting porches to seventy-nine houses in Oakmead-road and Ravenstone-street (Mr. R. H. Miller).—Consent.

Wandsworth.—That the Council do make no order, on the application of Mr. R. H. Miller, for permission to retain wood and tile gables to houses erected in Oakmead-road and Ravenstone-street.—Agreed.

Width of Way and Space at Rear.

Whitechapel.—A block of shops, with working-class dwellings over, on the west side of Steward-street, Spitalfields (Mr. R. Midworth for Messrs. Pickford and Co., Ltd.).—Refused.

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Deviation from Certified Plans.

Finsbury, Central.—Deviation from the plans certified by the District Surveyor, under section 43 of the Act, so far as relates to the proposed erection of a building upon the site of No. 21, Henry-street, Pentonville (Mr. G. W. King for Messrs. Whitbred and Co., Ltd.).—Consent.

Width of Way, Lines of Frontage, and Space at Rear.

Bethnal Green, North-east.—A house, with bay windows and a projecting hood over the entrance in Parmiter-street, and with a stable and van-shed at the rear, on the site of Nos. 7 and 9, Parmiter-street, Cambridge-road, Bethnal Green, to abut also upon Skinner-court (Messrs. H. Dawson and Son for the trustees of the Moravian Trust Estates).—Consent.

Line of Frontage and Working-class Dwellings.

Islington, West.—A block of dwelling-houses on a site on the east side of Caledonian-road, Islington, northward of Pentonville Prison (Mr. R. Robertson for the Housing of the Working Classes Committee of the Council).—Consent.

Islington, West.—Four blocks of intended dwelling-houses, to be inhabited by persons of the working class, and proposed to be erected, not abutting upon a street, on a site on the east side of Caledonian-road, Islington, northward of Pentonville Prison (Mr. R. Robertson for the Housing of the Working Classes Committee of the Council).—Consent.

Formation of Streets.

Wandsworth.—That the resolution of the Council of July 14, sanctioning the formation or laying out of a new street, for foot traffic only, on the site of Nos. 13 to 15, High-street, Putney, to lead from High-street to Brewhouse-lane, and the construction of a roof over such street (Mr. A. E. Chasemore for Mr. T. S. Jay), be modified so far as may be necessary to permit the applicant to erect gates at each end of the street, and to dispense with the erection of posts across such street.—Agreed.

Woolwich.—The abandonment of certain streets, and portions of streets, which were intended to be laid out upon the portion of the Eltham Park estate, acquired by the Council for the purpose of the formation of Eltham Park, the description of such streets being as follows: Greenlaw-road, Crathie-road, Cramond-road, and the portions of Greenlea-road, Glenlyon-road, and Glenshiel-road, east of Glenesk-road, the formation of which was sanctioned by the Council on October 10, 1899, upon the application of Mr. G. F. Logsdail on behalf of Mr. A. Cameron Corbett, M.P.—Agreed.

Wandsworth.—That an order be issued to Mr. A. J. Wellings sanctioning the formation or laying out of new streets for carriage traffic to lead out of the north-western side of Franciscan-road and North-eastern side of Totterdown, Tooting.—Agreed.

Lewisham.—That an order be issued to Messrs. Eastman Brothers sanctioning the formation or laying out new streets for carriage traffic, to lead out of the south side of Sydenham-road, Lewisham (for the Building Estates and Property Association, Ltd.).—Agreed.

Dulwich.—That an order be issued to Mr. C. E. Barry, sanctioning the formation or laying out of new street for carriage traffic to lead from Woodwarde-road to Court-lane, Dulwich, and in connexion therewith the widening of a portion of Court-lane.—Agreed.

Lewisham.—That an order be issued to Mr. A. W. Osborn sanctioning the formation or laying out of new streets for carriage traffic to lead out of the south side of Leahurst-road, Lewisham, to Fernbrook-road (for Messrs. Johnson and Aldridge).—Agreed.

Lewisham.—That an order be issued to Mr. E. J. W. Hider refusing to sanction the formation or laying out of a street (a mews), 14 ft. wide, to lead out of the north side of Dowanhill-road, Torridon-road, Lewisham (for Mr. Richards).—Refused.

Means of Escape at Top of High Buildings.

Holborn.—Means of escape in case of fire proposed to be provided in pursuance of section 63 of the Act, from the front rooms on the sixth floor of the "Bedford Hotel," Nos. 83, 85, and 87, Southampton-row, Holborn (the upper surfaces of the floors of which rooms are above 60 ft. from the street level) for the persons dwelling or employed therein (Mr. H. Walduck).—Consent.

Lines of Frontage.

Woolwich.—Buildings on the site of the "Duke of York" beer-house and "Fortune of War" public-house, and of Nos. 16 to 38 (even numbers), inclusive, and Nos. 35 to 63 (odd numbers), inclusive, and on a portion of the site of the "Coffee Tavern," New-road, Woolwich (Messrs. Church, Quick, and Whincop for the freeholders of the Burrage estate).—Consent.

The recommendation marked † is contrary to the views of the local authority.

METROPOLITAN ASYLUMS BOARD.

THE usual fortnightly meeting of the managers was held on Saturday last week, at the offices, on Victoria Embankment, Sir R. Hensley in the chair.

On the recommendation of the Finance Committee it was agreed to make application to the Local Government Board for an order authorising an expenditure of 135,200*l.* on the proposed reconstruction of the South-Eastern Hospital.

The General Purposes Committee reported on the proposed establishment of sanatoria for consumptives. The matter was considered by the Managers a year ago, when the Bermondsey Borough Council addressed the Board on the subject. The matter was then deferred for a year.

The Committee now recommended: —

"That the Managers, having duly considered the question of the proposed establishment of sanatoria for consumptive patients and the letters received from the Local Government Board and the various metropolitan Local Authorities and Medical Officers of Health in regard thereto, are of opinion that the matter is one of such vital and far-reaching importance to the community at large, and one which, if adopted by the Managers, would entail so considerable an extension of their duties and responsibilities, and so large an increase in their expenditure, as to call for some authoritative expression of opinion by the chief Health Authority of the country, viz., the Local Government Board, before the Managers are asked to take any definite action in the matter, or to make any further inquiries in regard thereto; and that the Local Government Board, the several Boards of Guardians, the Borough Councils, and the Medical Officers of Health be so informed."

This was agreed to after some discussion.

The Contract Committee submitted a report dealing with the practice of taking the names and addresses of persons applying for tender forms. The Committee had been instructed to report as to the advisability of discontinuing the practice. The practice was instituted by a resolution of the Committee of the 28th February, 1900, and the method adopted was as follows:—A slip is handed to each applicant for a tender form and he is required to enter thereon the name and address of his firm, the form of tender required, and the date. These slips are filed, and when the time for issuing forms has expired, all the slips are packed up, labelled, and stored. The Committee were of opinion that the system gave a useful means of reference in case of any question arising as to the firms who had tender forms. It also prevented firms from obtaining an unnecessarily large number of copies of each tender form. It appeared to the Committee, however, that it would be advisable to limit their issue as far as practicable to persons likely to submit bonâ fide tenders. So far as they could see, no legitimate objections to the practice exist, and so far as was officially known, no complaints against the system had been made by any of the numerous firms who ordinarily applied for tender forms.

The report was received.

On the recommendation of the Works Committee Messrs. W. H. Barber and Son were appointed to take out the quantities of the reconstruction works at the South-Eastern Hospital.

COURT OF COMMON COUNCIL.

THE usual Court of Common Council was held in the Guildhall on Thursday last week.

On the motion of Mr. Samuel Alderton, the Streets Committee were directed to consider the existing regulations in regard to lamps overhanging the public ways, and to report as to the desirability of making any alterations therein.

Mr. Morton, the Chairman of the Streets Committee, said that the Committee already had the matter before them.

The Sanitary Committee submitted a report in which they referred to a letter from the London County Council, which had been referred to them for report, enclosing copies of a first draft of certain sanitary provisions which the Council proposes to seek in its General Powers Bill of next Session, which letter asked the views of the Corporation on the question of such provisions being made applicable within the City of London. The Committee recommended that the suggested provisions be approved generally, subject to the Corporation being the sole authority for carrying out the Act within the City, and to its being exempted from the operation of the clause giving the Council power to institute proceedings in the City. The recommendation was agreed to, and it was agreed also to inform the London County Council accordingly. The Committee reported also on a letter recently received from the London County Council enclosing copies of by-laws with reference to the casting of waste-paper, etc., in public thoroughfares, spitting in public places, window-cleaning and painting, etc., which by-laws are now in force in the Administrative County of London. The recommendation of the Committee that no action be taken in the matter at present, was agreed to.

Among the correspondence received was a letter from the London County Council enclosing two copies of a return of the condition of bridges carrying railways over roads and roads over railways in the County of London, and stating that the Council had been advised that any steps taken under Sections 46 to 67 of the Railway Clauses Consolidation Act, 1845, which deal with the question of repair and maintenance of bridges, etc., must be at the instance of the local authorities. A letter was received from the Town Clerk of the Metropolitan Borough of Paddington with reference to the recent litigation on the question of the right of the Borough Council to erect a hoarding in front of a block of flats overlooking an open space (St. Mary's Disused Burial Ground) to prevent the owner of the block in question obtaining a right to the access of light. The letter enclosed a copy of a resolution passed at a recent meeting of the Borough Council:—

"That the attention of the Corporation of the City of London, London County Council, the City of Westminster, and the Metropolitan Borough Councils be called to the case of Boyce *v.* Paddington Borough Council, and that they be asked to express their willingness, or otherwise, to share in the expense of carrying the appeal to the House of Lords."

ROYAL COMMISSION ON LONDON LOCOMOTION.

ON Thursday last week, the Royal Commission sitting under the chairmanship of Sir D. Barbour heard evidence from Mr. J. H. Brown, Chairman of the Highways Committee of the Battersea Borough Council, who also spoke generally for many of the other Borough Councils of London. Witness advocated the establishment of a steamboat service, and the extension of the cab radius. He pointed out the nuisance which arose from the unloading of scaffolding, etc., and thought that with regard generally to the regulation of unloading in streets, the Police and the Borough and County authorities should co-operate together to fix times of prohibition in each district, to meet local needs and circumstances. He referred at length to the constant breaking up of streets by companies having the power to do so, and said that in two years in Battersea alone there had been 8,734 such openings. It was true that the companies were supposed to leave the street in a proper condition, but where a street was paved with wood it was certain to be damaged by being broken up. While, however, the Borough Councils desired greater powers of control as to the breaking up of the streets, they strongly objected to the County Council usurping their functions as street authority. His Council was in favour of the Police controlling omnibus routes, and if this were done, the local authorities would make up roads specially with granite to suit their traffic. With respect to unenclosed forecourts, it was frequently found that the paving of them was unsightly, and they were often dangerous through being badly paved. He thought the local authority should have power to compel owners of forecourts either to suitably enclose them, or to pave them at such a level and with such material as they might direct. The queues outside theatres and music-halls constituted a nuisance, and his Council thought, in erecting new buildings of this class, powers should exist to compel provision to be made upon the premises for those waiting to enter.—Mr. H. G. Hills, Town Clerk of Wandsworth, said his Council would object to the London County Council having control over the opening and reinstatement of trenches in streets. He suggested that Section 72 of the Metropolis Management Amendment Act of 1862, which required the previous consent of the London County Council to a street widening by a Metropolitan Borough Council, should be repealed. He would object to the suggested abolition of the veto of the local authorities as to tramway schemes, and gave as a reason the case of the County Council wishing to make the local authority pay one-third of the cost of widening a street which it was necessary to widen simply for the construction of a tramway which did not particularly affect Wandsworth.

The first witness called at the sitting of the Commission on Friday last week was Mr. Alderman J. H. Robinson, the Chairman of the Works Committee of the Stepney Borough Council. He gave evidence at some length with regard to street improvements in that Borough, and put in a number of recommendations by his Council. The Council were of opinion that it should be compulsory upon the owners of docks, when so required by the highways authority, to substitute for the existing inadequate swing bridges, bridges of sufficient capacity to meet the requirements of the traffic, such bridges to be fitted with the latest mechanical appliances. That the bridge when so reconstructed should be subject to the jurisdiction of the Borough Council as the highway authority, who should

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be empowered to make by-laws for regulating the manner of opening the bridges, etc.

Mr. James Rush Dixon, Surveyor to the Metropolitan Borough Council of Shoreditch, was then called, and gave evidence at some length. He said that the length of public streets in Shoreditch was forty-three miles, of which some five miles were busy thoroughfares for traffic across London. There were many streets in the Borough where the congestion was most marked, it being particularly bad between the hours of seven and nine in the morning, at midday, and again in the evening from five to eight o'clock. Such streets were Old-street, Kingsland-road, Norton Folgate, Holywell-lane, Hoxton-street, and East-road. Considerable blockages occurred at the junction of the streets. In Old-street, Kingsland-road (southern end) and East-road, the congestion was due to a large extent to the trams, there being considerable lengths of single line. It was the opinion of his Borough Council that the congestion would in a great many cases be relieved by the construction of passenger subways. He mentioned as places where such subways would be convenient the intersection of Old-street and Kingsland-road, Shoreditch High-street, and Great Eastern-street and Commercial-street.

THE LONDON BUILDING ACT.

On Wednesday the Law and General Purposes Committee of Bethnal-green Borough Council reported having asked the London County Council to consider the following points when preparing their bill to amend the London Building Act:—

To prevent building on forecourts except under such conditions as will prevent danger to life in case of fire.

To prevent buildings being erected rendering existing buildings on another owner's land unsuitable for habitation by reason of obstructing access of light and air.

To secure power to set back buildings about to be erected on the site of old buildings less than 20 ft. from the centre of the road, if the cubic contents or height of the new structure will be greater than the old.

That factories and warehouses shall not be erected upon unbuilt-on spaces substantially surrounded by dwelling-houses, on which spaces the building of dwelling-houses would be prohibited for want of air space.

That power should be conferred on Borough Councils to control raking shores.

That the Borough Council shall have power with regard to permitting or not the erection of bridges and similar projections across streets.

That power be given to the Borough Councils to control awnings, blinds, and similar projections from shop fronts without need to prove the existence is an annoyance.

TRADE CATALOGUES.

The Beeston Foundry Co. (Beeston, Notts.), send us their catalogue of radiators, boilers, pipes, and fittings for heating apparatus. It is a volume of 100 pages, clearly printed, well bound, and fully illustrated, and shows what English manufacturers can do when roused by American competition. The principal radiators are of the vertical type, with one, two, or three columns from back to front, and are made in sections so that radiators of various lengths can be put together without difficulty. Other varieties are square, circular, annular (to clasp columns), and quadrant (to fit in angles). Loop radiators for ventilation are also shown, and a hinged radiator for hospitals, which is arranged to swing like a gate, so that every part can be easily cleaned. In every case complete dimensions are given, including the area of heating surface. Among the boilers we notice the "Robin Hood" and "Mona," which are of cast-iron, made in sections so that boilers of various sizes can be built up from similar parts. The "Beeston" boiler is either cast or wrought welded. The fittings illustrated include a great variety of pipe-connexions, expansion boxes, cisterns, valves, grates, pipe-stands, etc., complete prices are given, and there are also some valuable hints on heating apparatus generally, and on the company's apparatus in particular. The catalogue is one to keep and use.

From Mr. L. Rasch we have received a twenty-eight page catalogue of the patent "Economy" gas cooking stoves and independent coal ranges. The gas cooking stoves are made of wrought-iron, double-jacketed and insulated, with malleable cast-iron top plates, on which the cooking utensils are placed; the heating is therefore indirect, as the burners are below the hot plate. It is claimed that this arrangement economises gas, and reduces the labour of cleaning. The catalogue contains illustrations of roasting ovens, grillers, hot closets, cookers, coffee apparatus, portable stock-pots, etc., heated by gas, independent coal ranges, combined coal and gas ranges, coke or charcoal grills, etc. An illustration of the works at which these fittings are made is given, but the town and county are not stated.

A well-bound catalogue of 644 pages has been received from Messrs. T. and W. Farmiloe. It is a comprehensive catalogue of the tools, materials, and fittings used by plumbers, glaziers, painters, and others. Nearly seventy pages are devoted to water-closets of various kinds, earth-closets, seats, cisterns, etc. Lead bends and traps, both cast and hydraulic drawn, are illustrated and described. These are followed by a section on drainage running to forty pages, and including manhole covers, grates, flushing tanks, cast-iron and stoneware drain-pipes, traps, channels, testing and cleansing apparatus, etc. Twenty-six pages are given to inlet and outlet ventilators, and to chimney cowls. Lavatory basins and fittings occupy eighty pages; urinals, sixteen pages; baths and geysers, fifty pages; pumps, garden fittings, and hose, fifty-three pages; plumbers' fittings (taps, unions, washers and wastes, traps, etc.), forty-five pages; and gas fittings, fifteen pages. These are followed by speaking tubes, lightning conductors, electric bell fittings, telephones, filters, water-softening apparatus, heating apparatus, cisterns, hot-water tanks and cylinders, wrought-iron tubes and fittings, rain-water goods, soil-pipes, plumbers' and gasfitters' tools and materials. Varnishes, paints, and painters' tools occupy forty pages, and glass and glaziers' tools fifty pages. There is a good index of twenty-eight pages. It will be seen that the catalogue is a useful work of reference for builders.

"The September, 1903, Illustrated Catalogue" of the General Iron Foundry Co. contains upwards of 600 pages, about one-half being devoted to kitchen ranges and stoves of various kinds, steam cookers, hot closets, fire-grates, mantels, etc. Many of the interiors and mantel registers are, as is so frequently the case, overloaded with ornament. Ten pages are devoted to cast-iron baths; these are followed by lavatories, and a few sinks and water-closets are shown. The more strictly utilitarian work includes manhole-covers, grates, pumps, cattle and pig troughs, street urinals, air grates and other ventilators, soil-pipes, rain-water goods, cast-iron sashes and sky-lights, columns and lamp-posts, cast-iron staircases, verandahs, railings, and gates are also shown, as well as wrought-iron fencing and gates. Two special sections are devoted to stable and cow-house fittings and hot-water apparatus; the latter including boilers of different kinds, radiators, pipes, and fittings. From the same firm we have also received an illustrated catalogue of wrought-iron casements, and another dealing with wrought-steel and cast-iron windows, and cast-iron fire-escape stairs.

Messrs. Smith and Turner send us their "Abridged Catalogue of Inventions mostly for the efficient working of doors, gates, sashes, fanlights, and the like, produced from a century's accumulated experience and experiment." It contains illustrations and prices of door-springs of various kinds, door-stops and buffers, water-bars for the sills of casements, espagnolette bolts, panic bolts, fanlight-openers, self-closing gate-hinges, etc., many of the fittings being of an ingenious character.

The St. Pancras Ironwork Co. have sent us their catalogue of iron staircases, doors, verandahs, balconies, etc. It contains 106 pages. Different designs of spiral cast-iron stairs are first shown, and these are followed by straight flights, plain and ornamented. Numerous illustrations of fire-escape stairs and balconies, erected by the company at hospitals, hotels, flats, factories, and other buildings, are given as examples of this kind of work. Attention may be drawn to the different kinds of treads used by this company in their iron stairs. Among the other illustrations we notice wrought-iron and cast-iron gates, pavement and stall-board lights, cast-iron verandahs and porches, iron roofs, and stable and cow-house fittings. The catalogue contains some useful memoranda on iron and steel.

We have received from Messrs. Hayward, Brothers, and Eckstein their "Section 10" catalogue of metal casements and sashes, collapsible gates, iron doors, etc. The casements include inward-opening, outward-opening, horizontal and vertical swivel, "fall-back" or hopper, and folding, and separate illustrations of casement fittings are given. Steel and cast-iron sashes are shown in considerable variety; the dimensions and prices of stock sizes cannot fail to be of use to architects and builders. Attention may be drawn to the prismatic sheet glass for refracting light into dark rooms. The section on collapsible gates occupies twenty-four pages, and contains illustrations and prices of gates of various kinds. The catalogue contains also a few examples of wrought-iron grilles, iron doors, etc.

Messrs. Mellowes and Co., London, have sent us a small catalogue containing illustrations and descriptions of their "Eclipse" roof-glazing. Nearly the whole of the catalogue is devoted to photographic illustrations of important buildings in which this system of roof-glazing has been adopted, including the Crystal Palace and some large railway stations. A folding sheet is inserted in the catalogue, and will be useful to architects and builders, as it gives details (one-fourth full size) of all the woodwork, lead flashing, etc., required in connexion with the glazing.

An illustrated catalogue and price list of joinery has reached us from Messrs. Henry Sandell and Sons. It contains illustrations and prices of gates, doors, handrails, newels, balusters, trellis-work, mouldings of various kinds and for various purposes, sash stuff, etc., and will be of use to builders and (although to a less degree) to architects.

We have received from Messrs. Rd. Melhuish, Sons, and Co., a copy of the new edition of the "Ironmongery" section of their catalogue. It is a well-bound volume of 330 pages, and is a worthy companion to their "Tool" catalogue, which we noticed some time ago. At a rough estimate, the number of illustrations exceeds 2,000, and it is therefore impossible for us to do more than indicate, in a general way, some of the more important classes into which these may be assorted. The first place is given to door-furniture, among which are latches, locks, knockers, letter-boxes, handles, hinges, finger-plates, draught-excluders, etc. Gate fittings are also shown. The window furniture includes sash-fasteners, casement-fittings, fanlight-openers, sash-lines, pulleys, lifts, fittings for blinds, curtain-rods, etc. Other important classes are galvanised-iron goods, stable-fittings, ventilators, gas-cookers and stoves, plumbers' brasswork, gas-fittings, electric bells, and electric light fittings. In addition to these there is a miscellaneous assortment of the minor goods included under the term of ironmongery, such as hooks of various kinds, nails, screws, bolts, drawer-pulls, and cupboard fittings. The illustrations also include baths, heating apparatus, rain-water goods, etc. There is a full index, and the catalogue is a convenient work of reference for architects and builders in search of ironmongery of stock patterns.

The Student's Column.

CONCRETE-STEEL.—XXIII.

COLUMNS.

In view of the fact that increasing importance attaches to the reliability and endurance of columns and stanchions in modern building construction, such members deserve the most careful consideration. It is not enough for the architect to know that the strength of the columns is adequate to support the calculated loads; he must also be satisfied as to their durability and fire-resisting qualities.

The possibility of corrosion in steel columns erected in the ordinary way, protected by nothing better than one, two, or three coats of paint, and simply enclosed in the walls of a building, ought to cause more uneasiness than appears to be experienced by most designers who follow this undesirable practice. Even if the metal were thoroughly cleaned before painting—which is seldom the case—no one can reasonably expect the original coating of paint to be sufficiently durable to insure the safety of a structure for all time. It is universally admitted that steelwork exposed to climatic influences must be repainted at regular intervals for the purpose of preventing corrosion, but steel columns encased in brickwork cannot be treated in the same way, and those responsible do not always reflect that the inherent porosity of brick, and fissures or other internal spaces may permit moisture to gain access to the protecting paint. Considering these points, together with the admitted fact that

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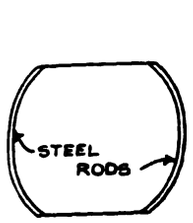

Fig. 47.

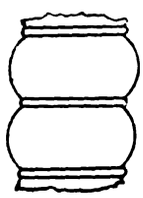

Fig. 48.

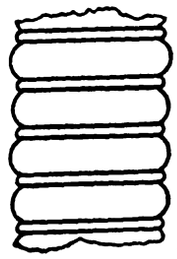

Fig. 49.

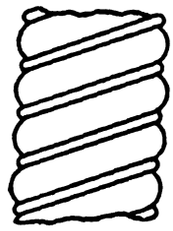

Fig. 50.

corrosion may take place underneath the paint itself, it becomes evident that columns applied in the manner indicated, cannot be considered as really durable members of a structure. They may be moderately well protected against fire, but interior columns that are not encased in brickwork are certainly not.

The excellent practice of enclosing isolated columns in terra-cotta or other casings affords considerable protection from fire, but not necessarily from corrosion, and the next step in advance is to cover all isolated columns with concrete, at the same time filling any interior cavities that may exist with the same material. Similar treatment is also advisable in the case of columns built into the walls.

Practical experience, and notably the recent examinations of steelwork taken from some buildings demolished for the construction of the New York Rapid Transit Subway,* has sufficiently proved the preservative effect of concrete so far as corrosion is concerned, while the service rendered by concrete as a fire-resisting material is too well-known to require comment.

We are brought in this way to the conclusion that the joint use of steel and concrete is most desirable in column construction, as conducing to durability and fire-resisting qualities. The next point to consider is whether the materials can be employed to better advantage than they are when the central core consists of steel and the outer shell is composed of concrete. This question is soon answered, for the laws governing the design of columns tells us that metal is of far less value in the centre than at the outside of such members. As a hollow cylinder undoubtedly possesses the best and most economical section, the proper place for the steel would be outside the concrete if nothing but strength had to be considered. But we have also to insure safety from corrosion and fire, and this may be done by adding an outer casing of concrete.

Thus we arrive at a form of column in which there are three concentric parts, (1) a central core of concrete, (2) a middle zone of steel, and (3) an outer zone of concrete. The steel is applied so that its maximum strength may be developed, and the concrete protects the inner and outer surfaces of the metal, and contributes to the resistance of the column.

In numberless cases the hollow interiors of cast-iron and steel columns have been filled with concrete, sometimes with and at others without an exterior covering, and it is quite a common practice to employ foundations for bridges and other structures, where concrete is filled into steel cylinders. But we believe that architects and engineers rarely calculate upon the additional strength so gained, and it is not generally known that the additional resistance actually is very great, or that the concrete used in this way acquires new qualities of truly surprising character.

Engineering text-books have nothing to say upon these points, which belong to the new and comparatively unknown domain of concrete-steel.

For the moment we will put aside the question whether a cylindrical tube constitutes the most desirable form in which steel may be applied in conjunction with concrete for the construction of columns, as, before proceeding to discuss matters of this nature we propose to refer to the characteristics of concrete in compression, when reinforced by steel in tubular form.

The internal forces acting in solid bodies may be placed in two categories. Cohesion is the force by which the molecules are held together, this force varying in proportion to the distance of the molecules from each other up to the elastic limit. Friction is the resistance to the relative motion of bodies, and it exerts an action in the interior of bodies similar to that exerted on their surface. Concrete is a body in which cohesion and friction are both evidenced, and these forces unite to resist compression. Sand may be taken as a fair example of a cohesionless body, in which resistance to compression is afforded by friction alone. When sand is filled into a tube and subjected to pressure by a piston small enough to fit inside the tube, friction between the particles resists compression to a certain degree, but as the height of the sand column is decreased there is a tendency to bulge outwards, causing pressure on the interior of the tube. As this pressure is resisted by the surrounding metal, the longitudinal shortening of the column is prevented to a very considerable extent, and the sand is effectively reinforced. This principle is exemplified in the sand pile, which consists of a sand column formed in earth by the aid of a hollow steel shaft sunk to the required depth and withdrawn as the sand is filled in. The lateral bulging of the sand has the effect of reinforcing the surrounding earth, so that the condition is the converse of that obtained in the case of a column.

When concrete is placed in a tube and subjected to axial pressure, the resistance to longitudinal shortening is increased by molecular cohesion, and proportionately less pressure is exerted laterally on the metal. Consequently, the thickness of the latter can be much less than that required for the support of a sand column. Assuming the coefficients of friction to be of equal value, the difference between the resistance of the sand and the concrete indicates the effect due to cohesion, and the difference in question may be termed the specific resistance of concrete.

The efficiency of a tube for reinforcing sand or concrete in the manner suggested, depends largely upon the fact that the lateral bulging at any cross section is small as compared with the total longitudinal shortening. Consequently the intensity of tensile stress in the metal is far less than the intensity of the stresses that would result from direct axial pressure equal in amount to the pressure applied at the top to the sand or concrete. The steel is applied in a form that permits its tensile strength to be utilised in the most advantageous manner, and the concrete, prevented from extending laterally, is most materially assisted in withstanding axial pressure, a duty for which it is well fitted by its comparatively great compressive strength.

The foregoing argument leads naturally to the conclusion that exceptionally favourable results may be realised by confining, or, in other words, in reinforcing the concrete so as to minimise lateral bulging.

So far as we are aware, the only investigation bearing upon this treatment of concrete is one conducted by M. Considére, and reported by him in two communications made last year to *L'Académie des Sciences*. As the scope of the *Comte Rendus* did not permit a fully detailed account of the entire investigation to be given, the information therein contained has been supplemented by articles published simultaneously in two technical journals.*

One remarkable experiment made by M. Considére was the following:—A metal tube, 7½ in. diameter, was filled with concrete, and then bent, so that the radius of curvature of the central line was 21.6 in. After this, the tube was cut and removed. Notwithstanding the considerable deformation undergone by the concrete, it was not broken, only a few cracks were found on the compressed side, and subsequent tests showed that the concrete still possessed very considerable strength.

This test does not throw light upon the compressive resistance of concrete reinforced by a surrounding case of metal, but it is sufficient to reveal the very unexpected fact that a material usually regarded as extremely brittle, can be made to acquire considerable ductility. In consequence of the result obtained from the test, it was decided to try a similar experiment upon concrete reinforced with a spiral winding of iron wire, a type of reinforcement termed "hooping" by M. Considére.

Accordingly, a specimen was prepared, consisting of a concrete prism, 4 ft. 3 in. long, reinforced with longitudinal rods and spiral hooping, the concrete being mixed in the proportion of 840 lb. of Portland cement to 1 cubic yard of gravel and sand. The prism was subjected to a pressure of 7,940 lb. per square inch of original section, and was bent into the shape of a letter S, with a greatest versed sine of 0.4 in. in a length of 13 in. Although the prism was so much bent that the radius of curvature was 24 in., the outer surfaces of the concrete showed no transverse cracks. Hence the deformation which occurred was not due so much to extension of the outer fibres as to compression of the inner fibres, which on calculation was found to be as much as 17 per cent.

Upon removal of the reinforcement the concrete was sufficiently cohesive to permit of its being handled without breaking. It was then placed on two supports about 3 ft. 7 in. apart, and required a weight of 55 lb. to break it by bending. One half of the prism which was less bent than the other, but had been subjected to the pressure of 7,940 lb. per square inch, was next placed on two supports 20.5 in. apart, and being loaded did not break across until a weight of 428 lb. had been applied. The diameter of the concrete, after the reinforcement had been taken off, was reduced to about 4.75 in., and the tensile resistance, judged by the last mentioned test, was calculated at 205 lb. per square inch, or very little below the original tensile strength of the concrete.

Compression tests made on specimens of hooped concrete, short enough to be loaded without causing flexure, showed longitudinal shortening of 3 per cent., or less, before failure.

Some other hooped specimens were tested under compression. The first, made of concrete mixed in the proportions stated above, bent under a pressure of 6,070 lb. per square inch, and was shortened 0.6 per cent. After removal of the reinforcement, the average compressive resistance of the plain concrete was 1,420 lb. per square inch, but its real resistance was considerably more, as the pressure was not applied quite accurately.

A second test was made with greater precautions on a hooped specimen, mixed in the proportion of 630 lb. of Portland cement to 1 cubic yard of gravel and sand, and this withstood a pressure of 10,270 lb. per square inch, with a longitudinal shortening which averaged 2.4 per cent., and did not exceed 2.8 per cent. in any part.

After removal of the reinforcement, the concrete core sustained a pressure of 9,700 lb., or, as the sectional area was about 10.5 in., nearly 924 lb. per square inch.

The foregoing examples are selected from a large number of similar tests, and they serve to demonstrate the remarkable qualities acquired by concrete when surrounded by a continuous metal sheathing, and also when bound with spiral coils of wire.

From the experiments made in this direction, M. Considére concludes that hooped concrete is capable of sustaining without failure considerable longitudinal shortening; that even after the most severe treatment it retains the greater part of its original resistance; and that when subject to the small amount of deformation which is experienced in actual practice, concrete reinforced in this way should be regarded as possessing constant resistance from the time the maximum is reached.

The relative effect of different methods of reinforcement for columns may be made clear by considering a cylinder of simple concrete not long enough to develop flexure when under compression. The application of pressure will result in longitudinal shortening and lateral bulging.

Let us assume that to such a cylinder four thin steel rods be applied for longitudinal reinforcement. On the application of pressure to concrete and steel alike, the concrete will be compressed at the top and swelled out to a barrel-like shape, as in Fig. 47. The steel will also bend outward owing to the lateral thrust exerted by the concrete, and in consequence of the load imposed, for while the concrete cylinder does not bend like a column, the steel does so bend owing to the small diameter of the rods in proportion to their length. These rods give very little support to the concrete, and they do not to any appre-

* Proc. Am. Soc. C. E. Vol. xxix., March, 1903.

* "Le Génie Civil," 1902, Paris: "Beton & Eisen," Vienna.

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ciable extent help to restrain it from extending laterally. This is an extreme case, and the conditions are purposely exaggerated.

Now let us assume a cylinder of concrete armoured with welded steel hoops or rings, as in Fig. 48, which shows part of the cylinder. Here the concrete is prevented from bulging except between the hoops, and a certain amount of assistance is thereby given. In Fig. 49, the hoops are closer together, and there is a still further reduction in the amount of lateral swelling, with a proportionate increase of resistance. In Fig. 50 spiral coils are applied instead of detached hoops, and the effect is naturally more continuous throughout the length of the column.

These illustrations are purely diagrammic, and are merely intended to suggest in a general way the influence of reinforcement applied in the manner stated.

BOOKS RECEIVED.

Aids to the Mathematics of Hygiene. By R. Bruce Ferguson. Second edition. (Baillière, Tindal, and Cox. 2s. 6d.)

Geometry for Technical Students. By E. H. Sprague, A.M.Inst.C.E. (Crosby Lockwood and Son. 1s. 6d.)

Report on Prospects of British Trade in South Africa. By Henry Birchenough. (Eyre and Spottiswoode. 1s. 6d.)

Correspondence.

BRIGHTON HOSPITAL FOR WOMEN COMPETITION.

Sir,—As a competitor, I wish to call your attention to the extraordinary proceeding in connexion with the above competition. Shortly after the designs were sent in, an invitation was issued by the Committee inviting competitors and the general public to an "at home" to inspect the designs; but a few hours before that function the competitors received a notice informing them that they (the competitors) would not be allowed to attend.

The award was eventually made, and we have now received notice that we shall only be allowed to inspect the selected designs.

Was not this an extraordinary way of treating the competitors? Surely they, after spending so much time and money, should have been placed on the same footing as the general public. I really think the Committee ought to have given them an opportunity of inspecting the whole of the drawings, so that a full comparison might have been made, thus enabling them to benefit by any salient points that might have struck their notice in any one of the designs.

Competitor.

OBITUARY.

Mr. Hibbert.—We have to announce the death, on November 19, at his residence, Ashby Folville, Anerley, Surrey, of Mr. James Hibbert, aged seventy years. Mr. Hibbert was formerly in practice as an architect in Preston, Lancashire. He made the plans and designs for the Preston and County of Lancaster Royal Infirmary, near Deepdale-road, which was built in the Italian style in 1868-9, at a cost of 18,000*l*., and comprises a pavilion having two floors for seventy-six beds, and an infirmary with detached wards for thirty-two beds, for infectious cases, erected at the charges, 7,000*l*., of the late Mr. E. R. Harris. He was the architect also of the Harris Free Library and Museum in Lancaster-road, Preston, which was built in 1882-93, at a cost of 80,000*l*., provided by the Harris trustees, on a site, valued at 30,000*l*., given by the Corporation. The principal front, which is after the Ionic order, is 130 ft. long, and has a massive hexastyle portico with fluted columns; the figures in the tympanum, representing the School at Athens in the age of Pericles, were sculptured by Mr. Roscoe Mullins from a general design by Mr. Hibbert. The building, which forms one of the most important of its kind in the county, has an entrance-hall and staircase rising to the upper floor; the principal floor contains the reference and Shepherd libraries and a museum of casts, and copies from the antique; the upper floor was planned for the museum and art galleries, the Newsham collection of pictures and drawings of the British School that is valued at 40,000*l*., the lending and patents libraries, reading and newsrooms, and the models and fine art exhibits; the shelving in the libraries has a capacity for 90,000 volumes. Mr. Hibbert took a prominent part in the municipal affairs of the borough; he was an Alderman, a member of the Town Council, and had served as Mayor.

Mr. Martin.—We have also to announce the death, at Brighton, on November 24, of Mr. James Edward Martin, M.Inst.C.E., and late Secretary to the Government of Bengal, Public Works Department. Mr. Martin was elected an Associate of the Royal Institute of British Architects in 1874, and a Fellow in 1883. He prepared the plans and designs for the clock tower at Delhi.

GENERAL BUILDING NEWS.

Primitive Methodist Chapel, Scarborough.—The foundation-stones were laid recently of the Seamer-road Primitive Methodist Chapel. The new building, which is on a site immediately in front of the existing building, will be of red brick, with stone facings. The present chapel will become the schoolroom proper. The ground-floor of the chapel will accommodate 275 persons, and there will be two aisles, with pews on either side and in the middle. The gallery will accommodate 180 persons. The choir and organ are to be placed immediately behind the rostrum, and there will be accommodation for a choir of over fifty. The transepts and other seats will provide seating for sixty persons, thus making a total accommodation of 563. There will also be provided a minister's vestry, etc. The architect is Mr. J. Caleb Petch, whose plans were selected in competition, and the contractors are Messrs. Hunter and Smith (brick, masonry, and plastering), Mr. T. Wilcox (joinery), Mr. F. W. Rudeforth (slating), Mr. J. C. Gill (plumbing), Messrs. Appleby and Brogden (iron work), and Mr. James Carr (painting). The estimated cost of the whole building is 1,600*l*.

Congregational Church, Pontypool.—The foundation-stone of the new Mount Pleasant Congregational Church and Sunday Schools, Pontypool, which are to be erected at a cost of 6,000*l*., was laid recently. The new church will occupy a site facing the main road and overlooking Hanbury Park. It will be in the Early English style. The main window of the first elevation will be of stained glass. Accommodation will be afforded for 550 worshippers. The architects are Messrs. Swash and Bain, Newport, and the builders Messrs. Leadbeter Bros., Newport.

Congregational Church, Dover.—The foundation-stone has just been laid of the new church to be built by the Dover Congregationalists at a cost approaching 7,000*l*., at the foot of Priory-hill. The church is designed in a modified form of the Decorated Gothic. Accommodation is provided for a congregation of 647 persons. Kentish rag, with Corsham stone dressings, are used for the external walls. There are three classrooms at the back of the church, and lavatory accommodation is provided. Electric lighting will be used throughout. The heating arrangements are to be carried out on the hot air principle. There will be galleries on three sides of the church, which will be approached by two stone staircases from the vestibule. The contract for the building is 6,182*l*., including the boundary walls and railings. Messrs. R. and G. Brisley are the builders, and the work is being carried out from the designs and under the superintendence of the architects, Messrs. Cresswell and Newman and Mr. W. Beeston as joint architects.

Church, West Jesmond.—The foundation-stone of the new church in West Jesmond, Newcastle, dedicated to St. Hilda, has just been laid. Mr. Charlewood is the architect for the new church, and Mr. Hepple the builder.

Restoration of Toynton All Saints' Church, Lincolnshire.—The Church of Toynton All Saints, in the deanery of Bolingbroke, Lincs., which is now under repair and restoration, has been found to contain a thirteenth-century arcade in the south wall and a Norman arcade in the north wall. These were not discovered till the plaster was removed. The north arcade, which is much damaged by fire, is in a weak state, and needs underpinning, but the Bishop, the Rural Dean, and the Rector are of opinion that it would be a great pity that the arcades should be built up again for lack of funds. To display them will add 250*l*. to the cost of the restoration. The architect is Mr. Harold Bailey, of Newark-on-Trent. It may be added that the south arcade, which is of the Decorated style, consists of four bays. There are two limestone pillars, octagonal in shape, but standing on square bases. Three of the arches are quite perfect, but one has at some time been cut away, to make room for a window to give light to the west gallery. The Norman arcade, which is probably two centuries older, has five bays, of about 9 ft. each. The pillars are round, with carved capitals. The two arches which have so far been cleared show traces of the Norman custom of coating sandstone with plaster, and then painting the plaster. When the arches were built up in the fourteenth or fifteenth century the brickwork was plastered and the plaster adorned with ornamental lettering.—*Times.*

Llandovery College, Wales.—The new buildings of Llandovery College have just been opened. The buildings are of blue stone from Swansea and red sandstone from Cylrychen, near Llandebie, with dressings of Staffordshire brick. The buildings contain a tiled kitchen and servants' offices, a dairy, bread store, hot and cold meat larders, and a bakery. On the ground floor are a couple of new classrooms. The new scheme also provides for the transformation of the old dining-hall into two more classrooms. Occupying a good half of the ground space on the ground floor is the new dining-hall, which measures 71 ft. by 28 ft., or 8 ft. longer than the present school-hall, and is lighted by two windows in the Tudor style, with ten lights to each; two other large windows with six lights, and a centre window with two lights. On the first floor are four studies—each for four boys—and further along the corridor are five baths, with concrete flooring. In the lavatories lockers are constructed. There are several new dormitories. Each room contains from eight to ten beds. In the corridors are lockers for the boys' clothes and suits, and leading off the passages are a sick-room, matron's-rooms, and an airing-room. Various alterations have been made to the old buildings. The architects were Messrs. Paley and Austin, of Lancaster, and the builder Mr. G. Mercer, Llanelly.

Building Scheme, Stechford, Worcestershire.—In the near future effect is to be given to a big building scheme at Stechford. An estate of fifty-two acres has been acquired, and a newly-formed company, with a capital of 20,000*l*., is to exploit the area for the building of house property. On the one side the estate extends along the railway towards Marston Green as far as the lane leading over to the Lea Hall Tavern. Diagonally a line cutting through the middle would stretch from the vicinity of the Bull's Head at Stechford to within forty or fifty yards of the Yardley Arms Hotel. It is stated that there is accommodation for between nine hundred and a thousand houses. A few of these on the lower or north side of the railway will probably be let at 7s. 6d. or 8s. per week, but in the case of those across the line the rental will be 9s. or 10s. Each house will have a bath, and the company is to plant the gardens with a number of fruit trees, and in other ways—by means chiefly of horticultural prizes—induce the tenants to take an interest in their gardens. The streets are also to be lined with avenues of trees, and there will be two miles of roads. To avoid the monotony of style so common to suburban Birmingham, it will be stipulated that not more than four houses shall be exactly alike. —*Birmingham Post.*

Restoration of Tideswell Church, Derbyshire.—At a meeting of Tideswell Church officials it was decided to proceed with the work of restoration. Mr. Oldrid Scott, architect, of London, has been engaged, and will shortly prepare detailed plans, and a faculty for the removal of the gallery will then be obtained. The south doors of the church are in a dilapidated condition, and some unknown parishioner has offered to place new ones of design prepared by Mr. Scott. The west end of the tower has been pointed, and one or two missing stones replaced. The heating of the church has just been improved by Messrs. Newton, Chambers, and Company, of Sheffield; new silver Communion vessels have been given by the Vicar and Mrs. Fletcher; and many improvements have been effected in and around the building.

Building Developments in New Leeds.—Whilst there is talk of extending the city of Leeds beyond its present borders, it is interesting to note the signs of growth and expansion within the existing area. One of the most notable of these developments is that now in progress on the west side of Chapeltown-road, on what was known for years as the Earl of Mexborough's estate. The last eight or nine months have been occupied in levelling and laying out, and in constructing roads. The work has now been nearly finished, and the first block of houses is in course of construction. Over five thousand lineal yards of new streets are in course of construction, some 36 ft., and some 42 ft. wide. One of these thoroughfares, to be known as Savile Mount, will be practically a continuation of Leopold-street into Buslingthorpe-lane. Another street will, it is expected, before very long be carried right through the estate into Meanwood-road, emerging not far from the Destructor. Hall-lane, at the top of Reginald-terrace, is to be continued to Buslingthorpe-lane, at a width of 42 ft., and that, no doubt, will to some little extent relieve Chapeltown-road of heavy traffic. Only one or two of the building plots facing Chapeltown-road have yet been disposed of. One of the collateral advantages of the Mexborough estate

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coming into the market is that the Leeds Corporation are enabled to contemplate a much-needed widening of Chapeltown-road. A strip of about four yards has in anticipation been thrown into the footpath for the entire length of the estate.—*Yorkshire Post.*

CONGREGATIONAL CHURCH, CAERPHILLY.—The foundation-stones of the new Congregational Church have just been laid at Caerphilly. The new edifice is being erected upon a corner site in Van-road, adjoining the present chapel. Mr. W. Beddoe Rees, of Cardiff, is the architect. On the lower floor are arranged the church parlour, two vestries, four class-rooms, kitchen, lavatories, etc. The chapel is on the floor above, and will accommodate 500 without galleries. The building is being built with local stone, with blue Newbridge stone facing, and Doulton stone dressings. The woodwork throughout is of selected pitch-pine. The total cost will be about 3,000*l.* The work is being carried out by Mr. J. Howells, builder, Caerphilly, under the supervision of the architect.

OFFICES FOR THE EYRE ESTATE, ST. JOHN'S WOOD.—New offices for the trustees of the Eyre Estate, have been erected on the site of No. 125, Park-road, St. John's Wood. The plans and designs were made by the late Mr. Eley White, and have been carried out under the directions and superintendence of Mr. H. O. Cresswell.

WESLEYAN SUNDAY SCHOOL, LONG EATON.—On the 24th ult. the new Wesleyan schools at Derby-road, Long Eaton, were opened. The schools adjoin the school chapel, off College-street, and form part of a scheme for a new church with a school, costing 10,000*l.* Messrs. Brewill and Bailey, of Nottingham, are the architects, and Messrs. Vickers and Son, Nottingham, the builders. The building comprises ten classrooms, two large enough for 100 scholars each, and may be used as a meeting-room. The heating arrangements are by Messrs. Danks and Co.

THEATRE ROYAL, BIRMINGHAM.—The new Theatre Royal, Birmingham, is to be erected from the designs of Mr. E. Runtz, of Messrs. Runtz and Ford. The main entrance will face New-street, but inside the structure varies from the old Theatre Royal in that the stage, instead of abutting upon Colonnade-passage, will adjoin Stephenson-street. The chief entrance will be situate at the Colonnade end of the frontage. The latter is nearly 82 ft., and the remainder will be devoted to four shops. The gallery will be approached from a private twenty-feet way leading from Stephenson-street, and there are to be two exits on the opposite side of the building leading into Colonnade-passage, while access will be gained by means of three staircases. The entrance to the upper circle and pit will also be in Colonnade-passage, and exits for occupants of the dress circle and stalls are to be provided on that site. The principal entrance is provided with a large crush room some 22 ft. by 19 ft., from which stairways lead on the right to the dress circle and on the left to the stalls. Altogether the exits will number twelve. The box-office is to be placed on the right-hand side of the main entrance. The area of the house is to be divided into stalls, pit stalls, and pit, with refreshment rooms for both departments. Behind the dress circle is to be a foyer saloon, with raised alcove or recess. In the gallery there will also be a large saloon, with the usual lavatory accommodation. The approximate seating accommodation is as follows:—Stalls, 230; pit stalls and pit, 520; dress circle, 350; upper circle, 440; boxes (of which there are to be twelve—three on either side of the stalls level, and three on either side of the dress circle level), 48; and gallery, 672; making a total of 2,260. The proscenium opening is to be 34 ft., and the stage itself 73 ft. wide, with a total depth of 48 ft. The building will comprise five stories, and will be built of red brick or terra-cotta and stone. Surmounting the erection is to be a group of statuary.—*Birmingham Mail.*

NEW TOWN HALL FOR LAMBETH.—On Thursday of last week the Town Clerk of Lambeth reported to the Borough Council that the occupiers of all the houses on the site acquired at the corner of Brixton-hill and Acre-lane for a new Town Hall would give up possession at Christmas or within a fortnight after. The only interest outstanding was the freehold interest in a strip of land facing Brixton-hill, and notices for the acquisition of this under the order had been served. It was estimated that the total cost of the site would be 25,425*l.*

CO-OPERATIVE STORES, BIRTLEY, DURHAM.—New central premises have been erected on the Durham-road, Birtley, by the Birtley District Co-operative Society. The building contains on the ground floor rooms for the carrying on of the grocery and provision business, drapery, butchering, cafe, furnishing, boots and shoes, millinery, greengrocery, jewellery, etc., with all the necessary warehouses at the back. The second story contains rooms for the tailoring, halls to seat 800 and 300 respectively, newsrooms, billiard rooms, board rooms, and the various offices for the general staff. The building, when finally completed, will have cost about 25,000*l.* The architects are Messrs. Liddle and Brown, Newcastle, whilst the building itself has been erected by the society's own staff, under Mr. Jobling.

ST. MARK'S, BROADWATER DOWN, TUNBRIDGE WELLS.—This church, designed in the sixties by the late R. L. Roumieu, has recently had added to it a choir vestry, harmonising with the architecture of the original structure. Opportunity has also been taken to improve the choir seating, position of prayer-desk, and lectern, and to substitute marble steps into the chancel for the Portland stone ones. A baptistry has been built at the west end of the church, into which the font has been moved, and stained-glass windows by Messrs. Clayton and Bell fill the lights. The whole of the additions and alterations have been carried out by Mr. Harry Mansfield (Messrs. George Mansfield and Son) of Tunbridge Wells, whose father built the church. The architects are Messrs. Roumieu and Aitchison, of London,

CHURCH, WEALDSTONE, MIDDLESEX.—Two more bays of the nave and aisles of Holy Trinity Church were consecrated on the 24th ult., which now completes the original plan, with the exception of the spire. The concrete foundations for the whole edifice had been put in at the time the building was started, but, one of the societies which gave a grant stipulated that the west wall should be a temporary one, so that the church could be hereafter lengthened to meet the requirements of a rapidly growing district. The style is Early English; the exterior is of Kentish rag with Bath stone dressings and windows; the latter both in aisles and clearstory having a narrow band of red brick in the external arches. The roof is of green slates. The architects are Messrs. Roumieu and Aitchison, of London; and Messrs. Webster and Cannon, of Aylesbury, are the contractors.

CHURCH, MARSDEN COLLIERY.—The new Church of St. Andrew at Marsden Colliery, near South Shields, was opened recently. The new place of worship is a stone structure, erected from plans prepared by Messrs. J. Potts and Son, architects, Sunderland; Messrs, W. D. Allison and Son, Whitburn, being the contractors. There is sitting accommodation in the nave for 200 persons. The outer walls are of Marsden limestone, with freestone dressings, and the internal fittings and seats are of pitch pine.

ALL SAINTS' CHURCH, WIGSTON MAGNA.—This church has been opened recently after undergoing alterations and repairs. The organ has been renovated and restored, and a new organ chamber has been built. The chancel floor has been raised four steps, and repaved with Portland stone and Dumfries stone squares in the choir, and Portland stone and marble squares in the sanctuary. Under the stalls the flooring is of wood blocks. The new stalls for priests and choir are in wainscot oak, and comprise traceried fronts, with monogram of the donor, and carved poppy heads. There is a new altar rail, also in oak, and reredos, of which the upper panels are linen moulded, and the carved centre frame filled with a stamped velvet dossal, having gold applique work. The sedilia is fitted with cushions and hangings; there is also a new stove, with copper screen. The old priests' door in the chancel has been preserved and repaired. The chancel is lighted with hammered wrought iron brackets and incandescent gas lamps. The architect for the whole was Mr. H. T. Goddard, of Leicester.

BANK, BELFAST.—New premises are about to be erected in Belfast for the Provincial Banking Company. The plans have been prepared by Messrs. Carroll and Batchelor, architects, Dublin. Messrs. M'Loughlin and Harvey, of Belfast and Dublin are the contractors.

NEW BANK, MANCHESTER.—The new head offices of Parr's Bank, in Spring-gardens and York-street, Manchester, are to be opened on Saturday, the 15th inst. The building has been designed and completed in all its branches by Manchester firms. The exterior of the building, which is designed in a modern Renaissance style, is of red Carlisle stone, the roof being of green slates and the dome surmounting the tower of copper. The bank occupies the whole of the ground floor and basement. The latter floor is practically in two portions, one portion being given up to the various strong rooms, the other half to the various rooms usually assigned to the clerking staff of a large bank. On the groun floor the whole of the interior is lined with marble, and the woodwork is of dark stained mahogany. A feature of the banking chamber is the saloon roof over the clerks' portion. This roof is treated with enriched fibrous plaster work and leaded glazing. The large windows of the bank are framed in bronze. The whole of the upper floors, three in number, are divided up into offices for letting. The Plenum system of ventilation has been adopted throughout the building. The contractors are Messrs. Neill and Sons, Manchester, and the architects, Messrs. Chas. Heathcote and Sons, also of Manchester.

SANITARY AND ENGINEERING NEWS.

PENN AND PENN FIELDS SEWERAGE.—At a meeting of the Seisdon Rural District Council recently, the tender of Mr. Herbert Holloway, of Wolverhampton, amounting to 11,970*l.*, was accepted for the carrying out of this sewerage scheme, in accordance with the plans and specifications prepared by Mr. R. E. W. Berrington, M.Inst.C.E.

WORCESTER SEWAGE DISPOSAL.—A further stage has been reached in the matter of the purification of the sewage of Worcester. It will be remembered that pressure has been put upon the Worcester authorities to take some definite step with regard to the purification of the sewage of the city, and accordingly a deputation from the Council in June of this year made a comprehensive examination of various well known methods of sewage treatment, visiting amongst other places Exeter, Uxbridge, and Redhill, with the result that their report was in favour of the Oxidation Sprinkler Bed methods in operation at the two last-named places. Mr. T. Caink, A.M.Inst.C.E., the City Engineer, in accordance with his Council's instructions, has recently prepared a scheme upon the lines of the methods employed by the Redhill Corporation and the Uxbridge Council, and the Local Government Board having given their sanction, it is now proposed to carry out the scheme, which includes disintegrating tanks with Bacterial Oxidation Beds, on which the sewage will be distributed by means of Candy-Caink Revolving Sprinklers, and a tender has been accepted by the Council for the first portion of the purification works, the amount of the tender for the disintegration tanks being 7,404*l.*

STAINED GLASS AND DECORATION.

STAINED GLASS WINDOW, BISHOPTON CHURCH, NEAR STOCKTON.—A new stained glass window has been placed in St. Peter's Church, Bishopton, near Stockton. The new window consists of two bays, in both of which the figure of Christ is shown. Messrs. Wailes and Strang, Newcastle-on-Tyne, carried out the work.

WINDOW, WELLS CATHEDRAL.—A new window has just been unveiled in the north transept of Wells Cathedral, in memory of Somerset men who fell in the War in South Africa. The general subject of the window may be described as "Kings and warriors in the making of England, centring in Alfred the Great." The work has been designed and carried out by Messrs. James Powell and Sons, London.

SELWYN COLLEGE, CAMBRIDGE.—In continuation of a scheme which is being gradually accomplished, a window has been inserted in the college chapel, and dedicated to the memory Arthur Temple Lyttelton, late Bishop of Southampton, who was the first Master of Selwyn College. The window was designed, as well as the others in the chapel, by Mr. C. E. Kempe; it contains figures of St. Luke, and Auskar, and Boniface.

ST. SAVIOUR'S, SOUTHWARK.—A new window, representing St. Augustine, Bishop of Hippo, and designed by Mr. C. E. Kempe, has been inserted in the north aisle at a cost of about 80*l.*, subscribed by friends of the late Mr. James Frederick Field, Assistant-Treasurer of the Collegiate Church and Member of the Chapter. The corresponding window in the south aisle, representing St. Swithin, was given by Mr. Field, in memory of his father.

MEMORIAL WINDOWS, HAMSTERLEY.—Two memorial windows to the late Viscount Gort have been erected in Christ Church, Hamsterley. The east window represents the Ascension, the west one St. John the Evangelist and St. John the Baptist. The work has been executed by Mr. G. J. Bagaley, Newcastle-on-Tyne.

FOREIGN.

FRANCE.—It is proposed to erect a statue to Cervantes near the Avenue Marigny, on the Champs Elysées, Paris.——A colossal statue of Corneille is to be erected, next year, on an elevation in the outskirts of Rouen. The sculptor is M. José de Charmoy, and the statue will be grouped with two other figures representing two of the heroines in Corneille's dramas, Chimène and Camille.——A competition has been opened, for Architects of the Department of the Loire and the adjoining Departments, for a new savings' bank at Montbrison.——A new museum is to be built at Albi.——The architectural models of the Parthenon, the temple of Pæstum, the Coliseum, etc., now in the Ecole des Beaux-Arts at Paris, are to be transferred shortly to the Museum of St. Germain.——M. Chédanne, the well-known architect, has been promoted to be "Officier" of the Légion d'Honneur.——The

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jury of the Ecole des Beaux-Arts for the competition in decorative composition, has awarded the first medal to M. Cayou, a pupil of M. Deglane.——M. Emile Bertone, author of some valuable studies on the ruins of Palmyra, has been appointed architect to the Société de Géographie, in succession to the late M. Leudière.——M. Guadet, architect to the Palais Royal, has presented to the Musée des Arts Decoratifs the fine wood-carvings and columns once belonging to the apartments of the Regent, and executed in the eighteenth century after the designs by Oppenordt.——The jury in the competition for the new building for the Chamber of Commerce at Limoges, have awarded the first premium to M. Planckaert, of Limoges.——A Lycée for girls is to be built at Valenciennes, at a cost of 800,000 francs.

United States.—The project for a wide street from Copley-square, in Boston, to the Broadway-bridge, has been revived. Copley-square is becoming every day a more important centre of traffic, and, while it has five long streets diverging from it to the north, west and south, it has toward the east only one. It is expected that the cost of the land taken for this improvement will soon be repaid by the improvement of the property on both sides, which has been lying idle for several years.——The City of Buffalo has just entered upon the establishment of an architectural bureau in the Department of Public Works, where plans are to be made for the various buildings required by the city.——An organisation of employers has been recently formed at a conference in Chicago, to be known as the Citizens' Industrial Association of America. Its purpose is to "assist by all lawful and practical means the properly constituted authorities of State and nation in maintaining and defending the supremacy of the law, and the rights of the citizen"; as well as to "encourage harmonious relations between employers and employed."——The new licence law for architects in New Jersey has already given occasion for several controversies. In one case, an elderly member of the profession, who had long ago retired from active practice, was brought before a court, charged with practising without a licence, on account of some trivial professional service which he had rendered, and was only released on promising not to offend further. Recently, the two members of the firm of Benner and Son, of Bradley-beach, were summoned into court, to answer to the same charge. It is reported that they propose to resist the operation of the law.

Germany.—A new Museum in connection with the Art Schools has been built at Flensburg in Schleswig Holstein. The architects, K. Mühlke and F. v. Gerlach, have succeeded in forming a group of buildings which are worthy of their position on the high ground overlooking the town, and which recall the characteristics of the Mediæval North-German Architecture.——In Cologne a new theatre has been completed; the architect is Herr Karl Moritz. Special care has been given to the heating, lighting, and ventilation of the building. ——A book has been published in Leipzig entitled, "Country Churches. Designed and executed by the Architects Schilling and Graebner" (Landkirchen, Entworfen und ausgeführt von den Architekten Schilling und Graebner.) In this the architects have shown that they have endeavoured to design churches for country towns that, whilst answering all requirements, are not out of keeping with their surroundings, and that tend to raise the artistic taste of the people.——In Berlin, the new Government Buildings in Wilhelmstrasse have been completed. The architect is Herr Kieschke. ——An International Congress will be held at Nüremberg in April, 1904, to discuss the question of hygiene in schools. The Chairman of the German Committee is Professor Griesbach, and the General Secretary of the Congress is Dr. Paul Schubert.——The restoration of the Castle at Mannheim is now completed. The work has been in progress for seven years, and has cost 1,250,000 marks.——The new museum at Augsburg is to be carried out according to the plans of Herr Walter Krauss, and will be in the same style as the museum at Stuttgart.

Austria.—The architect Camillo Sitte, the Director of the Technical Schools at Vienna, died on November 16, in his sixtieth year. Sitte is most widely known by his work on "The Building of Towns on an Artistic Basis" (Der Städtebau nach künstlerischen Grundsätzen) which has been translated into French and English.——An important building for the shelter of the homeless has been opened in Vienna. The architect is Herr Fleischer.

Switzerland.—As the new bridge across the Rhine, which is in process of construction at Basel, is to be on the site of the old one, a temporary bridge is to be built in order to relieve the traffic. Messrs. A. Buss and Co. and P. Holzmann and Co. have been entrusted with the construction of both bridges.

MISCELLANEOUS.

Advertisement for "Architect's Managing Assistant."—An advertisement for the above appeared in our issue of the 21st ult., replies to be sent to "Architect," to an address in Chancery-lane, the real object of which, we regret to find, was not what appeared on the surface, and was what we strongly disapprove of. One or two readers who responded to it have sent us the reply they received, and we need hardly say that, had the publisher suspected the real object of the advertisement in question, it would not have been inserted.

Scarborough Master Builders' Association.—The annual meeting of the Scarborough Master Builders' Association was held on the 21st ult., the President (Mr. A. W. Sinclair) occupying the chair. The following officers were elected:—President, Mr. A. W. Sinclair; vice-president, Mr. R. H. Carr; hon. secretary, Mr. Fred Hardgrave; auditor, Mr. W. Malton. Representatives were also elected to attend on behalf of the Association at the half-yearly meetings of the National Association of Master Builders of Great Britain and Ireland, and the Yorkshire Federation of Building Trade Employers. After seven years' greatly appreciated work as hon. secretary, Mr. R. H. Carr resigned, and was heartily thanked for his services, being also elected vice-president of the Association.

Non-Flammable Wood.—The Non-Flammable Wood and Fabrics Co. send us a specimen slab of wood treated by their method, which has been impregnated throughout its substance with fire-resisting ingredients. We have tested it in flame, and it will not burn, but only chars. We may add a few rules from the circular sent with the specimen as to the process. It consists, as regards wood, in submitting the latter to a series of operations consisting of, first, a vucuum treatment by which the pores are opened and partially cleansed; second, a treatment of saturation with a fire-proofing solution throughout the various pores and tissues; and, third, the evaporation of the water of the solution from the wood, the whole resulting in rendering the wood incapable of spreading flame, causing it instead, when subjected to fire, to merely carbonise slowly at the point of contact with the flame. The woods that lend themselves best to successful treatment are ash, beech, birch, chestnut, deals, elm, firs, mahogany, pines, walnut, whitewood. Oak and teak are more difficult to treat, and require a special process. The time for treatment varies according to the description and thickness of the wood to be treated, and occupies, including drying (from twenty to forty days, but the company keep large quantities of stock timber on supply. The comparative cost of non-flammable wood varies from 1-7th to ¼ in. in excess of the cost of untreated wood, according to the class of work and thickness of wood treated.

The Sanitary Institute.—At an examination in practical sanitary science, held in Manchester on November 20 and 21, four candidates presented themselves, and the following two candidates were granted certificates:—T. B. Hetherington (Carlisle); G. Bottomley (Lindley, Huddersfield).

Newnes' Technological and Scientific Dictionary.—Messrs. Newnes ask us to express their apology to our readers for their delay in the issue of the first part of their Technological Dictionary. Owing to the numerous references and verifications which had to be made, the publishers are compelled to delay the publication of the first number until January. Readers of our advertising columns will have seen their advertisement; but, for the benefit of those who have not done so, Messrs. Newnes will be pleased to send a complete prospectus on application.

St. George's Chapel, Albemarle-street, W.—This proprietary chapel has recently been closed, the trustees having sold the building for business purposes. The chapel, of which the late Rev. Dr. Ker Gray was the last incumbent, was originally built in 1810, and contained 1,200 sittings. The interior was modernised and redecorated at a considerable outlay some while ago. The organ, having two manuals and 22 stops, was built by J. C. Bishop.

Church of St. Columba, Haggerston.—In response to the petition of the vicar and churchwardens, the Chancellor of the Diocese of London has agreed to issue a faculty authorising the building of a mortuary chapel adjacent to the north wall of the church and upon some land which belongs to the church. The petitioners represented that the small parish has a population exceeding 7,000 persons, mainly of the poorer class, and that for sanitary reasons the provision of some such resting-place apart from their own crowded homes was greatly needed. St. Columba's Church, in Kingsland-road, was built in 1868-9, after plans and designs by the late James Brooks. It is cruciform on plan, and forms a typical example of that architect's work.

Railway Sleeping Accommodation.—The English railway companies have done wisely in at once reassuring the public on the subject of the cleanliness of the sleeping-car accommodation after the alarmist reports circulated by the *Lancet* in connexion with the treatment of the bedding and blankets in the United States on some of the railways there. Seeing the immense convenience to passengers of sleeping accommodation on long journeys, it would have been regrettable had inattention to such necessary details prevented the public from availing themselves of its advantages; but, as it is, public attention having been drawn to the subject can only tend to insure greater attention being given to the question of bedding, not only by the railway companies, but also in hotels.

Belgian Exports.—In his report on the commeree of Belgium for the year 1902, Mr. Hertslet, the British Consul-General, mentions that in the cement industry, the export trade did not show much sign of improvement as regards value, but in the matter of quantity it continued to grow, and showed an increase of 10 per cent. as compared with that of 1901. In this department, the enormous demand from the United States, amounting to 116,661 tons, as compared with 67,633 tons in 1901, and increased demands from Cape Colony (9,862 tons) and Canada (24,173 tons), played the chief part. 3,383 tons were sent to Australia, 6,085 tons to British India, and 1,943 tons to the Straits Settlements. The glass exports were well sustained, and, surpassing in value those of 1901, regained the high position they held in 1899. This increase was chiefly due to large orders from China, Japan, Canada, the United States, and Turkey. The iron and steel industries suffered, not only from local over-production, but from that in the neighbouring countries. A market, however, was found for a large quantity in the United States. The exports of iron and steel included 138,678 tons to the United Kingdom, 10,843 tons to Australia, 3,160 tons to Canada, 8,358 tons to Cape Colony, 65,633 tons to British India, and 5,697 tons to the Straits Settlements. The United Kingdom also took from Belgium 4,435 tons of lead, 121,585 tons of stone (of which 4,416 tons was worked, polished, or sculptured), 32,242 tons of timber, and 42,294 tons of zinc.

The Central Tower of Rochester Cathedral.—Mr. C. Hodgson Fowler has been appointed as architect for the re-building of the central tower of Rochester Cathedral. A donation of 5,000*l*., lately given to the Dean and Chapter by Mr. T. H. Foord, a native of Rochester, will be applied towards the new works. The present tower, with its battlements and angle-pinnacles, is depicted in the late Mr. Brewer's drawing, published in our columns of October 3, 1891. The tower was recased, and raised as we now see it, during the repairs that were begun in 1826 under the directions and superintendence of Cottingham, who pulled down the spire. In 1871 Sir G. Gilbert Scott began his reparation of so much of the fabric as extends eastwards from the nave, which portion had formed the church of the Benedictine monks, established there by Gundulph. The nave, partly built by Gundulph, had been the parish church of St. Nicholas. After the fire of 1179, and before the close of the twelfth century, the reconstruction of the crossing and transepts and the rebuilding of a central tower were commenced, but that work was shortly afterwards relinquished. Before the end, however, of the thirteenth century, the rebuilding of the south transept and the raising of the central tower clear above the roofs were accomplished, the two eastern piers of the tower, with the arch above them, having been built during the time of the Priors Ralph de Ros and his successor Helias, and the two western piers reconstructed somewhat later. Then, in or about the year 1343, Bishop Hamo de Hythe raised the tower, and added to it a spire constructed of wood, and during the middle of the eighteenth century Hamo's portion of the tower was rebuilt. We understand that Mr. Fowler's designs comprise a new spire to be constructed of oak and covered with lead.

The Art of Architecture.—The third of a series of lectures on architecture by Professor Beresford Pite, was given at the Technical Schools, Leicester, on the 27th ult. The lecturer first dealt with materials in relation to design of details. There must, he said, be an essential sympathy between the designer and the materials employed, whether it was in the representation of architectural form or natural form. A building designed in intelligent sympathy with the materials employed had a style of its own. The brick building differed in constructive nature as well as in appearance from the stone building, and it was necessary to realise the importance of these distinctions. Although it might be rank heresy to say it there was no real reason why a building should not look at its best when it was smart and new. A new building with new materials would become

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beautiful when there was sympathy between design and material. In the past they had been so completely chained down by their rose-coloured views of antiquity that unless their buildings were old they did not see beauty in them. With sympathy between design and material a new building could be beautiful, even though untouched by the heavy hand of time. The lecturer afterwards discussed treatment of details in English Renaissance domestic buildings, including panellings and stone mouldings. A criticism of students' work followed.—*Leicester Post.*

PATENT OFFICE.—An open competitive examination for not fewer than twenty-four situations as assistant examiner in the Patent Office will be held by the Civil Service Commissioners in January next. The examination will commence on the 5th of the month, and forms of application for admission to it will probably be ready for issue in the course of a few days; they will be obtainable on request addressed by letter to the Secretary, Civil Service Commission, Burlington-gardens, London.

THE INTERNATIONAL SOCIETY OF SCULPTORS, PAINTERS, AND GRAVERS.—At a Council meeting of this Society held on December 2, Monsieur Rodin was elected President, in succession to the late Mr. Whistler.

THE DORE GALLERY.—This gallery has passed into the management of Mr. H. E. Nicholls, the former Secretary of the Continental Gallery in Bond-street. It is intended that it should be utilised for a more varied series of exhibitions, including what it is the fashion to call "one man exhibitions." The gallery has for many years appealed only to the popular taste of the artistically uneducated section of the public; it is to be hoped that it may now represent a better class of exhibitions.

ELECTRIC SUPPLY, LIVERPOOL.—Mr. A. B. Holmes, Consulting Electrical Engineer to the Liverpool City Council, has prepared a Report on the Corporation electric supply stations and plant, which has just been circulated amongst the members of the Council. Mr. Holmes points out that the demand for electrical energy for power and lighting continues steadily to increase, and it is estimated that the output of the supply stations for 1903 will exceed that of the previous year by the following percentages: Lighting, 20 per cent.; power 60 per cent.; and tramways, 5 per cent. The connexions to the supply mains for lighting and power (exclusive of tramways) at the commencement of the current year were equivalent to 221,000 c.p. incandescent lamps; and it would be necessary for the Electric Supply Committee to consider what extensions would be required to meet the demand for electrical energy which might be anticipated in 1904 and 1905. No more steam plant could be installed in the existing power stations in the central districts, and no suitable site was obtainable in these districts for another large steam station, by means of which the simplicity and economy of the generation of energy at the pressure of distribution to the consumer could be secured. It was consequently necessary to bring in an additional supply at high pressure from Lister-drive. Mr. Holmes presents a plan for coping with the emergency, and explains that if his proposals are approved the extensions for 1904 will be as follows:—(1) At Fairclough-lane, an addition to the building and 2,000 kilowatts transforming power; (2) at Oldham-place, an addition to the building and 2,000 k.w. transforming plant; (3) at Rice-lane, the construction of a sub-station to contain transforming plant of 800 k.w.; (4) at Cobbs Quarry, 800 k.w. transforming plant; (5) at Smithdown-road, 000 k.w. transforming plant.

LEGAL.

ALLEGED BREACH OF A BUILDING SCHEME.

MR. JUSTICE KEKEWICH in the Chancery Division last week concluded the hearing of the case of Dixon *v.* Thompson, an action by the plaintiff to recover from the defendant damages laid at 10,000*l.* for alleged breach of a building scheme or agreement that no business, trade, or manufacture should be carried on upon land at Sevenoaks, now or lately belonging to the defendant, and that nothing should be done which would be a nuisance and disturb any adjoining owner. Plaintiff also claimed damages for breach of an agreement by defendant not to sell any land to the South-Eastern and Chatham Railway Company, and for injury sustained owing to nuisance by noise by the railway company.

Mr. Astbury, K.C., and Mr. Methold appeared for the plaintiff; and Mr. Warmington, K.C., and Mr. Atkin for the defendant.

The plaintiff's case was that in 1885 he purchased from the defendant about eight acres of land and a house situate in the Hippington Park Estate, Sevenoaks, giving 10,750*l.* for it. His house was named "Edenhurst." The plaintiff alleged that the defendant formed a building scheme by which the estate was to be developed for high-class private residences only, with the usual stabling and out-buildings, and no business, trade, or manufacture was to be carried on, and nothing done to be a nuisance or annoyance to adjoining owners. The plaintiff afterwards purchased an additional eight acres of land, paying 500*l.* per acre, and there was a covenant that the land should be used only for the erection of private residences. The plaintiff's case was that he purchased on the faith of the building scheme; but the defendant in 1901 voluntarily sold to the Railway Company a piece of land adjoining the plaintiff's for the purpose of its being used as a quarry, and the Railway Company commenced quarrying in 1902, causing a nuisance or annoyance to the plaintiff.

The defendant by his defence denied that he formed any building scheme or offered for sale any portion of the estate subject to a building scheme, or that the piece of land sold formed part of the residential property. Defendant denied that the plaintiff purchased under any restrictive covenant or upon a building scheme. He also denied that the plaintiff had suffered any damage, or that he (defendant) had committed any breach.

Mr. Astbury, in opening the plaintiff's case, said the question was whether the plaintiff had been led to believe that there was a building scheme, and if he proved that he was, then, he submitted, he was entitled to succeed.

Plaintiff was then called, and in the course of his evidence said that after the purchase of "Edenhurst" he spent some 3,000*l.* or 4,000*l.* in improving it. At the time of his purchase the nature of the surrounding property was exclusively residential. In 1885 defendant approached him with a view to his adding to his land. Defendant told him that he was only selling the land for private residences, and he would require purchasers to enter into covenants to that effect to protect the rest of the property. Plaintiff agreed to enter into these covenants, and then selected about eight acres of additional land adjoining his property, which he purchased at 500*l.* per acre. He never would have bought if he had known that there was to be a quarry where it now was. He had seen no document which he could regard as a building scheme of the estate.

Mr. W. R. Crouch, F.S.I., Sevenoaks, gave evidence that, in his opinion the quarry was a nuisance and annoyance to residents on the estate.

Mr. Warmington, for the defendant, submitted that plaintiff had made out no case either for the building scheme or representations. It was clear that there had been no breach of any covenant.

Mr. Astbury: Yes, of an implied covenant.

Mr. Warmington said that the plaintiff purchased under a form of agreement approved by his solicitors. There was no fraudulent representation. The deed itself was dead against any such scheme.

Mr. Sidney Thompson, a solicitor, and son of the defendant, said that he submitted to the plaintiff's solicitor the draft agreement, and there was nothing to show any building scheme in connexion with the estate.

The defendant, whose evidence was taken on commission, deposed that no building scheme existed so far as his recollection went.

In the result his lordship, in giving judgment, said there was no doubt in his mind that no such scheme as was stated in the statement of claim existed, and there was no trace to be found of one in any of the documents. He thought that on all grounds the plaintiff's action failed, and must be dismissed with costs.

CAPITAL AND LABOUR.

BUILDING TRADE DISPUTE, ST. HELENS.—In consequence of a depression in the building trade and the bad weather, the employers of St. Helens have decided that the bricklayers and joiners in their employ shall start work at 8.30 each morning instead of seven o'clock. The employees of one of the firms in the town struck work on the 30th ult. The employers have very little work, and, owing to the new arrangements at the Town Hall that the plans of new buildings have to be submitted to the Highway Committee as well as the Health Committee, it is stated that inconvenience and delay are suffered, and the work of the employers is consequently interfered with. If the plans sent into the Health Committee are disapproved on the smallest technical objection it means a delay of five or six weeks before the plans can be rectified and passed before the two committees concerned. This the masters consider an unnecessary infliction upon them.—*Liverpool Post.*

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

21,480 of 1902.—G. H. ALEXANDER: *Kilns or Ovens, for Burning Cement, Plaster or Lime.*

A continuous working force draught kiln for burning cement and the like, arranged for the discharge of the burnt material clear of or away from the attendant.

24,023 of 1902.—J. C. MCCHENAHAN: *Process for the Manufacture of Stone.*

A process of making stone, which consists in saturating granulated moulding material with a hardening chemical solution, and then pouring a liquid stone composition on to the saturated moulding material, and leaving the stone composition to set and take up a facing or coating of the moulding material while absorbing the chemical solution and thus becoming hardened.

27,107 of 1902.—P. J. KOCH: *Device for Simultaneously Opening the other Wing of a Door if one Wing is Opened.*

A device for simultaneously opening or closing the other wing of a door if one wing is opened or closed, comprising in combination, a rail running at right angles to the front wall of the cupboard and fixed in the bottom of the same, segment shaped hinges fixed with one end to the door wings and pivoted at the other end in the door frame, two levers, each connected at one end with the inner end of the segment shaped hinge, and pivoted with the other end in a vertical pivot guided in the rail, two levers pivoted at one end to a pivot guided on the rail and linked with the other end to the middle of the first-mentioned pair of levers.

17 of 1903.—J. B. PEACE: *Window Sashes for Enclosing the Window Spaces of Band Stands, Shelters, Kiosks, and other Erections.*

Means for enclosing open window spaces of band stands, shelters, kiosks and the like, consisting in the employment of two or more window sashes, hinged together horizontally, and counterbalanced by one pair of weights common to the series of hinged sashes.

591 of 1903.—C. ROSENHEIM: *Fastening for Casement Windows, Fanlights, and the like.*

A fastening apparatus for casement windows, fanlights, and the like, comprising means for alternately closing and firmly securing within their frames, and releasing therefrom, and opening such windows or the like by successive pulls upon a cord, wire, chain, or the like.

17,250 of 1903.—A. D. S. DALGLEISH: *Door or Window Stops or Holders.*

Door or window holders consisting of projections, jointed or not, and springs or spring pieces, the projections having enlargements at their ends, and either the springs or spring pieces, or the enlargements, or both, being provided with sloping faces adapted to allow of engagement and disengagement of the enlargements on the projections with the springs or spring pieces by pushing or pulling the door or window.

13,867 of 1903.—W. A. HILDYARD: *Bolts or Fasteners for Doors, Windows, and the like.*

This invention relates to bolts or fasteners for doors and windows. The bolt is made so that on releasing a knob or lever the shoot is automatically shot by means of a spiral spring placed at the back of it, and also automatically locked. The knob or lever works in a cavity in the shoot, a small spring fastened to the shoot being utilised to give a downward pressure on the knob, so that, when the shoot is in its normal position, the knob falls into a slot in the top of the bolt, at right angles to the direction in which the shoot moves so that the shoot cannot be shaken out of the desired position or pushed back except by releasing the knob. To release the shoot the knob is raised when the shoot is pushed forward by the spiral spring, the knob moving with it along a slot in the top of the bolt, etc., depressed by the aforementioned spring, which drops into the slot at right angles to the shoot, this making the fastening secure. To replace the shoot in its normal position the knob has to be raised and drawn back, when it will fall into the slot at the other end, and thus keep the bolt unfastened.

20,837 of 1903.—C. A. FLODQUIST: *Windows and Doors.*

An arrangement in windows of two or more divisions with double sashes, of outwardly opening double sashes swinging round a hinge or pivot, which may support one or more supplementary pivots fitted in such manner that when the sash is opened it swings towards an adjacent sash opening, the sash of which when opened either swings outwardly away from the sash first mentioned or swings inwardly.

7,596 of 1903.—E. H. GUNTHER: *Folding Furniture.*

This invention relates to folding furniture, such

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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as chairs, tables, and the like. A chair made according to the invention comprises a pair of rectangular frames or trestles hinged together in the usual manner, the seat being pivoted to the longer of the two frames, against which it is folded when the chair is collapsed. To retain the chair in its open position, the longer frame is provided with a transverse bearing or supporting strip, which extends beyond the said frame, so that when the two hinged frames are opened out the smaller frame comes into contact with, and is held by, the projecting ends of the said bearing strip, so as to hold the two hinged frames in the required position. As an additional support, there is also provided upon the under side of the seat a second supporting strip, which is sufficiently long to extend into the path of the smaller of the hinged frames, which, when the seat is lowered, comes into contact with the said strip and is supported thereby. At this part the hinged frame is advantageously furnished with a bar, so that the aforesaid bearing strip is supported upon its whole length. In practice the said bar is attached to the under side of the seat by means of a strap or the like, so that when the seat is raised the said bar also raises the smaller of the hinged frames.

24,690 of 1902.—W. L. Stanway: *Bricks.*

This invention relates to face bricks, and consists in so making them that they require no pointing, and do not show dampness between the joints. The bricks are made with a sinking on the top and right-hand side, which, when the bricks are laid together, acts as a mortar stop, and prevents the mortar from showing or oozing through to the face side of the wall, and makes a complete close butt joint.

27,154 of 1902.—G. B. Ellis (Société Raffit et Bosc): *Fire-resisting Arch or Span Floors.*

An arch or span floor comprising for each case bay, arch, or span, two laterally skew backs of hollow pottery, terra-cotta, or other material, disposed so as to bear against the vertical webs of "I" girders forming the beams or joists, for the entire height of the girders or nearly so, each skew back having oblique bearing faces at its upper and lower portion respectively, upon which faces bear two courses composed of thin hollow blocks of pottery or other material having oblique joints, the lower course, which is plane, receiving or supporting the plaster or other facing forming the surface of the ceiling, and the upper course, which is in the form of an arch, serving in conjunction with the "I" girders, to support the flooring or fasten above, the combination constituting a hollow and light arch or span floor.

28,856 of 1902.—E. Bagnall: *Manufacture of Wood Paving Blocks.*

The manufacture of wood paving blocks, whereby a number of short lengths of wood are held together by an iron or steel wire clip or stay rod.

17,660 of 1903.—J. W. Mackenzie (The Cemental Fireproofing Co.): *Fireproof Floor and Ceiling Construction.*

This consists in the combination with floor beams of main supporting metal bars extending from beam to beam, and attached thereto by means of stirrups resting on the top flanges of the beams, and a concrete of similar plastic material centre, reinforced with metal rods and a wire lath or fabric, and suspended from said bars so as to permit the concrete or similar plastic materials forming the body of the floor to completely surround and inbed the bars, when said material is placed on the centre from above.

28,951 of 1903.—A. Piat: *Cesspools, Surface Drains, and the like, and Apparatus for Evacuating the same.*

A removable cesspool, surface drain, or reservoir, consisting of any kind of perforated metal, surmounted by a basin, having a clack valve mounted on knife edges, and provided with a rod, which allows of its easy removal.

MEETINGS.

Friday, December 4.

Architectural Association.—Paper on "Photography for Architects," illustrated by lantern views, by the A.A. Camera and Cycling Club. 7.30 p.m.

Glasgow Architectural Craftsmen's Society.—8 p.m.

Junior Institution of Engineers (Westminster Palace Hotel).—Professor D. S. Capper, M.Inst.C.E., on "Recent Developments in the Construction and Working of Gas Engines." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. W. H. A. Robertson on "Artificial Draught, as Applied by Fans to Steam Boilers." 8 p.m.

Incorporated Association of Municipal and County Engineers.—Metropolitan District Meeting to be held in the Municipal and County Club, 4, Whitehall-court, S.W. Discussion will then be resumed upon "The New By-Laws made by the London County Council in regard to Depositing Drainage Plans with the Sanitary Authority." 7.30 p.m.

Saturday, December 5.

Sanitary Institute (Provincial Sessional Meeting, Town Hall, Leicester).—Discussion on "The Collection, Disposal, and Utilisation of Town Refuse in Leicester." The discussion will be opened by Mr. Frank W. Allen, A.M.Inst.C.E., to be followed by Messrs. E. George Mawbey, M.Inst.C.E., C. Killick Millard, M.D., D.Sc., Alderman T. Windley, J.P., Councillor A. Shaw, Leicester. The chair will be taken at 11.0 a.m. by Mr. William Whitaker, B.A., F.R.S., Chairman of Council of the Institute.

British Institute of Certified Carpenters.—Annual General Meeting. 6 p.m.

Monday, December 7.

Surveyors' Institution.—Ordinary General Meeting. Mr. Edward Thomas Scammell, F.R.G.S., on "The Preservation of Timber, with special reference to its protection from Dry Rot and the increase of its usefulness for Estate Fencing and other purposes." 4 p.m.

Society of Arts (Cantor Lectures).—Mr. Bennett H. Brough on "The Mining of Non-Metallic Minerals." III. 8 p.m.

Liverpool Architectural Society (Incorporated).—Paper by Miss Ethel Charles, A.R.I.B.A., entitled "Reflections on Architecture." 6.15 p.m.

Tuesday, December 8.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Sanitary Science).—Dr. J. C. Thresh on "Water and Water Supply." II. 7 p.m.

Institution of Civil Engineers.—Paper to be further discussed: "On the Distribution of Mean and Extreme Annual Rainfall over the British Isles," by Mr. H. R. Mill, D.Sc., LL.D. 8 p.m.

Wednesday, December 9.

Sanitary Institute.—Discussion on "The Flooding of Basements in London by Sewage," to be opened by Mr. Maurice Fitzmaurice, G.M.G., M.A., M.Inst.C.E., and Dr. H. R. Kenwood. The chair will be taken by Sir Benjamin Baker, K.C.M.G. 8 p.m.

Society of Arts.—Mr. H. H. Cunynghame, C.B., on "Furnaces suitable for Jewellers' Work, Enamelling, Art Casting, and other suitable industries." 8 p.m.

Northern Architectural Association.—Mr. G. S. Aitken, F.S.A. Scot., on "Bothwell Castle," with lantern illustrations. 7.30 p.m.

Edinburgh Architectural Association.—Mr. J. Stuart Syme on "The Art of Sculpture in Ancient Egypt." 8 p.m.

Institution of Electrical Engineers.—Annual Dinner.

Institution of Civil Engineers.—Students' visit to the locomotive works of the North London Railway, at Bow Road. Assemble at the works. Train from Westminster Bridge Station to Bow Road, 1.40 p.m.

Thursday, December 10.

London Institution.—Mr. E. Walter Maunder on "Mars and its 'Canals.'" Illustrated. 6 p.m.

Institution of Electrical Engineers (in the Rooms of the Institution of Civil Engineers).—December 10 being the 300th anniversary of the death of William Gilbert, the Mayor and other representatives of the Borough of Colchester will attend officially at 8 p.m. to receive an historical picture (representing Dr. Gilbert in the act of showing his electrical experiments to Queen Elizabeth and her Court) which will then be presented by the Institution of Electrical Engineers to the Borough of Colchester, in which town Gilbert was born in 1544 and died in 1603. A paper will then be read, entitled: "The Slow Registration of Rapid Phenomena by Strobographic Methods: the 'Ondographe' and 'Puissancegraphe' (Wave Recorder and Power Recorder)," by M. E. Hospitalier (President of the Société Internationale des Electriciens, Foreign Member of the Institution of Electrical Engineers). M. Hospitalier will also give a demonstration of the Ondograph.

Manchester Society of Architects.—Mr. Ellis Marsland on "The Statutory Registration of Architects." 6.45 p.m.

Friday, December 11.

Tramways and Light Railways Association (Society of Arts, John Street, Adelphi).—Mr. Atherley-Jones, K.C., M.P. (President), on "Protection in Special Relation to Tramway and Light Railway Enterprise." 8 p.m.

Saturday, December 12.

The British Association of Waterworks Engineers.—Eighth Winter Meeting to be held at the Geological Society's Rooms, Burlington House, W. (1) Ballots will be taken for the Council and Officers for 1904-5, and for new Members and Associates. (2) Prof. Henry Robinson on "The Storage of Flood Water." (3) Mr. Alfred J. Jenkins on "The New Reservoir for the Hoylake and West Kirby Waterworks." (4) Mr. Neil J. Peters on "The Cogan Extensions of the Cardiff Corporation Waterworks." 11 a.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

November 18.—By Fox & Vergette (at Sandy).
Willington, &c., Beds.—Portions of the Willington and Cople Estate, 276 a. 1 r. 85 p., f., (in numerous lots) £14,562

November 19.—By Baxter, Payne, & Lepper (at Bromley).
Bromley, Kent.—Homesdale-rd., &c., 27 plots of building land, f. (in lots) 665
70, Park-rd., f., w.r. 39*l.* 360

November 20.—By Dilley, Son, & Read (at Warboys).
Warboys, Hunts.—Three copyhold fields, 25 a. 0 r. 23 p. 865
A copyhold house, y.r. 20*l.* 450
Nine cottages, f. and c., w.r. 29*l.* 15*s.* 258

November 21.—By Ventom, Bull, & Cooper (at Lyme Regis).
Lyme Regis, Dorset.—Marine-parade, 2 freehold building plots 30
Bradford House, f., p. £235

November 23.—By Fortescue & Branson.
Shepherd's Bush.—77, 79, and 81, Daviville-rd. (flats), u.t. 91 yrs., g.r. 18*l.*, w.r. 137*l.* 4*s.* 1,070

By Kemsleys'
Stapleford Abbotts, Essex.—Tysea Hill, a freehold cottage and four enclosures, 7 a. 1 r. 12 p., y.r. 15*l.* 405

November 24.—By G. Gouldsmith, Son, & Co.
Belgravia.—81, Eaton-pl., and 81, Lyall-mews West, u.t. 25 yrs., g.r. 5*l.*, p. 3,500

By Walter Hall.
Finchley.—2, Holden-rd. u.t. 76½ yrs., g.r. 10*l.* 10*s.*, y.r. 60*l.* 470
Willesden.—Florence-ter., Chapter Works, u.t. 95 yrs., g.r. 12*l.*, y.r. 80*l.* 690

By May & Rowden.
Oxford-st.—71, Berwick-st., (S.), f., y.r. 60*l.* 1,600
Soho.—17, Bateman-st., f., y.r. 66*l.* 1,350

By Sworder & Sons (at Bishop's Stortford).
Bishop's Stortford, Herts.—Windhill, Windhill House and 5 a., f., p. 3,100
Windhill-rd., St. Katharine's and 0 a. 3r. 12 p., f. and c., y.r. 80*l.* 1,350
Hadham-rd., Stort Lodge and 6 a. 2 r. 32 p., f. and c., y.r. 105*l.* 2,500
Marsh Barns Farm, 81 a. 0 r. 34 p., f., y.r. 160*l.* (in lots) 10,465
Old Hadham-rd., Victoria Villa and 1 a. 0 r. 38 p., f., y.r. 30*l.* 830
Hockerill-st., two cottages, f., y.r. 23*l.* 8*s.* 330
A perpetual rent charge of 4*l.* 19*s.* 8*d.* per annum 150

November 25.—By S. H. Davids & Co.
Notting Hill.—961, Ladbroke-gr., u.t. 67 yrs., g.r. 10*l.*, y.r. 48*l.* 460
Shepherd's Bush.—114, Godolphin-rd., f., y.r. 46*l.* 16*s.* 675
Twickenham.—13, Victoria-rd., u.t. 63½ yrs., g.r. 6*l.* 10*s.*, y.r. 25*l.* 225
Barnsbury.—17, Ellington-st., f., y.r. 57*l.* 880
Marylebone.—3, 4, and 5, Great Quebec-st. (S.), u.t. 9½ yrs., g.r. 135*l.*, w.r. 373*l.* 410

Rushworth & Stevens.
Regent's Park.—3, 4, 5, 6, and 7, Mornington-pl., u.t. 25 yrs., g.r. 35*l.*, y.r. 260*l.* 1,980
Woolwich Common, Kent.—Ordnance-rd., f.g.r. 8*l.* 18*s.*, reversions in 25 and 54 yrs. 330
Ordnance-rd., f.g.r.'s 33*l.* 15*s.*, reversion in 20 yrs. 1,050
Ordnance-rd., f.g.r.'s 22*l.*, reversion in 54 yrs. 535
Ordnance-rd., f.g.r. 20*l.* 5*s.*, reversion in 22 yrs. 605
Ordnance-rd., f.g.r.'s 10*l.*, reversion in 25 yrs. 475
8 and 56, Ordnance-rd., f., y.r. 32*l.* 470
28 to 39 and 51, Ordnance-rd., f., w.r. 336*l.* 12*s.* 2,230

By W. A. Ryder & Co.
Leyton.—2, Alexander-rd., u.t. 77 yrs., g.r. 4*l.* 10*s.*, y.r. 26*l.* 355

By R. Tilby & Son.
De Beauvoir Town.—142, Culford-rd., u.t. 19½ yrs., g.r. 3*l.* 10*s.*, y.r. 32*l.* 215

By Thomas Wright.
Beckenham.—33, Mackenzie-rd., f., ... 500

By Boyton, Sons, & Buckmaster (at Fulham).
Fulham.—10, Parson's-green, area 15,000 ft., f., p. 1, Eddiscombe-rd., u.t. 86½ yrs., g.r. 5*l.* 10*s.*, e.r. 34*l.* 830
45 and 47, Britannia-rd., u.t. 53 yrs., g.r. 8*l.*, y.r. 60*l.* 315
..... 640

By Waterer & Sons (at Hersham).
Hersham, Surrey.—Broad-la., Poplars Farm, 3 a. 1 r. 0 p., f., p. 1,025
Mud Town, freehold building land, 5 a. 1 r. 13 p., f. 500

By Bellamy & Co. (at Putney).
Twickenham.—12 Crown-rd., s., f., y.r. 50*l.* 825

November 26.—By Balch & Balch.
Kentish Town.—53 to 59 (odd), Peckwater-st., u.t. 45½ yrs., g.r. 20*l.*, w.r. 135*l.* 4*s.* 985
Hornsey Rise.—80, Shaftesbury-rd., u.t. 70 yrs., g.r. 6*l.* 5*s.*, p. 395
Holloway.—20, 22, and 24, Chalfont-rd., u.t. 30½ yrs, g.r. 15*l.*, y.r. 78*l.* 560

By Bisley & Sons.
Walworth.—26 and 28, Heygate-st., u.t. 39 yrs., g.r. 10*l.*, w.r. 98*l.* 16*s.* 550
Bermondsey.—11, Ambrose-st., u.t. 24½ yrs., g.r. 2*l.*, w.r. 33*l.* 16*s.* 245
Rotherhithe.—271 and 273, Lower-rd., u.t. 15½ yrs., g.r. 6*l.*, y.r. 52*l.* 295
Silver-st., a plot of freehold building land 145

By Farebrother, Ellis, & Co.
City of London.—75, 75a, and 76, Little Britain (S.), area 3,250 ft., f., y.r. 380*l.* 11,000
Battersea.—9 to 15 (odd), Este-rd., u.t. 40 yrs., g.r. 10*l.*, w.r. 98*l.* 16*s.* 600

By Hammersley, Kennedy, & Co.
Portman-sq.—32 and 33, York-pl. (boarding houses), beneficial leases for 9½ yrs., y.r. 212*l.* 10*s.* (including goodwill, furniture, &c.) 810

By Wm. Hollis.
Hendon.—Brent-st., New Lodge and 2½ a., f., e.r. 165*l.* 3,500

By Johnson & Byfield.
Canonbury.—62, Marquess-rd., u.t. 42 yrs., g.r. 8*l.*, y.r. 50*l.* 410
Holloway.—79, Tabley-rd., u.t. 62½ yrs., g.r. 7*l.* 7*s.*, y.r. 42*l.* 405

By W. Martin & Co.
Peckham.—15 and 16, The Glns., u.t. 72½ yrs., g.r. 14*l.*, y.r. 68*l.* 610
Dulwich.—71 and 73, Glengarry-rd., u.t. 76½ yrs., g.r. 12*l.* 12*s.*, y.r. 69*l.* 12*s.* 495
57, 59 and 61, Rodwell-rd., u.t. 74 yrs., g.r. 18*l.*, w.r. 107*l.* 18*s.* 780

By Nott, Cartwright, & Etches.
Wimbledon.—Palmerston-rd., &c., f.g.r. 7*l.*, reversion in 73 yrs. 190

By Walter Simmonds.
Bermondsey.—7 and 9, Dockley-rd., u.t. 33½ yrs., g.r. 10*l.*, w.r. 88*l.* 8*s.* 405
11 and 13, Dockley-rd., u.t. 33½ yrs., g.r. 10*l.*, w.r. 83*l.* 8*s.* 440

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15 and 17, Dockley-rd., u.t. 33½ yrs., g.r. 10*l.*, w.r. 88*l.* 8*s.* £465
New Malden, Surrey.—11 and 13, Grafton-rd., u.t. 59 yrs., g.r. 6*l.*, w.r. 40*l.* 6*s.* 220

By STIMSON & SONS.

Blackfriars.—46, Stamford-st., f., y.r. 65*l.* 90
53 and 55, Stamford st. (S.), u.t. 19 yrs., g.r. 20*l.*, y.r. 120*l.* 700
Southwark.—125 and 126, Great Suffolk-st. (S.), f., y.r. 84*l.* 1,510
Walworth.—205, Walworth-rd. (S.), f., y.r. 55*l.* 930
Clapham.—86, Abbeville-rd., u.t. 78½ yrs., g.r. 9*l.*, e.r. 50*l.* 510
Peckham.—2, 4, 6, and 8, Choumert-rd. (S.), u.t. 62 yrs., g.r. 10*l.* 10*s.* d., y.r. 168*l.* 1,900
6, Lyndhurst-sq., f., e.r. 65*l.* 1,000
Lambeth.—1 to 26, Howley-pl., u.t. 19 yrs., gr. 115*l.*, w.r. 681*l.* 4*s.* 3,010
Kensington.—1, Eli-mews., u.t. 77 yrs., g.r. 5*l.*, y.r. 60*l.* 595
St. Pancras.—54, Barclay-st., u.t. 10½ yrs., g.r. 2*l.* 10*s.*, e.r. 52*l.* 150
Clapham.—2, Albert-sq.-mews, u.t. 41¼ yrs., g.r. nil, w.r. 27*l.* 16*s.* 165

By H. HOLMES & CO. (on Premises).

Pentonville.—23, Claremont-sq., u.t. 8½ yrs., g.r. 3*l.*, e.r. 60*l.* 325

November 27.—By RAWLEY CROSS & CO.

Wimbledon.—Victoria-cres., freehold building site, area 5,000 ft., p. 1,470
Notting Hill.—32, Ladbroke-gr., u.t. 19 yrs., g.r. 10*l.*, y.r. 60*l.* 310

By ROBINS, GORE, & MERCER.

Soho.—11, Old Compton-st. (S), f., y.r. 70*l.* 1,950

By TYSER, GREENWOOD, & CRYER.

St. John's Wood.—10, Nugent-ter. (S), u.t. 63 yrs., g.r. 15*l.*, w.r. 93*l.* 10*s.* 510
Chiswick.—32 and 34, Essex-pl., f., w.r. 31*l.* 4*s.* 250
Barnes.—Station-rd., Prairie Cottage, f., e.r. 50*l.* 675

By HOLLINGSWORTH & COLLYER.

Northfleet, Kent.—37, Cooper's-rd., f., w.r. 36*l.* 8*s.* 260

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks.....	1 16 6	per 1,000 alongside, in river
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks ...	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons.....	1 10 0	" at railway depôt
Red wire Cuts ...	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ...	4 4 0	" " "
Do. Bullnose	4 10 0	" " "
Best Stourbridge Fire Bricks ...	4 S 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers.....	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers...	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End.....	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers...	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed.....	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime ...	21 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11*s.* 6*d.* per yard, delivered.
Stourbridge Fire Clay in sacks 27*s.* 6*d.*, per ton at rly. dpt.

PRICES CURRENT (*continued*).

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt.....	1 8½	" "
PORTLAND STONE (20 ft. average)—Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Whraf	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt
Beer in blocks	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks ...	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto.....	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	"
2 in. to 2½ in. Sawn one side slabs (random sizes).....	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in, self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly. dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16× 8 best "	7 0 0	" "
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green.....	15 2 6	" "
20×12 best Eureka unfading green.....	17 2 6	" "
18×10 " "	12 10 0	" "
16× 8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16× 8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles...	42 0	per 1,000 at rly. depot.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles.....	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and Valley tiles.....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. Ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ...	0 10 0	less than 7 in. and 8 in.
Deals: seconds.....	1 0	0 less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.....	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ...	8 10 0	9 10 0
Foreign Sawn Boards—1 in. and 1½ in. by 7 in.	0 10 0	more than battens.
½ in.....	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.).....	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)...	3 5 0	3 15 0

PRICES CURRENT (*continued*).

WOOD.

	At per standard. £ s. d.	£ s. d.
JOINERS' WOOD.		
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Petersburg: second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in....	14 10 0	15 10 0
" " 3 in. by 9 in. ...	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in,	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ...	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments.....	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube ...	0 3 6	0 4 6
Danzig and Stettin Oak Logs—, Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ...	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch.....	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube.....	0 4 0	—
Prepared Flooring—	Per square.	
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards ...	0 11 0	0 13 6
¾in. by 7 in. do. do. do.	0 14 0	0 18 0
1 in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0 ...	7 5 0
Compound Girders, " "	8 2 6 ...	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6 ...	8 17 6
Flitch Plates	8 5 0 ...	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6 ...	8 5 6

METALS.

	Per ton, in London £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0 ...	8 0 0
Staffordshire Crown Bars, good merchant quality.....	8 0 0 ...	8 10 0
Staffordshire "Marked Bars".....	10 10 0 ...	—
Mild Steel Bars	8 15 0 ...	9 5 0
Hoop Iron, basis price	9 5 0 ...	9 10 0
" " galvanised	17 10 0 ...	—

(*And upwards, according to size and gauge.)

Sheet Iron (Black)—		
Ordinary sizes to 20 g.	9 15 0 ...	—
" " 24 g.	10 15 0 ...	—
" " 26 g.	12 5 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.....	14 5 0 ...	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0 ...	—
" " 22 g. and 24 g.	16 10 0 ...	—
" " 26 g.	18 0 0 ...	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0 ...	—
" " 22 g. and 24 g....	13 5 0 ...	—
" " 26 g.	14 0 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker.....	11 15 0 ...	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0 ...	—
" " " 26 g.....	14 0 0 ...	—
Cut nails, 3 in. to 6 in.	9 5 0 ...	9 15

(Under 3 in., usual trade extras.)

[*See also page 593.*

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COMPETITION, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITION.

Nature of Work.	By whom Required.	Premiums.	Designs to be delivered
*Free Library Buildings	Wakefield Council	Not stated	Jan. 20 '04

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Sewering, &c. Wilberforce-terrace, Hulme	Paving Commit. Manchester Corp.	Surveyor's Office, Town Hall, Manchester	Dec. 7
Flagging, &c., North-road, from Melling-st. to Cross-st.	do.	do.	do.
Draining, Paving, &c. Passages, Rusholme	do.	do.	do.
Sewer Works, Manor Park, Lee	Lewisham Borough Council	E. Wright, Town Clerk, Catford, S.E.	do.
Kerbing, &c., Streets, (Neuchatel-road, &c.)	do.	do.	do.
Kerbing, &c. Hither Green-lane	do.	do.	do.
Kerbing, &c. Bromley-road	do.	do.	do.
Cast-iron Pipes with Trough Ends for Cables	Glasgow Corp. Electricity Depart.	W. A. Chamen, Engineer, 75, Waterloo-street, Glasgow	do.
Cast-iron Fuse-Boxes	do.	do.	do.
Kerbing, &c., Hoddesdon	Hertfordshire County Council	Urban A. Smith, County Surveyor, Hatfield	do.
Fire Hose	Borough of Guildford	A. W. Hall, Artillery-road, Guildford	do.
Self-recording Tide Gauge	Southampton Harbour Board	J. E. Pailthorpe, Clerk to the Board	do.
Painting, &c., six Firemen's Dwellings	Leeds Corporation	City Engineer, Municipal Buildings, Leeds	do.
House and Chapel, Whiteash, Letterfourie Estate	.....	A. Tod Brown, Civil Engineer, 12, Low-street, Buckie	do.
Branch Bank and House, Bingley	Craven Bank, Ltd.	R. Armistead, Architect, 8, Charles-street, Bradford	do.
Wrought-iron Tubes and Fittings	Wilmslow &c. Gas Co.	W. Severs, Engineer and Manager, Gasworks, Wilmslow	Dec. 8
Cottages at Provost Gasworks	Glasgow Corporation	A. Wilson, Engineer, 45, John-street, Glasgow	do.
Private Improvement Works, University-road	Bootle Corporation	Borough Engineer, Bootle	do.
Additions to Union Infirmary	Keighley Guardians	Moore & Crabtree, Architects, York Chambers, Keighley	do.
Alterations and Additions to Town Hall	Herne Bay U.D.C.	F. W. J. Palmer, Surveyor, Council Offices, Town Hall, Herne Bay	do.
Iron and Glass Verandah to Town Hall	do.	do.	do.
Three Houses and House and Shop, Corban-street, &c.	.....	J. W. C. Atkinson, Architect, 1, Ivegate, Bradford	do.
Six Houses, The Walk, Birdwell	.....	P. A. Hinchliffe, Architect, 14, Regent-street, Barnsley	Dec. 9
Tarpaving Playgnds, &c., Air Balloon Hill Sch., George	Bristol Education Committee	La Trobe & Weston, Architects, 23, Clare-street, Bristol	do.
Tarpaving Playgrounds, Moorfields School, St. George	do.	do.	do.
Tarpaving Playgrounds, Wick-rd. School, Brislington	do.	Holbrow & Oaten, Architects, 9, Clare-street, Bristol	do.
Drain Pipes, Bricks, Cement, &c.	Macclesfield Corporation	E. E. Adshaw, Borough Engineer, Macclesfield	do.
Roadmaking, Rathfarnham	South Dublin District Council	T. J. Byrne, A.R.I.B.A., 1, James-street, Dublin	do.
Additions to Cart-shed, Ramsden-street	Barrow-in-Furness Corporation	Borough Engineer, Barrow-in-Furness	do.
Five Houses and Shop, Ravensthorpe	.....	J. Barton & Son, Architects, Halifax-road, Dewsbury	do.
House and Farm Buildings, Belton, Doncaster	G. A. Maw	H. Kelsey, Architect, Queen-street, Epworth	Dec. 10
Stores	Leicester Corporation	E. G. Mowbey, M.Inst.C.E., Borough Engineer, Leicester	do.
Granite Kerb, Setts, &c.	do.	do.	do.
1,000 yds. 9-in. Pipe Sewer	Tynemouth R.D.C.	A. S. Dinning, 21, Ellison-place, Newcastle-on-Tyne	do.
Plumbers' and Glaziers' Work for General Repairs	Sheffield Corporation	J. F. Moss, Leopold-street, Sheffield	do.
Villa Residence, Bromley-road, Bingley	W. R. Dawson	W. Rhodes Nunns, Architect, Bingley	do.
1¾ miles Distributing Cable	Gas and Electricity Dep., Stockport	A. J. H. Carter, Electricity Works, Milligate, Stockport	do.
Lavatory, Hamilton Drive, Botanic Gardens	Glasgow Corporation	Office of Public Works, 64, Cochrane-street, Glasgow	do.
Cast-Iron Plates, Stuart-street Generating Station	Electricity Committee, Manchester	F. E. Hughes, Electricity Department, Town Hall, Manchester	Dec. 11
*Coast Guard Station at Littlehampton	The Admiralty	Superintending Engineer, H.M. Dockyard, Portsmouth	do.
*New Coastguard Station at Queenborough	do.	Director of Works Department, 21, Northumberland-avenue, W.C.	do.
Offices for Abattoirs, Tack-street	Markets Committee, Manchester	City Architect, Town Hall, Manchester	do.
Water Main, Clayton-with-Trickley and Thurnscae	Doncaster R.D.C.	J. H. Taylor, M.Inst.C.E., Manor House, Barnsley	do.
Covered Service Reservoir, Knab's Hill, Thurnscae	do.	do.	do.
Sunday School, Highfield-avenue, Wortley	United Methodist Free Church	C. F. Wilkinson, Architect, 35, Park-square, Leeds	do.
*Internal Cleaning and Painting at S.W. Hospital	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
400 tons 15-in. Cast-Iron Pipes	Glasgow Corporation	J. R. Sutherland, Engineer to Water Department, 45, John-street	Dec. 13
Arcade and Concert Hall, Aberystwyth	D. Phillips	J. A. Jones, Architect, 7, Queen's-terrace, Aberystwyth	do.
Materials (ropes excepted)	Hetton Coal Co.	T. Robson, Hetton Colliery, Hetton-le-Hole, R.S.O.	do.
Breaking and Carting Stone for Road Repairs	Northumberland County Council	J. A. Bean, County Surveyor, Moot Hall, Newcastle-on-Tyne	do.
Earthenware Ducts for Drawing-in System of Mains	Electricity Committee, Warrington	W. H. Grimsdale, Borough Elec. Engineer, Howley, Warrington	Dec. 14
130 Gas Lamp Columns, &c.	Darfield U.D.C.	D. Hammerton, Surveyor to the Council, Darfield, near Barnsley	do.
Painting, &c., of Workhouse, Lewisham	Lewisham Guardians	H. C. Mott, Union Offices, 286, High-street, Lewisham, S.E.	do.
Sanitary Pails	Barrow-upon-Soar, U.D.C.	H. Herrod, Barrow-on-Soar	do.
Painting, &c., Roof Work, Amiens-street Station	G.N.R. Co., Ireland	W. H. Mills, Engineer-in-Chief, Amiens-street Terminus, Dublin	do.
Fireclay Goods for Gasworks	Manchester Gas Committee	C. Nickson, Gas Offices, Town Hall, Manchester	do.
Paving Ware-road	Hertford Corporation	Borough Surveyor, Hertford	Dec. 15
Railway Lines, Bristol Harbour	G.W.R.	Engineer, Paddington Station, London	do.
*Iron Fencing	Tottenham U.D.C.	Council's Engineer, 712, High-road, Tottenham	do.
*Making-up Roads	do.	do.	do.
*Making-up Clifden-road	Brentford U.D.C.	Council's Surveyor, Boston-road, Brentford	do.
Pair of Semi-Detached Villas, Moor Lane, Halifax	.....	W. Clement Williams, Architect, 29, Southgate, Halifax	Dec. 16
Pair of Villa Residences, Moor-lane, Illingworth	.....	W. C. Williams, Architect, 29, Southgate, Halifax	do.
Brushes	Leicester Corporation	E. J. Mawbey, M.Inst.C.E., Borough Engineer, Leicester	Dec. 17
*Museum and Art Gallery	Kingston-on-Thames Corporation	A. Cox, Architect, 4, Adam-street, Adelphi, W.C.	do.
1½ miles Cast-Iron Pipes & Erection Engine Room, &c.	Welton R.D.C.	Elliot & Brown, Engineers, Burton Bgs., Parliament-st., Nottingham	Dec. 18
Dining-Room, Dormitory, &c., Cnty Asylum, Lancaster	Visiting Committee	Clerk of Works at the Asylum	do.
*Alterations to County Court, Pontypridd	Commissioners of H.M. Works, &c.	Registrar County Court, Pontypridd	do.
*Annual Contracts	House Committee, Guy's Hospital	The Superintendent, Guy's Hospital, S.E.	do.
Lockup and Court House, Eckington, near Sheffield	Derbyshire County Council	J. Soames Story, County Surveyor, St. Mary's Gate, Derby	Dec. 19
*Erection of Superstructure of Parcel Office	H.M. Office of Works	H.M. Office of Works, Storye's Gate, S.W.	do.
64 Houses, Tylorstown	Duke of York Building Club	D. C. Evans, Duke of York Hotel, Tylorstown	Dec. 21
Removal of Bridge & Erect New One over Calder Water	Lanark District Com. (Middle Ward)	W. L. Douglass, Civil Engineer, District Engineer, Hamilton	do.
Two Villa Residences, Hillsborough, Co. Down	.....	H. Hobart, Architect, Dromore, Co. Down	do.
Hospital at Workhouse, Jericho, Bury	Guardians Bury Union	A. Hopkinson, Architect, 15, Agur-street, Bury	Dec. 22
*New School, Napier-road	Gillingham (Kent) Education Com.	Secretary, 8, Waterloo-road, New Brompton, Kent	do.
Steel Girder Footbridge	Linton R.D.C.	A. M. Cook, Surveyor, Linton	Dec. 23
Stabling, Sheds, Mortuary, &c., Stanley-street	Horsham U.D.C.	S. Mitchell, 14, Market-square, Horsham	do.
Six Workmen's Cottages, Bradwell-on-Sea	Maldon R.D.C.	H. G. Keywood, Surveyor, Maldon	Dec. 28
*Cottage Homes, New Malden	Kingston Union	W. H. Hope, Architect, Seymour-road, Hampton Wick	do.
*Superstructure of New Government Offices, Cardiff	Commissioners of H.M. Works, &c.	Registrar County Court, Cardiff	Dec. 29
Sewage Dis. Wks. on Bacterial Principle, W. Shield-row	Stanley U.D.C.	J. Routledge, Surveyor to Council, Front-street, Stanley	Dec. 30
*Stoneware Pipe Sewers, &c., &c.	Coalville U.D.C.	J. B. Everard, 6, Millstone-lane, Leicester	Jan. 4, '04
Drainage Works, Boldon	H. Blenkinsop, Ross, Belford	Mr. Farrow, Brockley Whins Farm, Boldon	No date.
*Police Station, Wokingham	Berks Standing Joint Committe	County Surveyor, Broadway Buildings, Reading	do.
Re-erection after Fire of Warehouses, Collingdon-road	Cardiff Grain Co., Ltd.	H. Budgen, Architect, 95, St. Mary-street, Cardiff	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
*Draughtsman	Southampton Borough Council	2l. 10s. per week	Dec. 8
*Road Foreman	West Ham Council	200l.	Dec. 24
*Head of Building Trades Department	Northern Polytecnic Institute	250l.	do.
*Assistant in Building Trades Department	do.	100l.	do.
*Assistant Lecturer, &c. (Chemical Department)	do.	90l.	do.
*Architect's Assistant	London County Council	150l.	do.
*Surveyor's Assistant	do.	150l.	do.
*Assistant Examiners in Patent Office	Civil Service Commissioners	Not stated	Dec. 17
*General Assistant (City Engineer's Department)	Norwich Corporation	100l.	Dec. 21
*Assistant Examiners in Patent office	Civil Service Commissioners	Not stated	Dec. 22
*Assistant Civil Engineer, Admiralty	do.	Not stated	Jan. 7, '04.

Those marked with an asterisk (*) are advertised in this Number. *Competition*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xix. & xxi.

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PRICES CURRENT (*continued*).

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	14 0 0 ...	—
Pipe in coils	14 10 0 ...	—
Soil pipe	17 0 0 ...	—
Compo Pipe	17 0 0 ...	—
ZINC—Sheet—		
Vieille Montagne ....ton	26 0 0 ...	—
Silesian	25 15 0 ...	—
COPPER—		
Strong Sheet....per lb.	0 0 10½...	—
Thin.... „	0 0 11½...	—
Copper nails .... „	0 0 11 ...	—
BRASS—		
Strong Sheet ....per lb.	0 0 10 ...	—
Thin „ .... „	0 0 11 ...	—
TIN—English Ingots.... „	0 1 4 ...	—
SOLDER—Plumbers'.... „	0 0 6 ...	—
Tinmen's .... „	0 0 8 ...	—
Blowpipe .... „	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2¼d. per ft. delivered
„ fourths....	1⅝d. „ „
21 oz. thirds	3¼d. „ „
„ fourths....	2⅜d. „ „
26 oz. thirds	3⅝d. „ „
„ fourths....	3¼d. „ „
32 oz. thirds	4⅛d. „ „
„ fourths....	4⅝d. „ „
Fluted sheet, 15 oz....	2⅝d. „ „
„ 21 oz.	3⅛d. „ „
¼ Hartley's Rolled Plate....	1⅝d. „ „
⅛ „ „ „	2d. „ „
⅛ „ „ „	2¼d. „ „

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels...	per gallon	0 1 9
„ „ „ in drums....	„	0 2 1
Boiled „ „ in pipes or barrels...	„	0 2 0
„ „ „ in drums....	„	0 2 4
Turpentine, in barrels	„	0 3 8
„ in drums	„	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	„	19 0 0
Best Linseed Oil Putty....	per cwt.	0 8 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal....	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish....	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper....	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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J. H.—J. W. R. (Below our limit).

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*

BEXHILL (Sussex).—For the erection of a Coronation Clock Tower, West Parade, for the Corporation. Mr. Robert Hembrow, architect, 174, Queen's Road, Hastings. Quantities by Mr. J. T. Halliday, Bexhill-on-Sea :—

Clock excepted.

Gaston & Ramond, Bexhill-on-Sea* £232 16

Clock only.

T. Wright & Son, Devonshire-road, Bexhill* £82 0

BRIDLINGTON.—For Parade Extension Works, Royal Prince's Parade, for the Corporation. Mr. E. R. Matthews, C.E., Town Hall, Bridlington :—

G. Bell, Manchester £20,000

BRISTOL.—For taking down and re-erecting the side wall of 42, Mary-le-Port-street, for the Trustees. Mr. John A. Wright, surveyor, 6, Unity-street, College-green, Bristol. Quantities by Mr. A. Barratt :—

J. Perkins & Son	£470	E. Horton	£305
E. Walters & Son	410	H.W. & E. L. Neale ...	298
G. T. Daltry	394	E. Clark	295
W. A. Ship	355	Eastabrook.....	295
Jones & Hill	329	H. A. Forse & Sons,	
W. J. Bennett	320	143, Ashley-road*...	295

BRISTOL.—For the erection of warehouses, &c., Albert-road, St. Phillip's, Bristol, for Messrs. C. Vaughan & Sons. Mr. John A. Wright, architect, Bristol. Quantities by Mr. A. Barratt, Bristol :—

T. Broad	£2,376	A. J. Beaven	£2,150
Messrs. Easterbrook	2,368	R. Wilkins	2,064
A. E. Longden	2,300	Walkerdene	1,895
Perkins & Sons	2,295	W. J. Bennett*	1,770

[All of Bristol.]

BRITON FERRY (Wales).—For the supply of road metal for the Urban District Council. Mr. A. H. Clarke, Borough Engineer, Council Offices, Briton Ferry :—

	s. d.		s. d.
Pentoyllt Dinas Silica Co.	6 0	W. P. Powell & Co.	5 2
J. Evan Griffith ...	5 5	Bennet Brothers ...	4 9

[All per ton.]

COWPEN (Northumberland.)—For making-up William-street, at Crofton, for Cowpen Urban District Council. Mr. Robert Grieves, Surveyor :—

G. Dixon	£611 12 3	J. Shannon ...	£520 16 1½
J. Maclaren ...	608 14 6	J. Robson, Newcastle-	
G. E. Simpson...	558 16 0	on-Tyne*.....	516 18 10

DARENTH.—For installation of telephones at the Darenth Asylum, for the Met. Asylums Board :—

Coleby & Co. ...	£750 0 0	Weston & Sons	£344 0 0
Nat. Telephone Co., Ltd.	620 0 0	Wippell Bros. & Row	340 0 0
A. Smith	566 0 0	Western Electric Co.....	319 4 0
Donnison, Silem & Co.....	450 0 0	New System Private Telephone Co., Ltd.	298 18 10
Jackson Bros...	440 0 0	W. Defries	289 0 0
Fuller, Macleod & Co., Ltd. ...	420 0 0	Private Wire & Telephone Installation Co.,	
B. & R. Durant	413 13 5	Ltd.	284 17 0
Comyn, Ching & Co., Ltd. ...	374 0 0	Cox-Walkers, Darlington ...	263 0 0
Saunders & Co.	369 0 0	Hodgson & Co.,	257 18 0
British Home & Office Telephone Co.....	364 0 0	Mackrill & Sons	247 13 7
Rider & Co.....	349 0 0	P. Dewhirst,	
Wan Bros.	345 12 9	Blackpool* ...	245 10 0
Julius Sax & Co.	345 0 0		

[Engineer's estimate, £240.]

ECCLESALL (Sheffield).—For alterations and additions to the Rising Sun Inn, Abbey Lane, for Mr. F. Cockerham. Messrs. Hall & Fenton, architects, 14, St. James-row, Sheffield. Quantities by the architects :—

W. T. Sharp ...	£900 0 0	Badger &	
Wilkinson & Sons	880 5 0	Appleby	£703 0 0
E. Hart	862 17 0	H. Watkinson	690 0 0
G. H. Bown ...	847 4 4	H. White.....	683 0 0
Enos Moor	799 11 0	W. Needham ...	697 0 0
G. Vaughan ...	750 0 0	J. S. Teanby ...	674 0 0
Martin & Hughes.....	740 0 0	M. Hancock ...	670 0 0
G. Allen	715 0 0	J. Reed.....	665 0 0
J. Mason	710 0 0	T. Margerrison	
E. & W. Oxley	709 10 0	Church-street Dronfield* ...	678 0 0

FRIMLEY (Surrey.)—For the construction of two miles of 9 in. sewers, Chobham-road, for the Urban District Council. Mr. F. C. Wren, engineer, High-street, Camberley :—

C. Mott & Sons	£3,176 19 9	F. Roberts	£1,969 18 6
A. C. Soane.....	2,384 0 0	D. H. Porter ...	1,586 0 0
W. Norris	2,317 5 6	Wheeler, South-	
J. Coker	2,295 0 0	wark*	1,540 0 0
Messrs. Streeter & Todhunter	2,283 15 9	Swaker.....	1,435 19 0

HAYLE (Cornwall).—For the erection of a dwelling-house, Hayle Towans. Mr. Humphrey T. Broad, architect :—

R. Waters & Ford	£1,760 0	William Rutter...	£690 0
White & Thomas	1,550 0	W. J. Jary	508 14
W. J. Roach	740 0	Edward Dunn ...	507 10

HERTFORD.—For erection of a pair of cottages, Rook's Nest Lane, Therfield, for Mr. C. Newling. Mr. Jas. W. Hall, architect and surveyor, 18, Priory-park-road, Brondesbury, N.W. :—

	Well.	Building.
T. Nevett	£30	..... £760
Gemsons	19	 564
A. Balfour, Kilburn	17	 422

LONDON.—For sewage works for Hendon Urban District Council. Mr. S. S. Grimley, Surveyor, The Burroughs, Hendon, N. W. :—

	12 in. Sewer, Mill Hill Rd.	Gullies Brent Street.	Bell Lane Footpath.	New Brent St. Tar Paving.
	£ s. d.	£ s.	£ s. d.	£ s.
T. Adams	424 19 6	70 10	176 5 0	99 5
H. Williams	344 7 6	92 10	152 10 10	97 0
*Ballard, Ld, Child's Hill	282 8 0	59 10	167 0 0	83 5
W. E. Constable & Co.	—	—	—	85 10
Goddard & Co.	—	—	—	81 15

LONDON.—For a pair of new tail shafts for use on the ss. *Bazalgette*, for the London County Council :—

Messrs. Willilam Beardmore & Co., Ltd....	£230 0
The North-Eastern Marine Engineering Co., Ltd.	182 0
The Darlington Forge Co., Ltd.	156 0
Messrs. John Spencer & Sons, Ltd.	148 5

LONDON. — For new factory, Northampton-row, Clerkenwell, E.C., for Messrs. W. A. Fincham & Co. Mr. H. Yolland Boreham, architect, 75, Finsbury-pavement, E.C. :—

Battley, Sons, & Holness.....	£3,066	Dove Bros.	£2,975
Chessum & Sons ...	2,995	Wagstaff & Sons ...	2,837
Grover & Son	2,982	Sabey & Son*.....	2,795

MARCH (Cambs).—For the erection of a house in Norwood-side, for Mr. G. Theobald. Mr. W. Povargue, architect, Causeway, March :—

Shanks	£282 0 0	Eggitt	£276 0 0
Heath	276 14 0	Whye & Turner	260 2 6
Whittlesey	276 0 0	Watson & Barrett March*	257 0 0

SWANAGE.—For the execution of road works, Ulwell-road. Mr. John Sidney, senior, Engineer, Town Hall, Swanage :—

H. & J. Hardy	£2,696 18 0	G. Pond	£2,150 0 0
W. M. Hardy	2,323 0 0	Frank Parsons	1,949 9 9
J. T. Whettham, jun.	2,275 0 0	Burt & Burt*, Swanage*...	1,925 0 0
Parsons & Hayter	2,273 0 0		

SWINDON.—For the erection of five shops and Sunday-school premises in Faringdon-street, Swindon, for the Wesleyan Trustees. Mr. W. F. Bird, architect, Midsomer Norton, Bath. Quantities by the architect :—

Orchard & Sons	£8,398 0 0
Wills & Sons	7,995 0 0
George Kemp	7,749 0 0
H. & C. Spackman	7,725 0 0
R. J. Leighfield	7,583 11 1
A. J. Colborne	7,441 12 0
W. Warren.....	7,226 0 0
Tydeman Bros.	7,200 16 11
Joseph Williams, Swindon*.....	6,977 0 0

TONBRIDGE (Kent).—For Great Fishal Hall new stables. Mr. Delme G. Mootham, architect, Effingham House, Arundel-street, Strand :—

C. Vinten	£353 5	M. Warren	£297 15
Punnett & Sons ...	307 0	Jarvis & Son.....	293 0
Martin & Co.	305 0		

WALTHAMSTOW.—For new billiard room, &c., The Limes, Walthamstow. Messrs. Geo. Baines & Son, architects, Clements-Inn, Strand, W.C. :—

S. J. Scott	£475 0
Battley, Sons, & Holness	370 0
Sands, Palmer, & Co.....	350 0
T. Durden, 1, Oliver-road, Walthamstow*	274 10

LONDON SCHOOL BOARD TENDERS.

AT the last meeting of the London School Board the Works Committee submitted the following list of tenders :—

The interior cleaning at the following Schools will be executed between 19th December, 1903, and 9th January, 1904 :—

BERESFORD-STREET :—

W. V. Goad.....	£335	J. F. Ford	£239
Bargman, Son & Co.	279	W. Hooper	230
W. Downs	250	W. Sayer & Son*	229
W. Read	240		

[*See also next page.*

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BROOMSLEIGH-STREET:—

T. Cruwys	£349	Stevens Bros.	£243 0
H. Bouneau	303	Densham & Sons	223 10
Viney & Stone	276	W. Chappell*	195 0

CLIFTON-ROAD:—

Bulled & Co.	£271 0	H. Groves	£145 0 0
S. Musgrove	177 5	W. Banks*	144 19 6
W. J. Howie	172 0		

ECCLESBOURNE-ROAD:—

Patman & Fotheringham, Ltd.	£447 0 0	Grover & Son	£335 0
Dearing & Son	421 0 0	McCormick & Sons	316 0
Macey & Sons, Ltd.	383 14 6	C. & W. Hunnings	284 10
		Marchant & Hirst	257 0
		G. Barker*	242 0

EGLINTON-ROAD:—

Woollaston & Co.	£330 10	Proctor & Son	£230 0
W. Jolly	320 0	H. Groves	220 0
W. J. Howie	255 0	P. S. Howard	178 0
Sayer & Son	231 0	Hayter & Son*	174 8

ETHELBURGA-STREET:—

Johnson & Co., Ltd.	£328 0	R. A. Jewell	£208 0
Williams & Sons	260 0	Lathey Bros.	207 10
J. & M. Patrick	230 0	E. Triggs	207 0
R. S. Ronald	215 0	C. Gurling*	180 0

FIRCROFT-ROAD:—

Johnson & Co. Ltd.	£289 10	R. S. Ronald	£190
Williams & Sons	200 0	R. A. Jewell*	185

FLORA-GARDENS:—

C. F. Kearley	£257 0	G. H. Sealy	£197 0
W. Hammond	248 0	W. Hornett	193 0
Chinchen & Co.	219 0	W. Chappell	168 10
S. Polden	214 10	F. Chidley & Co.*	160 0
J. & M. Patrick	202 0		

FOSSDENE-ROAD:—

Woollaston & Co.	£298 0	Sayer & Son	£288 0
W. J. Howie	280 0	W. Jolly	280 0
Proctor & Son	255 0	H. Groves*	168 0
P. S. Howard	249 0		

FRIERN:—

H. Line	£310 0	W. Hooper	£207 0
Lathey Bros.	242 0	C. G. Jones	205 0
J. & C. Bowyer	239 0	H. Groves	192 0
Maxwell Bros., Ltd.	236 0	W. Read*	177 0

GLENISTER-ROAD:—

Woollaston & Co.	£216 10	H. Groves	£164 0 0
Proctor & Son	211 0	W. Banks	159 17 6
W. J. Howie	207 0	P. S. Howard*	134 10 0

HAWLEY-CRESCENT:—

T. Cruwys	£315	H. Wall & Co.	£181
Bate Bros.	256	M. Pearson	169
Thompson & Beveridge	213	Marchant & Hirst*	167
Viney & Stone	186		

"HIGHWAY" (B, G. I. and JM):—

Woollaston & Co.	£288 0	A. E. Symes	£271 0
H. Bouneau	280 0	J. F. Holliday	265 14
A. W. Derby	280 0	G. Barker*	255 0
Haydon & Sons	273 0		

KILBURN-LANE:—

General Builders, Ltd.	£284 0	Chinchen & Co.	£254 0
Densham & Sons	279 10	W. B. & A. Hide	234 15
C. F. Kearley	279 0	F. Chidley & Co.	231 0
W. Hammond	274 0	Bristow & Eatwell*	197 0

MARYON PARK:—

W. Jolly	£285 0	H. Groves	£165 0 0
Proctor & Son	197 0	W. Banks	153 17 6
P. S. Howard	179 0	W. J. Howie*	150 0 0

MAWBEY-ROAD:—

W. Downs	£322 0	W. J. Howie	£242 0
Maxwell Bros., Ltd.	280 0	Sayer & Son	214 0
H. J. Williams	246 0	E. Triggs*	191 0

REDVERS-STREET:—

Silk & Son	£219 10	H. Bouneau	£195 0
F. Bull	218 10	Haydon & Sons	178 0
A. W. Derby	204 0	Barrett & Power	167 0
Gavin Bros.	199 12	Runham Brown*	147 0

ROCHELLE-STREET:—

Barrett & Power	£119 0	H. Runham Brown	£106 0
W. Silk & Son	114 0	Belcher & Co., Ltd.	89 15
J. Haydon & Sons	107 0	F. Bull*	89 0

ST. JOHN'S (Halley-street):—

H. Bouneau	£177 6 6	Vigor & Co.*	£135 0 0
J. F. Holliday	161 9 0	G. Barker	125 0 0

WALDRON-ROAD:—

R. A. Jewell	£263 0	E. Flood	£215 0
E. P. Bulled & Co.	257 0	E. Triggs	197 10
R. S. Ronald	220 0	Hudson Bros.	197 0
Lathey Bros.	215 10	J. & M. Patrick*	197 0

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3. Glastonbury .. .. .. AUG.
4. Croyland .. .. .. SEPT.
5. Whitby .. .. .. OCT.
6. Bath .. .. .. NOV.
7. Tewkesbury .. .. .. DEC.

1895.
16. Kirkstall .. .. (out of print)
17. Abbey Dore .. .. APRIL.
18. Selby .. .. .. JULY.
19. Byland .. .. .. OCT.

1896.
24. Melrose. .. .. (out of print).
25. Waltham .. .. (out of print).
26. Tintern .. .. .. JULY.
27. Lanercost .. .. .. OCT.

1900.
32. Dorchester .. .. .. JAN.
33. Bosgrove .. .. .. APRIL.
34. Dunstable .. .. .. JULY.
35. Buildwas .. .. .. OCT.

8. Fountains .. (out of print).
9. Tynemouth .. .. .. FEB.
10. Malmesbury .. .. MARCH.
11. Netley .. .. .. APRIL.
12. Bolton .. .. .. MAY.
13. Lindisfarne .. .. .. JUNE.
14. Furness .. .. .. JULY.
15. Romsey .. .. .. OCT.

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23. Pershore .. .. (out of print).

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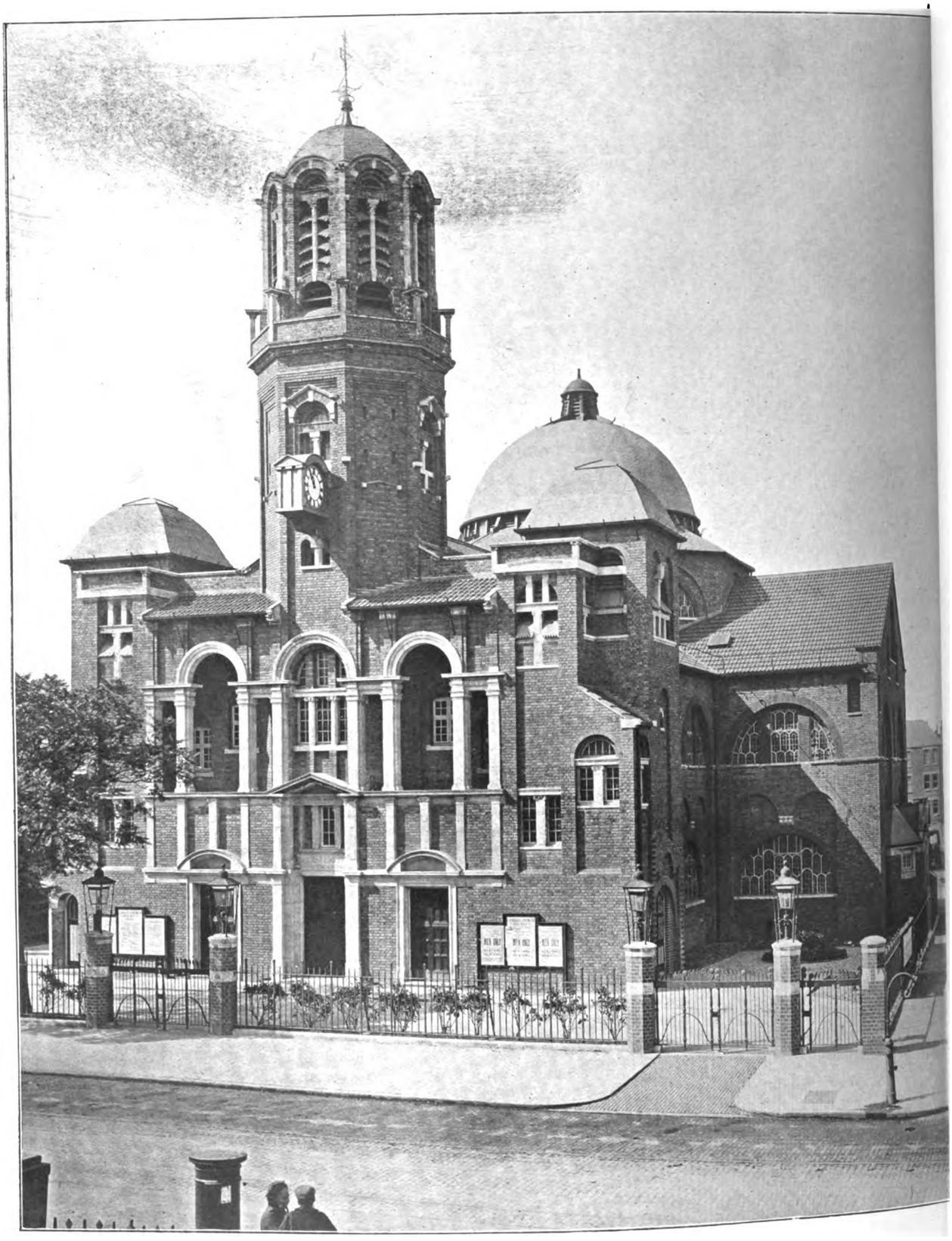

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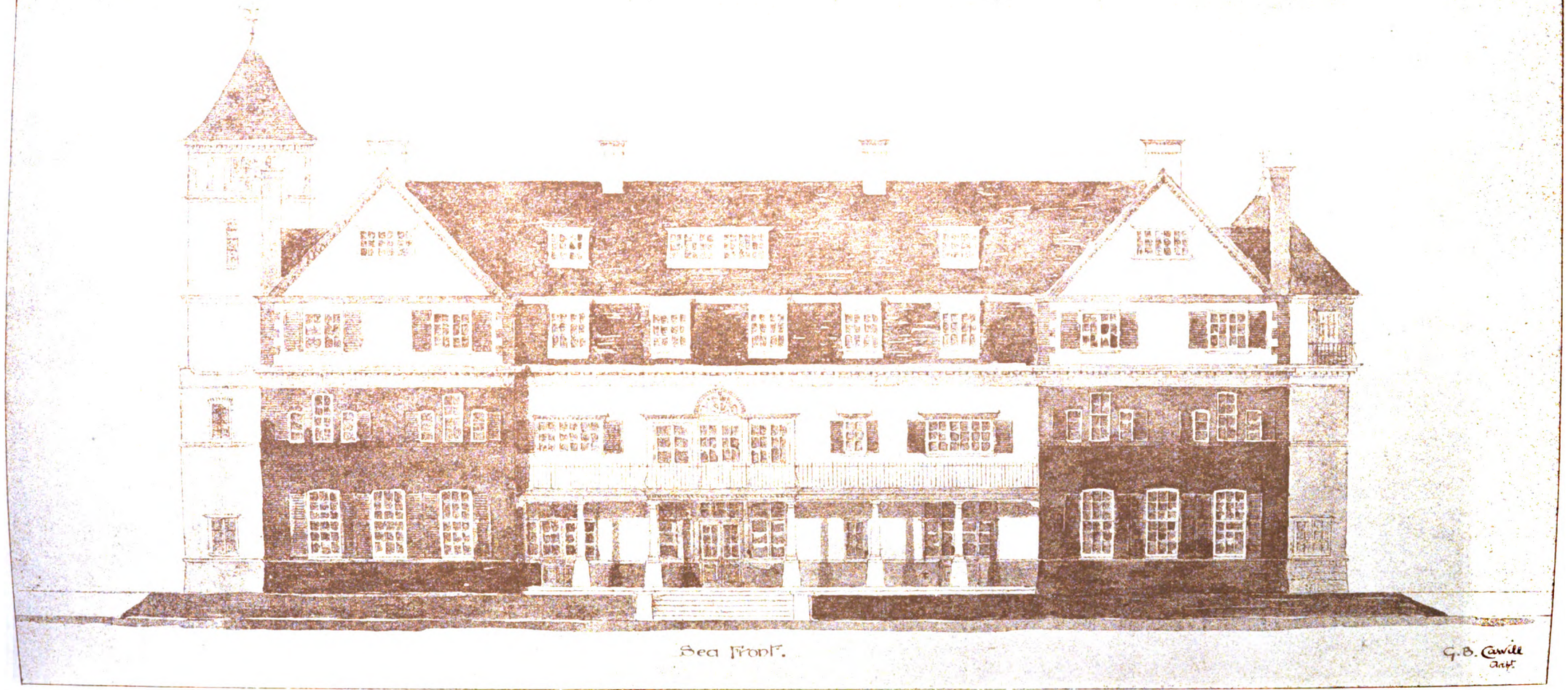

Sea Front.

G.B. Carvill Arch.

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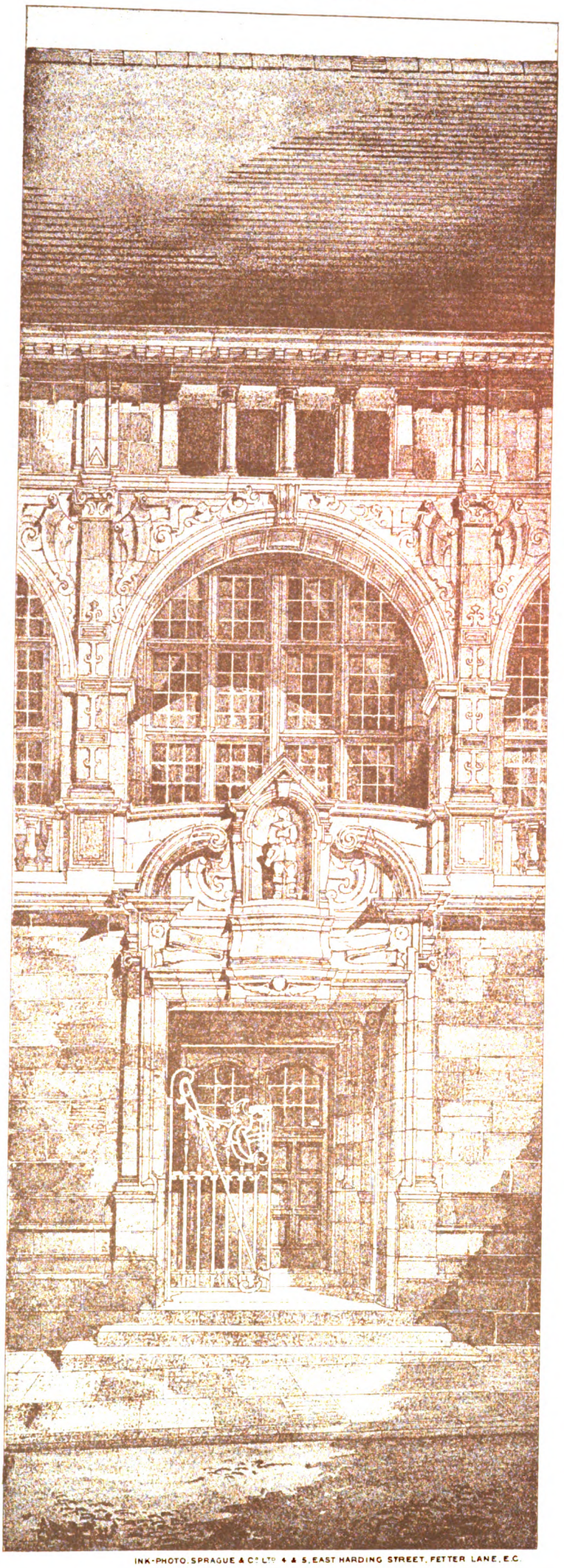

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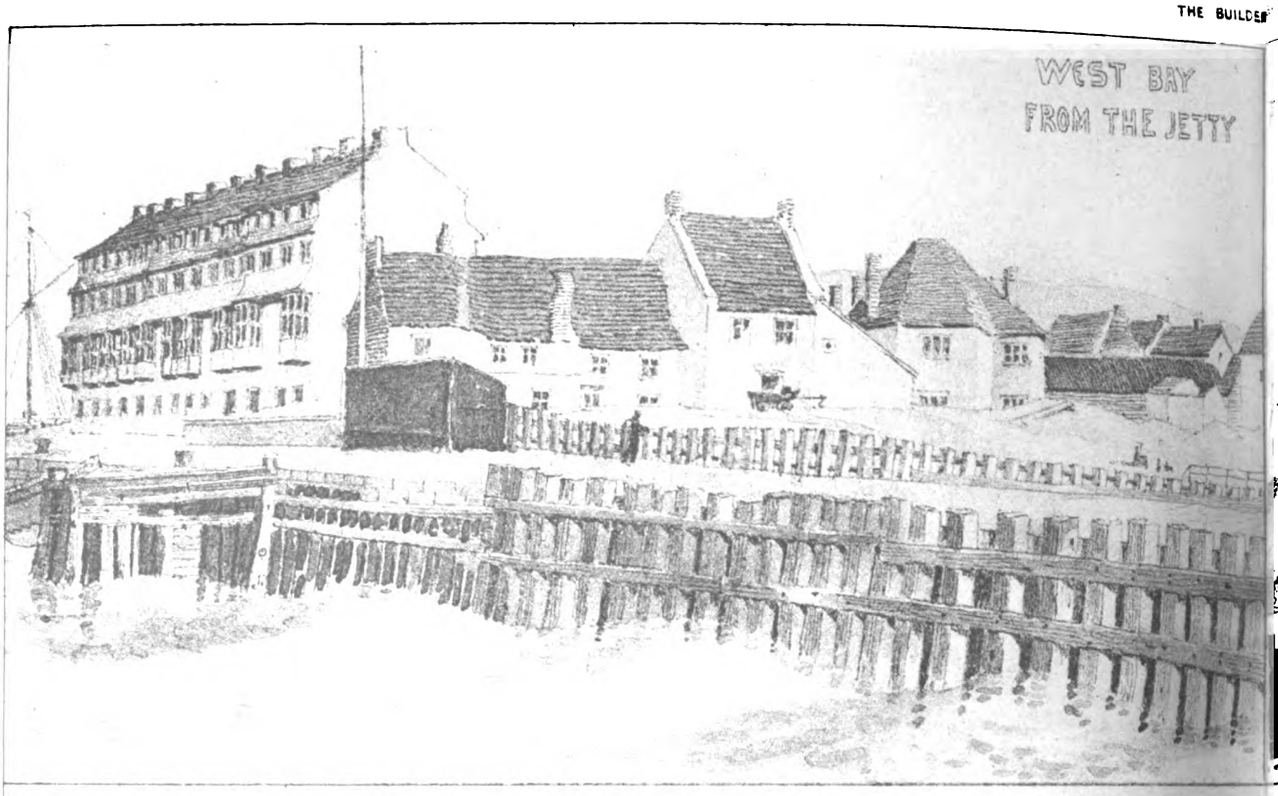

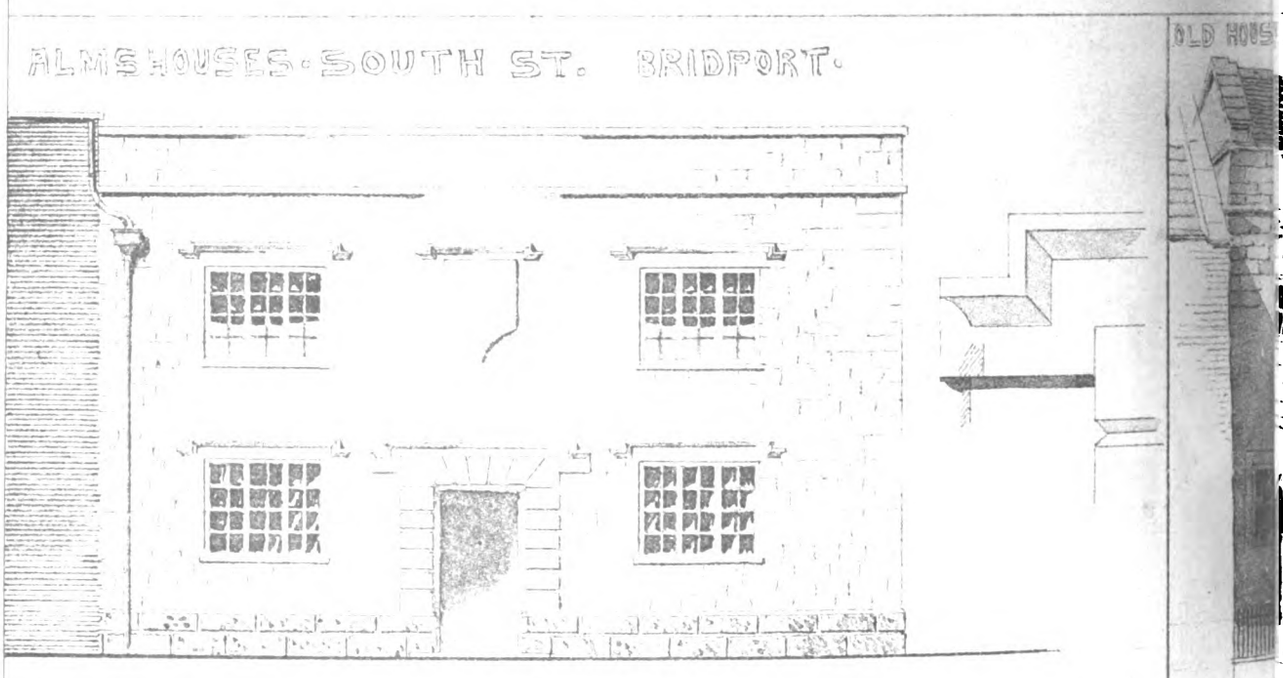

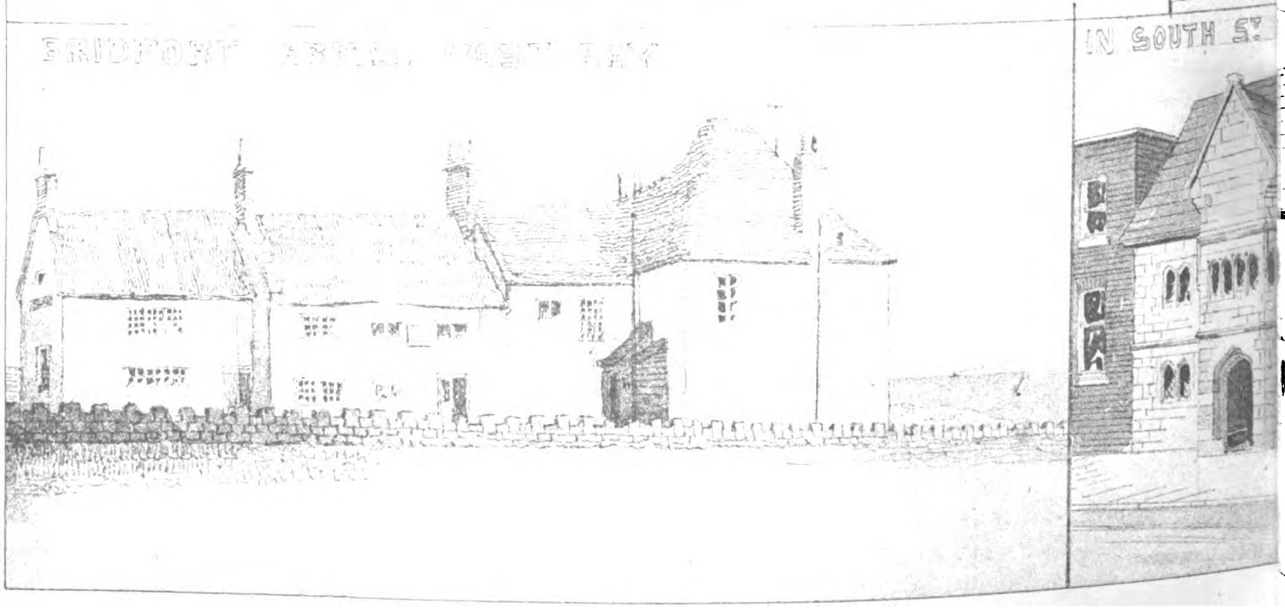

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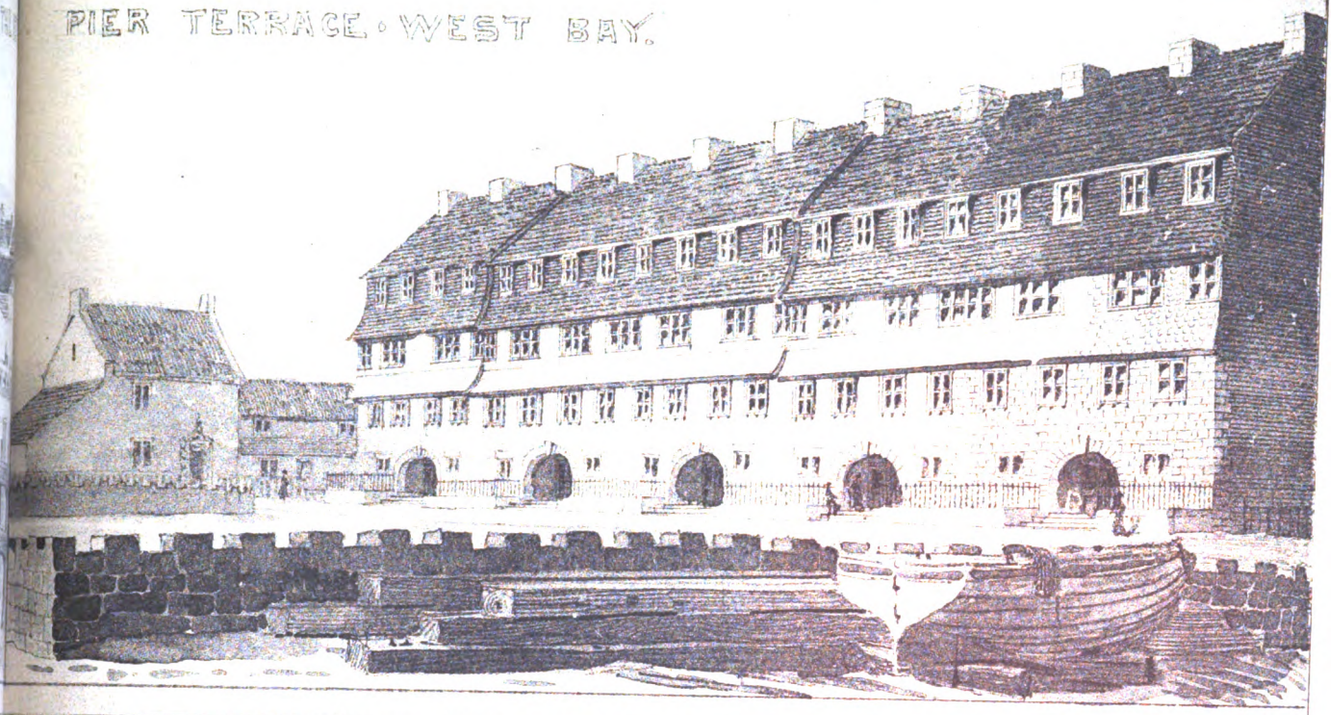

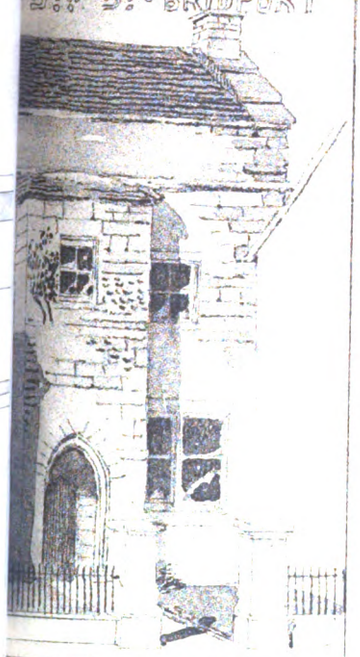

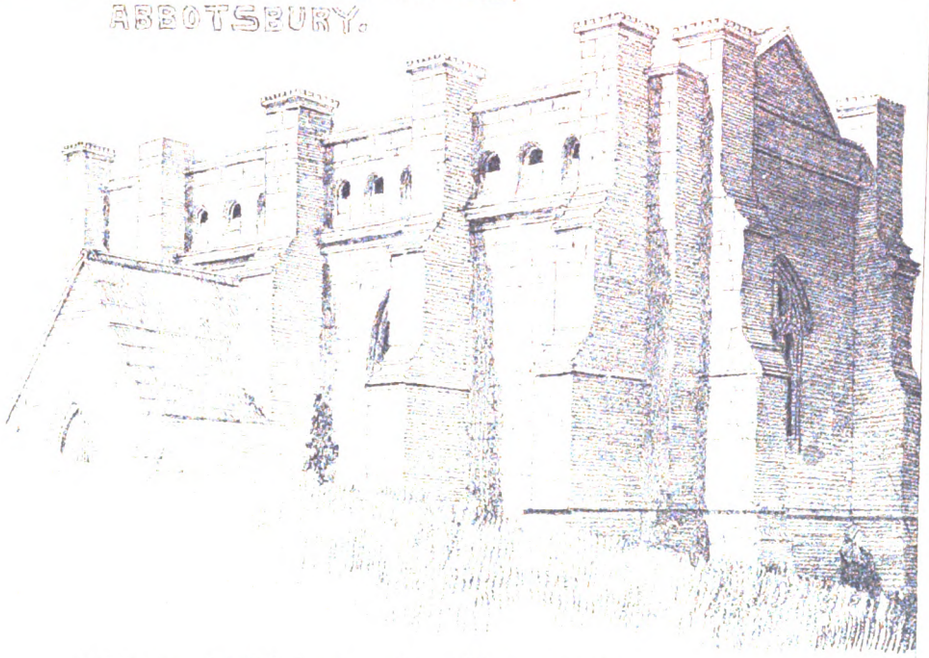

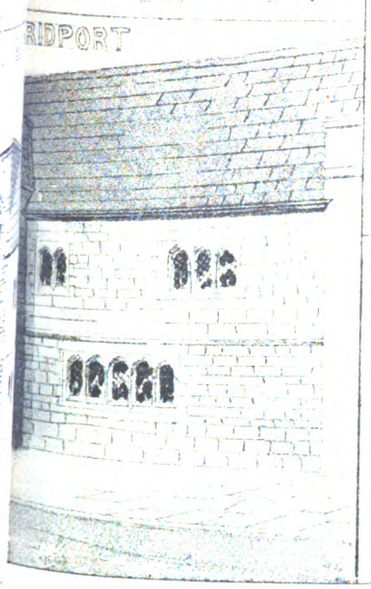

SKETCHES AT A DORSET WATERING PLACE

H·H·STATHAM·AUGUST·1903·

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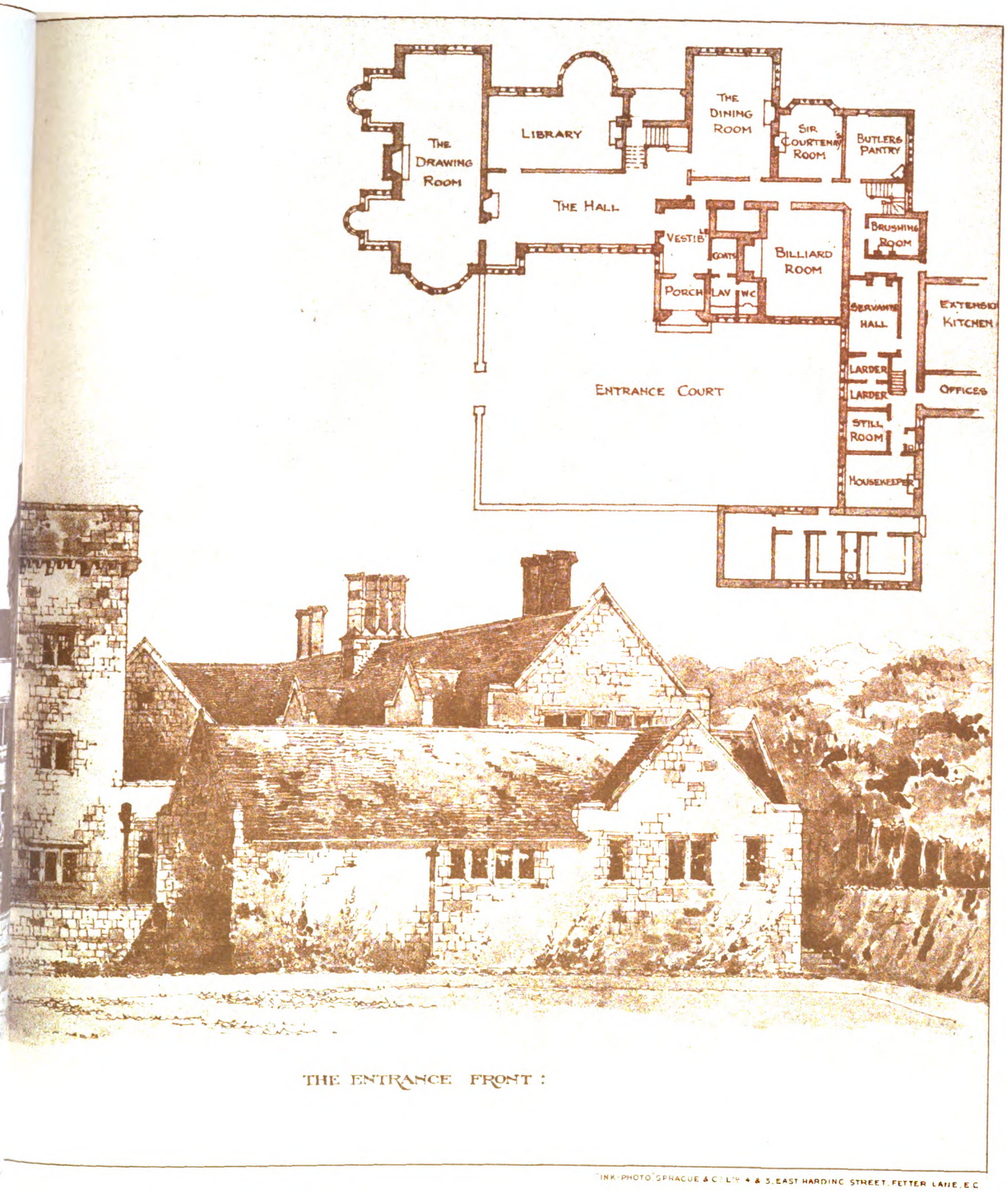

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The Builder.

VOL. LXXXV.—No. 3175. DECEMBER 12, 190

ILLUSTRATIONS.

Church of St. Peter, Lowestoft ..... Mr. E. P. Warren, Architect.
"Buckland," Brecknockshire ..... The late Mr. S. W. Williams, Architect.
Electric Generating Station and Offices, Ipswich ..... Messrs. C. Stanley Peach and C. H. Reilly, Joint Architects.

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Stockport Town Hall Competition.

STOCKPORT, like the majority of Northern manufacturing towns, has grown considerably in recent years, and, in process of expansion, has taken several smaller townships into its administrative authority. The proximity to Manchester and Liverpool, moreover, tends to increase its importance, and, being well served with railway, canal, and river communication, it is but natural that the city should anticipate continued prosperity. As it has, however, been developed from a series of detached communities, there is consequently no order in the lay-out of the thoroughfares; indeed, Stockport is as irregular and inconvenient as a large town could well be. Streets are hilly, narrow, occasionally passing under one another; there are no long stretches of roadway, and but few buildings possessing any merit.

Amongst other suggested improvements, the question of a new Town Hall has been before the Borough Council for some eleven years, but it was not until about six months ago that, a site having been secured, architects were invited to apply for selection to compete in designs for the new municipal buildings. From a large number of applicants thirteen competitors were chosen, but only nine sets of drawings were received. In our last issue we announced briefly the names of the authors of the premiated designs; we have since had the opportunity of inspecting the drawings.

The site is upon high ground, and, although containing a chapel, to be acquired at a later date, was considered as clear of all buildings, so that, having streets on four sides, some of which are eventually to be widened, the problem was simplified, and lent itself to a broad and dignified treatment. The form of the site is irregular, having only one side street (Eliza-street) square with the main front (Wellington-road South), which has an aspect of S.W. by W.; the remaining streets (Lacy and Edward streets) are both longer than those opposite to them, and no two streets are parallel; the ground rises considerably towards the rear, thus making the matter of levels in the buildings difficult. The accommodation required includes municipal offices and a town hall to seat two thousand people; the former included council chamber, committee-rooms, Mayor's parlour, offices for Town Clerk, Borough Surveyor, Borough Engineer, Treasurer, Collector, and Medical Officer, Gas, Electric Lighting, Water and Education Departments, etc. 60,000*l.* (inclusive of architect's fees) was the limit in cost, and this appears to us to have been one of the chief factors in influencing the assessor, Mr. T. E. Collcutt, in making his award.

The author of the drawings placed first is Mr. A. Brumwell Thomas, who has succeeded in producing, so far as external appearance is concerned, an excellent design, full of dignity, and withal honestly stone-like. The first impression gained from the plan is that this design is smaller in cubical contents than the other premiated schemes; the method by which this is principally obtained will be referred to later. A closer examination, however, reveals certain serious defects, and it is to be regretted that this admirable (in spite of the omission of scales and cardinal points) set of drawings should contain so great a number of the "tricks" which are often met with in competition designs; in this case the planning is so much affected by them that we feel compelled to draw attention to some of these inconsistencies. From the perspective view, which is most artistically treated, the roof of the town hall has been omitted, and one also searches in vain for chimneys, of which a very large number will be required; on the Eliza and Edward streets elevations the town hall gables and chimney from the heating plant are again left out; secondary staircases are planned in the side buildings to give access to offices and various other departments on several floors, and the plans show external doorways entering these staircases at basement and ground-floor levels; but the elevations give direct contradiction to such intention. There is no doubt that the main entrance-hall and staircase will have very little daylight, for although the plans indicate large staircase windows the section proves this to be a sheer impossibility, which is here admitted by the omission of the windows from the section; again, one of the two entrances to the council-chamber and the kitchen door opposite to it (through which access must be obtained during banquets in the committee-rooms) just escape three steps on the plan, but the section gives the correct relative levels, and the eight (nine, to be correct) steps there shown to ascend to the town hall floor-line instead of three, will quite prevent these two doors being constructed, and will necessitate a rearrangement of this important part of the design; the kitchen door should appear in the section, but is obliged to be left out. The report refers to the "public hall being at the same level as the Council suite," which is a statement at variance with both plan and section.

Coming to the actual planning, the town hall is placed on the east or highest part of the site at the rear, while the offices of the various departments are arranged on the three remaining sides. The committee-rooms (arranged *en suite* for banqueting purposes) and council-chamber are set in the centre of the quadrangle—a precaution against street noises. Most of the competitors have placed these committee-rooms on the street front. In this case, however, some considerable saving is effected in the length of the main façade; a reduction in the length of the side elevations is made by placing some of the offices below the end of the town hall, which does not appear to have been generally resorted to by other competitors.

A main corridor is carried through from the grand staircase past the council-chamber to the town hall, which is entered at a point half way down its length—an arrangement involving a procession of Mayor and councillors, upon civic occa-

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sions, through the greater part of the audience. Two large internal areas are formed within the buildings, into which no provision is made for the access of carts, machines, etc., and here it should be noted that the Council will have a large business in gas stoves and other appliances. A remarkable point in this design, and, indeed, in the second and third schemes, is that large boilers are shown in the basement for heating purposes, but no external door is arranged to admit of the boilers being removed or new ones brought in if found necessary. In each case the Borough Council would be compelled to pull down some of the structure to accomplish this operation. The public hall is lamentably deficient in the matter of provision for rapid emptying in the event of panic; moreover, the placing of seating accommodation round the walls is surely to be deprecated; nor is the central passage in the seats (only 4 ft. 6 in. wide) to be recommended. The stage is much too small for the purposes in which it would here be utilised; the gallery staircases are small and insufficiently lighted, and discharge into the main entrance to the hall instead of more directly into a street; the lavatory accommodation, especially for men, when the hall is filled is inadequate, and no urinals are provided. There are a number of defects in the offices, such as the Mayor having to go downstairs to the council-chamber; the adjacent lavatories to be used by the councillors and, in this case, by the Mayor, have inconvenient steps leading down to them in order to admit of the public balcony of the council-chamber being placed over, to which there is a long, bewildering public approach from Edward-street. The Mayor's parlour has no robing-room, and no sanitary convenience is provided for his use. The lavatory arrangement throughout is very deficient and inconveniently placed; this is particularly so on one of the plans, where an important borough official has to pass through his own clerk's office to reach the small convenience provided. The corridors serving the offices are but 6 ft. wide, which is still further reduced where pilaster projections occur.

These, then, are some of the points which will be found wanting in the actual working of this scheme. There are others, perhaps, less important, and at the same time many good points are shown in the plans; but, generally speaking, it may be said that the planning has been unduly influenced by the design of the fronts. The elevations are without doubt the best in the whole series of drawings submitted, and upon these considerable thought has been expended. It should, however, be noted that the massing of the parts does not arise naturally from the planning, and the external window treatment is obtained at the expense of some internal convenience. The skyline is most satisfactory, an effect which is enhanced in these drawings by the absence of chimneys. In making this criticism of the design placed first we have deemed it necessary to draw attention to its deficiencies, which, in our judgment, would have been sufficient to give at least two other schemes precedence, for it will be generally conceded that it is inadvisable to accept a building which is attractive to look upon (in this case incorrectly represented) at the expense of its working convenience.

Turning to the drawings placed second, designed by Messrs. Willoughby and Langham, of Manchester, they are at once seen to present a much more practical working scheme, in which a great deal of attention has been devoted to the small as well as to the more important requirements; but, broadly speaking, the treatment of both plan and elevation is unduly cut up and disturbed. The arrangement is, in general respects, similar to the first premiated design, except that the public hall is entered at the north end, and many of the points to which we have taken exception in the first scheme are here missing. The town hall is well planned, good provision being made for rapid egress. The authors have arranged side galleries, as asked for in the conditions of the competition (wisely omitted in the other premiated designs); and as the end gallery overhangs a very large part of the auditorium we cannot anticipate a success in the matter of acoustics. The council-chamber is horseshoe in form, placed in the centre of the site, and has a kind of ambulatory, or members' passage, around it from which too many entrances are provided into the chamber. The council cloakroom and lavatories are placed centrally in a top-lighted apartment, but this, although convenient, is much too strained for good planning, and we much question whether it would be permitted from a sanitary inspector's point of view. One of the defects of this plan is the great distance to be traversed by the Mayor and councillors from their chamber to the stage of the Public Hall; but perhaps the greatest drawback to this otherwise good scheme is that the cash office, where rates are paid, is placed below the council-chamber, and can only be approached by passing the grand hall and staircase; the constant traffic in this part of the building would prove a perpetual inconvenience. Too much space is given up to the main entrance-hall and stairs, which, taken with the semi-circular porch, is larger than required and too magnificent. Moreover, secondary staircases, with lifts, are provided for reaching the offices on the various floors; in the provision of stairs and passages this plan is very wasteful. The elevations possess that modern rendering of eighteenth century work, with which we are now familiar. The central part of the main front is massed round the entrance, and has a dome which recalls Greenwich Hospital, whilst the extremities of the main front are projected slightly, with a heavier treatment, leading up to a cupola. None of these domical features serve any practical purpose, and even a clock is missing, which would have provided an excuse.

The design placed third is, in our opinion, the best-planned building in the competition, being practically free from all the faults to which we have drawn attention in the first and second premiated schemes; indeed, the author, Mr. H. T. Hare, here shows a grasp and mastery of the subject of a municipal building. Whereas the first two plans show complete schemes, the one under notice is based upon future extension at a time when the chapel will be removed. We cannot imagine that any extension will ever be required, unless it be decided to house other administrative departments on the site. This design, however, is capable of being easily converted into a finished scheme by bringing the offices, now setting back from Eliza-street on the north, forward to the frontage line; this would, moreover, remove the only objection we have to take to the plan, viz., that some of the offices would look into an area when the extension was finally built. In cubical contents, however, this scheme is somewhat larger than Nos. 1 and 2, and is cubed at prices which we should consider too small; but this is a contingency which can be overcome without affecting the design to any great extent, and would not have prevented us reversing the order of the assessor's selection. The council-chamber, horseshoe in shape, and provided with an ambulatory, is placed centrally, but the town hall is on the south, or right-hand side, of the site, the stage end of which is conveniently provided with access from the municipal building. The planning of the offices of the various departments is admirable; corridors and staircases are well-lighted, ample in size and not wasteful; all departments are made distinct and self-contained, and the entrances are separate, and do not involve the traversing of passages of other departments, which is more than can be said for the two schemes which receive the assessor's preference. Eighteenth century English Renaissance again supplies the theme for a design with a good feeling for stone treatment. A large clock tower is placed on the Edward-street front.

The design by Mr. C. R. Locke, of Southport, is placed fourth. This is quite a departure from the general run of the arrangement of the departments. The main entrance and staircase are placed at the corner of Wellington-road South and Edward-street, but serve no great purpose, for the stairs do not lead up to the council-chamber, which is again placed in the middle of the site, but is here too much mixed up with the offices. The town hall is intended to face Eliza-street on the north. The entrance is much too small, and quite inadequate for audiences of 2,000 persons. A great number of offices look into areas on three floors, amongst them the Town Clerk's private room and the deputy-Town Clerk's office! The elevations are very busy and the scheme generally too costly.

Messrs. Briggs and Wolstenholme are placed fifth, and their design is illustrated by a splendid set of drawings, but the planning is wanting in the elements of the subject. The council-chamber, the most important room in the scheme, is square in form, and placed next a noisy street, on the south side; one door only is provided, through which all ingress and egress is to be made; moreover, that door is placed at the end of a long corridor, exposing the Mayor and officials to some unpleasant draughts. Again, the main stairs and council lavatories are situated a long way off; the upper ground plan shows how the staff in the various offices would require to cross the landing at the head of the grand staircase to reach their conveniences. The main entrance is placed on the east front, and is marked by a large tower. The public hall is at the back, next Lacy-street, and here again a central lateral entrance is provided for the Mayor and councillors.

Mr. J. S. Gibson is disappointing. Although following the general placing of the departments by the other competitors, his plans show many inconvenient and unpractical details. The council-chamber could be much improved in its approaches,

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and it is difficult to understand why so many offices look into areas where corridors might be more advantageously placed. The elevations are well designed, and show a praiseworthy restraint in treatment. The town hall main entrance has been set back and a carriage drive allowed for, but this has had the effect of making the south front a series of receding planes.

Messrs. Darbyshire and Smith locate their council-chamber over the main entrance, where most noises will be found; a dome is placed above it. The style employed is a kind of Renaissance very much overdone.

Messrs. Brady and Adshead have a good plan. Their whole design is kept very small in scale, and is wanting in vigour, the low elevations and small windows giving the impression of a building of much less importance. The town hall is on the north side, and has side galleries; the placing of the doors side by side to men's and women's cloakrooms and conveniences is bad. The Mayor is supposed to go up and down stairs to and from the council-chamber, and no robing-room and separate lavatory is provided for his use.

Messrs. W. Hill and Son, of Leeds, send a design with good fronts, but with a plan which does not call for any comment.

Looking broadly at the drawings submitted, this important competition has not produced a very high standard of excellence in design. It is true that four competitors failed to send in, but we could have wished for a better selection of competitors. The assessor's award leaves much to be desired, for, as before stated, we have very little hesitation in saying that after a careful comparison of the schemes we should have reversed the order of the three premiated designs. It is understood that the Council have not yet confirmed the award or made a final selection.

NOTES.

Municipal Loans. ANYTHING which Sir Michael Hicks Beach, as a former Chancellor of the Exchequer, has to say on financial questions is worth consideration. His advice, given to the Corporation of Cheltenham last week, that for a time municipal and local bodies should issue as few loans as possible, cannot be passed over. The value, says the late Chancellor of the Exchequer, of municipal securities has fallen because there are too many of them on the market; it is, in fact, glutted with high-class securities. When this is the case it follows, of course, that a smaller amount, and at higher interest, is subscribed when a local authority comes to borrow from the public. But, while this advice is certainly sound from a financial point of view, it seems to be given with a want of perception as to the needs of local authorities. A Corporation which has to create, for example, a new system of drainage must borrow the money for it. We believe that English local authorities are by no means rash in launching new undertakings, otherwise their financial credit would not be as good as Sir Michael Hicks Beach says it is. It would be a matter for regret if his advice caused local bodes to defer necessary sanitary and other public works. By all means let these be undertaken after due consideration; but a local authority is not a business syndicate to issue or defer the issue of stock according to the demands of the money market.

Secret Commissions and House Agents. HOUSE agents will do well to study the case of Andrews *v.* Ramsay and Co. in the Law Reports for the current month, since it was alleged the case decided a new point. The plaintiff was a builder who instructed the defendants, who were auctioneers and estate agents, to sell a property for him for 2,500*l.*, agreeing to pay them 50*l.* as commission. After sundry negotiations a sale was effected at 2,100*l.*, and out of the deposit paid by the purchaser to the defendants, the defendants, with the consent of the plaintiff, retained 50*l.*, the amount of their commission. It subsequently came to the plaintiff's knowledge that the defendants had also received 20*l.* as commission from the purchaser, and he brought an action against the defendants to recover this 20*l.* commission, and the money was paid into court. The plaintiff then sued the defendants for the 50*l.* they had received as commission from him, on the grounds that as the agents had created an interest for themselves in the sale they were disentitled to any commission from the plaintiff. The court gave judgment for the plaintiff, and hence the defendants received nothing at all in respect of the transaction, although the plaintiff had had the benefit of their services. So stated, the case may appear a hard one, but the reasoning is entirely satisfactory. The purchaser was evidently willing to give more for the property than the price agreed upon by the agent, since he paid the agent 20*l.* for commission; a secret profit which the vendor was entitled to as part of the purchase money.

Testing Electric Generators. THE paper on the testing of electric generators by air calorimetry, which was read to the Institution of Electrical Engineers last week by Professor Threlfall, is a very important contribution to practical electrical engineering. Methods of air calorimetry are well known in physical laboratories, but hitherto they have not been used in engineering work. The method was invented by Professor Threlfall in order to measure the efficiency of a 400 h.-p. electric generator which practically formed part of the engine to which it was coupled, and could not therefore be tested by the ordinary brake methods. He enclosed the generator in a roughly-made wooden case and supplied air to it by means of fans. The air first passed through a pipe to the case, and its velocity in the pipe was most accurately measured by a simple form of anemometer which the lecturer proved to be a trustworthy instrument. The temperature of the air entering and leaving the case was measured by ordinary thermometers. Now practically all the electric energy wasted in the generator goes to heat the air passing through the case, and since the specific heat of air is known, we can measure by this method the losses in the generator itself. The electrical output of the machine is measured easily by an ammeter and voltmeter, and thus the efficiency of the generator can be calculated to a high degree of accuracy, as an error of one per cent. in measuring the losses will only introduce an error of one-tenth of one per cent. in the value of the efficiency deduced. In the discussion, Dr. Glazebrook mentioned that experiments were being carried on at the National Physical Laboratory on the method used by Professor Threlfall to measure currents of air and that the results obtained practically confirmed the method. We consider this method of testing generators well worthy of the attention of manufacturers, and we see no reason why it should not be considered as a standard method of testing generators.

Fenders on Electric Cars. A DIFFICULTY not yet surmounted by tramway engineers and car builders is the design of a really satisfactory fender, or "cow-catcher." The cars of the London County Council tramways are provided with a fixed guard, which is evidently intended to scoop up any foot passenger who may fall in the way of a car. As the lip of this contrivance is several inches above the roadway, it is not at all certain that the expected result will be obtained, except, perhaps, in the case of a rotund person of large diameter and clothed in closely-fitting attire. There is danger that a child might be jammed between the lip and the roadway, and that the clothing of a woman would be caught in a similar manner. The only mishap of which we have heard on the County Council lines was the case of a young woman who was knocked down by an electric car and scraped along the road for fifty or more yards before the driver could pull up. This was clearly a case of clothing being caught. An inquest held a week or two ago at Teddington, regarding the death of a boy by one of the electric cars of the London United Tramway Company, makes evident the fact that the most approved life-guards are not worthy of their name. In this case an automatic cow-catcher was available, an appliance that could be controlled by hand, but it would also work automatically. From the evidence given before the Coroner, it appears that although the space between the guard and the track was only supposed to be five inches, the child was found fixed in the mechanism between the front wheel and the "cow-catcher." The body was so jammed that it was found necessary to remove the bottom boards of the car before it could be extricated. This result scarcely justifies the claim of the apparatus to be called a life-guard, and if, as stated by the engineer to the tramway company, this is the best appliance of the kind in Europe, enquiry should be made for something better in other parts of the world.

Memorial House to Melanchthon. IN Germany a great man's "Geburtshaus," or "Wohnhaus," is commonly regarded as well-nigh sacred, even if it possesses in itself no particular architectural interest or value. A strong appeal was made not long ago to the Grand Ducal Government of Saxony against the projected conversion of the Luther house at Eisenach into a restaurant. At Bretten, in Baden, a notable atonement, so to say, has recently been made to the memory.

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of Luther's contemporary and fellow-reformer. By the care and labours of Professor Nikolaus Müller, of Berlin, a memorial house has been built on the site of that in which Philip Melanchthon was born on February 14, 1497. The French destroyed the original house in 1689; six years ago its successor was pulled down. A ceiling in the new house is a copy of that of Melanchthon's study at Wittemberg; the rooms are equipped with portraits, MSS., coins, letters, and other exemplars relating to Melanchthon and his times, and the library contains first editions, mostly in duodecimo, of nearly all his works.

The Art Union of London. We have received a copy of the print issued this year, as usual, to its subscribers by the Art Union. It is a powerful and highly-finished etching by Mr. C. O. Murray from Mr. Stanhope Forbes's recent Academy picture, "Good-bye! Off to Skibbereen." This is one of those popular subjects of real life which are, we suppose, the kind of work most welcome to the majority of the subscribers; but, as in many other cases, the reproduction is unnecessarily large for the subject, and seems designed to satisfy the class who want a good large engraving on their walls of some subject they can understand, rather than anything representing the higher intellectual quality of art. At the time this annual Art Union bonus to subscribers was started, this was perhaps all one could get people to care for; but things ought to have got beyond that now. We should like to see the Art Union taking more pains to educate the people to the idea that quality is more important than quantity in black-and-white work, and that it is not the main purpose of the art of painting to depict realities of everyday life.

The Goupil Gallery. The exhibition now open at the Goupil Gallery contains in the first room a small collection of exceptional interest—studies and sketches by modern French painters, living and dead. It is seldom we get these in England. We find Daubigny, the landscape painter, represented by two sketches of interiors; and M. Jacque, another landscape painter, by studies of figures. By Diaz, on the other hand, there is a very slight pencil sketch of a forest scene which is Diaz all over—you can see in it the germ of his finished pictures at a glance. A very fine pencil study by Corot, "The Road to the Village," is probably an early work; one or two smaller ones indicate his later style. Among the other things in this room Mr. Haité's "The Cornfield" is a very fine study, and we are inclined to think he shows better in black and white than in colour. There are other fine studies by Troyon and by M. Fantin-Latour. The second room contains a selection of water-colours and pastels of unequal interest. Among the best are Mr. Robert Fowler's "Liseuse," a figure study somewhat in the manner of M. Fantin-Latour; Mr. Leslie Thomson's fine competition called "On the Blackwater," where a stranded ship rises up in the centre of the scene; Mr. Tom Brown's "Forsaken" (which should rather be called "Marooned"); and a little study called "Moonrise," by Mr. Roger Fry. There is a collection of Mr. Brabazon's colour-blottings, of which Nos. 102 and 116 are really too bad; there is a feeling for colour in others; but drawing comes first in all sound art. In the third room is a large collection of sketches by Whistler, some of them interesting, others worth little; it is a sample of the kind of absurd Whistler-worship of the day that such a thing as that called "nude study (*sanguine*)"—a minute red-ink scrawl in bad drawing, should be thought worth placing in an exhibition; it would be kinder to the painter to have kept it out of sight.

The Fine Art Society. At the Fine Art Society's Gallery is a collection of landscapes in water-colour by Mr. Sutton Palmer, exhibited under the general title "North and South." Here, at all events, there is no pretension of substituting scrawls and blots for finished art; these are landscapes showing most conscientious study of detail, while pervaded no less by a feeling for the beauty and the poetry of nature. "A Surrey Woodland, Spring-time" (12) is redolent of spring, Among the best of the others are "A Surrey Wilderness" (29), and "Near Newbury" (38); these are among the smaller drawings, but they are remarkable for their fine broad style. Among the highly-finished pictures "A Woodland Pool, Surrey" (52), if a little wanting in breadth, is quite perfect in truth and delicacy of representation; even the cattle, on a very small scale and not important objects in the picture, are conscientiously studied. The whole collection is a very satisfying one.

Holland Fine Art Gallery. At the Holland Fine Art Gallery in Grafton-street there is a small collection of pictures chiefly of the modern Dutch school on view. There are some very good names—Mauve, W. Maris, and J. Maris, but not represented quite at their best; W. Maris's "Ducks" has hardly enough subject for the size of the picture. Among the best are some works by M. de Bock, especially the landscape numbered 40—"The Marshes," a fine and artistic composition. A landscape by Gabriel, "The Farm" (22) has much beauty. Among the architectural interiors by Bosboom, which always seem made after one pattern, a small "Church Interior" (5) is very successful, and leads to the conclusion that his peculiar manner of treating interiors is really more suited to a small than a large scale.

New Buildings in Aldwych. We are glad to learn that Messrs. A. Marshall Mackenzie and Son, of Aberdeen, are to be the architects for a large and important building, a new hotel, in the new street Aldwych; not by any means that we wish the architecture of this new street to go out of the hands of London architects, or that we think there was any necessity to go to Aberdeen for it; but we are glad to hear that an architect who is an artist has been selected, whether Scottish or English. It is to be hoped the architecture of Aldwych will now show something better than the unfortunate commencement which has been made at the east end of the street.

THE APPLIED ART EXHIBITION AT CHELMSFORD.

The prospectus which we received a month or two back of the Applied Art Exhibition which it was proposed to hold in the Shire Hall at Chelmsford from December 1 to December 5, conveyed the impression that this was a kind of popular bazaar rather than an enterprise in the cause of Art. The announcement of a cinematograph, a band, and excursions in a motor-car, were calculated to convey this impression, which, however, a visit to the exhibition has entirely altered. In the preface to the catalogue we observed that a kind of apology was made for these lighter entertainments, on the ground that the management wished to attract all sections of the community, and that there might be people, "even in the enlightened County of Essex," who required a little amusement with their art. In reality the exhibition deserved great praise, and was a genuine attempt to arouse a little interest in applied art in the neighbourhood, and give illustrations of its meaning.

The first room, the "Ball Room," did not fully illustrate the objects of the exhibition, and showed rather a miscellaneous assortment of what might be called trade exhibits, some of them not very remarkable; but there was a good collection of lace by Messrs. Wilson of London; illustrated books on ornamental design lent by Mr. Batsford (we did not see these, but they are in the catalogue), decorated leather work by Miss Ellen Sparks (Chelsea), and two pianos by Messrs. Brinsmead, with well-designed and not commonplace cases. In the centre of this room, however, was a remarkable exhibit—a beautifully executed ½ in. scale model of the Westminster Cathedral, lent by the Cathedral authorities, and which has not before been publicly exhibited. This was really worth coming to see.

In the "Jury-room," on another floor, we found a good exhibit of the Essex Art Pottery, a local product, though the clay used in it comes from Devonshire. There was a great deal of good work in this, with the additional and very useful attraction of the actual manipulation of the clay on a wheel, which seemed to excite great interest. Messrs. J. Osmond and Son (London) showed a collection of decorative wood-carving, including some very good and artistic work.

The real point of the exhibition, however, became manifest in the third room, called the "Picture Room." Round this were a series of tables at which a number of young ladies, all dressed in a pretty and effective kind of uniform, were seated, engaged in the fabrication of various classes of art workmanship. All these ladies, we gather from the catalogue, are students of the local Art School. One of the objects of the exhibition is stated to have been "to show what excellent results have been produced under most disadvantageous circumstances by the students of the Chelmsford Art Classes, and to raise funds towards the fitting and equipment of the new Chelmsford art buildings." A visit to this room was enough to convince any one that the Chelmsford Art School is a success and is doing excellent work; and the actual processes of book-binding, tile and china painting, repoussé work, gesso work, intarsia, etc., form an exceedingly useful exhibition to bring before general visitors, who would thus get (many of them, probably, for the first time) an idea of the way in which these applied arts are really produced. Among the work done and partially finished at the exhibition were some book-bindings which would have done credit to any art and crafts exhibition.

In a small room between the two last-named, for the entry to which a small fee was charged (probably with the view of avoiding a crowd of visitors who would have rather impeded the demonstration) the "new three-colour" process of photographing in colour was illustrated and explained.

We had great pleasure in visiting the exhibition, and hope that it will have the effect desired, of stimulating interest in applied art in the neighbourhood, and assisting towards providing a new building for the Art School. Great credit is due to Mr. F. A. Fawkes, the Hon. Secretary and organiser of the exhibition, for a spirited and well-meant effort to assist and promote local art study and art-production in this manner.

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THE ARCHITECTURAL ASSOCIATION.

THE usual fortnightly meeting of the Architectural Association was held on Friday evening last week in the Meeting room of the Royal Institute of British Architects, No. 9, Conduit-street, W., Mr. H. T. Hare, President, in the chair.

The minutes of last meeting having been read and confirmed, and some nominations having been read, the following gentlemen were elected members of the Association: Messrs. C. J. Stewart, B. H. Collcutt, and P. G. Crawley.

New Premises Fund.

The President then announced the following further list of donations to the New Premises Fund:—Messrs. C. F. Selby, 5*l.* 5s.; H. W. Lonsdale, 5*l.* 5s.; W. C. Butterworth, 3*l.* 3s.; Geoffry Lucas, 2*l.* 2s.; "L. F.," 2*l.* 2s.; J. W. Wyles, 2*l.* 2s.; H. W. Braddock, 1*l.* 1s.; J. B. Gridley, 1*l.* 1s.; A. S. Hewitt, 1*l.* 1s; H. A. Legge, 1*l.* 1s.; and E. F. Cobbs, 10s. 6d.

On the motion of the President, a vote of thanks was passed to the donors.

Mr. Louis Ambler, Hon. Secretary, announced that a meeting of the Camera and Cycling Club would be held on December 9th, when a demonstration would be given by the Lumière N.A. Company, Limited, on "Colour Photography." He also announced that a Discussion Section meeting would be held on December 16th, when a paper would be read by Mr. A. O. Collard on "The Work of an Exhibition Architect."

A vote of thanks was then accorded to Mr. Maurice B. Adams for a donation of old prints of the Royal Architectural Museum (on exhibition that evening).

A vote of thanks was also passed to the donors of lantern slides as follows: 51 slides of Gothic work, presented by Mr. W. Wonnacott; 27 slides of Classic and Gothic works, presented by Mr. G. H. Lovegrove; 48 slides of Gothic and Renaissance works, presented by Mr. Alan Potter; 5 slides of Beauchamp Shopland, Essex, presented by Mr. J. G. Collings.

A vote of thanks for the following donation to the library was accorded to Mr. B. T. Batsford: "The Drainage of Town and Country Houses," by G. A. T. Middleton.

Photography for Architects.

The following paper by the Camera and Cycling Club on "Photography for Architects" was then read by Mr. Francis R. Taylor.

MR. PRESIDENT AND GENTLEMEN,

The Architectural Association Camera and Cycling Club fully appreciate the honour conferred in devoting this evening to the subject of "Photography for Architects." It must be stated at the outset that as the question of photography and sketching is to be considered at a joint meeting of the Architectural Association Discussion Section and the Architectural Association Camera and Cycling Club, no discussion on that is intended to-night.

The work of the club is in itself sufficient evidence to show that photography has a useful sphere of action in architectural work. There are, however, many in our midst who consider that photography is opposed to the best traditions of the study and practice of architecture. It is therefore the purpose of this paper to put before you facts which will prove that photography for architects possesses a value both in the study and practice of architecture which cannot be overlooked.

The subject will be dealt with under two main heads, viz.:—

The utility of photography in

1. The study of architecture.
2. The practice of architecture.

and the apparatus and appliances for architectural photography will then be briefly considered.

The Study of Architecture.

The usefulness of photography in the study of architecture will be considered with reference to its value in educational work, and also to its value as a record of old work. Photography in its application to the study of architecture is simply a means of delineation, and it is the finished photographic print or lantern slide which is the valuable aid to study.

Photography should not be considered as antagonistic to sketching. It has a utility in the education of the architect by producing an accurate delineation of old buildings unattainable by a sketch. It must not be forgotten that however valuable a sketch or measured drawing may be to the individual student who prepared it, there is the personal error to bear in mind when this method of delineation is applied for general study.

Photographs in conjunction with measured drawings undoubtedly form the best means for architectural study and research. It may be mentioned that in the Architectural Association Sketch Book there are examples of measured drawings together with a photograph of the work. This method of illustration might be employed with advantage to a much larger extent, not only in the Sketch Book, but in all architectural publications. Whenever any old building of interest is to be pulled down to make way for modern improvements or for other reasons, a set of measured drawings with a series of photographs form the best record of the old work. In record work research should be made as to how the building has fulfilled its purpose and how its environment affected its design. To obtain this knowledge the employment of photography is a valuable assistance.

The method adopted for the training of architects by a system of instruction in classes has its value considerably enhanced by using photography as one of the means of illustration. The use of the lantern slide in lecture work is a great step in advance of the ordinary lecture diagram. It is essential, in order to make the instruction imparted by lecture work of the greatest value, that the illustrations employed should receive concentrated attention whilst the various points are being explained. Diagrams specially prepared for lecture work are in the majority of cases of but little avail, and it is impossible for the lecturer to satisfactorily explain from them, even to an average-sized class or meeting, the various points dealt with, simply because they cannot be properly seen from every part of the room, and, besides, in most instances, are badly placed for the lecturer's use. Frequently the walls of the room are smothered with measured drawings, plates from the building papers, and similar illustrations, and an attempt is made to explain some points when only one or two present can see the illustration referred to. One does not object to illustrations of this kind on the walls if they are simply intended for those present at the meeting to see for themselves before or after the lecture, but to use them as lecture diagrams is really the height of absurdity.

But all these difficulties are obviated by employing photographic means. Lantern slides of the actual work, of measured drawings, of illustrations from books and other publications—in fact, of illustrations from every available source, can be thrown upon the screen, can easily be seen by every one, and enables the lecturer's explanation to be understood by all.

Lantern slides for architectural lectures should be made with a view to suitability of purpose. Photographs of buildings, both externally and internally, would be useful to illustrate the grouping and general effect, and then should follow photographs of towers and spires, of piers and arches, of caps and bases, of doors and windows, of vaulting, etc., to illustrate the treatment of the parts, and, lastly, of mouldings and ornament. If a systematic sequence is followed, the slides would be of immense value in promoting the study of architecture.

In illustrating constructive subjects, the same principles should be adhered to—explanatory lantern slides to illustrate the manufacture and uses of the various materials, and then slides showing the different methods of construction.

Measured drawings, sketches, book illustrations, and, in fact, every process of delineation can be brought within the scope of the optical lantern. The possibilities of the usefulness of lantern slides in educational work is practically unlimited.

The slides themselves should on no account represent more than is required. Simplicity should be our guide in these matters. All diagrams, book illustrations, etc., should be represented on the screen as large as possible. The attempt to crowd many illustrations in one slide should be condemned. A lantern slide for lecture purposes should not consist of a confused jumble of details with meaningless letters or figures. It is bad enough in a text-book, but infinitely worse in a lantern slide. The object of all study is to gain knowledge, and not to cause confusion.

The use of telephotography in the study of architecture is one which should receive our careful consideration. In many instances parts of a building well worth studying are inaccessible for measuring, and in those cases an ordinary photograph gives a general idea of the composition and a telephotograph the details.

The Practice of Architecture.

The utility of photography in the practice of architecture might receive far more attention than it does. In many instances the only use to which photography is put in architectural practice is in the reproduction of drawings by the ferrogallic process. In this process the reproduced drawings are either on a thin paper, or on a paper similar to Whatman's, and a black or brown line is obtained on a white ground. The advantage of the process is that the reproduced copies can be coloured similarly to an original drawing. A great saving of time is effected, because from one complete set of tracings any number of reproductions can be obtained. If the reproductions are to be kept for a considerable time, as in the case of copies for the Authorities, care must be taken in the selection of the paper owing to its tendency to fall to pieces after a time. For this reason the authorities will only accept photographic reproductions on linen. The makers of the paper might consider the best means of surmounting this difficulty. It may be mentioned here that some of the papers used shrink slightly in the process of obtaining the reproduction—this emphasises the necessity of fully dimensioning all drawings. The ferro-prussiate process with a white line on a blue ground is sometimes used, but as colouring is then out of the question, it is not so suitable for general architectural work. Its use is limited to drawings where colouring is not essential, as, for instance, in details of steel construction.

Besides this special application, the use of photography in architectural practice is generally limited to what may be termed the legal phase of our profession, although a wider application would be a distinct gain. No one will deny that photographs of buildings about to be pulled down are valuable records, and in ancient light, easement, party structure, and such-like cases would always be useful on one side or the other. If the building happens to be one of considerable architectural interest, then the value of the record cannot be overrated.

In modern work, photography could be used to increase our knowledge and experience in a way little thought of, and the wonder is that it has not been more generally applied for the purpose.

Photographs of a building at its various stages of erection, with the dates, and in some instances the time, noted thereon, would be a valuable record of the class of work, and, in addition, would be very serviceable in the valuation of certificates. Photographs of special works of construction in buildings of a distinctive type would be most useful for future reference when dealing with similar works.

Photographs of the finished building should in all cases be obtained, and a comparison made by showing the photograph side by side with the perspective drawing. With reference to comparisons, a collection of photographs of similar detail and ornament of old and modern work would prove of use both in the study and practice of architecture.

The practical use of photography in delineating the progress of a structure from time to time is employed by engineers with the best results, and there is no reason why we should not do likewise. In a few isolated cases it is done, but it rests with the profession at large to avail itself of the opportunities within its grasp. This legitimate use of photography in our every-day practice would assist in grappling with many difficulties with an ease at present unknown.

The utility of photography in the study and practice of architecture having been dealt with, it now remains to deal with the technical part of the subject. It is evident that in order to obtain the best results in the application of photography to the study of architecture the taking of the photographs should be performed by ourselves, otherwise the photographs or lantern slides will not express the subject in the best way.

It is impossible for a professional photographer to know exactly what is wanted unless he happens to have made a thorough study of architecture, and we know that in the majority of cases he has simply a mere smattering of our requirements. If his speciality is architectural photography, his knowledge of architecture may, in a general way, be said to be peculiar, and not, by any means, extensive. Consequently, if the work is to be done well, the

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photographs and lantern slides should not be left in his hands for selection of subject. There may be exceptions, but the exceptions prove the rule. It might, of course, be urged that the professional photographer could do the work under our guidance, but it will be found that this method is expensive, and is, in reality, only applicable in those instances where selection of subject is not required to any great extent.

It is desired to make a thorough record of an old building. Here the best way to proceed is to make measured drawings of the building, and a complete series of photographs. Who is most capable of taking the photographs? Unquestionably, he who undertakes the recording of the old work. Again, in detail and ornament, who knows which is best to select for architectural purposes? Certainly not the professional photographer, for he would be in a state of bewilderment, whereas the architect would not have the slightest hesitation about the matter. In the many requirements of architectural practice where the question of architectural selection does not arise, the photographic work can with advantage be delegated to the professional photographer.

The architect who decides to use photography as an aid in his study and practice should understand certain technicalities of photography. The questions which present themselves are:—

What is the best camera for architectural work?

What lenses should be used? What photographic plates and papers should be employed?

Dealing with the questions in order:—Firstly, What is the best camera for architectural work? Before anything can be done, the size of the camera must be decided upon. The ordinary sizes are: 4¼ in. by 3¼ in. (quarter plate); 6½in. by 4¾ in. (half plate); 8½ in. by 6½ in. (whole plate); 10 in. by 8 in.; and 12 in. by 10 in. It is generally agreed that the larger sizes are the best for architectural work. But the larger the size the more expensive it will be. Besides this, the weight of the camera is a serious matter, especially as in the majority of cases the work would be done at a distance from home. For these reasons it may be conceded that the half plate is the most serviceable. When lantern slide work is contemplated, the quarter plate is generally selected, as that is the most suitable size for the purpose.

If a good lens is employed, the quarter plate size might be used for all work, as the photographs can be enlarged with satisfactory results.

The requirements for a good camera are:—

1. Lightness, with rigidity.
2. Rising and falling adjustment to the front of the camera.
3. A reversing and swing back.
4. A long extension.
5. Parallel bellows, or only slightly conical.
6. Focussing screen and focussing adjustment.
7. Double dark slides.

The lightness of a camera is necessary for convenience in carrying about, and rigidity is required to prevent movement whilst the photograph is being taken. The rising and falling adjustment allows the position of the photograph on the plate to be varied. In architectural work a considerable rise is frequently required. The reversing back is essential in order that the photograph can be taken in a horizontal or vertical position. In many cases the camera must be tilted to include the whole of the building, hence a swing back must be provided, for the plate must be kept vertical, otherwise the vertical lines of the building would converge in the photograph. A long extension provides for the use of a long focus and telephoto lenses.

Parallel bellows prevent the cutting off of the edges in the photograph when a short focus lens is used.

The focussing screen is the sheet of ground glass upon which the photograph is depicted. It is adjusted to obtain a clear, sharp image by means of a rack and pinion movement. The double dark slides hold the plates for exposure, and at least three, or, better, six, double dark slides should form part of the outfit. The question to decide in the selection of a tripod stand is one of rigidity, compactness, and portability.

Secondly: What lenses should be used? It is best to provide in an outfit for architectural work a set of lenses of different foci and of a good make. The lenses should be of a rectilinear type. For average work the rapid rectilinear of about 7 in. focus is most serviceable on a half plate. Long focus lenses are useful in detail work, and wide angle lenses are essential in confined positions.

The telephoto lens would be a most valuable acquisition in the equipment. Some of the best examples of detail work are at too great a distance from the position available to give a photograph of a satisfactory size, but a telephoto lens enables you to obtain it to a larger scale with the same extension of camera. As this lens is not of a fixed focal length, the scale of the photograph can be altered at will.

Thirdly: What photographic plates and papers should be employed? Ordinary plates of a good make are the best for architectural work, especially for interiors, although in dark interiors, where very long exposures are requisite, rapid plates may be used with advantage. Isochromatic plates are useful where the lighting of the interior is yellow. In interiors where the light from windows, etc., would be likely to cause halation it is necessary to use backed plates.

The development of the negatives requires care on the part of the operator. The developer which the majority of workers prefer for negatives is one of the pyro formulæ—either pyro-ammonia of pyro-soda—and there is no doubt that a very wide latitude is given by the use of pyro. Hydrokinone is a cleaner developer, and for that reason is the one generally selected for lantern slides—it has not the wide latitude of pyro, but in lantern slide work this is not so important. The method of procedure cannot be discussed now. It may be mentioned, however, that the architect-photographer should do his own development, and not follow the advice expressed in the well-known advertisement phrase of "You press the button, we do the rest."

The chief printing processes can be classified under four heads, viz.:—(1) Silver printing-out processes; (2) platinotype; (3) carbon; (4) bromide; and the decision as to what processes should be adopted depends upon circumstances.

A silver printing-out process such as the well-known P.O.P. of various makes, produces excellent results, but if permanent photographs are required, then platinotype or carbon processes should be used. For enlargements, bromide papers are most satisfactory. The advantages of the various processes can be best judged of by the numerous prints which will be placed before you for inspection.

The chief printing processes can be classified as follows:—

1. Printing-out processes.
2. Processes requiring development.

Printing-out processes include all the processes in which printing-out is resorted to. The albumen silver paper is an example, and at one time was the one generally employed. The gelatino-chloride of silver printing-out paper, commonly called P.O.P., has to a large extent superseded it. The P.O.P. of various makes, with suitable toning and fixing, produces very effective results.

The processes requiring development are best exemplified by platinotype, carbon, and bromide. If permanent photographs are required, then platinotype or carbon processes should be decided upon. For enlargements, bromide papers are most satisfactory. The advantages of the various processes can be best judged of by the numerous prints which will be placed before you.

The architect photographer, being fully equipped, now sets forth to take photographs. He makes a selection of some old building, and, if he be an earnest worker, he does not, as is often thought, make a tremendous rush at it. Whilst long exposures are being given he devotes his time to finding out all he can about the building, and maybe he measures details and obtains full sizes of the mouldings.

It seems to be a stock argument with the opposers of photography for architects to refer to the inverted image on the focussing screen, as if that were the important part of studying the work. That is only a means of obtaining a good photograph, and as to the inverted image, one gets used to it in precisely the same way as our minds have been able in infancy to correct the impression of the inverted image which is produced on the retina of the eye.

The great question before you is the utility of photography in our study and practice. The question of photography and sketching is not to be considered, and if you are fired to enthusiasm in this matter, there will be ample scope for your eloquence at the meeting on the 6th of next month previously referred to.

The value of combining photography with measured work should receive a large share of your attention, and encouragement is much needed for architectural research, and in giving it every method of delineation should be recognised, together with a clear description of the work and its history.

Mr. Arnold Mitchell, in proposing a vote of thanks to Mr. Taylor, said they must all recognise how much trouble Mr. Taylor had taken in the matter, not only in the preparation of the paper, but in the way he had collected and grouped around the walls so many photographs. He had been specially struck by one remark in the paper, *i.e.*, "The object of all study is knowledge," and it was to be supposed that discussion there, at the end of the papers read, had a similar object, and so any critical remarks must be taken in that spirit. There were many points in the paper one might refer to, but there were two he would touch upon specially. Mr. Taylor said at the outset that no discussion was intended that night on the subject of sketching *v.* photography, as the matter was shortly coming before the Discussion Section of the Camera and Cycling Club, but a little further on Mr. Taylor said, "Photography should not be considered antagonistic to sketching," and in several other places he discussed the matter. More than that, the lecturer had shown some interesting slides of the poor architect's sketches, and had compared them with photographs of the same buildings or features. In this connexion, it was impossible to separate sketching from photography. He would not say more on this head, except to add that he was a hopeless opponent of Mr. Taylor's views, for it seemed to him that sketching was absolutely essential to the student of architecture. Photography was anathema to the architectural student until he had mastered sketching. It was well enough for a man whose time is limited, and who wanted to get details of what he was sketching, but the moment a man took to the camera, his sketch-book was too often left behind. The facilities for getting a large number of pictures were so great with a camera that a man did not care to add to the bulk of the apparatus by taking his sketch-book, and so he did not spend much time before a building, and study those points worth knowing. The camera should be for older men; to the student it was anathema. The second point he wished to refer to was that if they did backslide it was most important to make a good job of it; "be a photographer as well as an architect," he would say. He had been struck in seeing some of the lantern slides by the fact that the architect came first and the photographer was a bad second. Surely the architect had an enormous advantage over the professional photographer in knowing what to take. Architects knew what they wanted, and they should not neglect the photographic part of the business entirely, as they did sometimes in the photographs they took. If architects must photograph, their photographs should be of the best. He had brought with him some half-dozen slides of architectural subjects taken by a young amateur friend of his. He should like to show them, and at the same time have put upon the screen again the series of professional architectural photographs that Mr. Taylor had compared with the slides taken from architects' sketches. [Mr. Mitchell then showed about half-a-dozen beautiful slides of buildings and details. He especially called attention to the clearness of focus, and the effect of light, and one, interior of Exeter Cathedral, he characterised as a beautiful bit of pictorial work—far more beautiful than the average photograph taken by architects.] The point of view of the amateur was every bit as good as that of the architectural student in this matter. Was it not worth while to aim high and try and get detail which would come out on the screen with the brilliancy and effect of some of the slides he had shown? His friend who took these views used a ½ in. plate, and his method of printing was direct from the negatives, which was not the usual method of members of the Camera Club, he believed. His friend always used on his camera a little level screwed down on to it—not the ordinary screw level, but a circular one with a tiny hole in the centre with a little bubble coming exactly under this little opening. It was by care and attention in small matters that the best results were obtained.

Mr. G. Scamell, in seconding the vote of

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thanks, said that he was afraid that if one went much in for reproducing picture work from books, etc., for lecture work, there might be difficulties about copyright. It was a great advantage in photographing buildings, especially monuments, to introduce a scale, so that in future reference one could always get a rough idea as to size. The Society of Antiquaries published a very good scale for 6d., which could be put on the base of a building when photographing. It did not interfere with the artistic view, and it was of great assistance afterwards to get a rough idea of size. As to the size of the camera, he always used a whole plate, for he found it a convenience. If one had a whole plate size camera, a piece of cardboard could be used and only half-plate need be used if that was desired, and the whole plate could be taken whenever they liked. The most useful levels were the plumb bob. For architectural work square bellows were far preferable. As to lenses, it was of great advantage in architectural work in having a lens inserted in a camera not to have it inserted in the middle of the front, it should be as high as possible. Mr. Taylor recommended carrying a series of lenses, but an ordinary stigmatic lens gave a choice of three foci. As to plates, for the last 600 or 700 negatives he had taken he had not used a plate. Instead, he had used nothing but Wellington and Ward's stripping films. The advantage of that was that in cycling with a camera the weight was kept down—it made a difference of 5lb. or 6lb., which was important. With films, one got practically no halation. As to printing, if a permanent result were desired, there was nothing for it but platinotype. Carbon did as well, but it was difficult to work. For mounting, the only thing to be used was starch paste. As to exposure, expose too long rather than too little.

Mr. Hugh Stannus, in supporting the vote of thanks, said he felt a little sympathy with Mr. Taylor while Mr. Mitchell was criticising, for the slides that Mr. Mitchell showed were so very beautiful that a new terror was added in lecturing. He could quite imagine some innocent lecturer, who in an unguarded moment had promised to read a paper on, say, Egyptian architecture, having thrust upon his audience, after he had done his best, some half-dozen slides of Egyptian work which would quite outshine his own. He supposed that the slides Mr. Mitchell had shown were taken by Mr. Gardner. [Mr. Mitchell: No.] Mr. Gardner belonged to the class of amateurs, but he was most artistic in the matter of lantern slides. He did not think that any of them could equal him; and the slides Mr. Mitchell had shown were so beautiful that he thought they were by Mr. Gardner. As to the use of photography, he remembered a very striking remark made by the late Lord Leighton arising out of the photographic snapshots by Mr. Muybridge, the American, of animals in motion. He (the speaker) asked Lord Leighton if he thought these would be of any use in his work, and the reply was that, though they might be of use to some people, he did not think of using them himself, as he preferred to go along as he had begun, using those powers with which Nature had endowed him, and nothing else. He (the speaker) thought that that was a pregnant remark; it meant so much more than Lord Leighton said. He very much admired some of the beautiful slides shown of views of roofs and ceilings looking up. He supposed those were taken with Reflectors. Such views could be taken with Reflectors at 45 deg., or with the camera pointed upwards. He had had a Reflector made to hook on to the front of his camera by the Autotype Co.; and by means of it he had been enabled to take a number of those beautiful incised tomb-slabs in the Camposanto at Pisa, which were very difficult to get in any other way. Ceilings as well as floors could be taken, and he advised all students to have a Reflector, for it was of great use. As to showing lantern-slides to students, there was an important point which had not been alluded to. In order to show slides darkness was needed, and that meant that students would be unable to take notes. He had been asked at South Kensington to use lantern-slides, and for the sake of the students he thought he ought to say no, but since then he had seen the expedient used at Liverpool by Professor Simpson, whom they were all glad to have back in London. The arrangement, which was admirable, admitted light from a side-window, and students were able to see to write, while the screen was hung against the dark part of the side-wall in the corner. Where slides were shown to students there ought to be arrangements for taking notes, and he hoped that some such arrangement would be made in the new premises of the Association. He did not agree with Mr. Taylor in regard to showing construction. Slides for buildings as a whole, and for details, were all very well, but when one came to beams and joists, etc., he thought that students learnt more from models than from slides. Another point, one which had not been dealt with, was the difficulty a lecturer had in illustrating comparisons—comparisons between two buildings or periods. That difficulty was obviated in some cases by two lanterns and two screens, but that was a serious expense. Another way was to have two slides together, showing first one and then the other several times. But he thought the two-screen method was the best one. He had not noticed a measure on any of the views which had been shown. A yellow measure did not take, but the black and white one which Mr. Scamell had shown was admirable, and at a cost of sixpence all photographers ought to have one. As to sketching, Mr. Taylor might have made another point. Just as the greater includes the less, so one might photograph a sketch, but one could not, in anything like the same time, sketch the photograph. Photography and making photographic slides need not by any means do away with sketching, and he trusted it never would, for if it did it would be a curse to the architectural student. Notwithstanding photography, one could always go on sketching, and sketches one was always glad to see. He had done some photography himself. When one was inside a church and had to wait, perhaps, forty minutes for a photograph to take, there was time to take full-size mouldings and dimensions, and every young photographer should do that. One of the reasons for sketching was that a man should spend a certain time in front of a building. Street told a student who was going to Italy that when he was in Verona he should sit in front of S. Anastasia for an hour and look at the building, for it was only in so doing that one realised the beautiful proportions. He (the speaker) had been in front of S. Anastasia with his camera, and after ten minutes, which enabled him to take a photograph, he had gone off to the Duomo. Now, he could not remember much about S. Anastasia; and that indicated one of the drawbacks of photography, as any one who had sketched the building would be able to appreciate and remember its beauty. As Mr. Mitchell said, the advantages of photography were in the case of a man who had gone beyond his early student days. Such a man could, with a camera, get 300 photographs in a three weeks' tour in Italy. A man could not go to Italy and in three weeks bring back 300 sketches. What was so valuable in photography was the quickness with which one could take records. He sympathised with Mr. Taylor in grappling with the whole subject. He (the speaker) thought that several members of the Camera Club would have taken different branches of the subject, and had that been done, there would have been several interesting expressions of personal views. Mr. Taylor deserved the best thanks of the meeting for his attempt to grapple with the whole subject.

Mr. J. D. Crace supported the vote of thanks. Mr. Taylor had pointed out a good many of the uses of photography, but he had not touched on the archæological side. That was certainly one of the most valuable phases of photographic work, for with a good clear photograph, taken in a proper light, points could be seen that might very well be passed by the eye affected by a large amount of general interest. Any point of interest could be concentrated in a photograph, and information was gained in this way that might not otherwise be got. Mr. Fergusson pointed that out to him in the case of the Erectheum—how certain joints could be observed and certain details, which indicated changes of intention which hours on the building would not have revealed. Mr. Spiers made the same observation in discussing the subject of Baalbec: a change in the method of building at a particular point was shown by the photograph, which was quite obvious on the spot, but which could very well be passed by unless attention were drawn to it. The success of a photograph depended to a great extent on the selection of suitable light. In the case of Mr. Mitchell's photographs, the artist evidently had an eye for the light treatment of his subject, particularly of interiors. That was of great importance, for in forced and strong contrasts of light a great deal of detail was lost as well as many charming gradations of shadow. As to the camera *v.* sketching, a student might easily be led to devote too much time to the camera and too little to the pencil; but to the more mature student, whose time was taken up with his professional work, photography was of great use. The camera, used fairly, was a help. But the student would do well to remember the truth, which was happily put by a clever man, who said that if he had to write a book on the general principles of education its title should be "Sur la nécessité de rendre l'étude difficile," and so it was with the man who was compelled to spend an hour before his subject; he knew more about it at the end of that time than the man who had spent only ten minutes.

Mr. W. Wonnacott, in supporting the vote of thanks, said that the work the Camera Club was endeavouring to do was for the benefit of the Association—the good old idea of mutual help and support. He agreed with Mr. Stannus that some interesting views would have been expressed had various members of the Camera Club dealt with different phases of the subject, and would have helped the lecturer to prove his case; it had been his idea from the commencement to arrange for such treatment of the subject. The subject had been treated under two broad heads: the study, and practice, of architecture, and the lecturer suggested that two more might have been added: the study and practice of photography; but the study of those subjects should go hand in hand. The paper contained no word on the literature of the subject, and it would have been well to have given a list of useful books. He was often asked what was a handy guide. He was often asked, too, what was the best camera. His reply always was: the very best you can afford, for it is no good starting "this black art" with toys. The chemical side of photography was not only interesting, but useful, and he had, as an architect, got benefit time after time in the knowledge he had gained in studying the chemical processes entailed in photography. Then, as to the actual photographic records, it was all very well to sit before a building and try to absorb it like a sponge, but they had heard that in ten minutes they could know nothing about a building, and yet, in ten minutes they could get a good photograph which would last a lifetime! He believed that in a very few years there would be marvellous results in colour-photography. Colour-photography was already a commercial process, but it was extremely expensive. In time the pretty sketch would go altogether, for science was coming to our aid in all departments of work, and it would be necessary in future only to train the student's eye to guide his hand. They were told not to touch photography until they ceased to be students, but he defied any one to tell him when he ceased to be a student. They must live and learn every day of their lives, and why they should give up a delightful pastime until middle life he could not see. As to telephotography, they could see how useful it would become. As to the Camera Club, it was more energetic than ever, and their little effort that evening was to show that the work they did was not time wasted. The Club was getting together a fine collection of lantern slides, which would be of permanent benefit to every one. There was one way in which the Association could help them—i.e., by starting a photographic competition, and by offering a small prize for some photographic work. If the photographers were doing work that was wrong, he suggested some such endeavour should be made in order to put them right.

The Chairman said that Mr. Mitchell had been rather severe on Mr. Taylor, but it must be remembered that Mr. Mitchell was a sketcher *par excellence*, and that consequently he took an extreme view. As usual, the right view to take, he thought, was the middle course. Photography should be regarded as an assistance in sketching, and not as a substitute, and he thought there was danger in a young student having a camera. The fact that the student, without any trouble, was able to take a number of pictures of what he saw must tend to prevent him making careful sketches or measured drawings. The very young student, therefore, ought not to take to the camera until he was well out of his pupilage. Per-

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haps the best procedure was, as Mr. Taylor said, to make a measured drawing and then to take a photograph of the same work: that would make the best possible record. Mr. Taylor showed a view of the groining at the cathedral at Oxford, and said it would have been impossible to have made a sketch of it. Mr. Taylor could not have meant to go as far as that, for he (the speaker) had spent two long days sketching that groining, and he had no doubt that that work did him good; he was sure he would not have spent two days on the work had he had a camera with him. There was one disadvantage in the use of slides for teaching purposes, and that was in the fact that one view could be on the screen only for a few moments at a time if there were many views to show. If diagrams could be placed on the walls, and photographs of the same work shown on the screen, students could examine the work after the lecture. The practical uses of photography in such matters as questions of light and air were unquestionable, for nothing gave such a reliable record in points of this kind as photography. He had also found it very useful in surveying old buildings for alterations or additions, for it saved hours and hours of measuring. In the case of a brick wall, the height of inaccessible parts could be got with tolerable accuracy by counting the courses of brickwork in the photograph or by putting a scale against the building, as had been suggested. In putting the vote of thanks to Mr. Taylor he desired to include Mr. Wonnacott for having worked the lantern.

The vote of thanks was then heartily agreed to.

Mr. Taylor, in reply, said he thought the vote of thanks should be given to the Camera Club as a whole, because it was due to the Club that that meeting had been a success. He agreed that it might have been better to have had several members of the club deal with different branches of the subject, and that could easily have been arranged. As to Mr. Mitchell's criticisms, they must not forget that criticism should always be desired, nor must it be forgotten that Mr. Mitchell himself made use of photography in illustration of his very excellent lectures. Although Mr. Mitchell did not photograph himself, he knew that there were advantages in photography. As to the bad effect of photography on students, if the thing were going to be abused it should not be used. Photography was used by the earnest worker as a means to promoting his own study. Not only should a student photograph in order to aid him in his work, but he should measure and draw. It was an excellent plan to introduce a scale into a photograph, and the scale referred to by Mr. Scamell seemed to be a good one. As to the difficulty of getting light in a lecture-room for the purpose of enabling students to take notes, only half the lights need be turned out, and the light thus obtained was strong enough for the student's purpose. As to models being preferable to slides of construction, he thought that both should be used. As to the time slides were on a screen, that depended on the lecturer and on the subject. In a good many cases it was sufficient to have half-a-dozen slides to illustrate a lecture. Photography, if taken to, should be done well; it was no use taking half measures. Mr. Mitchell's slides were all specially selected, it must be remembered, but they were all obliged to Mr. Mitchell for bringing them to the meeting. As to the photograph of vaulting looking up, no reflectors were used, the camera was simply placed pointing upward.

The Chairman announced that the next meeting will be held on December 18, when Mr. G. P. Bankart will read a paper on "Old Stucco and Plaster Work, with Reference to Modern Possibilities."

The meeting then terminated.

MAIDENHEAD (ROAD) BRIDGE.—The Corporation of the Borough will apply for leave to bring in a Bill, next Session, for the purpose of freeing the bridge from the tolls originally levied in pursuance of the Act of 1772, of discharging the mortgage debt, and of vesting the property, as the "Bridges Estate" or "Undertaking," in the Corporation. The bridge, replacing the old wooden one which had been first built in the latter half of the thirteenth century, was built in 1772-4, at a cost of about 20,000*l.*, after plans and designs by Sir Robert Taylor. It consists of seven semi-circular stone arches, with three smaller arches of brick at each end.

ENGLISH AND AMERICAN METHODS IN THE ERECTION OF BUILDINGS.

LAST week we gave the first part of a paper entitled "A Comparison of English and American Methods in the Erection of Buildings," which was read by Mr. Charles Heathcote, of Manchester, before the Institute of Builders, in the Hall of the Society of Arts, John-street, Adelphi. We now give the conclusion of the paper, and some notes of the discussion which followed:—

"There has been much talk about the number of bricks that can be laid per day. At the Westinghouse Works, Manchester, where I was associated architect with Mr. Rodd, one of the first engineers of America, it has been said that on a part of the work 1,600 bricks were laid per man per day. It is quite correct. We have had this number laid in a two-brick wall at a very different kind of building to a big works, Parr's Bank, Manchester, to wit, with ordinary bond set by trowel in firm mortar made with Warmsworth Cliff lime. This was without paying extra wages either. But 1,600 bricks was not the average, and I know of no building where such has been the average. But you may learn something from the Westinghouse Works, although the conditions were not those of an ordinary building, let under one contract to one builder. No contractor was ever asked to undertake the whole contract. All heavy work was let per ton, per cube foot, per square yard. The excavating was let to one firm, the steel to another, the slating to another, and so on—all English firms. On one side of the site were brick kilns, and whilst the excavations were in progress some 4,000,000 bricks were made and stored, the site was levelled, and about eight miles of railway track laid down connecting all parts of the works together, and proceeding from a main track from the Ship Canal docks and the principal railway systems. Timber was stored adjoining the rails, the large machine shop foundations were in, the steel work well commenced—in fact, there was a quarter of a million pounds worth of work done or material delivered on the site before an American contractor came to employ bricklayers, carpenters, etc. He did not come as a contractor with a contract price for doing certain work, but was an official of the company. Therefore there is no comparison of this work with that of a general contract. But he got the work pushed on rapidly, and, by saving time, saved the company interest on their money, and, being empowered by an enlightened Board to employ as many men as could be utilised, he accomplished the speedy work. And please note that the architects had every drawing ready. There was no delay of five minutes for instructions. There was nothing to wait for, and extra wages were given to men, enabling the best to be picked out and retained on the job.

If you want brickwork executed very quickly, do it at a great rate, have heaps of material ready, and put on every man you can. Pick out and keep the best men—discharge the others, and to entice the best men to your work, and to spin out all they know, make it worth their while to stop by paying 10 per cent. more wages, give bonuses for work executed against time, and have plenty of superintendents and foremen. It may not be the best finished, for perhaps it is not necessary, but we are talking of speed and how to obtain it. A great feature in the speed of bricklaying is the kind of foreman employed. If he be a man of ability, understanding his work, and with sufficient will power to have the work carried out as it should be, and retaining only the competent workers, the work progresses properly. There can be no criterion of how many bricks should be laid in, say, backing up stonework, erecting buildings partly stone and partly brick, but in an ordinary building, faced with stocks, with stone dressings, general internal walls with the usual doorways, arches, fireplaces, flues, beam filling, and such like, if a bricklayer averages throughout 700 English bricks of common brickwork per day of ten hours, he is doing a fair day's work for 8s. 4d. An American friend of mine, Professor John Gray, of the North-Western University, Illinois, to whom I have been of service in giving data regarding British labour for his returns to the American Government, wrote to me in the spring of this year about bricklayers' wages in America. The *Chicago Tribune* of February 14, 1903, contained reference to this subject. It says:—"Some 4,000 members of the Bricklayers and Stonemasons' Union have been granted a wage increase. The bricklayers have been getting 4 dollars 40 cents a day for eight hours' work, and they asked 4 dollars 80 cents. This was given them as a set scale, and to be in force for three years. The men also demanded a half holiday on Saturdays for six months in the year, and it was granted." This increase without a strike was equivalent to a rise of 10s. per week. Professor Gray added the following very expressive remark:—"It seems to me that, notwithstanding the numerous strikes in this country, our employers are more likely to grant demands, especially for increase of wages, than the English employer is, and to try to speed up to the new scale. I believe it costs less per 1,000 to get bricks laid now in Chicago than when men were paid 2 dollars 40 cents for ten hours' work, instead of the before-mentioned 4 dollars 80 cents for eight hours' work." This price is 2s. 6d. an hour! This would be an incentive to labour-saving machinery, one would think. America is not free from labour difficulties.

In connexion with this matter, I have been at some trouble to obtain data of English bricklaying under English superintendence. I will cite a few, all of which have been vouched for to me:—Great Northern Railway extension, Manchester. Foundations 3 ft. thick, hydraulic lime mortar, English bond; average, 1,760 bricks per man in 9 hours. The same building—stanchion foundations, blue bricks in cement, 1,056 bricks per man in 9 hours. The same building—3 ft. wall, both faces finished with blue picked bricks in cement; 704 bricks per man in 9 hours. The same building: Wall 18 in. thick, common brick in hydraulic lime mortar, English bond; wall faced one side in picked bricks; 846 bricks per man in 9 hours. On a job in Bolton: 18 in. wall, faced with selected bricks pointed up, 882 bricks per man in 9 hours. At the same job, in an abutment 8 ft. thick, faced one side with white glazed bricks in putty mortar, 909 bricks per man in 9 hours. All these bricks were laid by men on ordinary wages of 10d. per hour under Trades Union Rules, and without bonuses, etc.

Let me give you another fair instance of this class of work. We, my sons and myself, have recently erected a refrigerating store near the Market, Manchester. It has basement and sub-basement and nine other floors. It is faced on two sides with stock bricks, panelled with arches, and has terra-cotta mouldings, bands, cornices, etc. Taking basement walls, face work, setting round terra-cotta, windows, openings, lift recesses, etc., the brickwork from first to last averaged 750 bricks per man per day of ten hours on ordinary wages.

The most speedy erection of an ordinarily-finished building ever managed in Manchester was that of Peak's Warehouse, Portland-street, in that city. It was done by Robert Neill and Sons, builders, under us as architects. It will be of interest to you to know the methods adopted, especially as it was entirely initiated, organised, supervised, and executed locally. The building is a seven-storied warehouse for the home trade. There are three hoists, the usual counting-house, private office, kitchen, fittings, etc. Every wall and ceiling plastered, and the building generally well fitted up with counters, electric light, etc. It stands on 1,000 square yards of land, and faces into three streets.

The old building was gutted by fire on July 24, 1902. One side wall had to be taken down, one façade had the stonework of a floor to be replaced, and the back had to be half rebuilt. In rebuilding it was decided to adopt more modern planning, which necessitated different lines of columns, increased height, and new work even to the column foundations. The clearance of the debris and insurance matters took until September 7. On that date the contract was signed. At the time of signature complete drawings and details were handed to the contractors, Messrs. Robert Neill and Sons, Manchester. We arranged that the steelwork should be erected by the steel engineering contractor, so that this part should not be dependent upon anyone. We had arranged with a mill to commence rolling for us within twenty-four hours of receiving our instructions, and also with a foundry to work in three shifts of eight hours each to get the cast work out. The whole work was under the immediate supervision and organisation of Mr. Harold Heathcote, one of my partners, with a clerk of works to keep the progress notes, etc. The result of organising and looking ahead, spending £001. for additional cost in pushed labour, and having

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a first-rate building firm to deal with, resulted in the whole warehouse being completed and business resumed on January 24, 1903, or twenty weeks from signing the contract. The cost was about 23,000*l*. From the date of the contract to the time the whole of the iron columns, beams, and floor joists for seven floors, inclusive of ordering, making, and erecting, was only seven weeks, showing what can be done if one sets about it the right way. It was the result of trained organisation and preparedness.

I have mentioned the thought Americans have put into some lines of business to undercut our manufactures. Let me give one example in connexion with our building trade.

Perhaps in America the extremes of weather make it more a necessity to very carefully consider the question of heating buildings than with us. But it is of sufficient importance to our comfort and general health that our system and our appliances be as perfect as we could devise. Yet we did not as carefully study the subject as we might have done, until American competition has forced our manufacturers to do so effectually. It is an industry closely connected with buildings, so may be taken as an instance of how we did not master the subject as we might have done, and should probably have continued in complecent satisfaction had not American competition forced our heating-apparatus makers to do so for their own protection, and with the usual result, for some of our manufacturers are to-day producing cast sectional boilers and radiators equal to either American or French in price, finish, and efficiency, although not yet in as many varieties or of the largest capacity. If they will do this they will at least again command the market of their own country, and they may be trusted to then push forward the export of their wares. To obtain the best article, the American manufacturers concentrated their fullest thought, energy, and scientific knowledge upon the character of the metals best adapted to meet the various requirements of softness, non-porosity, smooth clean finish and uniformity of thickness in casting. This was specially directed upon what are known as sectional boilers, where enormous heating surface is required, where the pressure is high. With them method and standardising are enforced in fitting and erecting, and in having the template of each member numbered and indexed before leaving the works, so that in the event of any of the component parts requiring renewing they can easily be duplicated. Large quantities of radiators have been shipped to Europe within recent years. One firm, at all events, was quite prepared to have their work done in France, because it was found that the French workmen bestowed greater care and interest on the moulding and casting of radiators, producing a most reliable and beautifully-finished article. These improvements, as I have said, were so materially affecting the English trade that the necessary incentive was created—the incentive of self-interest—and we are again holding our own. We shall do more than this if our manufacturers will give up their conservatism altogether, and increase the varieties, and also the capacity, of the heating boilers, and not need more foreign competition to jog them up again. We were slow to adopt the telephone, electric tramcar, the electric light, the motor car. We sometimes expect to compete successfully with those countries which adapt themselves to the quickly-changing conditions of life. It is our conservatism that is injuring us, and it might be added it is competition that is stirring us up. The young Englishman in this or any other business needs to devote more time to studying the technical details, learning the methods of other countries, and from that knowledge striving for high standard of workmanship, and enterprise in combination with originality. May I suggest that the Institute of Builders use their influence towards getting all apprentices to pass through building construction classes in the technical schools.

In very large buildings, where there is much architectural treatment involved, the architect is generally very fully employed in quietly, earnestly considering and working out the details of his design, and will perform that duty more whole-mindedly if not constantly diverted by personal superintendence as well. It may be worth consideration if there might not be with advantage in, say, great Government contracts, an architect, associated with the designing architect, who will have the entire charge of superintendence. And for each of these architectural positions the best man for English buildings is a trained, energetic, high-minded English gentleman. There are many men answering this description, and as capable as can be found in any land.

The question of labour is most difficult to answer. Quoting from a work by Mr. J. F. Fraser: "The raw material from which America produces its workers is the finest procurable in the world. America is not the dumping ground of the world's refuse. The immigrants into America are hardy Europeans discontented with the conditions in the old countries, but who have saved enough to set out and try their abilities in the new. Daring, pluck, and enterprise are necessary to break with family ties, and the men who have shown sufficient courage to do this are the very men likely to prosper wherever they settle." And this emigration is a great matter with us. In America, if a man does not work up to all that is in him he is discharged, for there are plenty coming by the next boat ready to take his place. With us our numbers of the best men are not thus increased, and the trades union sometimes discourage the good man to do his best, but encourage him to slow down to the level of the poor one. It is often the best men who emigrate, and their places are to some extent filled with an unrestrained pauper refuse from any country wishing to get rid of them. Is this reciprocity? Do we legislate, as I have said, in this, as in our Patent Laws, for our own country's benefit, and for the advantage of our own people? We are not as alive as we ought in common sense to be for our own interests. This immigration and emigration are serious items in the labour difficulty. It can only be restrained by our working men knowing they will have as much reward here as elsewhere in return for their best endeavours. Do you offer any rewards to your workmen for improvement of knowledge, for suggesting improvements, for specialised ability, thus giving them increased interest in their business. The American gets a real, honest joy out of his working. He likes it. His interest is in it. He is optimistic. He knows there are openings for his progress. He has a magnificent belief in his own abilities, and loves to read those papers which prove what a fine fellow he is, and how he overcomes the sleepy European. Enthusiasm is in the air. There is no do-nothing class supposed to be on a higher plane than business men. He sees the wealthy around him working as hard as he does.

His English fellow is taught by his Union that if an American lathe-turner works four lathes it is no reason he should be allowed to work more than two, caring not whether the trade thus leaves his employer, his country, or not. There is a greater readiness generally in the States to listen to the suggestions of the workpeople, and many of the labour-saving machines are the outcome of this better understanding, and if you look into it, you will find English brains well to the fore in inventions. The greater interest of the workman in his work, his endeavour to rise in the world, the better-schemed education he has received, and the readiness of the employer to listen to the suggestions of the improvements are all factors stronger in the States than in England. The sentiment in England that a man who belongs to an idle, leisured class is, for that reason, to be envied, forms a great drawback to progress and efficiency. The example to those less blessed with the world's goods does not tend to enthusiasm for diligent work. To see the wealthiest working hard in the business gives a solidarity of interests, a feeling of contentment to all engaged therein. An American's ambition for wealth and the power wealth gives is greater than ours. He will work longer hours, and when there is no need for it in order to add wealth to wealth. Whether, in the one life we have, this is a true and worthy ambition, is another story, not falling within the lines of this paper. The American employer considers the health and comfort of his people conducive to his own interests, and endeavours to meet this end by considering their welfare in the dining-rooms and conveniences of the workshop. In many works each man has a locker for his clothes, and has ample arrangements for keeping himself respectable in cleanliness and appearance. It must be admitted that there has been no lack of our Government interference on behalf of the English workman. Innumerable Factory Acts, Special Rules, Compensation Bills, Board of Trade Regulations, are in force here that have no existence elsewhere.

I believe we shall adopt many American business methods here, altering many of our conditions, and bringing about a more mutual appreciation of the difficulties between employer and employed. This is very necessary to modify the actions of Trade Unions in those directions for curtailing the output of material and hampering a free working man in doing the utmost he can with his labour, which is his capital. It is the old story in England. The first brick-making machines were invented in England, but the men working them were killed. The first building in Manchester where men dared carry bricks without the ordinary hod was the Town Hall, less than thirty years ago. Even then the contractors had to obtain the protection of the police. The whole fallacy of the Union's policy of allowing and encouraging a man to do less than a fair day's work in order that some other man may get a job, depends, it would seem, upon the false assumption that the amount of work to be done is a constant quantity. There is no limit to the work to be done here if we can do it quickly and economically, for there is no limit to human wants. I am indebted to Mr. Merttens, who says:—"Whilst unregulated and inorganised labour must be deprecated, the labour organisations must not block economic progress. The newest machines replacing costly labour must be adopted and be worked as cheaply and efficiently as possible, and the output increased wherever desired. To restrict the better-educated and more skilled workmen from doing the best and the most they can, is an economic fallacy, which, if persisted in, will utterly ruin the trade of England. With the adoption of machinery, wages have risen all over England; with the adoption of more modern labour-saving machinery American wages have risen still more. But the fault does not lie with the workers alone. Employers in England have yet to learn the economy and efficiency of high wages, and to acquire some of the intensity of application of their American competitors. The more they go and study their methods of combination and organisation, especially in economising labour, the better. There are, of course, many trades which are not as efficient in America as in England." And to a lecture by Sir William Bailey I am indebted for the following:—"Civilisation is the economy of force, whether it be intellectual moral, or spiritual, and if we can only persuade working men that the rewards are in proportion to the production, and that to get more work to do we must have the ability to produce more work in less time, because of the demand for cheap commodities, then something will have been achieved."

It would be very advisable of contractors to spend some time in the States closely and earnestly studying the methods of labour, combination, etc., mentioned. Americans are very hospitable, and will give you a genuine welcome. There is no hampering an American workman in his business. If he can set bricks he is taken on as a bricklayer, and the other workmen do not strike the job because he has not been a bound apprentice for four years. Here it is once a labourer always a labourer, but there you are a bricklayer if you can lay bricks.

There is also a spice of adventure about the American working man. He will cease to be a watchmaker and take to farming; give up newspaper reporting to start a constructive engineering company, a patent roofing or a patent flooring company; a builder's pay clerk will start in conjunction with a student for "electrical equipment in all its departments and permanent-way constructors." It is risky to himself and all who employ him, and shows nothing from which we can derive any benefit. The drink statistics show that the expenditure per unit here is just twice as much as in America. If our workmen would spend only one-half what they do in this line their wages would increase by their working on St. Monday, now an off day, and their savings result in scores of millions going into reproductive trade. We should not hear much then about the alteration of Fiscal policies, for we should be fully employed in one great boom of trade.

One way to lessen the difficulty with labour is to pay the best man the best wage you can afford him, so long as he gives you his best; make him to realise his best friend is his employer, and that it is his personal advantage to forward the employer's interests. In that manner you will retain the men you really need and give the natural incentive to the workman's

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progress and advancement. Have you ever tried employment by piecework in building?

It is desirable to guard myself from the supposition that I think the struggle to accumulate money should be engrossing, and that it should be a main object of life. I am aware of the danger of allowing the consideration of industrial problems to obscure those of a social character. The productive activity of the people depends on their physical, moral, and intellectual qualities, and unless we improve these the industrial problem will hardly be solved. But I do maintain that whilst in business you should do it to the best of your ability, and if you can learn from your competitors any element of success and method it is a part of your duty to obtain it and act upon it with wisdom and with energy. And, further, business men should develop the power of initiation and improvement even upon those desirable elements that are to be gathered from others. We have not yet attained to the full perfection in anything, and the future is in the hands of the man with brains to think, self-reliance to carry out, and energy to complete. Many there are amongst us doing this now, making earnest, persevering efforts; but the wish to do it is far from universal, far from being the ambition that it should be, and, indeed, must be if we are to retain all along the line our position in the business world. And you may depend upon it there is great life and there are great possibilities for us all in our England, or we cannot otherwise account for the great love so many foreigners have for our land and their sensitive desire to share our good fortune and our trade. It is not necessary, either, to carry business to such excess as to make men into sleek and prosperous human animals and to lose the noblest qualities and prerogatives of life and manhood. All I suggest is the greater quickening inspiration in our methods, our intensity, our business life. The challenge is uttered in strong, clear, masterful tones to-day. Let us but answer it more fully than we are doing by the old British love of work and enterprise. This is the regenerating grace needed in our business world, and is the prophecy of prosperity.

The Chairman, Mr. William F. King, President of the Institute of Builders, said he was glad to hear Mr. Heathcote's valuable and interesting paper, and to know that that gentleman thought that Englishmen, instead of being the most conceited people in the world, were apt to belittle themselves rather too much; but, in any case, builders were always ready to learn, and he should like to hear something as to American scaffolding, as to their methods of haulage, and as to cranes and lifts.

Mr. Henry Holloway (Messrs. Holloway Brothers) said he had recently had an opportunity of visiting America, and of studying on the spot some of the matters mentioned. As Mr. Heathcote had said, Englishmen had some things to learn from American methods, for in some respects Americans were a little ahead of us; but the result of his visit was, from the building trade point of view, disappointing. Perhaps he had been led to expect too much. At the same time, there were many things to admire in the American methods. What struck him most was the energy and brightness of the American—his audacity, almost—in tackling big schemes. American builders and contractors ran enormous risks—risks which English business men would never think of taking—and that was probably due to the fact that there was not the dishonour in failure in the States that there is here. If an American started a big venture and came to grief, he found friends to help him, and he started again with enthusiasm, still honoured by others. He (the speaker) could corroborate what had been said as to the genial way in which Americans acted towards English visitors. His visit was a delightful one, because the Americans made it so. The great complaint Americans had against us is that we do not visit them as much as they would like. He greatly admired the splendid way in which Americans had developed the metal trades; in their bronze work, castings, etc. From the largest work down to the smallest detail, the work was beautifully done and reasonable in price. Any one interested in the metal trades here would learn more than would any one in any other branch of the building trade by going to America. But, having said so much, he could not say anything more that was favourable. The whole system of building in America—design, erection, and effect—was showy, temporary, and with a want of genuineness and permanency about it. Their sky-scrapers were architectural monstrosities, and he was very glad that the law in this country prevented such buildings being erected, and he should be sorry if any public body in this country ever gave encouragement for the development of such buildings. Mr. Heathcote had referred to labour-saving machines. He (the speaker) went to America particularly in order to learn what America could teach in regard to labour-saving appliances, and after careful investigation in most of the large cities—New York, Philadelphia, Boston, Chicago, Pittsburg, etc.—he found no machine that would be adaptable to English work that was an improvement on machinery in use in London. In some respects the American builders were behind us. Mr. Heathcote rather suggested that there was no difficulty with labour in regard to the adoption of machinery, but that was not quite correct. In the stone trades there was great difficulty with the men in regard to the use of machinery, and at the present time the rules regulating masons and employers provides that for every machine put in the shop the employer was to provide five men at the banker. Perhaps he ought to add that most of the masons working in America were either Scotsmen or Englishmen. He could emphasise what had been said as to supplying details. He found everywhere that it is an essential point in every job where speed was necessary, that every detail drawing that the contractor wanted was ready for him before he started the job. As to steel, it could be turned out and on to the job just as the American contractors wanted it—delivered on the job, morning after morning, as it was wanted. If English steel manufacturers would, or could, do the same, it would be a great advantage. The way the Americans were able to do this was as follows:—The steel was got ready and run out of the works on to the railways, and the railway companies ran it into sidings until it was wanted. Sometimes it was in a siding for three months, but the companies charged no demurrage. In large steel jobs, it was rarely that the architect designed the work; the contractor designed his own steel work, having his own engineers, and the architect was not even paid commission on the steel work. The contractor prepared his own drawings for the steel work in his own office, and the work was carried out under his direction. In addition to the staff of engineers in the contractor's office—he was speaking of large works—he had representatives with sets of drawings at Pittsburg, Philadelphia, and other places where the steel was manufactured, and these men saw the steel-work prepared for use. He quite agreed that Englishmen did not get credit for their work. He had an experience as to that. At a big hotel, he was admiring the glazed brickwork, which was some of the finest work he had ever seen. He took the trouble to inquire into the matter, when he found that the glazed bricks had come from Leeds. Everything was sacrificed to speed, and he was reminded of that in thinking about the glazed bricks. In a Boston building in the basement he noticed that the walls were faced with glazed bricks. There were no headers; they were all stretchers. He remarked to the architect: "You do not have bond in your brickwork." The reply was: "No; the walls are faced with the bricks simply as a decoration; we cannot stop to build it with the main wall." A two-brick wall was run up, and a workman came along later and treated the facework as decoration. Construction and beauty were sacrificed to speed, which was not what would satisfy here. As to the number of bricks laid per day, in some cases as many as 1,600 or 1,800 were laid per man per day in America, but it must not be forgotten that those bricks were smaller than ours, and were easier to handle. But such a high rate as he had mentioned had been obtained by constantly raising the men's wages, so that now they were receiving the equivalent of 2s. 3d. per hour. The employers were not prepared to go further, and the effect was that the number of bricks laid was now diminishing. At a large power station he visited, with an ordinary 2 in. wall, with red brick facing, he found that the men were not laying anything like 1,600 bricks per day, but that the actual number was about 800. He found that the general average number laid was about 1,200, and that the number was gradually diminishing; the high rate was kept up by giving exceptional wages. He had taken the trouble to find out how many bricks men here were recently laying. He took ordinary jobs, and he found that the number varied considerably—from rather more than 900 down to 500 per day, was the average was about 700. He found that exceptional circumstances altered the result. In a job of his own, similar to a job he visited in New York, he found that his men working under ordinary rules, were laying 1,400 bricks per day, and his experience was that bricklayers here were not far behind the Americans. When one came to consider quality, there was no comparison, for the American work was very rough, and the quality of the English work was far beyond American. The American bricklayer did not work from side scaffolding. With their system of steel construction, the steel went up ahead of the brickwork. The boom jib crane was used much as it was used on board ship, and this was raised floor to floor as the steelwork went up. Scaffolding was put out of windows, and was very roughly made, and trestles were used, with boards upon them. Our men would not tolerate such a dangerous system, and it was surprising what risks the Americans were ready to run. He saw a man some 150 ft. above the level of a road driving a rivet, standing on the flange of an iron girder without any protection. As to superintendence, on most of the jobs he visited, instead of a practical foreman such as we had, the superintendent or general foreman was a young man who had had a University training and had passed his civil engineering course at the college. Sometimes the superintendent had had a little training in the office, but generally he went on to a job direct from college, and at twenty-five years of age he was a "full-blown" superintendent of works. His main duty was not to see that the work was done well, but to "hustle" the sub-contractors. The large buildings were erected on the sub-contracting system. The general contractor had no yard or works, but he did everything from his office. The general contractor rarely employed direct labour, excepting bricklayers and fixers of steelwork. That system did not make for good work, although it made for larger profits and less responsibility to the contractor. As to joiners' work, that again was divided; one man making nothing but doors, another sashes, etc.

Mr. H. H. Bartlett said that such a paper as they had listened to was calculated to enlarge their minds. As to the American system of steel construction, it was a simple matter to build that way. The steel work was fitted together even to the last rivet before even it was brought on to a job, so that when the building was erected there was no doubt, no wondering, whether this or that would fit. Everyone knew where each part would go. English builders did not have these advantages. It was almost the universal practice here for the builder to have the details of a building supplied as he went along and as he was supposed to require them. If a contractor knew beforehand exactly what was to be done he could have his machines ready and could carry out the work rapidly. Not that buildings were any the better for being erected rapidly: slow building was generally lasting building. Building work of a most complicated and difficult character had been erected by English builders, and it had stood for ages. Not many years ago one of our leading architects, now dead, told him that work was done at such a rush that the pleasure of designing and carrying out a building had gone. That architect said that he liked to see a model of his building to see the effect of it; and he liked to see the building go up slowly, and to alter it, if necessary, for no man could tell what it would look like from seeing it on paper. By our present methods that was impossible.

On the motion of the Chairman, a hearty vote of thanks was accorded to the lecturer.

Mr. Heathcote, in reply, said that, as to the labour-saving machinery, he thought that Mr. Holloway had somewhat misunderstood him. He (the speaker) had alluded to labour-saving machinery, mainly in connexion with other businesses than the building trade, to show that Americans were always preparing something to do away with that expensive item labour. But he had noticed that the machinery American builders had, if not better than ours, was employed more generally. If we employed two machines for a particular purpose they would have half a

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dozen in order to get over the work more quickly. The Americans took greater risks, and Mr. Holloway agreed with him there. These risks were taken to push the work on more rapidly, but he (the speaker) thought they erred in doing this. The scaffolding put up in London and most parts of England was such as a man could trust himself on, with little danger to himself, but that could not be said of all the scaffolding in vogue in America. He agreed with what had been said as to American bronze work and castings; they had taken great trouble to get the best metals for these castings, but the work was not equal to the French. The metal work in an American passenger lift was very good, and it was necessary to examine it carefully in order to find out that it was simply a casting, without any cutting or embellishing or finishing off. Such things were beautifully made, and in that respect we had something to learn from America. But we had nothing to learn from them as to constructional steel. A well-known American gentleman, who has had great experience in building, said in regard to the Trafford Park building: "This is as beautiful a piece of steel work as I have seen." The steel for that was supplied by Messrs. Dorman, Long, and Co., of Yorkshire. As to speed, that firm had put up for him (the speaker) more than 100 tons of steel work per day. Few firms could do as well as that. [Mr. Holloway: The Midlanders are better off than the Londoners.] As to the expedition of building work, he thought it was almost certain that we should have to alter some of our laws affecting buildings. If one had to build quickly, it was necessary to use steel construction; one could not build stone walls 4 ft. or 5 ft. thick as quickly as one could build walls by using steel stanchions. He understood that a steel building was to be put up in London on a site near St. James's-street, and the County Council insisted on having the walls as thick as though there were no steel in the building at all. That was not progress; the building would be stronger than if brick were used. In Manchester this point was appreciated, and architects were allowed to put up steel buildings with thinner walls than would be necessary without the steel, and the authorities there were helping in the matter of the speedy erection of buildings. As to the designing of the steel work for the Westinghouse buildings at Manchester, the steel contractors had nothing to do with the design of it; it was designed for them by the engineer, down to the very rivet holes. He (the speaker) had for work now in hand in his office a staff of engineers, and they turned out every detail of the ironwork. Nothing was left for the contractor to design. He believed that that was what the Americans did. [Mr. Holloway: There are exceptions.] He thought that the Americans made too much of speed, while we might speed up a little more with advantage, but retaining our good work. We did not want to sacrifice our good work, but to "speed it up."

The meeting then terminated.

MAGAZINES AND REVIEWS.

In the *Art Journal* Mr. Claude Phillips continues, and apparently concludes, his article on "Great Portrait Sculpture through the Ages." The article is written with much eloquence, and in general we entirely concur in the critical opinions expressed. The illustrations are happily selected; and the Rotrou portrait by Cafferi serves to remind one of the powers of a sculptor who has been rather forgotten in this country. Houdon's celebrated statue of Voltaire and his beautiful bust of Sophie Arnould, on opposite pages, give a dramatic illustration of the variety of power of this great sculptor. Mr. Phillips emphasises (and no wonder) the immense difference between the English portrait sculpture of the early and of the latter part of the nineteenth century. In fact, we can remember the time when the annual show of busts at the Academy was a kind of standing joke. There are very poor ones to be seen now, but they are in a minority, and English portrait sculpture has a life and *verve* of its own, though the best of it is based, as Mr. Phillips says, on the Florentine art of the Renaissance. Mr. Brock he regards as an exception in this respect—as a continuer of the old English school of what may be called downright portraiture, but in an improved form. An article on Bewick is specially interesting for the illustrations, in which a considerable number of photographically reproduced representations of Bewick's original brush drawings of birds are accompanied by reproductions of the line engraving into which he had to translate them for publication. Admirable examples of line work as they are, they are not equal to the original drawings. Messrs. Leslie and Eaton's essay on "The Royal Academy in the Nineteenth Century" introduces in this number the figures of George Jones, battle painter; Wilkins, the architect; Pickersgill, and Etty, giving as an example of the latter his best work, the "Nymph and Satyrs." In regard to Jones, who thought himself like the Duke of Wellington, the authors quote Wellington's caustic remark that "he was not aware that he had ever been mistaken for Mr. Jones," but they might have fairly quoted the Duke's more complimentary remark standing before one of Jones's battle pictures—"Good! Good! Not too much smoke"; a remark characteristic of the attitude of the practical soldier towards theatrical battle-pieces. A short article on a landscape attributed to Rembrandt in a Guildhall exhibition is evidently right in ascribing it to De Koninck; it is that painter's composition in every line.

In the *Magazine of Art* Mr. Spielmann's article on "Art Forgeries and Counterfeits" deals this month with "Modern Oil Pictures" and "Modern Antiques." The disclosures as to modern pictures and the tricks played with them are enough to make one's hair stand on end. Sidney Cooper would give a verdict on the genuineness of any picture professing to be his for a fee of 5*l.* (payable before the verdict was given), and he declared that out of 153 pictures submitted to him as his own not more than eleven were genuine. One of the cleverest frauds mentioned is that in which an eminent artist who never signed his pictures on the face was asked by a dealer to oblige him by signing it at the back, which he did. What he had signed was a copy inserted in the frame behind the genuine work, so that the dealer had now two "genuine" works, one really so, another authenticated by the signature on the back. An article on "Artistic Photography of To-day," by Mr. Horsley Hinton, gives illustrations of photographs by Mr. Alexander Keighley, who is called "An Impressionist in Photography," which afford more justification than most things of the kind we have seen for the assumption of artistic character in photography. They are so well arranged in regard both to composition and aerial effect as really to give the impression of pictures; but it is only in the line of "impressionism" that this kind of aim can be realised. As soon as a photograph is allowed to define too much, it at once proclaims the gulf between the photographer and the painter. Of the dining-room interiors given in Mr. Vallance's article on "The Furnishing and Decoration of the House" we prefer that designed by Mr. Logan, and carried out by Messrs. Wylie and Lochhead, except the table, the supports of which are somewhat heavy and clumsy-looking. The room is simple and severe in taste, as a dining-room should be. The experiment made in a room designed by Mr. Flockhart, of combining white metal with woodwork, we do not like as far as the furniture is concerned, with its metal "shoes." It is restless and spotty in effect. The practical remarks in the article as to the planning and arrangement of dining-rooms are sensible and useful. In Mr. Hamilton Jackson's article on "Electric Fittings of To-day," the metal examples strike us as rather showing the effort to be artistic than the achievement; too much effort and too little simplicity. The best things illustrated are really the two very simple wooden fittings designed by Mr. Ellwood. We cannot feel entirely in sympathy with the article on "The Arts and Crafts in France." There is a beauty of its own in much of this modern French work—and especially a beauty of execution; but the pretentious element is too much present. The paper knife in gilt bronze and ivory, for instance, by Laporte-Blaisser, ending in a woman's head with a butterfly head-dress, has the practical defect of being uncomfortable for the hand; besides that, the human figure, or a part of it, should not be used as a mere handle (in spite of much Renaissance precedent). The best thing figured in the article is M. Gaillard's sword hilt, with the dragon's head; the handle being symbolical, and at the same time good for the grasp. Convenience should go hand in hand with beauty in all articles that are to be handled.

The most interesting article in *Public Works* is that by Mr. T. W. Barber, M.Inst.C.E., on a great proposal for a barrage of the Thames at Gravesend, on somewhat the same principle as the Nile barrage, with sluice gates, the effect of which would be to convert the lower Thames into a great elongated lake of constant depth; and the oscillation backwards and forwards of the sewage poured into the river will be at an end. The advantages, as tabulated by the author, are so remarkable that the statement of them is worth quoting:—

"The immediate effects will be these:—

(*a*) The tides, Neaps and Springs, will be stopped at the dam.

(*b*) The river will be converted into a long lake having numerous affluents, the principal of which will be its natural flow over Teddington Weir.

(*c*) It will have a slow downward current, never reversed, so that all that enters it will pass downwards to the dam.

(*d*) Its level (normally at Trinity high water) can be regulated to any level above low water by the sluices.

(*e*) Within from 25 to 45 days of the closing of the dam the upland water will have pushed over the dam all the oscillating foul water of the tidal river, and thenceforward the water of the lake will be the same as that of the upper river, and any soilage in it must enter it by sewers or land drainage.

(*f*) There will thus be obtained by one work a navigable depth of water varying from 65 ft. at Gravesend to 32 ft. at London Bridge, without dredging or any interference with the river bottom or banks.

But the consequent effects upon the business and usage of the river will be tremendous:—

(*g*) Ships drawing 30 ft. can then proceed to London Bridge at any hour of the day or night, without waiting for tides.

(*h*) Ships of all tonnages and draughts can traverse the river, anchor anywhere, lay alongside any wharf or quay, always remain at one level for loading or unloading (an immense boon to shipowners and wharfingers), and need not lie out in the river or obstruct the free navigation.

(*i*) Dock entrances can be left open, thus saving the cost and time lost in working them. (The London and India Docks Co. estimate the cost of working their entrances at 50,000*l.* per annum.)

(*j*) There will be no mud entering the docks and backwaters, the water in which will freely circulate with the clean river water.

(*k*) Exceptional tides, being stopped at the dam, will not overflow the river banks as now sometimes happens.

(*l*) Reduced cost of towage, barging, repairing river banks, camp-shedding, quays, dredging, management, control and policing of the river.

(*m*) Greatly increased safety of navigation: no grounding, swinging with the tides, collisions due to tidal drift. The tides are responsible for most of these accidents, and for many lives lost—casualties which would not occur in a lake.

In addition to these there is a most valuable asset created in the advantage the new conditions open up for:—

(*n*) Pleasure traffic, boating and sailing, fishing, and the provision of efficient steamboat services, with fixed piers. London will be provided free with a lake of fresh water 45 miles long and from a quarter to half a mile wide. It is certain that this will give rise to extensive pleasure boating of all kinds, which will have ample room owing to the removal of all vessels from mid-stream anchorages to the shores."

There will be no more muddy foreshores and no stirring up of mud by tidal scour. The picture is a fascinating one, nor is the estimated cost very alarming in proportion, viz.: 3,658,000*l.* But there is one point the writer does not touch on: what will be the effect on the Thames mouth below the barrage? We should like to hear something on that head. Other articles of interest in the same number are on "The Water Supply of Vienna," on "Passenger Transportation Problems in Boston, U.S.A.," and on "Municipal Copenhagen." All these are fully illustrated. There is also an article by Mr. W. N. Twelvetrees on "The Engineering Standards Committee and its Work." We have not space to summarise these; but they are all full of information.

The *Berliner Architekturwelt* is filled with a variety of illustrations, from practical street buildings to those romantic sketches of monuments and cemetery gates, looking as they were hewn out of primæval rock by the people before the flood, which German archi-

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tects are so fond of evolving on paper, though it can hardly be supposed that even on their own soil they find any opportunity of realising these dreams in a concrete form. The most interesting illustration in the number, however, is the design for a family sepulchre, or the front of it, in the cemetery at Weisensee, by Herr Dülfer, a Munich architect. This is a thing original and effective without any eccentricity. A design for a corona for lighting the foyer of the Frankfort Theatre, by Herr Seeling, of Berlin, is a good piece of work, shown in a coloured print. The practical buildings illustrated do not present anything for special comment.

The *Architektonische Rundschau* gives a perspective view and plans of the new Police buildings at Dresden, of which Baurat Julius Temper (Dresden) and Laudbauinspektor Carl Schmieden (Plauen) are joint architects. The plan is a slightly irregular parallelogram divided into three internal quadrangles by cross blocks; the exterior treated in a simple and severe classic style, with a circular block at the two main angles; here an order is employed on the upper story; in the remainder of the façade the effect is got only by the grouping and treatment of the windows. It is a solid and massive stone building, looking as if it was erected regardless of expense, and with some rich and rather effective carved decoration, not however of the most refined order. There is a bad effect produced in the first floor story of the circular pavilions by some clumsy corbelling out of the masonry courses, the object of which is not apparent, unless it represents blocks left for some carving not yet carried out.

The *Architectural Record* (New York) has a long article on "American Architecture of To-day," the illustrations to which are chiefly those of private houses. The author, Mr. Herbert Croly, commences by remarking that the United States has been passing through a great period of building activity, but that there is now rather a lull in this respect, and the season is opportune to consider the general architectural achievement during this period of activity, and the tendencies which it shows. And the main tendency, he thinks, is to confine American architecture to a very few prevalent types of design. "American architecture is still heterogeneous and indiscriminate enough; but it is not as heterogeneous and indiscriminate as it used to be. Certain special solutions of special architectural problems have been worked out, and have been largely adopted; and it is even more encouraging to note that these special ways of treatment and types of design, while open to many serious objections, all have some measure of propriety. It looks as if American architecture were becoming nationalised in very much the same way, if not to very much the same extent, that the architecture of modern England or France is nationalised." It is remarked that the use of brick is now very general, "and where brick is used, it is generally well used." The main point of the article, however, is that there is growing up a feeling for the adoption of standards of style based on precedent, and that this will tend to raise the character of American architecture. (The very great stress laid on French precedent of late years does not seem to be sufficiently recognised.)

"The difficulty with modern American architecture is that it started with nothing but vicious associations, and the good architects have been confronted by the enormously difficult job of substituting comparatively good for the comparatively bad associations of the past. In so doing they have depended too much on obtaining an interesting variety of effect, and too little upon the value of repetition as an advertisement. Architectural repetition is in bad odour in this country, because in the past it has been applied chiefly to such dead and dreary material as brownstone fronts. Nevertheless the one sensible course for the future—the one course, which will provide both for a better quality of design and for a completer understanding between architect and client—is to make out of repetition a conviction and ideal. If the opportunities for repetition are studied with sufficient care, the necessary variety and novelty of effect will take care of themselves."

Of the other articles, one on "Brick Building in London," by Mr. D. N. B. Sturgis, draws attention to the examples afforded in some modern London buildings of this class, of unpretentious and inexpensive architectural treatment. "The Architecture of West Point," an article of considerable interest, by Mr. Montgomery Schuyler, describes and illustrates the important architectural additions and improvements which are contemplated or in progress at this great military academy. The design for the Riding Hall, in the accepted designs of Messrs. Crane, Goodhue, and Ferguson, is a striking one, but looks too much like a piece of a mediæval fortress.

The *Nineteenth Century* contains what is in many respects an interesting article by Mr. C. L. Eastlake on the administration of the National Gallery; an article chiefly historical in its nature. There are two architectural criticisms in it to which we may refer. The one is in regard to the defective lighting of Edward Barry's galleries, in consequence of the double skylight, a flat glass roof under a sloped one, the former of course a regular dust holder. We commented on this years ago, and pointed out the far better effect of the single roof put up by Sir J. Taylor for the Office of Works. The other is the closing sentence in praise of the front of the building, of which it is said that "no public building has been so unjustly abused by the public." As a matter of fact the public neither praise nor abuse architecture, they do not care enough about it to do either. But this maintenance of the façade of the National Gallery as being a design worthy of its splendid position is really as a mere kind of hereditary superstition. It is a poor concern, and no special pleading will make it otherwise.

In *Scribner*, under "The Field of Art," Mr. Russell Sturgis and Mr. Frank Fowler go into what we should be rather inclined to call a rhapsody over Mr. Sargent's new wall painting in the Boston Library, of which the centre figure in bas-relief, the Crucifix, was exhibited two or three years ago in the sculpture-room at the Royal Academy. It is, we presume, treated as a coloured relief in the midst of a picture. American critics have a way of rhapsodising over everything that is produced by an American artist and decorates an American building. It is a pity that they cannot see their way out of this very self-regarding attitude, and try to look at things from an independent and truly critical standpoint. If they could do so, they would perhaps perceive that it is a question whether the decoration referred to is not far too Byzantine, too imitative of ancient art, too expressive of feeling for a superstition long since dead, and only indulged in modern life as a kind of æsthetic and religious pose, to have any fitting place as decoration to a modern library. But probably they would say that "it were to consider too curiously to consider so." Mr. Penfield's "Holland from the Stern of a Boeier" (whatever that may be) is worth notice for its author's coloured illustrations of buildings, people, and country, produced in chromo-lithography, in a simple and restricted colour scheme, but admirably characteristic and effective.

In the *Century* Miss Wharton's "Italian Villas and their Gardens" is continued, treating in this number of Sienese villas, and adorned with three illustrations by Mr. Maxfield Parrish, reproduced in chromolithograph and evidently designed and coloured *ad hoc*; not representing the real tones, but very effective notwithstanding, especially Vicobello, with its cream-tinted marble alcove in front of the brown masses of the trees.

Harper contains an article of great interest by Mr. G. H. Darwin, on "The Birth of a Satellite," especially concerned with the probable cause and manner of the formation of the moon from the primary mass in which it and the earth were first combined. It is a purely scientific article, illustrated by diagrams to render the reasoning employed obvious to the eye as well as to the understanding.

The *Cornhill* contains an article entitled "Whistler the Purist," by Mr. Mortimer Menpes, chiefly interesting in regard to personal traits. It appears that Whistler carried his ideas of art into everything, and was very particular as to the cut of his coats being in accordance with æsthetic ideals (to the bewilderment probably of his tailor). The account of his dealings with the Society of British Artists, who rashly made him a President and found they had exchanged King Stork for King Log, is amusing enough.

The *Revue Générale* contains an article by Dr. Moeller on "La Question des Sanatoria," which is useful as collecting together the opinions of sanitarians of different countries. Of the important question as to the best kind of building, so much discussed in England at present, he however says nothing, and does not even seem to be aware of a difference of opinion on the subject.

The *Antiquary* contains an article by Mr. Bailey-Kempling on the antiquities of Hersham, an old-fashioned village near Morecambe Bay, and "Breadsall Priory," one of Mr. Bailey's "Ramblings of an Antiquary," illustrated by sketches. Breadsall was the residence of Erasmus Darwin during the closing period of his life.

Knowledge contains a valuable article on "The Sunspots of 1903," by Mr. Walter Maunder, and one by Mr. W. F. Denning on "The Markings and Rotation Period of Saturn," a planet the study of whose main orb has been rather neglected owing to the exceptional and attractive problem presented by his rings.

ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A MEETING of the members of the Association of Municipal and County Engineers, arranged by the Metropolitan district, was held at the Municipal Officers' Club, Whitehall, on Friday, December 4, to discuss further the new drainage by-laws of the London County Council. The meeting was adjourned a month ago for the purpose of communicating with the remaining metropolitan surveyors to see if it were possible to arrange a uniform method of procedure throughout the metropolitan area. Mr. W. Weaver, C.E., of Kensington, President, was in the chair, and there were present Messrs. R. J. Angel (Bermondsey), W. Nisbet Blair (St. Pancras), J. Rush Dixon, hon. district secretary (Shoreditch), P. Dodd (Wandsworth), R. M. Gloyne (L.C.C.), Arthur Harrison (Southwark), P. G. Killick (Finsbury), H. J. Marten (Wandsworth), F. Sumner (Woolwich), and Oliver E. Winter (Hampstead).

Before beginning the business of the meeting the President expressed deep regret at the great loss which the profession had sustained by the death of Sir Frederick Bramwell.

The President, in reopening the discussion on the new by-laws, said he expressed his views a month previously as to the desirability in the interests of the public of one general system being adopted in all the London boroughs for carrying out the new drainage by-laws of the London County Council, and by such unanimity of working avoiding the present divergencies of practice. As many of the borough surveyors were not present at the previous meeting it was resolved to address a circular communication to each of them, enclosing copies of the forms which he had prepared, and inviting their suggestions for improving the forms in conjunction with the new by-laws. Only seven surveyors had forwarded suggestions, and the silence of the others might be interpreted in two ways—either they had no proposals to make on the suggested course of procedure, or they preferred to keep to their several modes of procedure. As he was of opinion that the second reason was the correct one, he was afraid there was little use in some of them endeavouring to bring about unanimity of practice. Such a desirable improvement must be left to the Local Government Board or the London County Council, to bring about by some future general order, begotten of public opinion aroused by the inconvenience and difficulties which would, without doubt, arise from the onerous requirements of the new by-laws. Personally, he begged to thank those brother surveyors who had favoured him with their suggestions and the meetings with their presence, and he could only express sympathetic regret that the others were prevented from joining in the deliberations of their more fortunate and less-worked brethren. Without doubt it was a tax on a busy official to ask him to devote his well-earned leisure to a task presenting no chance of profit or pleasure.

The Hon. Secretary (Mr. Rush Dixon) then read the following communications:—

Mr. Thos. Corfield (Deptford), in his communication, said he saw no objection to the Kensington form being adopted.

Mr. Harley Heckford (Poplar), referring in his letter to Form No. 2, expressed the view that the word "intend" required space for the addition of "s" in case of a single applicant. The situation of premises should not be described by words "being the. . . . premises. . . . from. . . ." Such a description was more or less vague, and liable to distortion by applicant; moreover, it was not required, as the previous wording, and especially the fact of a proper block plan having to be submitted, rendered any difficulty in location im-

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possible. As plans drawn in ink upon tracing linen would undoubtedly have to be accepted under the new by-laws it would be advisable not to have space upon the form or plan, but rather to ask for tracings on linen in every case; and as the scale was optional (not less than 16 ft. to 1 in.) the publication of a scale would lead to greatly disfigured application forms. Moreover, there was not sufficient room to give the necessary plans upon the space provided. As to form No. 2b, he was not favourably inclined towards the asking of a deposit of 2*l.*, which, of course, could not be enforced, nor did he think the surveyor of a borough should be either called on to undertake, nor should he for his council adopt, such a business as the making of plans for private persons. He might further say that paragraph 2 of the by-laws relating to additions, partial constructions, etc., appeared to include every known alteration that could possibly take place in drainage work, and the proviso to nullify entirely the import thereof; and he was of opinion that a definite line of policy should be clearly adopted as to when and when not a plan was required.

Messrs. H. Marten and P. Dodd (Wandsworth) suggested certain amendments of the Kensington forms, and that regulations similar to those attached to Form No. 2 should be inserted in place of the detailed description in writing. The practice in Wandsworth was to approve all plans subject to the Borough Council and the County Council's by-laws and regulations. They thought that that was very much better than to ask builders for detailed description in writing, as on the Kensington form, while it would ensure better work and remove a great deal of unnecessary responsibility from the surveyors and inspectors. As to the duties of the surveyors and medical officers of health in connexion with drainage of new and old buildings, the following resolutions had been adopted by the Wandsworth Council—viz., (1) "That the public health work, except reconstruction and repairs of drains and sanitary fittings, be under the supervision of the medical officer of health." (2) "That the matters of drainage and sanitary fittings and repairs be under the supervision of the surveyors." The writers' experience was that this system worked admirably, and they did not think it desirable to adopt Mr. Weaver's suggestion that the medical officer should report all repairs and minor alterations to the surveyor.

Mr. M. W. Jameson (Stepney) intimated that he quite agreed with part of Form No. 2, but thought that duplicate plans should be insisted upon. He hardly saw the necessity, however, for the applicant having to fill in the page "Detailed description in writing," as surely all those details were fully covered by the requirements of the by-laws. With respect to Form B, as the deposit of 2*l.* could not be legally enforced he thought it should be removed from the form.

Mr. William Oxtoby (Camberwell), in his letter, agreed that it would be a good thing to obtain uniformity in London with regard to drainage matters. The Camberwell form (a copy of which accompanied the communication) differed, he thought, only slightly from the general run of forms.

Mr. E. E. Finch (Bethnal Green) expressed the view that Form No. 2 should be larger, and that the detailed written description, with the exception of the first clause, should be omitted; that only the first by-law should be printed; that provision should be made for endorsing on the forms the order of the Council; and that the last part of Form 2*b*, relating to the deposit of 2*l.*, should be omitted.

Mr. R. J. Angel, Bermondsey, was of opinion that the form submitted by Mr. Weaver was too cumbersome. The small jobbing builder, with whom many of them had to deal, would not be able to fill up such a form intelligibly. Then he did not think the numerous questions to be necessary. It was no use asking a man what he would do, and at the same time telling him what he must do. The position and size of the drains were all set out on the plan, and as the builder had to carry out the work according to the requirements of the London County Council by-laws, that was sufficient. At the previous meeting Mr. Weaver had suggested that in cases of urgency the plan should be drawn in the office. He, for one, should certainly not allow that in his district. Why should they do architects out of legitimate work? There were men in their various districts who earned a livelihood by making these drainage plans and other work which came to them, and he would never countenance taking such work and doing it in the office. They would simply be increasing their own work to the detriment of some one else. Then there was the question as to how the work should be divided between the different departments. In Bermondsey they considered the sanitary inspector was a nuisance inspector, who searched out nuisances and rectified them, and they kept him to that. The surveyor did the whole of the original drainage work.

Mr. Dodd, Wandsworth, believed that in ninety-nine cases out of a hundred a block plan showing the drain would be sufficient. He could quite understand that if they had to carry out the duties of a District Surveyor or a county surveyor, where they had to see to the thickness of walls, damp courses, etc., that a detailed plan would be required.

The President wished to know how a block plan would meet the requirement of by-laws, Sections 3 and 4, which required them to show the positions of all windows and other openings into the buildings, and the height and position of all chimneys.

Mr. Dodd mentioned that Section 1 only required such plans, sections, and particulars of the proposed construction as might be necessary.

Mr. Blair, St. Pancras, remarked that Section 1 did not cover Sub-section 3.

Mr. Sumner, Woolwich, considered the detailed description in writing necessary. It made the architect think out the matter when submitting a plan to the Local Authority. He proposed that a Committee of six be appointed to consider the various suggestions, and to draw up a draft form to be submitted to the surveyors of the various London Councils.

Mr. Dodd, Wandsworth, seconded the proposition.

The President, before putting the resolution, said he did not want the meeting to put a somewhat onerous duty upon half-a-dozen gentlemen unless they were fully convinced that some good was likely to result.

The resolution was carried, but the meeting failed to constitute the Committee.

Mr. W. N. Blair, St. Pancras, declined to serve on the Committee. His reasons for voting against the resolution was that he felt it would be love's labour lost. They had taken a good deal of trouble in St. Pancras in remodelling their drainage form, and as it had been approved by the Committee, he could not go and ask them to alter it.

The President also asked to be left off the Committee. He did not shrink from work if he could see any result, but he did not see any possibility of practical results.

Mr. Winter, Hampstead, said he was in the same position, as he had just settled a form with the medical officer, and it had been approved by the Committee. The form followed somewhat on the lines of Kensington, but they did not make provision on it for a plan.

Mr. Rush Dixon, Shoreditch, thought it a pity they could not obtain more unanimity of practice among London surveyors.

Mr. Sumner, Woolwich, said he had prepared his form, but had kept it back until after the meeting.

Mr. Martin, Wandsworth, also mentioned that he had kept his form back in the hope that they might be able to get a common form for the Metropolis.

A vote of thanks having been accorded to Mr. Weaver for presiding, the proceedings terminated.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday in the County Hall, Spring Gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to lend Greenwich Borough Council, 4,500*l.*, for erection of buildings at depot; Lambeth Borough Council, 2,926*l.*, for paving works; and Stepney Borough Council, 2,400*l.*, for street improvement. Sanction was also given to the following: Hackney Borough Council, 1,000*l.*, for street improvement; Hampstead Borough Council, 14,145*l.*, for electric light installation; St. Pancras Borough Council, 10,000*l.*, for electric light installation; and Stepney Borough Council, 1,902*l.*, for a similar purpose.

Westminster Improvement: Housing Accommodation.—On the recommendation of the Improvements Committee it was agreed that the account of the Westminster improvement be debited with a sum of 50,000*l.* in respect of the accommodation provided at Millbank for the rehousing of the persons of the labouring class displaced in connexion with the improvements.

Tramways: Pimlico Electricity Generating Station.—The Highways Committee recommended, and it was agreed:—

"That the estimate of 64,000*l.*, submitted by the Finance Committee, be approved; and that expenditure of sums not exceeding that amount in all be authorised for the acquisition, under the compulsory powers conferred upon the Council by the London County Council (Tramways and Improvements) Act, 1903, of the freehold and leasehold interests in property required, and the provision of a site for the accommodation of persons of the working class to be displaced, in connexion with the erection of an electricity generating-station at Pimlico, for the working of the tramways in the western portion of the County of London."

Housing.—The following recommendations of the Housing of the Working Classes Committee were agreed to:—

"That the estimate of 20,840*l.*, submitted by the Finance Committee, be approved; and that expenditure not exceeding that amount in respect of the erection of Wenlake-buildings, Roby-street, St. Luke, be sanctioned.

That the tender of the Haslemere Builders, Ltd., amounting to 18,861*l.*, for the erection of Wenlake-buildings, be accepted. . . .

That the housing value of the site of Wenlake-buildings be fixed at 5,000*l.*; and that it be referred to the Corporate Property Committee to take the necessary steps to effect the transfer to the buildings account at the proper time."

The buildings will consist of two blocks of five story balcony dwellings, which will provide accommodation for 496 persons in 25 tenements of two rooms, 45 tenements of three rooms, and 15 tenements of four rooms, and one cottage of three rooms.

Mr. A. Smith said he hoped the Committee would remember that there was a Works Department, as several times lately they had passed it over.

Mr. Bruce replied that the Committee were bound to make both ends meet. The Committee was friendly to the Works Department, but lately the architect's estimates had been such that if the work had been undertaken by the Works Department at this figure there would have been a loss on the schemes. The Works Department was bound to accept the work at the architect's estimate, and therefore the only chance the Committee had of getting the schemes carried out was by contractors tendering below the architect's estimate.

Claim for Compensation.—The following recommendation of the Main Drainage Committee was agreed to:—

"That the seal of the Council be affixed to the appointment of Mr. John Henry Clutton as sole arbitrator with regard to, and to the formal offer submitted herewith in satisfaction of, the claim of Messrs. W. H. Lascelles and Co. for damage to their property at Sugar-house-lane, Stratford, through the construction of the Hackney Wick to Abbey Mills relief sewer. . . ."

Sewage-polluted Watercress.—The Public Health Committee recommended, and it was agreed, that inquiries be made by the medical officer of health with regard to the condition of watercress beds in the county of London, and that he be instructed to extend his inquiries to sources outside the county from which watercress is supplied to London if it is found practicable to do so after a preliminary investigation.

A Site for Council Premises.—In answer to a question, the Deputy-Chairman said that the Establishment Committee was constantly on the look out for new offices, and the Sub-Committee had agreed to recommend that some premises be taken in the immediate neighbourhood. A meeting of the Sites Committee had been called for Friday next at 3 p.m. The Committee at its last meeting did not think the present a very opportune time to press forward any large scheme. Although the Government was desirous of knowing the views of the Council at an early date as to the vacant land they are clearing opposite the County Hall, yet they very considerately would not take any action without first giving the Council an opportunity of considering the matter further.

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Belgian Rails.—Lieutenant-Colonel Rotton moved, and Mr. Gaskell seconded:—"That it be referred to the Highways Committee to ascertain and report to the Council (*a*) the number of hours of labour per week worked by the men employed by the Belgian firm in making rails for London tramways, and (*b*) the rate of wages per hour paid to such men, and if they do any work on Sundays in connexion with the manufacture of such rails."

After considerable discussion, Mr. McKinnon Wood moved an amendment as follows:—"That it be referred to the Highways Committee to ascertain and report to the Council (*a*) the number of hours of labour per week worked by the men employed by foreign firms making the rails for the Government, provincial Corporations, London tramways, and railways; (*b*) the rate of wages per hour paid to such men, and if they do any work on Sundays in connexion with the manufacture of such rails; and (*c*) the amount of mining royalties paid by foreign firms as compared with those paid in Great Britain."

Mr. Ward seconded the amendment, which was carried.

Tenants and Land Tenure.—Mr. Lewis moved, and Mr. Dickinson seconded, the following:—"That it be referred to the Corporate Property Committee to consider and report as to the means by which the Council could offer to prospective tenants of its surplus lands fixity of tenure at a fair rent with rights of property over buildings they have erected."

Mr. Bruce moved an amendment to delete the words "means by which the Council could offer," and insert the following: "desirability of the Council offering."

After discussion this was agreed to.

District Surveyors and Salaries.—Mr. Dew moved:—

"That it be referred to the Building Act Committee to report whether it is advisable that the Council should exercise the powers, conferred upon it by section 158 of the London Building Act, 1894, to pay fixed salaries to the District Surveyors instead of their being remunerated, as at present, by fees; with due regard to the statutory responsibility of the District Surveyors for the stability of buildings, etc., being in no way lessened."

He said he did not make this motion out of any hostility to District Surveyors. There were some splendid men serving London in this capacity, but he thought the Council would be well advised to bring them under the more direct control of the Council by abolishing the present arrangement, and paying them a fixed salary. It was absurd that the man who watched the builder to see that he carried out his work properly should yet be able to collect a fee from him.

Captain Hemphill, Chairman of the Building Act Committee, said his Committee were prepared to accept this motion, as it was only a motion to report as to the advisability of paying fixed salary. The Building Act Committee did, on June 11th, 1890, present a report to the Council on the subject, in which they thought it was undesirable to pay District Surveyors fixed salaries. However, there might be other facts to be brought forward, and the Building Act Committee would accept the motion. He might mention two or three cases bearing on the subject. The first was as to the Royal Aquarium, in connexion with work as to a small wooden bridge. The surveyor proposed, and was entitled, to charge 75*l.* in fees, which was a great deal more than the cost of the proposed work, for, according to the Act, he was entitled to charge on the whole building. In another case, a gentleman in Mayfair had some small work done to a balcony, and he had to pay 4*l* 5s. in fees, which was more than he had to pay for the repairs. In another case, in Southwark, an inquiry was made into the condition of some coping of houses, and if the District Surveyor had been called in the fees would have amounted to 25*l*.

Mr. Campbell said the Council was more likely to get good work under the present arrangement than under the one proposed.

The motion was then agreed to.

Water Companies' Charges—Dr. Fletcher Little moved: "That in view of the large sum claimed by the London water companies based on receipts from rates levied on coach-houses, stables, outhouses, and gardens, in addition to the amount already levied on the rateable value of the whole premises, the attention of the Metropolitan Water Board be called to the subject." This was agreed to.

The Council then adjourned.

Illustrations.

CHURCH OF ST. PETER, LOWESTOFT.

THE design illustrated shows a building intended to replace the existing Church of St. Peter, which was built about 1835, and is quite inadequate in size and arrangements for a greatly increased congregation. The chancel, morning chapel, with organ chamber over it, and the vestries have now been built; the nave is left for the future, and a further accumulation of funds.

The walls are faced with red brick, all the dressed stonework is in Casterton stone, the roofs are covered with "sea green" slates. A large reredos in triptych form, given by Mr. B. A. Charlesworth, and containing a coloured centre panel of the Crucifixion, in low relief, by Mr. R. Anning Bell, and painted wing panels by Mr. W. D. Adams, is to stand behind the altar. Painted glass, by Mr. Christopher Whall, is to fill the east window.

The church is planned with passage aisles, to seat 550. The architect is Mr. E. P. Warren, of London, and the builders Messrs. Collins and Godfrey, of Tewkesbury.

"BUCKLAND," BRECKNOCKSHIRE.

THIS house was erected some years ago, from the designs of the late Mr. S. W. Williams of Rhayader, whose name will be in the memory of many of our readers as an accomplished archæologist as well as architect, and as the author of an excellent book on the remains of the Abbey of Strata Florida. He was a member of the Institute of Architects and of the Society of Antiquaries, and for some years before his death was County Surveyor for Radnorshire.

The previous house, an ancient one, was entirely destroyed by fire, and the one here illustrated was built to replace it. It is built of a purplish grey stone (Silurian formation) quarried on the estate, with dressings of red Hollington stone, the roofs covered with green slates.

The principal feature internally is a large central hall (58 ft. by 38 ft.) panelled in oak and with a coffered ceiling. The billiard-room and drawing-room open out of the hall, and the dining-room is contiguous to it. The staircase, wainscotted in Austrian oak, leads to an arcaded gallery from which the principal suites of bedrooms open.

As the house was built on the site of the old one, the question of aspect—south-west—was settled by circumstances.

ELECTRIC GENERATING STATION, IPSWICH.

THE Ipswich Electric Generating Station, which we illustrate this week, was opened on the 21st November. It is a very complete example of a municipal undertaking of this kind, the whole of the electrical department of the Corporation being placed on the same site as the power station and car shed.

The administration department faces Constantine-road, the entrance being placed centrally, with accountant's department to the left on entering, and tramways department on the right. The engineer's office and meter department are on the first floor. At the back of the administration block is a large workshop, communicating with the tram car shed at one end, and the engine-room at the other, and is conveniently placed for the work of both departments. Tram rails run through it to the engine-room. The engine-room is faced internally with white glazed and blue Staffordshire bricks. The floor is covered with red adamantine tiles, the roof is constructed with steel principals and covered with patent dry glazing. The switchboard is arranged on a gallery on one side of the engine-room. Immediately behind is the battery-room and chamber for mains leaving the station.

The site is on the banks of the River Orwell, the water of which is used for condensing. The general level of the site is low, the subsoil water being only a few feet below the surface, consequently all important parts of the building are raised above ground level, including main flue, which is above the ground.

The tramcar shed is 180 ft. long and 87 ft. wide, with a roof in three spans supported between the main walls by columns. There are eight sets of lines, providing accommodation for 40 cars, and the usual workshops for painting, etc.

The buildings externally are faced with red kiln-burnt bricks, with Bath stone and white Suffolk brick dressings. The two pediments of the front elevation are rendered in cement, with moulded enrichments around the circular windows. The roofs of the administration block are covered with permanent green slates.

Mr. S. A. Kenny, of Ipswich, was the builder of the power station, administration block, and tramcar shed. Messrs. Shillitoe and Son, of Bury St. Edmunds, were the contractors for the chimney shaft and destructor building. The roof glazing was executed by Messrs. Mellowes, of Sheffield, the iron windows by the Crittall Manufacturing Company, of Braintree, Essex. The steel work was carried out by Messrs. Dorman, Long, from the designs of the architect, the white glazed bricks were obtained from the Farnley Iron Company, the stone from the Bath Stone Firms, the red bricks and the Suffolk facing bricks were supplied by Messrs. Bolton and Laughlin, of Ipswich.

Messrs. Kennedy and Jenkin, of Westminster, are the engineers, and the architects are Mr. C. Stanley Peach and Mr. C. H. Reilly, of Westminster.

THE SURVEYORS' INSTITUTION.

PRESERVATION OF TIMBER.

AN ordinary general meeting of the Surveyors' Institution was held on Monday afternoon at No. 12, Great George-street, Westminster, Mr. A. Buck, President, in the chair.

Mr. J. W. Penfold, Hon. Secretary, having read some donations to the Library and Library Fund, and a vote of thanks having been accorded to the donors on the motion of the President,

Mr. E. T. Scammell, F.R.G.S., read a paper entitled "The Preservation of Timber, with Special Reference to its Protection from Dry Rot and the Increase of its Usefulness for Estate Fencing and other Purposes." Having referred to some samples of treated wood, which he had placed on view for inspection, to the importance of the preservation of timber to the United Kingdom, and to the fact that the supply of timber is rapidly decreasing in all parts of the world, he said that the wholesale destruction of the forests of the old world and the new for the legitimate purposes of land settlement, agriculture, and trade, and the wasteful methods often employed in the supply of these needs, to say nothing of the enormous areas of forest destroyed by fire, had brought us within measurable distance of a timber famine. He mentioned this in order to bring into prominence the necessity, not so much of conserving and developing the forest resources of the world and thus repairing the waste of past and present years, as of adopting such means as science brought within our reach of preserving the timber itself. If it is possible, as many think, to render timber less subject to decay and consequently more durable, and to make it even more fit for industrial uses, by methods of preservation, then no effort should be left untried to secure this important result. Another reason of considerable weight, which lent encouragement to such effort, lay in the fact as expressed by Dr. Von Schrenk in his paper on "Seasoning of Timber," issued by the United States Department of Agriculture, that "much standing timber of varieties now worthless for constructive purposes, owing to its rapid decay, may be made commercially valuable by preservative processes." The lecturer, proceeding, said he wished it to be clearly understood that he did not propose to enter into a technical discussion of the merits of the various processes of which he would treat. He desired rather, from the information he had gained, to lay before them some facts.

The causes of decay in wood were mainly fungi, bacteria, insects, and worms. Fungi, in various forms, were parasites of the living tree, and often so affect it as to render it useless for industrial purposes. But they also act as agents of decay, in the same or other forms, in the tree after it has been felled. The most important of the fungi that affect converted timber were the merulius lachrymans, which produced the disease so well known and so much dreaded, dry-rot. "The spores of this fungus," said Professor Boulger in his book on "Wood" (1902), "germinate on damp wood, provided some alkali is present, such as the ammonia fumes in stables. Then under the influence of warm still air (in the absence of

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ventilation) its spawn threads spread not only in all directions through the wood, forming greyish-white cords and flat cake-like masses of felt on its surface, but even over surfaces of damp soil or brick-work and thus to other previously uninfected timbers. Imperfectly seasoned timber is most susceptible to dry rot; the fungus can be spread either by its spawn or by spores, and these latter can be carried even by the clothes or saws of workmen, and are, of course, only too likely to reach sound wood if diseased timber is left about near it; but on the other hand, dry timber kept dry is proof against dry rot, and exposure to really dry air is fatal to the fungus. If only the ends of properly seasoned beams which are inserted in brick walls are previously creosoted, it will prove a most effective protection."

Bacteria, which were also low forms of plant life, were very similar in their action to fungi. But their exact nature and modes of operation it was very difficult to determine. "It is known," says Dr. Von Schrenk, "that fungi and bacteria, which grow on dead or living organic matter, obtain their food by breaking up the complex chemical compounds of which the wood is composed into smaller substances. But there are many questions connected with their life history of which we know practically nothing."

It was well to notice that among the chief contributing aids to the growth of fungi and bacteria were heat and moisture; in fact without these, in due measure, it would be impossible for destructive agents to grow, however abundant might be their food supply. Excess of cold, therefore, or excess of heat, producing complete dryness, were alike inimical to their growth. The same might be said of excess of moisture. Immersion in water, as was well known, would preserve timber from decay for unknown periods. But in considering the question of wood preservation it was certainly important to remember that "no water means no rot." Among the food supplies of fungi and bacteria, nitrogenous substances, such as the sap in the younger portion of the wood, play an important part. It was, therefore, necessary that in any system of wood preservation these should be removed or rendered, if it be possible to do so, chemically inert.

As to the decay caused by insects and worms, it might be said that these agents of destruction consist mainly of three kinds: (1) Moths, the larvæ of some of which were most destructive to growing trees and sometimes attacked converted timbers; (2) termites, better known as white ants; and (3) ship worms or teredos.

The ordinary methods of preservation were by seasoning, either natural or artificial, charring or scorching, and impregnation. As to seasoning, wood, when thoroughly dry, is practically indestructible. In the British Museum could be seen a sample of Egyptian wood that must be, at least, 3,000 years old, while wood had been discovered in the cave dwellings, the age of which it was impossible to estimate. Pieces of pine had been unearthed in Illinois which had been buried 60 or more feet deep for many centuries. In this country there are numberless instances of wood used in buildings which had remained sound and good for hundreds of years. It could be well said, therefore, that dry wood might resist the attacks of destroying agencies for indefinite periods of time. So that, were it possible to season timber, so as to reduce it to a skeleton of lignin, there would be little, if any, need for other treatment. The process of complete seasoning, however, by so-called natural means, involved so many difficulties and occupied such a length of time, that for ordinary industrial uses it was necessary to seek the aid of so-called artificial means. He spoke of "so-called" natural and artificial seasoning because he wanted to make it clear that the difference between the two methods was only, or chiefly, one of name. He should rather describe them as "time seasoning" or "accelerated seasoning," for each method might be strictly "natural," and in complete harmony with the nature of the wood itself. Seasoning could be accelerated by immersion in water. Many of the constituents of wood, which required to be got rid of or changed before the timber could be seasoned, were "leached out" in water, so that timber that had been soaked in water might on exposure to the air be much more rapidly dried. Hence the custom of rafting timber down rivers was recommended, not only as a cheap means of transit, but as a help to seasoning. It would be impossible, however, to adopt this process to any large extent, even were it found to be uniformly advantageous to the wood.

Among the conditions necessary to the success of natural or time seasoning, that was, seasoning by air drying alone, were: (1) the sizing of the timber; (2) its careful stacking so as to secure the free passage of air; and (3) the necessary shelter from the rain or sun. These were matters that were often neglected, and which required increased attention on the part of timber users. But with all the care and skill that might be exercised, the results were often so unsatisfactory, and the cost of thorough seasoning so heavy as to require the employment of other methods. Some timber users strongly object to any other process than that of air-drying, as they consider that timber, though it might be dried quickly by artificial or accelerated means, was often deteriorated in the process, and that the waste involved by splitting might entail in the end greater cost than the slower but surer process. In recent investigations on this subject by the United States Agricultural Department—Bureau of Forestry—whose efforts might well be copied by our own Board of Agriculture, it had been found that careful methods of accelerated seasoning were found to answer well. There were two methods of accelerated seasoning ordinarily employed, viz., kiln drying or hot-air seasoning and steam-drying. In respect to the former, Professor Boulger said, "kiln-drying or hot-air seasoning is suited only to boards or other small material. It is a common practice to first steam the timber, which reduces its hygroscopicity and, therefore, its warping. This, however, is said to reduce the strength, if not also the durability of the wood." Some of the advocates of the steaming process affirm that this did not necessarily follow, as it was possible so to treat the wood that its strength and durability were augmented. But Professor Boulger went on to say: "If not steamed, the ends of boards should be clamped before kiln-drying to prevent splitting and warping. Neither hygroscopicity nor shrinkage of wood can be altogether overcome by drying at temperatures below 200 deg. Fahrenheit; but as a rule only the first shrinking is likely to cause splitting, so that any timber which has had from three to six months air-drying may be safely kiln-dried. Too rapid kiln-drying, however is apt to produce 'case hardening' in oak and other hard woods, the drying and shrinking, that is, of an outside shell followed by 'honeycombing,' or splitting of the interior along the pith-rays."

Dr. Von Schrenk said that "in a number of timber-treating plants in the States green or water-soaked wood is steamed for several hours to prepare it for the injection of chemicals. Steaming is said to coagulate the albuminous substances present in wood, thus rendering the walls of the wood-fibre more permeable." This was the view maintained by the advocates of steaming in this country as a means of accelerating seasoning. But Dr. Von Schrenk considered that until the objection that arises from the risk to the wood, in steaming at high temperatures was overcome, it was at best a "makeshift, and unless modified materially, it can never replace open-air seasoning, supplemented, possibly, by kiln-drying."

Among the processes in operation in this country, the author mentioned the following:—The Chateris-Shapland (improved), the Erith, the Haskinised, Parsons, the Sturtevant, and the Superheated Steam, and he gave a brief description of them. He then briefly referred to charring. It was well-known, he said, that the durability of timber and its immunity for a considerable time from decay, were ensured by charring, which had been practised for unknown periods. The piles on which Venice was built, were charred, and so were ships timbers used in the British Navy long years ago. At the present time it was largely employed in works of piling and fencing, and, on some railways, for oak and other hardwood sleepers. Various processes of torrefying woods had been employed, but to be effective it was necessary that the timber should be thoroughly seasoned before it was charred, if not, it would only hasten its decay. Another objection lay in the fact that the charred surface was liable to easy fracture, and to disintegrate by frost, water, and other influences. At the best, therefore, it could only be regarded as temporary in its action.

The author then dealt with impregnation, or the antiseptic treatment of timber. In seeking to obtain the object sought by any process of impregnation, there were four points, according to Dr. Von Schrenk, to be kept in view:—1st. It must be poisonous to bacterial and other destroying agents. 2nd. It should be capable of easy injection, and when once in the wood it ought to stay there. 3rd. It should penetrate all parts of the wood. 4th. It should be cheap.

One of the ablest works on the subject was that of Mr. S. B. Boulton. The full title of his book was "Antiseptic Treatment of Timber: a Paper read before the Institution of Civil Engineers in 1884, with an Abstract of the Discussion Thereon." Since that time a large number of treatises had been written dealing with various aspects of the question. Mr. Boulton said that "by the year 1838 four several systems of antiseptic treatment were fairly before the public, and competing for the favour of engineers. These were:—Corrosive sublimate, introduced by Mr. J. H. Kyan; sulphate of copper, by Mr. J. J. Lloyd Margary; chloride of zinc, by Sir William Burnett; heavy oil of tar (afterwards called creosote), by Sir John Bethell." The author then quoted Mr. Boulton's description of these systems, and subsequently gave further details of the systems of Burnettising and Creosotising.

Besides these methods of treating wood, there were many others which in recent years had come into use. Some of these were not really methods of impregnation, as they rely upon the solution sinking into the wood by the simple method of painting the wood with the solution or by dipping the wood into it. Among these were the following processes:—Carbolineum avenarius (Messrs. Peters, Bartsch, and Company, of Derby). Solignum (Messrs. Maior and Company, Limited, of Hull). Jodelite (Mr. Joseph Dee, of Manchester). The Atlas Wood Preserver and Disinfectant (The Atlas Preservative Co., Deptford, S.E.). Silvertown Special Wood Preservative (Burt, Boulton, and Haywood); and Stop-rot (Messrs. Pilchers, Ltd., London).

The concluding processes which he noticed were true impregnation processes. They were the Hasselman or Xylosote Process (Xylosote Company, London); The Electric Timber Seasoning and Preservation Company, Ltd., London; The Non-flammable Wood Company, Ltd., of Fulham, S.W.; and the Powell Process (The Powell Wood Process Syndicate, Ltd., London).

Mr. T. A. Dickson proposed a vote of thanks to the lecturer for his paper, and said that on estates where posts and fences were largely used the subject was of great importance. As to creosoting, he had found that the results were not as good as could be desired. Carbolineum had given him very satisfactory results.

Mr. Arthur Harston seconded the vote of thanks, and said that the paper would be a valuable one for reference. As to sap, it was often supposed that if the wood was dry the sap had gone, but, of course, the sap wood remained, and that was what was so readily attacked if exposed to either moisture or heat alternately. The important point was not only to endeavour to preserve wood, but to use it free of sapwood. Sapwood, until it turned blue, was, in the view of the timber merchant and builder, good sapwood, because fungi had not attacked it, but as soon as it was exposed to heat and damp it was liable to an attack. His firm had had to erect some miles of oak fencing, and they had found great difficulty in getting oak posts free from sapwood, and they had consequently adopted a system of cast-iron posts, and judging from the number of inquiries they had had other people had adopted the same system. As to wood for joinery purposes, perfectly dry wood should not be made use of in a damp building, as swelling of the wood was the result. As to the sugar process, no doubt if the sugar could be got into the pores of the wood the wood would be stiffened, but he should think it would set up a fermentation which would induce some growth which would destroy the wood. Fungi and the various organisms which attacked wood attacked more readily those with sweet sap. They did not attack so readily oak and teak, because the sap was bitter. To impregnate wood with sugar would, he should think, assist such attacks. In London a great deal of creosoted yellow deal had been laid down as wood blocks, and that had been an oppor-

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tunity in some cases for destroying all evidence of sap. As a result, the better informed surveyors to Councils bought their deal blocks uncreosoted, had them sorted, and the sappy wood thrown out, and then had the remainder creosoted. Preservative processes were expensive, and in reckoning the value of a process it must always be considered that in doubling the life they did not double the value of the wood. That was to say, the reversionary life of the wood due to the process must be discounted in present money. They paid their money down at once, and got their value after the natural life of the wood.

Mr. W. T. Ingram said the question was one of cost. What could be done to preserve the poorer and cheaper woods, and what was the cheapest and best method of doing so.

Mr. E. J. Elwes said he was disappointed that the paper did not contain more definite knowledge. What was wanted was more complete and exact knowledge on the subject of wood and its preservation. Our ancestors used tar as a preservative, and he knew of no better substance when properly used. If they could convert such woods as Scotch fir or spruce, which were now practically valueless except for inferior work—if they could, by some process, give them a life four or five times longer than they possessed at present—the value of those woods would be very greatly increased. As to wood for building, he had lived for years in a part of the country where timber was the natural building material, and if the ridiculous restrictions which had been adopted by the authorities could be abandoned he should have no hesitation in using properly-seasoned Scotch fir for keepers' houses and for buildings which were not wanted to last for more than two or three generations.

Mr. A. L. Howard referred to the practice of placing carefully-seasoned wood in buildings not fit to receive it, and to the possibility of destroying the natural life of timber by chemical processes.

Professor G. S. Boulger said the dangerous position for most woods was between wind and water, but as long as they were under water or perfectly dry they kept sound. Mr. Scammell and others spoke as though wood, once dry and seasoned, would last for ever. So it would if it was kept thoroughly dry. The British Museum example was nearer 4,000 than 3,000 years old, and if it was put half under ground in this country it would decay very soon. Although it was true that fungi attacked sapwood, it did not attack that only; it spread from one part to the other. The thing to do was to get rid of the food of the fungi, and that was the sap, and that was to be done by cutting off the sap or by some process or treatment. But more knowledge was required as to what happened in these processes. They heard of chemical compounds of iron and zinc with celluloids, but there was no such thing known. It was not known exactly why timber rots, but they did know that where it was sunk in the ground, there were, especially near the surface where there was plenty of moisture, conditions which set up decay. We needed to know more about soil bacteria. Wood, when seasoned, was vulnerable when placed in unfavourable conditions. Well-dried joists, exposed to damp, would be likely to decay, but where there was good ventilation it was different. As to the new process of impregnating wood with sugar, he was sceptical at first as to the claims made for it, but judging from the tests a great deal had been done by the process. Tar was a good preservative, but it could not be used for wood for use inside buildings.

Mr. E. R. Gabbett said that in the case of posts, etc., which were creosoted first and then had holes bored in them, wet got in and caused decay because the creosoting did not go right through the wood. The holes should be made first and then the wood should be creosoted.

The vote of thanks having been agreed to, and the President having said a few words, Mr. Scammell briefly replied, and the meeting terminated.

BOOKS RECEIVED

FOURTH REPORT OF THE BOARD OF TRADE ON THE CONCILIATION (TRADE DISPUTES) ACT. (Eyre and Spottiswoode. 6d.)

THE DRAINAGE OF TOWN AND COUNTRY HOUSES. By G. A. T. Middleton, A.R.I.B.A. (B. T. Batsford. 4s. 6d.)

LONDON ON THAMES IN BYGONE DAYS. By G. H. Birch, F.S.A. (Seeley and Co.)

A Postcard from Venice.

FROM VENICE.

SINCE the fall of the Campanile, in Venice, there have been many expressions of opinion as to the artistic, romantic, or constructive value and importance of rebuilding this famous monument. At one time—in common with others—even with the memory of its towering grandeur in one's mind, I venture to think that it might perhaps be better for St. Mark's at least to let it remain only as a memory, the church itself gaining and the piazza not losing by its disappearance, though, of course, the whole city as a group must do so.

Now, however, on revisiting the spot, and with the whole lovely dream made real again by personal observation, I am compelled to express my conviction that the loss is so great, the want of the previous rarity and completeness so much felt, that an aching void is created so acute to those who have ever seen the marvellous group of building, of which this Campanile was the culminating centre, that only reconstruction in some form or another can satisfy.

To my mind St. Mark's is absolutely dwarfed. The front seems naked, and, deprived of the Campanile and Loggia at once, staring in solitude, wanting the dominating feature of which it seemed a part, though dissimilar in style, etc. I cannot but hope that something will be done, though at present I believe there is much anxious thought as to what it should be, and the wooden hoardings at present only conceal the flat platform of the old foundations, with rows of new piles outside. These can be seen from the galleries and loggia of the Ducal Palace, as well as much of the old material in the courtyard of the Palace, carefully sorted out into heaps and numbered, some shafts of columns not even broken. The feeling of the inhabitants as to the catastrophe seems too strong for words; only action can express it, shrugs of shoulders and dramatic extension of arms assisting. But, to descend from the sublime to the ridiculous: postcards are printed showing how the indifference, or want of foresight, of the authorities is felt by the public and expressed in ridicule. But, indeed, it is no ridiculous matter, this neglect of warnings and postponement of needed attention and repair until it is too late. One is glad to know that in some instances the lesson is taken to heart, for the Church of the Frari is being saved; others, however, not less in a state of danger, are not at present in hand, though obviously actually dangerous structures. One of these, it is said, will be tied in or banded in such a way that if it fell—as, from the failure of foundations, it would seem likely to do—it must fall in a solid lump, to the destruction of anything in its line of fall, instead of crumbling down in a heap, as did the great Campanile.

Venice, December 3. C. F. HAYWARD.

[*** The accompanying cut is a reduction from one of the recent Venice postcards, enclosed by Mr. Hayward in his letter. The "Garantito senza pericolo" is distinctly humorous.—ED.]

APPOINTMENT OF SANITARY OFFICER.—The Local Government Board has sanctioned the appointment of Mr. G. T. Hill as a sanitary inspector in the City of London from November 12, at a salary of 180*l.* per annum, on the understanding that his duties are strictly those appertaining to the office of sanitary inspector.

ARCHITECTURAL SOCIETIES.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—Mr. Edwin C. Wallis, A.I.E.E., Vice-President of the National Association of Electrical Contractors, read a paper on the 3rd inst. before the members of the Leeds and Yorkshire Architectural Society. His subject was "Electrical Work as Affecting Architects." He called attention to the numerous electrical appliances which now constitute an inherent part of modern buildings, and urged the importance of the work being thoroughly executed. Lightning conductors, he said, ought not to be neglected, for if badly earthed or discontinuous they became fraught with danger. No need existed for the hideous obstructiveness at the tops of some conductors, but there was reason for blending them with the metal finial. Electrical hoists were coming more and more into use. They were marked either with continuous current, single-phase current, or two-phase current, and were quite manageable. In some respects they were superior to hydraulic hoists. The cost of working was less wherever electricity could be obtained at a low figure. Speaking of electrical development, he recalled the fact that twenty years ago there was very little electric lighting in Leeds. The Corporation power-station in Whitehall-road began with 500 h.p., but now there was an installation of 14,000 h.p., and another 4,000 h.p. was on order. Great advance had been made in electrical work and accessories, and the improvement was still going on. The tendency was to use higher pressures. Where formerly 50 volts were used in lighting, 230 volts were now used. A paper dealing with metal casements was afterwards read by Mr. G. Farrar, Mr. Butler Wilson, President of the Society, was in the chair.—*Leeds and Yorkshire Mercury.*

THE ARCHITECTURAL ASSOCIATION OF IRELAND.—The members of this Association recently paid a visit to the engineering works of Mr. William Spence at 107 and 108, Cork-street. They were received by Mr. Spence, his son (Mr. Arthur Spence), and Mr. H. J. Lundy, M.R.I.A.I., his son-in-law, through whom the visit had been arranged. Mr Spence accompanied the visitors through the works, explaining the uses of the various machines, while Mr. Arthur Spence illustrated his remarks by practical demonstration. Having inspected a new row of houses erected by Mr. Spence for his workpeople, and also a large fitting shop which is in course of construction, the members were conducted to the foundry, where the various processes of casting were explained. Several large castings were made in connexion with work Mr. Spence has in hand for Guinness's Brewery. The President (Mr. Charles H. Ashworth) thanked Mr. Spence for his kindness in allowing the Association to view his works, and Mr. Spence replied.

MIDDLESBROUGH BUILDING STATISTICS.—The number of building, draining, and street works in Middlesbrough approved last month was 43, or 11 more than in the corresponding month of last year. The number of houses in course of erection at the end of November was 285, and the number of other buildings and drainage works was 25.

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APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Finsbury, East.—A porch at an entrance in South-street to a building on the east side of South-street and north side of South-place, Finsbury (Messrs. Davis and Emanuel for Mr. C. G. Hill).—Consent.

Dulwich.—A one-story building at the rear of Wilson's Grammar School, Peckham-road, Camberwell, to abut upon Dagmar-road (Mr. F. F. Kelly for the Governors of the School).—Consent.

Wandsworth.†—A church on the site of No. 290, Balham High-road (Mr. J. L. Gibson for the Trustees of the Church).—Consent.

Kensington, South.—An addition to No. 133, Westbourne-grove, Kensington, to abut upon Pembridge-villas (Mr. F. W. Hunt for the London and Westminster Bank, Ltd.).—Refused.

Width of Way.

Holborn.—Rebuilding Nos. 14 and 14A, Elm-street, Gray's Inn-road, St. Pancras, abutting also upon Elm-court (Mr. A. Graham for Messrs. W. H. Wagstaff and Sons).—Consent.

Width of Way and Lines of Frontage.

Hampstead.—One-story shops upon part of the forecourts of Nos. 3 and 5, Fairhazel-gardens, Hampstead, to abut also upon Coleridge-gardens (Mr. W. Daniell for Mr. J. Gibb).—Refused.

Brixton.—A building with a one-story addition in front on the site of Nos. 242 to 258 (even numbers only) inclusive, Ferndale-road, Brixton, to abut also upon Stockwell-avenue (Mr. J. W. Chapman for the Bon Marché, Ltd.).—Refused.

Width of Way and Construction.

Wandsworth.—A one-story steel shed at Gothic Wharf, Brewhouse-lane, Putney (Mr. A. E. Chasemore for Mr. W. H. Jay).—Consent.

Space at Rear.

Battersea.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a dwelling-house at Falcon Wharf, on the west side of Lombard-road, Battersea, with an open space at the rear (Mr. W. J. Dresden for the Council of the Metropolitan Borough of Battersea).—Consent.

Width of Way and Space at Rear.

Battersea.†—Three houses on a site abutting upon the southern and western sides of Ethelburga-street, Battersea (Mr. G. J. Morriss for Mr. W. Taylor).—Consent.

Deviation from Certified Plans.

St. George, Hanover-square.—Deviations from the plans certified by the District Surveyor, under section 43 of the Act, so far as relates to the proposed erection of a building on the site of No. 110, New Bond-street, abutting upon Brook-street, St. George, Hanover-square (Mr. J. D. Young for Mr. D. C. Apperley).—Consent.

Formation of Streets.

Wandsworth.—That an order be issued to Mr. W. C. Poole, sanctioning the formation or laying out of new streets for carriage traffic on the Furzedown Park estate, Mitcham-lane, Tooting (for Messrs. Swain and Selley).—Consent.

Lewisham.—That an order be issued to Mr. H. Porter, sanctioning the formation or laying out of a new street for carriage traffic to lead from Woolstone-road to Cranston-road, Lewisham (for the Leathersellers' Company).—Consent.

Wandsworth.—That an order be issued to Mr. C. W. Braine refusing to sanction the formation or laying out of a new street for carriage traffic to lead out of the east side of Merton-road, Wandsworth (for the Wandsworth and Putney Gas Light and Coke Co.).—Agreed.

Width of Way and Building for the Supply of Electricity.

St George, Hanover-square.—A motor generator station, with an Italian terrace and garden on the roof of such station, on a site abutting upon Balderton-street, Hart-street, Duke-street, and Brown-street, Mayfair (Mr. C. S. Peach for the Westminster Electric Supply Corporation, Ltd.).—Consent.

Means of Escape at the Top of High Buildings.

City of London.—A deviation from the drawings approved on November 18, 1902, in respect of the means of escape in case of fire, proposed to be provided in pursuance of section 63 of the London Building Act, 1894, on the fifth and sixth stories of a building on the north side of East-street, Finsbury-circus, so far as relates to an alteration in the internal planning of a portion of the fifth story of the building (Mr. G. D. Martin).—Consent.

Marylebone, East.—Means of escape in case of fire proposed to be provided in pursuance of section 63 of the Act, on the fifth (top) story of proposed residential flats on the western side of Portland-terrace, Regent's Park, St. Marylebone, to abut also upon High-street (Mr. F. M. Elgood for Mr. J. A. Michell).—Consent.

Westminster.—Means of escape in case of fire proposed to be provided in pursuance of section 63 of the Act, on the sixth story of Queen Anne's-chambers, Broadway, Tothill-street and New Tothill-street, Westminster (Messrs. Rolfe and Matthews).—Consent.

Westminster.—Deviations from the drawings approved by the Council on July 28, 1902, in respect of the means of escape proposed to be provided in pursuance of section 63 of the Act, on the sixth and seventh stories of Rutland-court, Knightsbridge, so far as relates to an additional doorway, fitted with a self-closing fire-resisting door, being provided, from one of the flats to the internal staircase at the seventh floor level (Mr. D. Joseph).—Agreed.

Dwelling-houses on Low-lying Land.

Kennington.—That the solicitor do prepare a licence under section 122 of the Act to Mr. C. Barker, for the Duchy of Cornwall, for the erection of nine dwelling-houses on low-lying land, situated on the east side of Courtenay-street, Kennington-lane, Lambeth.—Consent.

The recommendations marked † are contrary to the views of the local authorities.

ROYAL COMMISSION ON LONDON TRAFFIC.

THE Royal Commission on London Traffic sat at the Westminster Palace Hotel on Thursday last week, when Mr. Arthur Harrison, Borough Engineer and Surveyor of Southwark, gave evidence. He recommended the removal of costermongers and other obstructions from main roads, and the provision of secondary streets for the relief of traffic. He thought the statutory powers now possessed by the Borough Councils over public highways should not be curtailed, because the local authority are far more conversant with the requirements of local traffic, and were in a better position to control the streets than any other authority.

Replying to the Chairman, witness said considerable improvement could also be obtained if the London Building Act, 1894, were amended so as to provide for the London County Council and the Borough Council working together on questions of improved street lines. At the present time a good deal of property in the South of London had large forecourts, and these forecourts were at times built over. Persons proposing to build over forecourts had to submit plans to the London County Council, and a copy of the plans was sent to the Borough Councils for their observations. The decision, however, remained entirely with the County Council, for the observations of the local authority might be regarded or they might not.

The Chairman: What evil arises?

Witness said the result was that they might get a street which was unimportant at the time spoilt although it might in time become an important street for traffic purposes. If a line was laid down by the local authority beyond which the buildings should not come, a good street might be made; the County Council did not always take the advice of the local authority There was the case of St. George's-road, which ran from the Westminster Bridge-road to the Elephant and Castle, where there were a large number of forecourts. The road varied in width from 92 to 70 ft., and they had a chance of making the street a uniform width. The Southwark Council suggested that there should be a line laid down for building but the County Council passed the plans and allowed the buildings to come forward.

The Chairman: You wish there should be some amendment of the Act by which the Borough Councils could have a more powerful voice in the matter?

Witness: Yes.

Replying to Sir John Dickson Poynder, witness said the Borough Council experienced certain dissatisfaction at the attitude of the London County Council. The decision did not narrow the road but it prevented it being widened. He believed there was some question of a consent given twenty years previously by the Metropolitan Board of works which came into this case.

The Chairman: As a rule you find the County Council very anxious to widen the street?—Yes.

Continuing, witness said there were other cases in which the local authority's observations were ignored by the London County Council.

Mr. R. M. Prescott, Town Clerk of Fulham, thought the local authorities should have the power of regulating heavy traffic in the streets, such as heavy carriages carrying timber.

Mr. N. Scorgie, Borough Engineer and Surveyor of Hackney, referred to the obstruction caused by the frequent breaking up of the streets by the water and gas companies, and thought the local authority ought to have power of controlling the time of such operations. He objected to the power of veto on tramway schemes being taken from the local authorities. He dwelt on the crowding of the population in the Hackney district, and supported the proposal of the North-East suburban tube railway to open up Waltham and Chequers Green for the working classes.

At a sitting of the Royal Commission on Friday last week Mr. Councillor Levy, for Hammersmith, gave evidence, and referred to the great congestion in Hammersmith, due to the improved facilities provided by the Central London Railway and the electric tramways. He suggested that King-street should be widened to at least 60 feet. Hammersmith Broadway also required to be widened. He suggested that the embankment of the River Thames, along the Hammersmith foreshore and the construction of a good carriage road would afford great relief to the King-street traffic, and would effect a most important and desirable public improvement. Several years ago the late vestry of Hammersmith prepared a plan of the proposal, and asked the London County Council to carry it out, offering at the same time to contribute a substantial sum towards the cost. The total cost of the improvement however appeared to the County Council to be prohibitive, and they declined to undertake it, but it was felt that the proposal should be carried into effect in the near future.

Replying to the Chairman, witness said the estimated cost of the embankment was 200,000*l.* The local authority offered to contribute 20,000*l.*

Mr. J. Patten Barber, Borough Engineer of Islington, said no doubt much of the delay and danger now caused in thoroughfares crowded with traffic would be prevented by proper widenings and improvements which would provide a greater area for the traffic.

Correspondence.

BRIGHTON AND HOVE HOSPITAL FOR WOMEN COMPETITION.

SIR,—Last week's issue of the *Builder* contains a review of the four sets of drawings which were premiated in the above-named competition. The criticism of my design, No. 46, ends with these words:—

> "But we must add that the omission of the proper staff accommodation asked for ought to have debarred it from consideration by the assessor."

In comparing the schedule in the instructions, and a list of the bedroom accommodation subsequently issued on a printed postcard, with photographs of the actual drawings now hung at Brighton, I find that all that was asked for is provided, and also three small rooms in excess of the Committee's requirements. I have checked the accommodation other than for staff, and cannot find that anything has been omitted or that the conditions and instructions have been departed from in other ways.

In digesting the notes as to accommodation required, it is to be regretted that your reporter did not pay equal attention to the conditions which preceded them. To take one condition only, had he done so, he would have seen that particular stress was laid upon the necessity of making the buildings as light and airy as possible, and that northern lights were to be avoided except in certain specially mentioned cases. In the first premiated design this condition has been completely ignored, as the principal unimpeded light to both the main wards is derived from the north. Even in the longest days of summer, owing to the deep projections, the sun could never reach these windows, and consequently half the beds would be sunless, apart from its being a breach of the conditions, which seems to have been a cardinal point in your reporter's opinion; it is astonishing that the neglect of such an elementary principle in hospital planning should have escaped the notice, not only of him, but of the assessor.

The last paragraph is not written with the object of criticising the design which, in the assessor's opinion, merits the first place, but to show, by comparison with the previous one, that the review is not quite even in its treatment. In justice to me, therefore, I hope you will be good enough to publish this letter in your next issue.

E. P. HOWARD.

*** We could not deal with our correspondent's remarks about his own design without seeing the drawings again, which is not possible at present; but our recollection is that he had omitted the dining-room and sitting-room for the medical staff (as distinguished from the nursing staff). His remarks about the lighting in the selected

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design are rather exaggerated, though we pointed out that the south light was somewhat impeded by projections.—Ed.

Sir,—Can you spare me a little space? On principle, I always try to agree with the assessor's award, but this one seems really too impossible.

The [illegible]lected design has nurses' rooms in the ro[illegible], [illegible]ed[illegible]nts' in the basement, and free access of [illegible] low[illegible] sunshine hindered nearly everywhere. The [illegible] ward (containing more than half the be[illegible] asked for) has its axis east and west, and one only gets direct south sun about two or three months in the year—in summer a verandah roof and in winter the roof of the out-patients' block keeps it off. A part of it will get sun for about an hour or so each day about 10 a.m. and 2.30 p.m. The maternity wards in the corresponding wing suffer in the same way. Projections are so arranged that they impede the air circulation as greatly as they hinder the sunshine. Surely the wards should have had their axes north and south (approximately), so as to get sunshine on each wall in turn. The site was admirably adapted for such an arrangement. I imagine the point never occurred to Mr. Hine, for of the four premiated the first is east and west and the second north and south, and the two for third place one each way.

Then as to the bedrooms for staff, etc. Some thirty-four were called for, and the conditions (and one would think common sense) required that they should have some sun. No 44 places over one-half of them facing north, or in a basement where the sun cannot enter. About thirty of them are entirely in the roof or basement.

Ward bathrooms are about 6 ft. or 7 ft. square, with the bath close against one wall. Are the patients expected to attend to themselves here?

The kitchen is nearly as large as one in an infirmary plan I have before me, where it does all the work for twenty-five times as many patients.

A good point is putting the out-patients' department on the street level; but to do this it is carried on stilts 12 ft. to 15 ft. high, and the space under labelled "Covered Drying-ground." The effect of the raising is not only to add to the cost, but to block out the light and air in the way already described.

With regard to the promoters. Some competitors had more information supplied to them than others by means of a sheet of questions and answers. These modified some designs, I know, and would have modified mine had I seen them.

Finally, as to the exhibition of all the drawings. You fear they had no funds. The profession appears to have provided sufficient. The hospital secretary told a competitor friend of mine that they had 100 to 120 applications for particulars (and presumably nearly as many guineas) yet only 62 sent in drawings. There was no offer in the conditions to return money to those who did not send in drawings, and those I have spoken to on the subject have not yet received, and do not expect to receive anything; so from this source alone there should be 40 or 50 guineas for hire of hall, etc.

Horace B. Appelbee.

THE MONTAGUE FORDHAM GALLERY.

Sir,—My attention has been called to the notice in your issue of the 21st ult. of an exhibition of metal work at No. 9, Maddox-street.

As my name is mentioned in that notice, perhaps you will allow me, through the medium of your paper, to give publicity to the fact that I have no connexion with the Montague Fordham Gallery, and no responsibility whatever for the exhibition referred to. I am working entirely on my own account and in my own workshops, and the directors of the Gallery have no authority to take orders on my account, neither am I prepared to execute any orders so taken.

Nelson Dawson.

Swan House, Chiswick Mall, W.

Owens College and Victoria University.—A Bill will be introduced in the course of next Session to provide for the cesser of Owens College, Manchester, for the merging of the College in the Victoria University of Manchester, with transfer to that University of all property, real and personal, gifts, bequests, rights, and privileges belonging to the College, and for the retention of the name or style of "The Owens College" for all buildings in Manchester which at the time of the passing of the intended Act have been erected by, or belong to, the College. In terms of the Bill the Victoria University will be free from the control or jurisdiction of the Charity Commissioners, as well as of the Board of Education under the Charitable Trusts Acts of 1853-1894.

The Student's Column.

CONCRETE-STEEL.—XXIV.

Columns (*continued*).

It is clear from the preliminary discussion of column design in the last article that by hooping or completely surrounding the concrete by steel considerably higher resistance can be obtained than by simple longitudinal reinforcement. But between these two types of reinforcement many intermediate varieties or combinations are possible. Engineers rarely make use of longitudinal rods alone, and columns are almost always designed on lines generally similar to those adopted in the construction of concrete-steel piles, of which Figs. 41-44 may be taken as fairly representative examples. The longitudinal rods are tied together by a more or less complex system of transverse rods or wires, and, in addition to keeping the vertical reinforcement in position, these transverse ties are of some assistance in preventing premature flexure, and in retarding the lateral swelling or bulging of the concrete. The value of the transverse reinforcement varies with its spacing measured along the axis of the column, and if placed too far apart the value must be small.

It has been generally acknowledged hitherto that test specimens of stone, concrete, and similar materials, subjected to direct compression, always fail by shearing along planes inclined to the direction of the stress. Recent investigations conducted in Germany by M. Foeppel, and in France by M. Mesnager, seem to prove, however, that this particular mode of failure is due to friction between the planes of the test specimens and the plates transmitting pressure. And by the introduction of a greased surface for reducing friction to a sufficient extent, it was found by these experimentalists that failure took place along planes parallel to the direction of the stress. If we accept the accuracy of this result an additional reason is furnished for the comparatively small value of longitudinal reinforcement, for rods placed so as to be parallel to the planes of rupture cannot have much influence in helping the concrete to hold together.

Hence it follows that the only advantage of longitudinal reinforcement in columns probably consists in adding the resistance of the steel to the resistance of the concrete, without any true reinforcing effect. This conclusion is similar to that arrived at from the consideration of Fig. 47 in the last article.

The precise influence of such reinforcing rods is somewhat difficult to define owing to the complicated nature of the stresses. It is known that the shrinkage of concrete when setting in air causes internal stresses of great intensity in concrete-steel. Experiments made in 1902 at L'Ecole des Ponts et Chaussées served to throw valuable light upon the effects resulting from shrinkage in large specimens of concrete-steel in which the concrete was mixed in the proportions of 1 : 3 : 6. In the case of specimens, 6 ft. 6 in. long by 4 in. square, each reinforced by four ¼ in. diameter rods near the surface, measurements showed that after three months the shrinkage of the concrete had caused a compressive stress in the steel equal to 6,540 lb. per square inch. Similarly in specimens, 13 ft. long by 8 in. by 16 in., each reinforced by four ⅞ in. bars about 1.3 in. from the surface, the compressive stress in the steel varied from 10,800 lb. to 14,220 lb. per square inch. No reflection is required to show the extreme importance of internal stresses such as these in the reinforcement of concrete-steel columns.

Internal compressive stress is of less importance in the steel reinforcement of beams, because the bars are generally situated in the tension area, and the effect of loading is first to relieve the compression due to shrinkage of the concrete and second to establish tensile stress, to resist which is the special function of the reinforcement. Hence in beams, the initial stress is an advantage; at any rate so far as the steel is concerned.

But in the case of columns the conditions are quite different, for the compression due to loading is added to the internal compression caused by shrinkage of the concrete. Unless this point is thoroughly recognised by designers, serious undercalculation of strength must inevitably follow.

For example, let us assume a quality of concrete is able to withstand without failure a reduction of length equal to 0.1 per cent. Compression to this extent in a concrete-steel specimen will be sufficient to account for a stress in the reinforcement of 29,000 lb. per square inch if the coefficient of elasticity be 29,000,000 lbs. Taking the intial internal stress at 14,000 lb. per square inch, we have a total compressive stress of 43,000 lb. per square inch, which is perilously near, or even above, the elastic limit of ordinary structural steel. Hence, before failure of the concrete, the reinforcement would be practically stressed up to its elastic limit, beyond which no addition would be permissible in practice.

Of course, the figures here used do not apply to all qualities of material, and the internal stress due to air-hardened concrete may not be so high as 14,000 lb., but the fact remains that very considerable compressive stress exists in concrete-steel, set in air, which should never be overlooked by the designer. As a general rule it may be taken that in concrete-steel columns, reinforced by longitudinal rods alone, or by longitudinal rods and transverse ties placed too far apart to afford adequate resistance to lateral swelling of the concrete, the total resistance to compression is little more than the sum of the resistance offered by the concrete and the steel.

Whether concrete in compression fails along planes inclined to, or parallel with, the direction of the force, it is perfectly clear than transverse reinforcement must be beneficial. The tendency to slide along oblique planes would be resisted by any bars intersecting such planes whether they be parallel or perpendicular to the direction of the force, and rupture along planes parallel to the direction of the force would be most effectively resisted by transverse reinforcement. Reinforcing wires, bars, and plates are generally applied in this way by designers of concrete-steel columns and other members intended to withstand compression, but the question is whether the material is disposed in the most advantageous manner.

Perhaps the best answer to this question may be found in the elaborate investigation undertaken by M. Considére, and to which reference was made in the preceding article. This well-known authority confined his attention at first to reinforcement consisting of circumferential hoops, and netting in which the wires were at right angles and parallel to the sides of the section of the specimens tested. The result was to show that with equal weights of steel the resistance of circumferential reinforcement was more than double the resistance of wire netting. This is only what might be expected, for the wires parallel to the faces of a section could have no effect in resisting lateral thrust caused by bulging of the concrete, and nothing would prevent them from moving outwards simultaneously with the concrete. The wires at right angles to the faces would naturally offer some resistance to swelling of the concrete, but only in proportion to the adhesion between the two materials. After trying various expedients M. Considére decided to confine his attention to reinforcement consisting of hoops and spirals of wire.

Table XXIX. gives the results obtained in 1901 from specimens of cement mortar, 1.6 in. in diameter, reinforced by a binding of fine iron wire and without longitudinal reinforcement. The mortar was mixed in the proportions of 675 lb. of cement per cubic yard of sand, with the exception of one prism,

Table XXIX.—Properties of Hooped Cement Mortar (Considére.)

Cement per cu. yd. of sand, lb.	675	675	675	675	730
Age of mortar, days	8	14	22	23	100
Percentage of reinforcement	2	3	4	2	3·4
Crushing strength of total section, lb. per sq. in.	4 870	6,540	7,360	4,930	10,500
Crushing strength of mortar only, lb. per sq in	569	711	853	853	2,420
Increased strength due to hooping	4,301	5,829	6,507	4,077	8,080
Calculated resistance of iron as longitudinal reinforcement	1,564	2,346	3,128	1,564	2,658
Ratio of hooped to longitudinal reinforcement	2·7	2·5	2·1	2·6	3·0

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in which the proportion of cement was 730 lb. per cubic yard. The iron wire was drawn cold and had no definite elastic limit, but the stress of 78,200 lb. per square inch corresponded with what was virtually the yield point.

The compressive strength of the specimen in the last column is very remarkable, and it is instructive to compare the resistance with that of an iron prism of equal weight. The specific gravity of the mortar was 2.4, and as the average specific gravity for iron is 7.65, the ratio of the densities is about 3.2. If we take the compressive strength of ordinary wrought-iron at 44,800 lb. per square inch and divide by 3.2 we have 14,000 lb. as the resistance per square inch for comparison with an equal weight of concrete. But as the average resistance of a riveted iron section is not more than 75 per cent. of a solid section, the compressive resistence of iron-hooped cement mortar comes out at the same value as that of an equal weight of iron. It is true that the strength of the iron wire used in the experiments quoted was higher than 78,200 lb. per square inch; but such resistance is never afforded by structural iron, and any calculations based on this or higher figures would be quite misleading.

Advantageous as hooping is shown to be with regard to crushing resistance, it is less serviceable than longitudinal reinforcement for resisting flexure, and further experiments were made upon specimens provided with both types of reinforcement. With the co-operation of M. Hennebique, of Paris, a number of prisms were formed, of octagonal section 5.9 in. diameter, and of two lengths—1.64 ft. for testing resistance to crushing and 4.25 ft. for studying the elastic and ductile properties of the combination. The proportions of the reinforcement were varied, the concrete consisting of 1,000 lbs. of Portland cement to 45 cubic feet of gravel and 22.5 cubic feet of sand in some specimens, and in others of 2,000 lb. cement to the quantities of gravel and sand before stated.

As fully 1,200 observations were taken, it is impossible to refer to them in detail, but a few remarks on the more important results may be useful. The following notes apply to one set of six specimens:—

No. 1.—Formed of simple concrete, and crushed under a load of 1,050 lb. per square inch.

No. 2.—Reinforced with helicoidal spirals of ¼ in. diam. iron wire, the coils spaced 1.18 in. centres. This failed by crushing under a load of 5,120 lb. per square inch of total section.

No. 3.—Reinforced with helicoidal spirals of 0.17 in. diam. iron wire, spaced 0.59 in. centres. This was not crushed by a pressure of 5,400 lb. per square inch. The testing machine was not suitable for greater pressure.

No. 4.—Same as No. 2, with the addition of eight longitudinal ¼ in. rods inside the spiral coils. This failed as a column under a load of 4,550 lb. per square inch.

No. 5.—Same as No. 3, with the addition of longitudinal rods, as in No. 4. Failed as a column under a load of 4,700 lb. per square inch.

No. 6.—Reinforced with eight longitudinal rods 0.35 in. diam., and circular ties of 0.17 in. diam. wire spaced 3.15 in. centres, this being closer than is usual in ordinary practice. Failure took place at a load of 2,420 lb. per square inch.

The result given by No. 6 is conclusive as to the inferiority of ordinary transverse reinforcement to spiral hooping. Some of the observations made during these tests are very instructive. No. 1, of simple concrete, ruptured suddenly without any premonitory sign, and No. 6 failed almost as suddenly, its breaking load being only about 7 per cent. more than the load causing the first cracks perceptible. The longitudinal rods bent outwards between the transverse ties and the concrete failed by crushing. These results show that simple concrete, and concrete reinforced by longitudinal rods, must be regarded as materials which fail suddenly with little accompanying deformation.

Nos. 2, 3, 4, and 5 behaved very differently. At the commencement of testing they showed, as did Nos. 1 and 6, very little deformation under small pressures, but the end of this elastic condition was not immediately followed by failure. Shortening was seen to increase rapidly, and cracks appeared in the concrete covering the spirals, the cracks growing gradually wider. Approximate measurements indicated that deformations of as much as 3 per cent. of the length took place before failure. From these notes it is clear that hooped concrete is able to sustain without crushing much heavier loads than simple concrete, or concrete reinforced with longitudinal rods and transverse ties, and, further, that it does not fail for some time after cracks have appeared in the outer surface, and considerable deformation has been evidenced. Hence this type of concrete-steel gives ample warning of approaching failure—a most valuable characteristic of any material used in structural work.

For guidance as to the spacing of the spirals, the following observations should be of service. While specimen No. 2 was under test, cracks began to appear under the comparatively small pressure of 1,730 lb. per square inch, a little later the concrete commenced to flake off, and failure ultimately took place between the coils. Failure was due to rupture of the concrete, there being no indication that the metal had reached its elastic limit. Specimen No. 3 showed no cracks until the pressure of 2,480 lb. per square inch had been attained, and flaking occurred much later, while, as recorded above, the prism did not fail under the maximum load imposed. In Nos. 4 and 5 cracks appeared under pressures of 2,900 lb. and 3,360 lb. per square inch, the higher figures being no doubt due to the addition of longitudinal reinforcement.

Considering these facts in connexion with the spacing and other details of the reinforcement, and with observations made during other series of experiments, M. Considére arrived at the conclusion that the most suitable spacing of the coils was from one-seventh to one-tenth of the diameter when auxiliary longitudinal rods were employed.

Numerous and varied experiments have demonstrated the fact that this ratio holds good almost independently of the absolute values of the dimensions.

OBITUARY.

MR. W. F. HEMSOLL.—The death of Mr. William Frederick Hemsoll, architect, took place at his residence, 40, Southbourne-road, Sheffield, on Saturday. He had been an invalid for several years, and unable to attend business since March last. Mr. Hemsoll was a Sheffield man, son of the late Mr. George Hemsoll. He was apprenticed to the profession of architect, surveyor, and valuer, and started on his own account in Figtree-lane when quite a young man. He was for ten years in partnership with Mr. Joseph Smith, and with him designed and superintended the erection of the Reform Club, several chapels and other buildings, and afterwards was associated with Mr. H. L. Paterson in the erection of the Woofindin Convalescent Home and several council schools. His partnership with Mr. Paterson was dissolved twelve months ago when Mr. F. W. Chapman joined him.

GENERAL BUILDING NEWS.

MODEL DWELLINGS FOR THE POOR, BIRMINGHAM.—A promising experiment, says the *Birmingham Post*, in regard to the housing of the working classes in Birmingham was inaugurated by the Lord Mayor on the 28th ult. More than a year ago a number of prominent citizens, who believe that the housing problem can be solved by private enterprise, promoted a company under the title of "Homes (Limited)" for the purpose of providing clean, sanitary, and cheap dwellings for the poor. After some searching a suitable site was secured in the heart of the poverty-stricken district of Deritend. A piece of land abutting on Palmer-street, Little Edward-street, and Little Barr-street was cleared by the demolition of a dilapidated chapel. Plans were prepared by Messrs. Hipkiss and Stephens, and two blocks of flats, four stories high, have been erected by Messrs. T. Elvins and Sons, of Handsworth. The buildings are divided into 60 tenements, 28 of which consist of one room each, to be let at 3s. per week; 16 of two rooms each, at 4s. 3d.; and 16 of three rooms each, at 5s. On every floor is a wash-house containing two boilers. There is a ventilated cupboard for food, and water is laid on to a sink in each tenement. The ends of the corridors are open to the air, and through these big openings coal and bulky furniture can be hauled by means of pulleys fixed in a convenient position. Fire escapes can be attached to each tenant's balcony in case of panic. Gaslight is provided in the corridors and staircases; whether gas or oil is used in the rooms is left to the discretion of the tenants.

NEW SCHOOL, HANWELL.—A school to accommodate 1,140 scholars is to be erected by the Middlesex County Education Authority at Oaklands-road, Hanwell. The plans have been prepared by Mr. William Pywell. The buildings are to consist of a two-story school for boys and girls and a single story building for infants, a caretaker's cottage, and the usual covered play sheds and sanitary blocks. The boys' and girls' school will have an assembly hall for each department. The classrooms are grouped round the halls. The infants' school will have a wide corrider for exercise, from which the classrooms will be entered.

BUILDING TRADE, GLASGOW.—Not for a period of something like twenty-six or twenty-seven years—not since the years immediately preceding the failure of the City Bank—has the local building trade boomed as it has done recently. Following the crash which the stoppage of the bank precipitated, building in the city was almost at a stand-still. During the year 1876-7 the linings granted by the Dean of Guild Court for houses and shops represented a valuation of 1,026,130*l*. The year following, the City Bank year, these figures dropped to 222,320*l*., and in 1880-81 they touched the lowest point in a period extending over thirty years, the valuation being set down at 77,100*l*. It required some time to recover from the staggering blow the bank smash had inflicted, and it was not until 1891-92—the year of the annexation of the south suburban districts—that the building trade got on to its feet again. In that year the court granted 106 linings, valued at 457,750*l*., and since then each year's returns have exceeded those of the twelvemonth before. 1901-02 witnessed the trade reach its high-water mark, the linings granted numbering 197, the valuation of which was 1,458,710*l*., while last year the valuation was estimated at 1,405,589*l*. It may be safely predicted that the figures for the current year will show a decided shrinkage on those just quoted, for builders and others interested in the industry have made up their minds to stay their hands for a while. Two features of interest mark the Guildry returns during the last three decades. Houses of one apartment have decreased in favour with builders, whereas houses of two and three apartments have claimed the major share of attention. Thirty years ago 1,338 one-room houses were erected; last year the total was 765. The year of the bank failure there were 531 two-room houses built; last year 2,117. The figures relating to three-room houses for the same years are 187 and 1,203. All parts of the city, and the suburbs, too, for that matter, have been the scene of the builders' energy and enterprise. Springburn, Dennistoun, Shawlands, Crosshill, Govanhill, Battlefield, Scotstoun, and Renfrew-road have been covered with modern tenements, and the men engaged in the work have been reaping substantial reward of their labours in the shape of continuous employment at maximum rates. But the question arises, has the supply of new houses exceeded the demand?—*Glasgow Evening Citizen*.

THEATRE, MIDDLESBROUGH.—The new Grand Opera House, Middlesbrough, is situated at the corner of Linthorpe and Southfield roads, and has a frontage of 152 ft in Southfield-road and of 100 ft. in Linthorpe-road. The exterior of the building has been carried out with pressed red bricks, with dressings of artificial stone. Messrs. Allison Bros., of Middlesbrough, have carried out the building contract, and the architect was Mr. W. Hope, of Newcastle-on-Tyne.

PRUDHOE CHURCH.—It is intended to remove the Catholic Church now adjoining Prudhoe Hall, Northumberland, and to rebuild it at Prudhoe-on-Tyne. The church is a modern building of stone throughout interior and exterior, complete with sacristies, tower, gallery, baptistry, chapels, and donor's vault, etc. The direction of this work is in the hands of Mr. Charles Walker, architect, Newcastle-on-Tyne.

RESTORATION OF ALL SAINTS' CHURCH, DERBY.—The vicar of All Saints', Derby, at the recent annual social gathering of the congregation, read a report from Mr. Temple Moore, the architect, on the subject of the restoration of the church. As the funds required would be too much to expect the congregation to raise unaided, a county committee was being formed.

BUSINESS PREMISES, BELFAST.—New business premises have been erected in Donegall-place, Belfast. Mr. Vincent Craig is the architect for the work. The building contract was carried out by Messrs. M'Laughlin and Harvey, under the superintendence of the architect, and the fitting up of the shop was executed by Messrs. Curtis and Sons, of Leeds. The other contractors were:—Electric lighting and plumbing, Messrs. Richard Patterson and Son; heating, Messrs. Musgrave and Co., Ltd.; decorative work, Messrs. Morrow and Son; strongroom and safes, Messrs. Chatwood and Co.; granite, etc., Messrs. J. Robinson and Co., Ltd.; stone carving and sculpture, Messrs. Winter and Thompson; glass, Messrs. Clokey and Co.; grates, etc., Messrs. Riddel and Co.

TOWN HALL, CHELTENHAM.—Sir Michael Hicks Beach, Bart., M.P., ex-Chancellor of the Exchequer, has just opened the new Town Hall

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which has been erected by the Town Council of Cheltenham. Mr. F. W. Walker, of Gloucester, was the architect, and the chief contract was placed in the hands of Messrs. Collins and Godfrey, of Cheltenham and Tewkesbury. The new Town Hall, in general design, is Classic, freely treated. On the north side of the building is the main entrance, which gives access to the crush hall, the dimensions of which are 40 ft. by 20 ft. The floor of this hall is of marble mosaic, with borders of floral pattern. At either end of the entrance-hall is an octagonal-shaped hall, measuring 24 ft. across; adjoining that on the east side is the ladies' cloakroom, while similar accommodation is provided for gentlemen on the west side, and here also is one of the staircases to the galleries which surround the great hall or entertaining-room. From the octagonal halls the main corridors, 92 ft. in length and 12 ft. wide, run the whole length on either side of the great room. The great hall is designed to fulfil the double purpose of balls and of concerts and public meetings; its dimensions are 112 ft. in length by 82 ft. in width, and 43 ft. in height. At the south end is a proscenium and orchestral platform, 31 ft. across, with organ loft, as yet empty; and at opposite end the front of the gallery is elliptically treated. A feature in the decoration scheme is the scagliola columns, sixteen in number. The balconies, five on either side of the hall, are rounded quadrants with elliptic fronts and turned balustrades. Behind the balconies run the promenades, 12 ft. wide, corresponding to the corridors below. The decorating scheme was modelled by Mr. H. Frith, of Gloucester, and is in the Renaissance style, freely treated. The dancing floor has been constructed throughout of the best maple (3½ in. by 1¼ in.), carried on rolled steel joists with patent springs. It is estimated the hall will seat from 1,200 to 1,500 people. Subsidiary halls are: the large drawing-room, 57 ft. by 27 ft.; the lesser drawing-room, 26 ft. by 16 ft. 6 in.; the cardroom, with lavatory adjoining, 26 ft. by 16 ft. 6 in.; the smoking-room, 20 ft. by 16 ft.; the supper-room, some 55 ft. square; and a room for light refreshments, 37 ft. by 37 ft.; while kitchen accommodation is given beneath.—*Bristol Mercury*.

WESLEYAN CHURCH, AVONMOUTH.—The memorial-stones have just been laid of a new Wesleyan Church at Avonmouth. The new buildings will occupy a corner site, centrally situated on the main road from Bristol. The school is to be built first, and it will serve the purpose of a chapel for the time being. The work is being carried out by Mr. E. Love, from the plans of Messrs. La Trobe and Weston, architects.

CONGREGATIONAL CHURCH, WHITTLESFORD, CAMBRIDGESHIRE.—A new Congregational church has just been opened at Whittlesford. The building has been designed to accommodate 300 adult worshippers, and has an extreme width of 41 ft. 6 in., and an extreme length of 74 ft. 6 in. It is set back a distance of 30 ft. from the roadway, and is so arranged that at any future period a Sunday school building can be added at the rear. There are two main entrance doors in front, leading into a vestibule 4 ft. 6 in. wide, occupying the whole width of the building. This vestibule has a tiled floor, panelled dado, and plastered walls. In the body of the church the seating is arranged in three bays, one in the centre and one on either side, to which access is obtained from two 4 ft. wide aisles. The platform is 15 ft. wide and 10 ft. deep. Behind the church are the vestry, stores, boiler house, etc., with separate entrance doors. The main features externally are the tower with its shingle-covered spire. The materials externally are red sand-faced bricks and hand-made tiles. The design for the church was prepared by Mr. Henry S. Jardine, architect, and Mr. J. Custerson, of Saffron Walden, was the contractor for the work.

BIRMINGHAM UNIVERSITY NEW BUILDINGS.—Within a few weeks, says the *Birmingham Post*, building operations in connexion with the erection of the second and more important section of the Birmingham University new buildings will be entered upon, and within a period of something like nine months, according to the terms of the contract, one portion of the main structure is to be completed. Already the building work is in a more advanced state than is generally known. Messrs. Smith and Pitts, of Balsall Heath, the builders who secured the contract for the erection of the power station, have practically completed this work, and the more extensive work of putting in the foundations, which was let to Mr. Thomas Rowbotham, contractor, Small Heath, will very shortly be finished. The cost of these foundations will be something like 70,000*l*. The work includes the construction of the basements, kitchens, and subways, these rising to a height of 13 ft. 6 in., and the superstructures thereon rise to a further height of 18 ft. 6 in. In fact, at the present time a considerable portion of the building is nearly half completed. The work has been in hand about fifteen months, and for a long time some 500 operatives were employed daily. To accelerate the job, the contractor has now upon the ground a large and up-to-date machine plant, without which the progress made could scarcely have been brought about. The tenders for the further superstructures, internal finishings, and other work will be dealt with by the architects during the present month.

GREENWICH CENTRAL LIBRARY.—On Wednesday the Greenwich Borough Council entered into agreements with Mr. Sydney Smith to prepare working drawings and a specification, and with Messrs. Fowler and Hugman, to take out quantities for the proposed Central Library at Tunnel Avenue. 6,350*l*. is the limit fixed for the cost of the building, excluding the foundations below the footings of the walls

CATHOLIC SCHOOL, LOCHGELLY, DUNDEE.—The new Roman Catholic School at Lochgelly has just been opened. The building is built of Grange stone, and is situated in Station-road. There are six classrooms to accommodate 310 pupils. The girls' and infants' entrance is at the south end of the building, and the boys' entrance at the north end, both entrances being connected by a corridor, 15 ft. wide, and, having a sound-proof floor, can also be used as a marching-hall. The corridor runs from the one end of the building to the other, connecting the two entrances, and has an open timber roof with continuous roof lights. At each end are teachers' rooms, cloakrooms, and lavatories, these being shut off from the corridors by large double swing glass doors. The dado walls of entrances, cloakrooms, and corridor are lined with white glazed tiles. Four of the classrooms are so divided with glass sliding partitions that they can be converted into a hall. The total cost is about 3,000*l*. The work has been carried out under the personal supervision of the architect, Mr. William Birrell, Kirkcaldy, and the following are the names of the contractors:—Mason work, Andrew Wilson, Cowdenbeath; joiner work, Alexander Smith, Ladybank; plumber work, Alexander Rolland and Co., Dunfermline; slater work, John Lawson, Kirkcaldy; plaster work, John Easton, Kirkcaldy; iron work, Thomas Gibson and Son, Edinburgh; glazier work, John Haxton and Co., Kirkcaldy; painter work, Andrew Alison, Cowdenbeath; tile work, Haddow, Forbes, and Co., Edinburgh; heating, Dilworth and Carr, Preston; sliding partitions, John Stones, Ulverston.

CENTRAL HOTEL AND RESTAURANT, WORCESTER.—The completion of the first section of the High-street improvements, commencing at the Cross, is now an accomplished fact, says the *Worcester Times*, and it is easy to conceive what a splendid acquisition will be secured to the streets of the city when the whole scheme is finished, as no doubt it will be within a few years, making the street 50 ft. wide, or double what it was, in its most congested parts. The removal of the old shops opposite the Bank will be effected within a few months. The new Central Hotel and Restaurant at the corner of the Cross is now completed. Messrs. J. Wood and Sons, of Worcester, were the contractors for the entire structure and fittings. Messrs. Lewis Sheppard and Son, of Worcester, were the architects, and the following firms supplied works and fittings of special features:—Messrs. J. Ward and Son, Worcester, the warming and cooking appliances; Mr. Santonna, of Worcester, the electric lighting; Messrs. Archibald Smith and Stevens, of London, the lifts; Messrs. Minton Hollins and Co., Stoke-upon-Trent, the wall tiling; Messrs. Doulton and Co., the terra-cotta and faience fireplaces. The general foreman representing the contractors was Mr. Charles Pumfrey.

SANITARY AND ENGINEERING NEWS.

PLYMOUTH MAIN DRAINAGE OUTFALL.—Recently, it will be remembered, Pethick Bros., the contractors for the main drainage outfall at Rusty Anchor, which is the subject of litigation between themselves and the Corporation of Plymouth, applied to the Council for permission to make a survey of the outfall works. The Corporation, however, refused the request on the dual ground that Messrs. Pethick were represented above and below water at the survey made some time since by the engineer and divers employed on behalf of the Corporation, and that a further survey now would interfere with the contract which Messrs. Pearson have accepted for the reconstruction of the outfall. Pethick Bros. thereupon issued a summons for leave to inspect, and an injunction to restrain the Corporation from proceeding with the work of reconstruction, until they had had an opportunity of making a survey. The hearing of the application took place in London on the 2nd inst. in Chambers before Mr. Justice Phillimore, and, in the result, the injunction was refused, but an order was made giving Messrs. Pethick liberty to survey, the survey, however, to be made without disturbance of pipes or coverings, and not to delay the work of reconstruction.—*Western Morning News*.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—The "B. and S. Folding Gate Co." have gone into so many other branches of manufacture that their original style is now a misnomer, and their business will be conducted in future under the style of "Arthur L. Gibson and Co."

BRICKS IN THE TRANSVAAL.—The Commercial Intelligence Branch of the Board of Trade has received a communication from Mr. C. A. C. Treemer, correspondent of the branch at Johannesburg, forwarding information with regard to the brick trade in the Transvaal. Mr. Treemer expresses the opinion that little or nothing could be done in the way of exporting bricks to that country, as the cost of rail carriage from the coast is a very big item, and, further, there are brickworks in Johannesburg, in some instances keeping their output down to correspond with the demands. The following are the prices quoted at Johannesburg:—Wire-cut bricks, 85*s*. per 1,000; stock bricks, 95*s*. per 1,000; fire-bricks, 10*l*. per 1,000.

AUSTRIAN CEMENT INDUSTRY.—H.M. Consul at Trieste has forwarded a memorandum to the Foreign Office regarding the present situation of the cement industry in Austria. He states that the consumption of Portland cement in that country from January, 1903, to October, 1903, has been somewhat greater than that of the corresponding period of last year. A considerable quantity of cement is at present used for the construction of the new "Tauri" railway, and the manufactories of the Alpine regions of Austria will have for this reason sufficient work for several years. The prices of cement, compared with those of last year, are not higher. On the contrary, the "trust" of Austrian Portland cement manufacturers, it is assured, does not intend to increase the prices of cement even for next year. To the "trust" belong all the twenty manufactories that are providing for the consumption of Austria; besides, conventions exist with fifteen manufactories of the interior of Austria and foreign countries which, within certain limits, stand in relation with the "trust." The Austrian cement export to foreign countries has been of small importance this year, not only because many Austrian manufactories are too far from the sea, but principally because of the excess of production elsewhere.

TOLEDO CATHEDRAL.—The correspondent of the *Standard* has sent the following communication to his journal:—"Senor Alcantara, with several other experts in architecture and art, visited Toledo Cathedral last week directly the Madrid papers published alarmist reports about the condition of that fine mediæval structure. Senor Alcantara states that many parts of the Cathedral, especially the tower and several columns, naves, and roofs, need prompt repair, as the authorities have for years pointed out. Only lack of funds prevents both the Public Works Department and the Diocesan authorities from saving the building, which is like many other Cathedrals and churches in Spain in being threatened with ruin."

UNDERGROUND ROOMS IN ST. PANCRAS.—The Public Health Committee of the London County Council reported as follows at Tuesday's meeting of the Council:—"On November 10 last, we reported that we had been in correspondence with the St. Pancras Borough Council on the subject of the large number of underground rooms illegally occupied in that Borough, and we stated that the Borough Council had informed us that they had taken action in certain cases and had served notices on the owners requiring them, within three months from the date of the service of the notice, to discontinue to suffer these rooms to be let or occupied as dwellings contrary to the statute. We have now received a further letter, dated November 30, from the Borough Council, stating that the notices were duly served on August 7 upon the owners and occupiers of fifty underground rooms illegally occupied as dwellings, requiring the discontinuance of their use as sleeping-rooms within three months. The notices expired on November 7, and on November 9 these underground rooms were re-inspected, with the following results:—Total number of notices, 50; rooms empty, 22; rooms occupied in conjunction, 15; premises demolished, 2; number of notices uncomplied with, 11. The Council is no doubt aware that the underground room must be let and occupied 'separate' in order to be illegally occupied. If two rooms in a basement are let and occupied together, one of which is underground within the meaning of the Act and the other is not, then there is no contravention of the law. It will be observed that in fifteen cases, or 30 per cent. of the total number, the occupants have either exchanged one of the underground rooms for a room on another floor, or have taken an additional room or rooms on another floor or floors, or the occupants have left, and the room has been let as an additional room to one of the remaining occupants."

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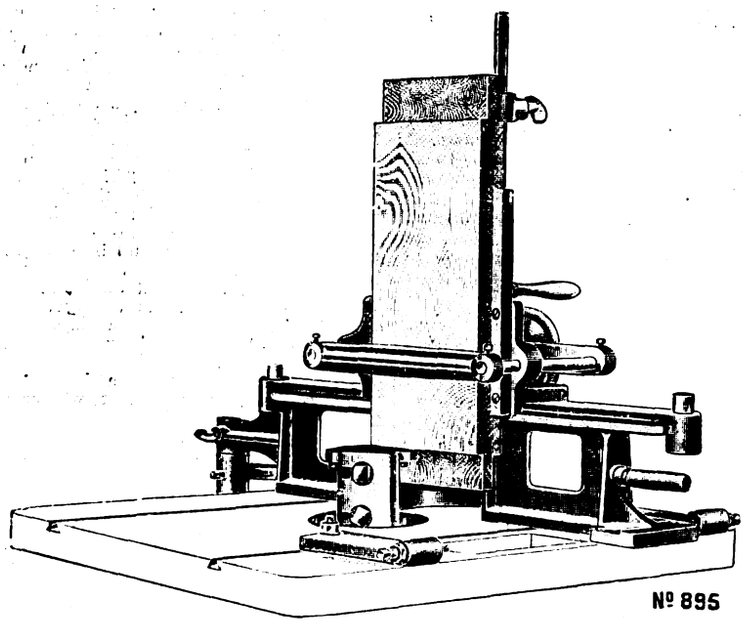

Sagar's Patent Tenoning Apparatus.

PATENT TENONING APPARATUS.—A newly patented appliance for tenoning, to be used in connexion with vertical spindle moulding machines, is shown by the illustration here reproduced. The apparatus, which is manufactured by Messrs. J. Sagar and Co., of Halifax, admits timber up to 11 in. wide by 3 in. thick, and it is claimed that it will make a complete and perfectly accurate tenon, up to the maximum length of 4¾ in. The device consists of a bracket oscillating horizontally and carrying a cramp for holding the timber in a vertical position. The cramp is fitted so that, after the timber has been secured it can be slid past the cutter block of the moulding machine, thus making one side of the tenon. The bracket is next swung over, so as to bring the other side of the timber to the face of the cutter, the cramp is pulled forward, and the tenon is then completed. Adjustable stops are provided on the table for regulating the thickness and depth of the shoulders, and by a very simple device the length between the shoulders of tenons can be accurately gauged without measuring or marking off. The complete apparatus is designed so that it can be fitted, without any special preparation, to the vertical spindle moulding and shaping machines made by the same firm.

THE LONDON BUILDING ACT.—On Tuesday, at the meeting of Deptford Borough Council, the Works Committee reported having had under consideration a letter from the London County Council asking for suggestions for the amendment of the London Building Act. The Committee thought that a clause should be inserted as advocated by Kensington Borough Council last year, providing for the transfer of the powers and duties of District Surveyors to the Metropolitan Borough Councils. The Committee further was of opinion that the powers exercised under Section 84, which were transferred by the London Government Act from the London County Council to the Metropolitan Borough Councils, should again revert to the central authority. The section in question deals with the granting of licences for the erection of wooden structures, but the difficulty of exercising this power had been very largely increased owing to a decision in the courts during the present year, in which a person, having already obtained the sanction of a Borough Council, was prosecuted and convicted under another section of the Building Act at the instance of the London County Council. Therefore, the Committee believed that it would materially enhance the efficiency of the administration of this section if the above-mentioned power were exercised by the central authority. The Report was adopted.

ARCHITECTS AND BUILDERS AND ARBITRATION.—A matter of some interest to architects and contractors was discussed at Tuesday's meeting of the Pontypridd District Council. It arose on the Report of the Works Committee, which reported having received a letter from Mr. H. T. Hare, architect of the new public offices, referring to the objection taken by Mr. Watkin Williams, contractor, Cardiff, to a clause in his draft contract—with respect of the right of the architect to have any work opened and to order the removal of improper work—being exempted from arbitration. Mr. Hare recommended that if Mr. Williams declined to sign the contract as drawn the tender of one of two other firms should be accepted. A letter was read from Mr. Watkin Williams suggesting that a local arbitrator be appointed to decide any dispute which might arise between himself and the architect with regard to the matters referred to in the clause. A resolution was moved at a committee meeting to amend the contract so as to provide that any dispute between the two be referred to arbitration by the President of the Royal Institute of British Architects, but this was lost by one vote. A deputation of local builders now waited on the Council, asking the Council to delete the clause.—Mr. Williams (Messrs. Williams and James) stated that the clause, which had been accepted by the Institute of Builders and the Institute of Architects, was to some extent being forced upon South Wales. It suited builders in London and in the North of England, but not in this district. It had not been adopted here, and the question would be considered at the next meeting at Swansea of the South Wales Federation of Builders, who were distinctly opposed to it.—Mr. M. Julian stated that the builders objected to any architect being sole arbitrator and being given full power of control as to the nature of material or workmanship, without the right to appeal. It was a very unfair position to put them in.—A letter was read from Mr. Watkin Williams, who is Vice-President of the South Wales Federation of Builders, stating that during his twenty years' experience he had never had occasion to refer to arbitration, and had not signed a contract which did not contain a fair arbitration clause. The Barry Council had conceded what he was now asking the Pontypridd Council to do, and the contract for the erection of the asylum at Talgarth, at a cost of 120,000*l.*, recently completed, contained an arbitration clause.—Mr. F. G. Edwards moved the deletion of the paragraphs in the committee's report alluding to the clause, which was seconded by Mr. Gronow. The Chairman (Mr. W. Lewis) pointed out that the contractor for the Cardiff offices and the London builders accepted the clause, and the majority of the committee thought they would best serve the interests of the ratepayers by supporting the wishes of the architect. Upon being put to the vote it was resolved by nine votes to six to delete the clause from the draft contract.—*Western Mail.*

"NOTES AT A DORSET WATERING PLACE."—In this article in our last, the reference to Chideock as "four miles west of Dorset" was (as was perhaps obvious) a slip of the pen; it should have read "west of Bridport."

A QUIETER BEDFORD-ROW.—On Wednesday last a deputation from Bedford-row attended at the Municipal Offices, Holborn, for the purpose of presenting a petition to the Mayor, Aldermen and Councillors of the Borough of Holborn requesting them to repave Bedford-row with quiet material in place of the present noisy stones. The deputation, which was introduced by Mr. Councillor Yates, consisted of Mr. Francis C. Adams, Mr. Edward F. Henley, the Hon. Norman Macleod Sinclair, Mr. Ernest C. Finch, and Mr. T. Bowden Green (Hon. Secretary of the Betterment of London Association and Street Noise Abatement Committee). Mr. Adams in presenting the petition pointed out that it was practically a unanimous one, having been signed by 153 firms and individuals, most of whom were solicitors, architects, estate agents, and auctioneers. The Mayor having informed Mr. Adams that the matter should certainly receive the careful consideration of the Council the deputation retired.

BUILDING MATTERS, SHEFFIELD.—The Surplus Lands Committee of the Sheffield City Council recommend the Council to adopt the tenders of Messrs. T. Lowe and Son, of Burton, of 17,840*l.*, and Mr. T. W. Ward, of Sheffield, of 1,350*l* for the erection of shops, with dwellings above, on a plot of land on the north-east side of Snig-hill. Mr. Ward's tender relates to ironwork only. The tender of Messrs. D. O'Neill and Sons for the erection of saleshops and dwelling houses on surplus land at the junction of Infirmary-road and Locke-street, for the sum of 3,709*l* has been accepted. At a meeting of the Highway Committee on December 4, letters were read from the Town Clerk explaining the present position of the Committee with regard to the Works Construction Department, and giving particulars as to the works now in hand, and the Sub-Committee also had an interview with Mr. F. W. Brock, the Manager of the Department. From the information given by the Manager, it appeared that the works at present in hand could not be finished for at least four months, this being dependent upon the weather; also that a large number of unsettled accounts, which the manager would have to deal with personally, were in hand, and that further assistance would be required for the measurement of the different works. The City Surveyor was authorised to arrange with Mr. Brock as to the employment of assistance, to enable the latter to complete the measurement of the various works and the settlement of the outstanding accounts at the earliest possible date.—*Sheffield Independent.*

ALTERATION IN CLAUSE IN CONTRACTS FOR PAINTING WORK, ETC., SCHOOL BOARD FOR LONDON.—The following is Clause 10 in the form of contract for painting and cleaning schools:—"10. All measured work and also all day work and materials which the Architect shall certify to be properly chargeable by the contractor as extras or additions or variations or to be properly allowable to the Board by the contractor as variations, omissions or deductions shall be respectively paid for or deducted at the rates set out in the Board's schedule of prices for repairs to buildings, etc., for 1902, with an addition of 10 per cent. to these rates, and in the event of any extra omitted or deducted works to which the items in the schedule do not apply then the amount to be paid or to be deducted in respect of any such work or materials shall be determined by the Architect, whose decision shall be final and binding on both parties." The Works Committee have had under consideration a letter from one of the firms tendering for the Board for this class of work, objecting to the wording of the clause, and the Committee have accordingly referred it to the Board's Measuring Surveyor, who has recommended that the clause should be altered as shown below: "10. All measured work and also all day work and materials which the Architect shall certify to be properly chargeable by the contractor as extras or additions or variations, or to be properly allowable to the Board by the contractor as variations, omissions or deductions, shall be respectively paid for or deducted, either (*a*) at the rates in the contractor's own priced quantities, so far as the prices apply (in which case the contractor must deposit his priced bills for examination before the contract is signed); and with regard to those items where the priced quantities do not apply, at the rates set forth in the Board's schedule of prices for repairs to buildings, etc., for 1902, plus 10 per cent.; or (*b*) at the rates set out in the Board's schedule of prices for repairs to buildings, etc., for 1902, with an addition of 10 per cent. to these rates. In the event of any extra omitted or deducted works to which the items in the schedule or in the priced bills of quantities deposited by the contractor do not apply, then the amount to be paid or to be deducted in respect of any such work or materials shall be determined by the Architect, whose decision shall be final and binding on both parties." The Works Committee are of opinion that this alteration might be adopted, as an experiment, for the group of contract works to be carried out next Easter, on the understanding that the question shall again be considered after the Committee have had an opportunity of ascertaining the effect of the alteration.

LEGAL.

A HASTINGS NUISANCE AND LIGHT AND AIR CASE.

THE case of Prior *v.* Tassell came before Mr. Justice Swinfen Eady in the Chancery Division on the 3rd inst.—an action by the plaintiffs, the owner and tenant of No. 2, Denmark-place, Hastings, against the defendant, the owner of

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adjoining premises, for an injunction to restrain the defendant, his servants and agents, from carrying on the business of a restaurant-keeper and fried-fish vendor, and from selling iced drinks, etc., outside his premises, so as to be a nuisance to plaintiffs, and also to restrain the defendant from interfering by an erection, outside his premises, so as to obstruct or diminish the access of light and air to the plaintiffs' windows.

Mr. Micklem, K.C., and Mr. Turrell appeared for the plaintiffs, and Mr. Vernon-Smith, K.C., and Mr. Peterson for the defendant.

Mr. Micklem, in opening the case, said that at the beginning of the year or at the end of last year the defendant altered his premises on the ground floor and turned them into a shop. It was really an oyster bar, there being a charge of 3d. for anyone who did not buy oysters, and those who did came in for nothing. Early in the year an American drinking fountain was placed outside the premises, and a circular counter was put in front, taking away the forecourt altogether. A sun-blind was put up across the forecourt, and fish was fried in the basement. The obstruction to the plaintiffs' light was twofold, throwing the basement and ground floors into comparative darkness during the greater part of the day. At the rear of the house their light was also materially interfered with, but this obstruction had now been removed.

Mr. Vernon-Smith said that his client had granted an under-lease of the premises, and went out last August.

Mr. Micklem said that up to October 24 there had been no discontinuance of the nuisance of fried fish. This was done in a kitchen which had been excavated. The plaintiffs had lost lodgers owing to the nuisance from the smell from fried fish.

Mr. E. Cousins, land surveyor and agent, gave evidence as to the obstruction to light to the plaintiffs' premises from the defendant's blind.

Other evidence having been given, the defendant was called. He said that there was no offensive smell from the kitchen, and that the blind in no way interfered with the light to the plaintiffs' house.

Other evidence having been given on behalf of the defendant's case, Mr. Justice Swinfen Eady gave judgment on the 4th inst. His Lordship said, on the issue as to the alleged obstruction of light, it was quite possible that at some period of the afternoon some shade might be thrown upon the lower portion of the plaintiff's dining-room window and on the window in the basement. To his mind it was not proved, but he could conceive that it was possible. The question he had to consider was whether the sun-blind materially, or substantially, diminished or darkened the light of either the dining-room or the breakfast-room in the basement, and he did not believe that it did. At the nearest point, the blind was something like 8 ft. from the plaintiffs' premises. But the real substantial part of the action was the nuisance from smell. The nuisance began at Easter and ceased in August, when defendant left the premises. It had not been proved that defendant's successors continued the nuisance. On this point of the case he thought the plaintiffs had entirely failed to prove their case. The action wholly failed, and must be dismissed with costs.

Order accordingly.

ARCHITECTS' FEES.

His Honour Judge Owen had before him at Newport County-court recently a case in which Messrs. Linton and Barker, architects, of Newport, claimed 15*l.* 15s. for professional work executed for Mr. Bernasconi, ship chandler, etc., of Newport and Cardiff, in respect of structural alterations to the Newport premises. Mr. J. Moxon was for plaintiffs and Messrs. Stephens, David, and Co. defended. A sum of 10*l.* 10s. had been paid into court. The defence was that the charges were excessive.—His Honour gave judgment for plaintiffs for the amount claimed.

AN UNAUTHORISED STREET.

At Thames Police-court recently, an adjourned summons was heard against Mr. A. Davis, of Aldgate-street, Aldgate, for forming a street without first obtaining the sanction of the London County Council, under the London Building Act, 1894. Mr. Dalby, barister, appeared for the London County Council; and Mr. Macmorran, K.C., and Mr. Harold Brandon, barrister, instructed by Mr. Romain, defended. For the Council it was stated that section 6 of the London Building Act put all streets under the control of the Council. It was contended that Mr. Davis had no right to begin the street at all. The street was laid out between Morgan-street and Cannon-street-road, St. George's. Mr. Davis acquired the property, and, having pulled down 47 small houses, replaced them by six large blocks of dwelling houses. Those dwelling houses would require to have proper air space, and notices of the buildings were put up in the ordinary way, with the space at the back. The District Surveyor afterwards found that the back-rooms of 16 of the dwellings were being made into something like shops, but he was given to understand that they would not be approached from that side of the street, and was also distinctly told that the open space was being kept as the open space of the dwellings. The next thing the Surveyor found was that where the path had been the defendant was engaged in some underpinning. It was soon seen that what he was realy engaged in making was a street with a row of shops on either side. On behalf of the defendant, Mr. Macmoran, K.C., said the place in question was simply a Jewish bazaar, or small market. In Morgan-street there were blocks of buildings in which were from 800 to 1,000 souls of the Jewish persuasion, and the place, or open yard at the rear, was principally used by them to make purchases. It had been recognised by the Jewish authorities, who had sanctioned the opening of a place in which poultry could be killed. The place in question was lighted and cleansed by Mr. Davis, who could close it at any time. Mr. Haden Corser, having heard the evidence, said he would reserve his decision.

J. H. COLLS, APPELLANT, *V.* HOME AND COLONIAL STORES, LTD., RESPONDENTS.

In the House of Lords on the 8th inst., this case was considered before the Lord Chancellors and Lords Macnaghten, Shand, Davey, Robertson and Lindley.

This was an appeal from a decision of the Court of Appeal consisting of Lords Justices Vaughan Williams, Romer and Cozens-Hardy, reversing a judgment of Mr. Justice Joyce which was argued in the first instance on May 15th, 18th and 19th of this year, before their Lordships House, which was composed of the Lord Chancellor and Lords Shand, Davey and Robertson, when judgment was reserved. A short time back as noted in the *Builder* of November 28th, their Lordships signified to the parties that they desired the case to be reargued, and the rehearing began on Tuesday, December 8th, the tribunal being strengthened by the addition of Lord Macnaghten and Lord Lindley. The question was rather a refined one, and related to the application of the law as at present laid down in reference to ancient lights. It is worth noting that although there are a great many decisions on the actual point their Lordships are now called upon to decide, both in the Courts of first instance and in the Court of Appeal, the proposition now put forward for discussion has never before come under the consideration of the final tribunal. The question is whether the owner of ancient lights is entitled to the entire access of light of which he was previously in the enjoyment, or whether his right is limited to such an amount of light as is requisite only for the ordinary use of the premises for habitation or business.

Mr. Justice Joyce, held, on the evidence, that the appellants proposed new building would cut off a portion of the sky area formerly visible from within the respondents' offices, and would to some extent necessitate the use of artificial light in the front portion thereof more frequently and during somewhat longer hours than formerly. He considered that as after the erection of the proposed building the respondents' premises would still be sufficiently lighted for the ordinary occupation as a place of business, and the respondents' business was one not requiring a special amount of light, the respondents had no cause of action. On that ground he entered judgment for Mr. Colls with costs. The learned judge, however, in giving judgment pointed out that should it be held by the Court of Appeal that the respondents were entitled to the full amount of light they had previously enjoyed without appreciable diminution, they had established a good cause of action since by the erection of the proposed building they had suffered some loss, and would be in that case entitled to the injunction sought.

The Court of Appeal reversed that decision, holding that a right to ancient light, was a right to the enjoyment, not of sufficient light merely for the ordinary occupation of the premises either as a place of residence or for business, but, of the full amount of light which had been enjoyed during the prescriptive number of years by the owners or occupiers of the premises. The respondents therefore were entitled to the injunction they claimed. Mr. Colls had pleaded —and perhaps the decision on this question for practical purposes is the more important—that assuming the Home and Colonial Stores, Limited, were right, and that they were entitled in the opinion of the Court to the full and uninterrupted light previously enjoyed by them, the establishing of that right did not give them a right to an injunction, but only to an inquiry as to damages. It was urged that in view of the great value of land in London and other towns that it was unreasonable to stop by the issuing of a mandatory injunction a building owner from erecting on the site of old premises, buildings of a greater height than those pulled down. In the present instance the old premises were of two stories only. Having regard to the price that had been paid for the site, the cost of demolition and of rebuilding, if the new building was only to be of two stories, the rent that could be obtained would be wholly inadequate. It was urged also as a matter of law that where there was an alternative remedy—in this case an inquiry as to damages—that the power of the Court to grant an injunction, the operation of which would be unreasonable, was only discretionary. That having regard to the fact that the law of "give and take" necessarily came in between citizens, who as a right of citizenship had to give up many rights, by necessarily conforming to laws passed for the good of the general public, the Court in this instance ought not to grant an injunction.—Lord Justice Vaughan Williams in dealing with this part of the argument said that the Home and Colonial Stores, Ltd., had established their right to an injunction, and that as they persisted in that right and declined to accept instead such a sum as on inquiry might be found reasonable compensation for the damage they had sustained, the Court had no power to force a litigant to accept compensation and the injunction must therefore go. That view was also accepted by the other members of the Court, and the injunction subject to the appeal to their Lordships house directed to issue.

Mr. Bray, K.C., Mr. Leigh Clare and Mr. A. B. Nutter (instructed by Hyde, Tandy, Mahon and Sayer), appeared for the appellant; Mr. Haldane, K.C., Mr. Hughes, K.C., and Mr. W. E. Vernon (instructed by Slaughter and May) for the respondent company.

Mr. Bray in opening the appellants case referred at some length to the facts that gave rise to the litigation, which were fully reported in a previous issue of the *Builder*, and need merely be recapitulated very briefly here. The plaintiffs, the Home and Colonial Stores, Ltd., claimed an injunction to restrain the defendant, a builder and contractor, from erecting on the site of 44, Worship-street, E.C., any building or erection so as to darken, injure, or obstruct any of the ancient lights formerly enjoyed by the plaintiffs. At the time the action was brought, in December, 1901, the plaintiffs had about 17 years unexpired of a lease of a block of buildings on the east side of Paul-street, at the corner between that street and Worship-street, which runs westward from Paul-street, so that the plaintiffs' buildings had a west front to Paul-street and a south front of about 150 ft. in length to Worship-street, a tolerably broad thoroughfare of some 41 ft. across. Opposite a portion of the south front of the plaintiffs' premises in Worship-street was the site of some buildings recently removed that had stood 19 ft. 6 in. in height, and the defendant Mr. Colls had entered into a building agreement to erect on this site a building which, if and when completed, would be 42 ft. in height. Building operations having been commenced, the present proceedings were instituted. Meanwhile before the decision was given by the Court of Appeal the building was practicaly completed, so that the injunction, if issued, would be in a form compelling Mr. Colls to pull down some part at any rate of the house.

The learned counsel occupied the whole of Tuesday bringing before their Lordships' notice all the authorities from the earliest times bearing on his first proposition that where the diminution of ancient light by the building of premises, though substantial, was nevertheless not sufficient to make the premises adversely affected unfit for ordinary occupancy or business, the right to ancient light did not in that case give the owner thereof a cause of action. He pointed to a passage in Mr. Justice Joyce's judgment (which judgment the appellant asked should be restored) in which the learned judge said the evidence showed that the plaintiffs' premises would still after the erection of the defendant's building be well and sufficiently lighted for all ordinary purposes of occupancy as a place of business. In coming to the conclusion that the plaintiffs had no cause of action the learned judge thought, though after considerable hesitation, that Mr. Justice Wright's decision in Warren *v.* Brown (16, the *Times* L.R. 540; 1900, 2, Q.B. 722), if not reversed by the Court of Appeal, ought to govern the present case. The decision in Warren *v.* Brown was reversed by the Court of Appeal (see 18 the *Times* L.R., p. 55), and when the present case was before that tribunal their Lordships seemed to consider that they were bound to reverse the decision of Mr. Justice Joyce, otherwise their decision in Warren *v.* Brown would be inconsistent with the decision in the present case. The parties in

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Warren *v.* Brown did not appeal to their Lordships' House.

The Lord Chancellor asked if the facts were similar in both cases.

Mr. Bray said the facts could be distinguished. In Warren *v.* Brown the business carried on by the occupier was that of a manufacturing hosier. The work needed especially good light in order to properly work the knitting machines. What the Court of Appeal there held was that it was no answer to a substantial interference with ancient light to say that abundant light remained for all ordinary purposes of inhabitancy or business. In the present case the business of the Home and Colonial Stores, Ltd., did not require "specially well-lighted" premises. Take for instance a photographer's business. Any interference with light to his studio would probably render the premises unfit altogether for that business. In that case, just as in the case of Warren *v.* Brown, it would be no answer to say "You still have light enough for ordinary business," because the reply would be, "If my business was that of an ordinary trade—a retail bootmaker, for instance, or as here, a grocer—I should have no real cause of complaint. My trade, however, is an exceptional one in this way, that I must have uninterrupted light to carry it on at all." That decision was not therefore a decision that need have bound the Court of Appeal, and of course the decision of the Court of Appeal was not binding on their Lordships.

The Lord Chancellor remarked that the Lord Chief Justice (Lord Alverstone) and Lords Justices Vaughan Williams and Romer formed the Court of Appeal before whom Warren *v.* Brown was argued. That was a strong Court, and their decision must be very clearly shown to be wrong before this House could overrule it.

Mr. Bray replied he was not arguing the case of Warren *v.* Brown.

The Lord Chancellor: I agree. But you are faced with this difficulty. You say, where there is left sufficient light for all purposes needed for the ordinary use of the premises, no action will lie. In Warren *v.* Brown the head note is, "If ancient lights are interfered with substantially and real damage ensues to the tenant or owner, an action lies. The fact that owing to the house being very well lighted, certain special businesses requiring much light are being or can be carried on there, cannot be disregarded in considering the effect of an interference, merely because after the interference other businesses not requiring much light can be carried on."

Mr. Bray replied that, assuming their Lordships held that the Court of Appeal was right, and that in the case of an ordinary business not requiring exceptional light a diminution of the light gave a cause of action, his submission would be that the remedy was compensation, and not a mandatory injunction.

The learned counsel had not concluded his argument when their Lordships rose, and the further hearing was adjourned until Thursday.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

26,396 of 1902.—R. BLAIR: *Jointed Boards for the Manufacture of Panelling, Linings, Flooring, Furniture, Casings, Casks, Barrels, and the like.*

According to this invention, in panelling, or wood work of the jointed or compound type, the fillets on the pieces or boards composing one ply or thickness of panelling or its equivalent are arranged to fit into corresponding grooves in the pieces composing the other ply or plys. The said grooves and fillets have curved sides, and there are not less than three complete fillets and two complete grooves in each piece or board, and are so arranged that on each meeting edge of the said pieces or boards an incomplete or half groove is presented, such half grooves forming complete grooves, into which fit central fillets on the other ply, for the purpose of locking the joints, when the respective pieces or boards are placed side by side and the respective plys or thicknesses are connected together.

24,582 of 1902.—E. W. LANCASTER and C. W. KREUSSLER: *Baths.*

A bath having a semi-circular, D-shaped, or other introverted form of foot end, having a waste and overflow chamber attached to foot end provided with means for attachment to a waste pipe, and having trunnions fixed to bath at centre of curve described by introverted end, the bath being adapted to be folded or turned up into a recess cupboard or cabinet provided with bearings to receive said trunnions.

24,655 of 1902.—J. KITCHEN: *Boilers and Furnaces used for Generating Steam, and for Heating Water for Hot-water Heating Apparatus, Domestic Supply, and other purposes.*

This consists in arranging the boiler and furnace in such a manner that the whole of the active combustion of the fuel takes place in the furnace itself before reaching the boiler, thus allowing the flame and heated gases only to impinge on the heating surface of the boiler.

3,575 of 1903.—T. WALTON and J. H. WALTON: *Apparatus for Steaming and Humidifying Air in Weaving Sheds, Spinning Mills, and like places.*

An apparatus for steaming and humidifying air in weaving sheds, spinning mills, and like places, consisting in the combination of a steam pipe having the inlet higher than the outlet, a trough or troughs above said steam pipe, all the troughs being on the same level and each containing pure water supplied continuously from a tank or reservoir, connexions with the steam pipe passed through each trough by which the pure water therein is heated by the steam without mixing with it; valves for regulating the supply of steam, and covers to the troughs for diverting the moisture arising therefrom.

16,762 of 1903.—G. H. STOUT and L. A. TURNER: *Gravity Locks.*

In a door lock, the combination with a suitable casing of a bolt plate having a projection formed on its upper front edge, said plate being pivoted in the casing at its rear lower corner so as to cause the bolt to assume by gravity a position whereby the projection thereon protrudes through an opening in the front of the casing, a knob spindle passing through the casing and forming the pivot of said plate, a notch formed in the plate adjacent to the spindle, a night latch tumbler journalled in the casing to engage said notch, a second spindle suitably mounted on the inside of the door and connected in operative relation with the said tumbler, a second notch formed above the first-mentioned notch, and a second tumbler and a key for operating said second tumbler to cause the same to engage said second notch to hold the bolt plate in locked position.

21,293 of 1903.—C. E. LAURENIUS: *Radiators or Heating Apparatus.*

A radiator or heating apparatus, consisting of an oblong iron jacket, both longitudinal sides being provided with extended hollow projections cast in one piece and running forwards and backwards under continuous slope, and forming canals for the heating medium, which projections, by having a similar position on both the said sides, and by meeting or nearly meeting at certain parts of their length, form at the same time a partition wall which is broken at certain places and compels the air, which is introduced from below as usual, to move in a zig-zag path in the jacket during its ascent.

21,572 of 1903.—A. J. BOULT (McKoy Clay Works): *Cutting and Delivery Devices for Clay and like Presses.*

A delivery table for green clay articles characterised by having on the cutter equipped longitudinally a reciprocable frame between the two end sections of the table top, an intermediate removable table top section, and a supplemental table for receiving the removable section.

20,644 of 1903.—W. U. GRIFFITHS: *Flushing Apparatus for Water-closets.*

In combination with a flush-tank having an outlet pipe embodying a port within said tank, a siphon hingedly disposed within said tank in such arrangement that when in one position its longer leg is in communication with said port and when in another position exposes said port so that water from the tank may rush directly thereinto, means for occasioning the movement of said siphon upon its hinge, said means comprising a cam mounted on the siphon and bevelled in opposite directions, a hinged closet-seat having an arm or extension, a pivoted lever mounted upon the flushing tank, and a rod depending from said lever the lower end of which is in proximity to said arm or extension.

393 of 1903.—T. CARRUTHERS: *Ventilators for Chimneys, Railway Carriages, and the like.*

This invention relates to ventilators for chimneys, railway carriages, and the like. The ventilator may be fixed to the top of a chimney to prevent back draught or smoke, or to exhaust vitiated air from the compartment of railway carriages, or the said ventilator may be used for sanitary purposes. In carrying out this invention, the ventilator is preferably constructed of fireclay, or it may be made of tin, in cylindrical form, with the lower end tapered and of smaller diameter than the upper part. Formed in the sides of the ventilator are slits or apertures into which are placed, from the inside of the ventilator, concave pieces one above the other. The concave pieces extend beyond the axis of the ventilator, and are inserted at opposite sides, so that when the smoke is passing up the ventilator it has a zig-zag course. The concave pieces are formed with stop pieces on the under side to prevent them from falling outwards through the apertures in the ventilator sides. In case the concave pieces should fall down the inside of the ventilator, the said pieces are prevented from dropping into the vent by reason of the ventilator being tapered at the bottom.

21,618 of 1903.—W. JOHNSON: *Appliance for Preventing or Curing Smoky Chimneys.*

This invention consists in an arrangement whereby the action from wind from any quarter which is usually the cause of smoking of domestic chimneys may be utilised in such way as actually to increase instead of impeding the draught. In applying the invention to a square chimney there is constructed of brick, clay, stone, cement, metal, or other material in a cubical or approximately cubical structure of the thickness of the chimney brickwork, which is inserted at any convenient height in the chimney, but preferably near the top, where it is well exposed to the action of the wind. This insertion is perforated with a series of horizontal passages at the outside of the chimney, which pass into a single vertical or nearly vertical passage at the inside of the chimney. The effect of this arrangement is that a force of wind pressing against the chimney is deflected, and a part of the air is increased in velocity in an upward direction inside the chimney, and should that force of wind passing over the top of the chimney tend, as it sometimes does, to invade the exit, and cause smoke to be driven down, that tendency is made by the action of the appliance to have a counteracting opposite effect. Similar appliances may be inserted in each face of the chimney, either at the same level or at different levels, so as to provide for similar action on the draught, from whatever quarter the wind may blow. The invention can also be applied to a stack of chimneys.

25,772 of 1902.—J. C. ETCHELLS: *Apparatus for Automatic Supply of Water from Low Pressure Mains to Fire Mains, Tanks, or other Receptacles.*

An apparatus for supplying water from a low pressure main at a higher pressure to a delivery main, the combination therewith of a high pressure water supply opening into the delivery main, a controlling valve placed in high pressure main, a cylinder in communication with the delivery main, and a piston or ram therein which is actuated by the pressure in the delivery main to close the high pressure valve, and a weight or spring connected to the said valve to open it when the pressure in the delivery main is reduced.

24,653 of 1903.—B. MCDOUGALL: *Construction of Roofs, Ceilings, and Floors.*

A floor and roof construction consisting of a series of joists or bars radiating from a common centre unsupported except at their outer ends, and concentric bands or rings engaging said bars or joists and uniting them into a rigid structure.

761 of 1903.—J. KULHANEK: *Iron Structures.*

Material for the erection of temporary or semi-permanent iron structures, such as pillars, posts, uprights, standards, stairs, girders, bridges, or truss or strut framework, which, after a structure which it has served to build is taken to pieces, may again be used for fresh structures or other building purposes without any alterations or repair, such building material consisting of pieces of sections of flat or angle bar iron, either straight or bent to the shape of triangles or squares, and provided with equidistant round or elongated openings.

21,799 of 1903.—P. M. JUSTICE (Aktiesélsrabet, Venezuela-Asfalt Kompagnie): *Manufacture of Artificial Asphalt.*

The manufacture of artificial asphalt in which Orinoco asphalt oil and powdered limestone containing lime or lime flour, are mixed together.

16,585 of 1903.—G. C. MARKS (E. R. Knapp): *Indirect Heating System for Buildings.*

An indirect heating system for a building, consisting in the combination with a common air box in the basement or lower part of the building or a number of upwardly extending air flues communicating with such air box and leading one to each room, each of such flues containing suitable heating pipes connected with common mains in the air box, and being fitted with inlet air registers at the lower ends, the arrangement being such that the inlet of heating medium to the respective pipes and inlet of air to the flue of any room may be regulated by devices available in that room.

* All these applications are in the stage to which opposition to the grant of Patent upon them can be made.

MEETINGS.

FRIDAY, DECEMBER 11.

Tramways and Light Railways Association (Society of Arts, John Street Adelphi.—Mr. Atherley-Jones, K.C., M.P. (President), on "Protection in Special Relation to Tramway and Light Railway Enterprise," 8 p.m.

SATURDAY, DECEMBER 12.

The British Association of Waterworks Engineers.—Eighth Winter Meeting to be held at the Geological Society's Rooms, Burlington House, W. (1) Ballots will be taken for the Council and Officers for 1904-5, and for new Members and Associates. (2) Prof. Henry Robinson on "The Storage of Flood Water" (3) Mr. Alfred J.

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Jenkins on "The New Reservoir for the Hoylake and West Kirby Waterworks." (4) Mr. Neil J. Peters on "The Cozan Extensions of the Cardiff Corporation Waterworks." 11 a.m.

MONDAY, DECEMBER 14.

Royal Institute of British Architects.—Mr. William Henman and Mr. Henry Lea, C.E., on "The Royal Victoria Hospital, Belfast: its Inception, Design, and Equipment." Illustrated by lantern slides. 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Bennett H. Brough on "The Mining of Non-Metallic Minerals." IV. 8 p.m.

Incorporated Clerks of Works' Association (Carpenters' Hall, London Wall).—Paper by Mr. Arthur T. Bolton, entitled, "Ingram Houses. Residential Clubs for Young Men." 8.30 p.m.

Society of Engineers.—Annual General Meeting. 7.30 p.m.

Builders' Benevolent Institution.—Executive Committee. 5 p.m.

TUESDAY, DECEMBER 15.

Institution of Civil Engineers.—(1) Professor J. Campbell Brown, D.Sc., on "Deposits in Pipes and other Channels conveying Potable Water." (2) Messrs. Osbert Chadwick, C.M.G., and Bertram Blount on "The Purification of Water highly charged with Vegetable Matter; with Special Reference to the Effect of Aëration." 8 p.m.

Society of Arts (Applied Art Section).—Mr. F. Warner on "The British Silk Industry." 8 p.m.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Sanitary Science).—Mr. B. R. Tucker on "Ventilation of Dwellings and Public Buildings." 7 p.m.

WEDNESDAY, DECEMBER 16.

The Discussion Section of the Architectural Association.—Mr. A. O. Collard on "The Work of an 'Exhibition' Architect." 7.30 p.m.

London Master Builders' Association.—Finance Committee. 4 p.m.

St. Paul's Ecclesiological Society.—Mr. F. Bligh Bond on "Rood-screens and Roodlofts," illustrated by limelight lantern views. 8 p.m.

Institute of Sanitary Engineers, Ltd.—(1) Half-yearly Meeting. 4.30 p.m. (2) Annual Dinner, Holborn Restaurant. 6.30 p.m.

Ladies' Foremen and Clerk of Works' Institution.—Annual Meeting of the Directors. 7 p.m.

Architectural Association.—Mr. W. E. Snell on "The Objects of the Garden City Association." 8 p.m.

THURSDAY, DECEMBER 17.

Institution of Electrical Engineers.—Mr. P. V. McMahon on "The City and South London Railway: Working Results of the Three-wire System applied to Traction. 8 p.m.

London Master Builders' Association.—Council Meeting. 1 p.m.

Leeds and Yorkshire Architectural Society.—Mr. J. B. Mitchell-Withers on "Sir Christopher Wren: his Time and Works." 6.30 p.m.

FRIDAY, DECEMBER 18.

Architectural Association.—Mr. G. P. Bankart on "Old Stucco and Plaster Work, with Reference to Modern Possibilities." 7.30 p.m.

Institution of Mechanical Engineers.—Mr. C. E. Stromeyer and Mr. W. B. Baron on "The Working of Various Water-softeners." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—(1) Mr. C. B. Case on "The Action of the Sea upon the Foreshore." (2) Mr. F. W. Cable on "The Causes of the Loss of Beaches." 8 p.m.

Glasgow Architectural Craftsmen's Society.—Debate: "Should Architects be Final Arbiters in Disputes on Contracts for their own Work?" Affirmative: Mr. R. N. Horn, A.R.I.B.A. Negative: Mr. Isaac Low, jun. 8 p.m.

SATURDAY, DECEMBER 19.

Junior Institution of Engineers.—Visit to the Electricity Works of the Walthamstow Urban District Council. Train leaves Liverpool-street at 2.23 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

November 20.—By MORRIS, MARSHALL & POOLE (at Bishop's Castle).

Sneal, &c., Montgomery. White House Farm, and holding adjoining, 128 a. 0 r. 30 p., f.... £3,500

November 26.—By STANDRING & GORBUTT (at Doncaster).

Belton, Lines.—Hirst Priory Estate, together with Little Hirst and Moss Wood farms, 443a. 2 r. 24 p., f. and c., y.r. 700*l.* 18,000

November 30.—By BRODIE, TIMBS & CO.

Woolwich, Kent.—1 and 2, George-st., and 48a, 48b, and 48c, Chapel-st. (S.), area 4,040 ft. f., y.r. 70*l.* 1,700

By ELLIOTT, SON, & BOYTON.

Hackney.—86, King Edward-rd., u.t. 31 yrs., g.r. 9*l.*, p. 470

By P. & G. GEEN.

Reversion to 22, 23, and 24, North-st., Lambeth, f., w.r. 99*l.* 16s., also f.g.r. 105*l.*, reversion in 65 yrs., life aged 65 2,500

Peckham.—2, Copeland-rd., u.t. 52 yrs., g.r. 6*l.* 8s., y.r. 50*l.* 450

By OGDEN, SONS, & OLLEY.

Wimbledon.—20, Kenilworth-av., u.t. 90½ yrs., g.r. 8*l.* 10s., e.r. 55*l.* 550

By FRED VARLEY & SON.

Highbury.—43, Riversdale-rd., u.t. 67 yrs., g.r. 7*l.*, y.r. 33*l.* 350

Finsbury Park.—50, Ambler-rd., u.t. 64 yrs., g.r. 5*l.*, y.r. 50*l.* 500

Bow.—1, Wilson-st. (S.), u.t. 59 yrs., g.r. 6*l.*, y.r. 33*l.* 225

December 1.—By C. W. DAVIES & SON.

Islington.—Liverpool-rd., f.g.r. 68*l.* 10s., reversion in 52½ yrs. 1,195

196 and 198, Liverpool-rd., (S.), f. w.r. 59*l.* 16s. 455

Offord-rd.—1, Gordon-st., f., y.r. 36*l.* 585

Islington.—19, Waterloo-ter., u.t. 27½ yrs., g.r. 5*l.* 5s., y.r. 45*l.* 350

Hoxton.—42, Herbert-st., u.t. 33½ yrs., g.r. 6*l.* 6s. e.r. 58*l.* 450

Kentish Town.—33 and 35, Burghley-rd., u.t. 59½ yrs., g.r. 12*l.* 8s., y.r. 90*l.* £840

Hoxton.—39, Napier-st., u.t. 46½ yrs., g.r. 13., w.r. 44*l.* 4s. 150

By DEBENHAM, TEWSON & CO.

Ealing.—Warwick-rd., a perpetual rent charge of 10*l.* 235

By HAMPTON & SONS.

East Tilbury, Essex.—Rectorial Tithe Rent Charges of 388*l.* 3,700

South Nutfield, Surrey.—Ridge Green House and 11 a. 2 r. 30 p., f., p. 9,400

By MARBETT & EDGE.

Woodford Green, Essex.—Four freehold cottages and laundry, area 1 a. 0 r. 4 p., w.r. 135*l.* 4s. 2,700

Monkham's-la., seven freehold cottages and 1 a. 3 r. 16 p., w.r. 162*l.* 3,600

By FIRTH, WARMAN.

Stoke Newington.—20, Lidfield-rd., u.t. 57 yrs., g.r. 5*l.*, e.r. 34*l.* 350

De Beauvoir Town.—49, Ardleigh-rd., u.t. 20 yrs., g.r. 3*l.*, y.r. 50*l.* 350

Finsbury Park.—85, Regina-rd., u.t. 63 yrs., g.r. 6*l.* 6s., y.r. 40*l.* 360

By J. C. PLATT (at Hammersmith).

Hammersmith.—69 and 70, Rednall-ter., u.t. 75½ yrs., g.r. 6*l.* 5s., w.r. 72*l.* 16s. 595

Chiswick. 205 and 207, Devonshire-rd. (S.), f., w.r. 94*l.* 18s. 860

32 and 34, Fisher's-la., f., w.r. 45*l.* 10s. 445

By WATERS & RAWLENCE (at Salisbury).

Handley, Dorset.—Handley House and 4 a. 2 r. 0 p., f., p. 710

December 2.—By CURTIS & SHARP.

Stratford.—24 to 46 (even), Rokeby-st., u.t. 66 yrs., g.r. 43*l.*, w.r., 270*l.* 8s. 1,480

5 to 39 (odd), Arthingworth-st. u.t. 66 yrs., g.r. 63*l.*, w.r. 380*l.* 18s. 2,080

West Ham.—38 and 40, Church-st. South, f., w.r. 47*l.* 9s. 470

Plaistow.—2 Samson-st., f., w.r. 24*l.* 14s. 295

Canning Town.—Victoria Dock-rd, the Old Ship, b.-h., f., y.r. 50*l.* 1,400

26 to 48 (even), Berwick-rd., f., w.r. 280*l.* 16s. 2,280

By FOSTER & CRANFIELD.

Knightsbridge.—3, Park Side (S.), Profits Rentals of 80*l.* for 13 yrs. and 70*l.* for 7 yrs. 1,125

Park Side, f.g.r. 30*l.*, reversion in 13 yrs. 3,450

7, Park Side (S.), part f. and part u.t. 14 yrs., g.r. 65*l.*, y.r. 225*l.* 3,200

4, Park Side (S.), profit rental of 115*l.* for 11 yrs. 760

Hampstead-rd.—2, Edward-st., y.r. 80*l.*; also l.g.r. 10*l.*, u.t. 65½ yrs., g.r. 45*l.* 460

By HILLYER & HILLYER.

Tottenham.—20, Highweek-rd., u.t. 79 yrs., g.r. 4*l.* 10s., w.r. 29*l.* 18s. 186

51, Beaconsfield-rd., u.t. 73 yrs., g.r. 6*l.*, p. 215

2a, Brunswick-rd., u.t. 73 yrs., g.r. 6*l.*, p. 185

188 and 190, Seaford-rd., u.t. 78 yrs., g.r. 8*l.* 8s. p. 371

By WATERS & RAWLENCE (at Frome).

Witham Friary, Somerset.—Alleyfield Farm, 111 a. 2 r. 29 p., f., y.r. 140*l.* 3,000

By J. H. BULMER.

Rotherhithe.—60 to 65 (even), Neptune-st., f., w.r. 66*l.* 6s. 1,000

Tottenham.—47, Russell-rd., u.t. 72½ yrs., g.r. 5*l.* 5s., w.r. 32*l.* 10*l.* 200

December 3.—By EDWIN EVANS.

Chiswick.—High-rd., Merton House Building Estate, area 1¾ a., f., p. 8,250

Pimlico.—142, Tachbrook-st., u.t. 34 yrs., g.r. 1*l.*, y.r. 60*l.* 660

Wandsworth.—15 to 21 (odd), Lavenham-rd., u.t. 97 yrs., g.r. 22*l.*, w.r. 130*l.* 720

62 to 68 (even), 76 and 80, Trentham-st., u.t. 97 yrs., g.r. 30*l.* 10*l.*, w.r. 187*l.* 4s. 1,170

39, Lonsdale-ter., u.t. 97 yrs., g.r. 5*l.* 5s., w.r. 31*l.* 4s. 205

615, Wandsworth-rd. (S.), u.t. 66½ yrs., g.r. 6*l.*, e.r. 60*l.* 510

Battersea.—22, Rosenau-rd., u.t. 76¼ yrs., g.r. 7*l.*, y.r. 49*l.* 395

11, 13 and 15, Abyssinia-rd., f., w.r. 106*l.* 12s. 2,200

Wembley, Middlesex.—Alperton-rd., two freehold building plots 140

By DUNN, SOMAN & COVERDALE.

Hampstead.—Flask Walk, Flask Tavern, f.g.r. 100*l.*, reversion in 31 yrs. 3,500

34 and 36, Flask Walk, f., y.r. 60*l.* 700

38 to 44 (even), Flask Walk, f., w.r., 68*l.* 18s. 400

46 and 48, Flask Walk, f., y.r. 74*l.* 520

Flask Walk, &c., f.g.r. 34*l.* 10s., reversion in 66 yrs. 900

Gardnor-rd., f.g.r. 48*l.*, reversion in 66 yrs. 1,250

By NEWBON, EDWARDS & SHEPHARD.

Regent's Park.—11, Titchfield-ter., u.t. 18 yrs., g.r. 12*l.* 10s., e.r. 65*l.* 240

Islington.—6, Hanover-st., f., y.r., 40*l.* 675

20, Union-sq., u.t. 33 yrs., g.r. 7*l.* 15s., y.r. 55*l.* 430

Holloway.—Wellington-rd., &c., l.g.r. 75*l.*, u.t. 40 yrs., g.r. nil 1,155

32, Parkhurst-rd., u.t. 42 yrs., g.r. 8*l.*, y.r. 50*l.* 395

Hornsey Rise.—129, Elthorne-rd., u.t. 63 yrs., g.r. 7*l.*, e.r. 38*l.* 840

Stamford Hill.—37, Ravensdale-rd., u.t. 67 yrs., g.r. 14*l.* 10s., y.r. 45*l.* 275

Stoke Newington.—236, High-st. (S.), u.t. 70 yrs., g.r. 13*l.*, y.r. 150*l.* 2,000

83, 85 and 87, Bouverie-rd., u.t. 67½ yrs., g.r. 16*l.* 10s., y.r. 103*l.* 1,105

Stratford.—6, 8 and 10, Albert-rd., f., y.r. 90*l.* 12s. 825

Hackney.—61 and 63, Hassard-st., u.t. 69½ yrs., g.r. 11*l.*, w.r. 67*l.* 12s. 470

By SIMSON & SONS.

Forest Hill.—South-rd., Highfield and 1¼ a., u.t. 32 yrs., g.r. 17*l.*, y.r. 87*l.* 650

3, South-rd., also Derwent House and Oakland House, u.t. 32 yrs., g.r. 18*l.*, y.r. 166*l.* 670

Stanstead-rd., f.g.r. 18*l.* 10s., reversions in 56 and 62 yrs. 440

Beadnell-rd., f.g.r. 40*l.*, reversion in 62 yrs. 970

Catford.—Rutland-rd., f.g.r. 26*l.*, reversion in 67 yrs. 595

59, Holbeach-rd., f., e.r. 32*l.* 385

Walworth.—Royal-rd., Royal Standard, b.-h., f.g.r. 60*l.*, reversion in 53 yrs. 1,550

1, 3, 5 and 7, Cook's-rd., f., w.r. 107*l.* 18s. 900

Norwood.—56 and 58, Gipsy Hill f., y.r. 115*l.* 1,080

Woodland Hill, freehold land and buildings thereon, e.r. 35*l.* 370

21 to 27 (odd), Woodland Hill, u.t. 63½ yrs., gr. 26*l.* 16s., y.r. 135*l.* £900

30, 32, 34 and 44, Woodland Hill, f., y.r. 112*l.* 1,430

Woodland-rd., f.g.r. 16*l.*, reversion in 67½ yrs. 400

37 and 39, Woodland-rd., u.t. 75½ yrs., g.r. 15*l.*, y.r. 71*l.* 50

Woodland Hill, f.g.r. 16*l.*, reversion in 68 yrs. 445

Woodland-rd., f.g.r. 49*l.* 7s., reversion in 55 yrs. 1,315

65 to 71 (odd), Woodland-rd., f., w.r. 75*l.* 8s. 770

61, 65, 67, 69 and 71, High-st., w.r. 142*l.* 6s.; also l.g.r. 47*l.* 10s., u.t. 34 yrs., g.r. 9*l.* 1,540

105, High-st. (S.), u.t. 9 yrs., g.r. 4*l.*, y.r. 30*l.* 105

Tooting.—High-st., &c., f.g.r. 213*l.* 4s., u.t. 17½ yrs., g.r. 90*l.* 1,380

By A. DOWELL (at Edinburgh).

Dulrinish, Inverness-shire.—The estate of Glendale, 25,000 a. 15,000

December 4.—By HIND & SONS.

Hackney.—1 to 6, Cambridge Lodge Villas; also Cambridge Lodge, area 55,000 ft., f., e.r. 445*l.* 10,000

St. George's East.—27 to 39 (odd), Philip-st.; 6, 8 and 10, Ellen-st.; 1, 2 and 3, Ellen-ct., f., y.r. 393*l.* 18s. 4,000

Hackney.—3, Bayford-st., u.t. 68 yrs., g.r. 5*l.*, y.r. 34*l.* 265

Bethnal Green.—Seabright-gdns, &c., l.g.r. 94*l.*, u.t. 9 and 81 yrs., g.r. 21*l.* with reversion... 240

By PERCIVAL HODSON.

Paddington.—11, Hampden-st., u.t. 41 yrs., g.r. 5*l.*, y.r. 48*l.* 230

By MARTEN & CARNABY.

Streatham.—88 and 90, Knolly's-rd., u.t. 73 yrs., g.r. 16*l.*, y.r. 98*l.* 780

By RICHARDSON & BOOTH.

Lewisham.—169, High-st., area ¼ a. f., e.r. 120*l.* 3,350

***Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; h.h. for beer-house; p.h. for public-house; o. for offices; s. for shops; ct. for court.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£	s.	d.			
Hard Stocks.....	1	16	6	per 1,000 alongside, in river		
Rough Stocks and Grizzles	1	13	0	„	„	„
Facing Stocks ...	2	12	0	„	„	„
Shippers	2	5	0	„	„	„
Fletton.....	1	10	0	„	at railway depôt	
Red wire Cuts ...	1	13	0	„	„	„
Best Fareham Red	3	12	0	„	„	„
Best Red Pressed Ruabon Facing	5	0	0	„	„	„
Best Blue Pressed Staffordshire ...	4	4	0	„	„	„
Do. Bullnose	4	10	0	„	„	„
Best Stourbridge Fire Bricks ...	4	8	0	„	„	
GLAZED BRICKS.						
Best White and Ivory Glazed Stretchers	13	0	0	„	„	„
Headers	12	0	0	„	„	„
Quoins, Bullnose, and Flats	17	0	0	„	„	„
Double Stretchers	19	0	0	„	„	„
Double Headers...	16	0	0	„	„	„
One Side and two Ends	19	0	0	„	„	„
Two Sides and one End	20	0	0	„	„	„
Splays, Chamfered, Squints.....	20	0	0	„	„	„
Best Dipped Salt Glazed Stretchers and Headers	12	0	0	„	„	„
Quoins, Bullnose, and Flats	14	0	0	„	„	„
Double Stretchers	15	0	0	„	„	„
Double Headers...	14	0	0	„	„	„
One Side and two Ends.....	15	0	0	„	„	„
Two Sides and one End	15	0	0	„	„	„
Splays, Chamfered, Squints.....	14	0	0	„	„	„
Second Quality White and Dipped Salt Glazed.....	2	0	0	„	less than best.	

	s.	d.	
Thames and Pit Sand	6	9	per yard, delivered.
Thames Ballast	6	0	„ „
Best Portland Cement	30	0	per ton, delivered.
Best Ground Blue Lias Lime ...	21	0	„ „

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s.	6d.	per yard, delivered.
Stourbridge Fire Clay in sacks	27s.	6d.	per ton at rly. dpt.

STONE.

	s.	d.	
BATH STONE—delivered on road wagons, Paddington depôt	1	6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt.....	1	8½	„ „
PORTLAND STONE (20 ft. average)—			
Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2	1	„ „
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2	2½	„ „

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PRICES CURRENT (*continued*).

STONE.

	s. d.		
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt	
Beer in blocks	1 6	"	"
Greenshill "	1 10	"	"
Darley Dale in blocks	2 4	"	"
Red Corsehill "	2 5	"	"
Closeburn Red Freestone	2 0	"	"
Red Mansfield "	2 4	"	"

YORK STONE—*Robin Hood Quality.*

	s. d.		
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt	
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2	3 per foot super.	"
6 in. Rubbed two sides Ditto, Ditto	2 6	"	"
3 in. Sawn two sides slabs (random sizes)	0 11½	"	
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	"	"
2½ in. to 2 in. ditto, ditto	0 6	"	"
Scappled random blocks	3 0	per ft. cube	"
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super.	"
6 in Rubbed two sides Ditto	—	"	"
3 in. sawn two sides slabs (random sizes)	1 2	"	"
2 in. self-faced random flags	0 5	"	"
Hopton Wood (Hard Bed) in blocks		2 3	per ft. cube. deld. rly. depôt.
" " " 6 in. sawn both sides landings		2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.		1 2½	" "

SLATES.

6in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly.dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	"
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green	15 2 6	" "
20×12 best Eureka unfading green	17 2 6	" "
18×10 " "	12 10 0	" "
16× 8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
16× 8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000 at rly. depot.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and Valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. Ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do.	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1½ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (80 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.

White Sea:	At per standard.	
First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0

PRICES CURRENT (*continued*).

WOOD.

JOINERS' WOOD.

	At per standard. £ s. d.	£ s. d.
Petersburg: second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals. 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in,	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube	0 4 0	—

Prepared Flooring—	Per square.	
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards	0 11 0	0 13 6
¾in. by 7 in. do. do. do.	0 14 0	0 18 0
1 in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0 ...	7 5 0
Compound Girders, " "	8 2 6 ...	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6 ...	8 17 6
Fitch Plates	8 5 0 ...	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6 ...	8 5 6

METALS.

IRON—	Per ton, in London £ s. d.	£ s. d.
Common Bars	7 10 0 ...	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0 ...	8 10 0
Staffordshire "Marked Bars"	10 10 0 ...	—
Mild Steel Bars	8 15 0 ...	9 5 0
Hoop Iron, basis price	9 5 0 ...	9 10 0
" " galvanised	17 10 0 ...	—

(*And upwards, according to size and gauge.)

Sheet Iron (Black)— Ordinary sizes to 20 g.	9 15 0 ...	—
" " 24 g.	10 15 0 ...	—
" " 26 g.	12 5 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.	14 5 0 ...	—
Sheet Iron, Galvanised, flat, best quality— Ordinary sizes to 20 g.	16 0 0 ...	—
" " 22 g. and 24 g.	16 10 0 ...	—
" " 26 g.	18 0 0 ...	—
Galvanised Corrugated Sheets— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0 ...	—
" " 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.	14 0 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0 ...	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0 ...	—
" " " 26 g.	14 0 0 ...	—
Cut nails, 3 in. to 6 in. (Under 3 in., usual trade extras.)	9 5 0 ...	9 15

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	13 17 6 ...	—
Pipe in coils	14 7 6 ...	—
Soil pipe	16 17 6 ...	—
Compo Pipe	16 17 6 ...	—
ZINC—Sheet— Vieille Montagne ...ton	26 5 0 ...	—
Silesian	26 0 0 ...	—
COPPER— Strong Sheet...per lb.	0 0 10½ ...	—
Thin "	0 0 11½ ...	—
Copper nails "	0 0 11 ...	—

PRICES CURRENT (*continued*).

LEAD, &c.

BRASS—	£ s. d.	£ s. d.
Strong Sheet...per lb.	0 0 10 ...	—
Thin "	0 0 11 ...	—
TIN—English Ingots	0 1 3 ...	—
SOLDER—Plumbers'	0 0 6 ...	—
Tinmen's	0 0 8 ...	—
Blowpipe	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

	2d. per ft. delivered
15 oz. thirds	1½d. " "
" fourths	3d. " "
21 oz. thirds	2½d. " "
" fourths	3½d. " "
26 oz. thirds	3d. " "
" fourths	4½d. " "
32 oz. thirds	4d. " "
" fourths	2½d. " "
Fluted sheet, 15 oz.	3½d. " "
" 21 oz.	1½d. " "
⅛ Hartley's Rolled Plate	2d. " "
⅞ " " "	2½d. " "
¼ " " "	

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels...per gallon	0 1 8
" " " in drums	" 0 1 11
Boiled " " in pipes or barrels	" 0 1 11
" " " in drums	" 0 2 2
Turpentine, in barrels	" 0 3 8
" in drums	" 0 3 10
Genuine Ground English White Lead	per ton 19 0 0
Red Lead, Dry	" 19 0 0
Best Linseed Oil Putty	per cwt. 0 7 6
Stockholm Tar	per barrel 1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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Each additional line ..... 1s. 0d.

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Each additional line ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all the sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s. }

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

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CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Culverting Part of River Blackstaff, Victoria-street ..	Improvement Committee, Belfast...	City Surveyor, Belfast	Dec. 14
*House, Carnmeen, Newry, Ireland	.....	W. J. Watson, Architect, Benvenne, Rostrevor, Ireland	do.
Drainage Work, Children's Home, Dartford Heath	Guardians of Union	Mr. Harston, A.M.Inst.C.E., 8, Hythe-street, Dartford	do.
830 ft. of 9-in. Pipe from Manor Gate to Main Sewer..	*Dartford R.D.C.*	do.	do.
Water Tower and Pumphouse, &c., to the Asylum	Ennis District Lunatic Asylum	F. O'Connor, Civil Engineer, Ennis Asylum, Ireland	do.
Forming and Paving Winifred-street	Warrington Borough Council	T. Longden, Borough Surveyor, Warrington	do.
2,000 tons of 5-in. Grit on Sandstone Cubes	do.	do.	do.
Stables, &c., to Aberaman	Cwmbach Industrial Co-op. Soc.	T. Roderick, Architect, Aberaman	do.
Brushes, &c.	Leicester Corporation	E. G. Mawbey, M.Inst.C.E., Borough Engineer, Leicester	do.
*Sanitary Palls	Barrow-upon-Soar, R.D.C.	H. Herrod, Barrow-upon-Soar	do.
Private Street Works	Stratford U.D.C.	E. Worrall, Surveyor, Council Offices, Old Trafford, Manchester	do.
Alterations, Female Epileptic Block, Workhouse Infir.	Birmingham Guardians	W. H. Ward, Architect, Paradise-street, Birmingham	do.
Granite, &c.	Longton Corporation	J. W. Wardle, A.M.Inst.C.E., Borough Sur., Court House, Longton	do.
Sewage Disposal Works, &c., at Sewage Farm	Shildon and East Thickley U.D.C.	C. Heslop, Council Offices, Shildon	Dec. 15
2,000 loads of Jarrah or Karri Planks or Blocks	Newcastle-on-Tyne Corporation	City Engineer, Town Hall, Newcastle-on-Tyne	do.
Private Street Works	Rawtenstall Corporation	A. W. Lawson, A.M.Inst.C.E., Borough Surveyor, Rawtenstall	do.
Electrical Stores	Manchester Corporation	J. M. M'Elroy, Tramways Department, 55, Piccadilly, Manchester	do.
*Extensions to House, Silloth	W. Thomson	Johnstone Bros., Architects, 39, Lowther-street, Carlisle	do.
*Iron Fencing	Tottenham U.D.C.	Council's Engineer, 712, High-road, Tottenham	do.
*Making-up Roads	do.	do.	do.
Rebuilding Premises, Waterloo-place, Londonderry	R. Keys & Co.	T. Johnston, Architect, 11, East Wall, Londonderry	Dec. 16
Cast-Iron Mains, &c.	Stockport Corporation	S. Mennler, Engineer, Stockport	do.
A Grinding Shop at Locomotive Works, Gateshead	N.E.R. Co.	W. Bell, Architect to the Company Central Station, Newcastle-on-T.	do.
Coach-house and Alterations to Stables	West Derby Union	C. H. Lancaster, Architect, Brougham-ter., W. Derby-rd., Liverpool	do.
Business Premises, Fore-street, Redruth	W. Snell	Sampson Hill, Architect, Green-lane, Redruth	Dec. 17
Museum and Art Gallery	Kingston-on-Thames Corporation	A. Cox, Architect, 4, Adam-street, Adelphi, W.C.	do.
Furniture for New Hospital, Northampton	Hospital Committee	C. S. Risbee, Secretary, Northampton General Hospital	do.
Repairs, Dorchester Grammar School	.....	A. L. T. Tilley, Architect, Dorchester	do.
*Painting and Decorating Council Chamber, &c.	Metropolitan Borough of Islington	*Borough Engineer, Town Hall, Upper-street, N.*	Dec. 16
Street Gas Lamps	Great & Little Usworth Parish Cn.	J. R. Elliott, Clerk to Council, Fern House, New Washington	do.
Seven Houses, Sacriston, Durham	Armfield Plain Co-operative Soc....	G. T. Wilson, Architect, 22, Durham-road, Blackhill	do.
Villa Residence, Upper Greenroyd Estate, Haxlfax	.....	A. G. Dazell, Architect, 15, Commercial-street, Halifax	Dec. 19
Motor Garage and Cycle Works, Bondgate	*Alnwick Motor &c. Co.*	W. R. Hindmarsh, Architect and Surveyor, Alnwick	do.
Repairing, Painting, &c., the "Red Lion," Tredegar	.....	T. Roderick, Architect, Glebeland, Merthyr	Dec. 20
Repairing, Painting, &c., the "Railway Inn," Pontlottyn	.....	do.	do.
Gartlock Asylum Extensions	Glasgow District Lunacy Board	Master of Works Office, Parish Chambers, 266, George-st., Glasgow	Dec. 21
Sixteen Artisans Dwellings	Mallow U.D.C.	B. E. F. Sheehy, Architect, 57, George-street, Limerick	do.
Septic Tank & Bacterial Filter Beds, Moulton Pk. Fm.	St. Andrew's Hospital Committee	B. Thompson, 67, Victoria-road, Northampton	do.
Stores for Six Months	Graigola Merthyr Co., Ltd., Swansea	The Company	do.
Fireclay Retorts, Firebricks, &c.	Gas Committee, Leeds Corporation	R. H. Townsley, Gas Offices, East Parade, Leeds	do.
English and Foreign Timber Required at Gasworks	do.	do.	do.
Extension of Cemetery, Harton	South Shields Corporation	S. E. Burgess, Borough Engineer, Chapter-row, South Shields	do.
Underground Conveniences, &c., Liscard	Wallasey U.D.C.	W. H. Travers, District Engineer, Public Offices, Egremont, Cheshire	Dec. 22
*New School, Napier-road	Gillingham (Kent) Education Com.	Secretary, 8, Waterloo-road, New Brompton, Kent	do.
*Enlargement of *Post Office*, Middlesbrough	H.M. Office of Works	H.M. Office of Works, Storey's Gate, Westminster, S.W.	Dec. 23
Mission Hall, Sanders-avenue, Kendal	.....	J. F. Curwen, F.R.I.B.A., 26, Highgate, Kendal	do.
Three Houses and Two Shops, London-road, Worcester	.....	H. P. Smith, 5, Foregate-st., & F. Hall, Clifton-on-Teme, Worcester	do.
15-ton Steam Road Roller and Scarifier	Glasgow Corporation	T. Nisbet, Master of Works, City Chambers Glasgow	do.
*Making-up *Cloncurry-street*	Borough of Fulham	Borough Surveyor, Town Hall, Fulham, S.W.	do.
Private Street Works	Erdington U.D.C.	H. H Humphries, Eng. & Surv., Public Hall, Erdington, Birm'ham.	Dec. 24
Freewiring	Pontypridd U.D.C.	R. P. Wilson, Consulting Engineer, 66, Victoria-street, Westminster	do.
Sewage Disposal Wks. (Bacterial Prin.) West Shield-row	Stanley U.D.C.	J. Routledge, Surveyor to Council, Front-street, Stanley	Dec. 26
Iron Foundry Work for Sewage Works	do.	do.	do.
Alterations, 76, Sankey-street	Education Committee, Warrington	T. *Longden, Borough Surveyor, Warrington*	Dec. 28
Assembly Hall and Classrooms, Fenton-st., Lancaster	Society of Friends	S. E. Barrow, Architect, Liverpool Bank Chambers, Lancaster	do.
*Cottage Homes, New Malden, Surrey	Guardians Kingston Union	W. H. Hope, Architect, Seymour-road, Hampton Wick	do.
Steel Superstr., for Coal Hoist Viaducts, Grangemouth	Caledonian Ry. Co.	J. Wolfe Barry, K.C.B., 21, Delahay-street, Westminster, S.W.	do.
Superstructure of Government Offices, Cardiff	*Commissioners of H.M. Works*	A. *Gilbertson*, Architect, 6, Stanley-street, Liverpool	Dec. 29
Roadmaking Machinery	Tipperary C. C. (N. Riding)	Company's Offices, 9, Great Castle-street, W.	Dec. 30
*Sewerage and Surface Water Drainage Works	Walmer U.D.C.	Beesley, Son, & Nichols, 11, Victoria-street, S.W.	Jan. 1, '04
*Sewage Disposal Works	Cheshunt U.D.C.	Clerk's Office, Manor House, Cheshunt	do.
*Filtering Tank and Sludge Beds, Enfield	*Cheshunt U.D.C.*	Council's Clerk, U.D.C. Offices, Manor House, Chesthunt, Herts	do.
*Coastguard Station at Herne Bay	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue, W.C.	do.
Public Library and Offices, Hounslow	Heston & Isleworth U.D.C.	Nowell Parr & A. E. Kates, Architects, Brunswick House, Brentford	Jan. 4
Swimming Bath, Hounslow	.....	do.	do.
Main Drainage, Whitwick	Coalville U.D.C.	J. B. Everard, M.Inst.C.E., 6, Munstone-lane, Leicester	do.
*Public Offices, Baths and Library	Heston & Isleworth U.D.C.	Nowell Parr & Kates, Architects, Brunswick House, Brentford, W.	do.
Bridge Widening, Scotswood-on-Tyne	Newburn U.D.C.	T. Gregory, Surveyor, Council Offices, Newburn	do.
*Taking down Church & Bdg., New Church, Whitehaven	.....	J. S. Moffat, Architect, 53, Church-street, Whitehaven	Jan.
*Lunatic Wards at Whipp's Cross road, *Leytonstone*	West Ham Union	Clerk's Office, Union Workhouse, Leytonstone, N.E.	Jan.
Installation of Inclined Retorts, Gaythorn Station	Gas Committee, Manchester Corp.	J. G. Newbigging, Civil Engineer, Rochdale-rd. Gas Stn, Manchester	Jan.
*Annual Contracts	Borough of Camberwell	Borough Engineer, Town Hall, Camberwell, S.E.	Jan. 19
Electric Power Plant for Lighting, Pumping, &c.	Enniscorthy Dist. Lunatic Asylum	H. T. Harris, Consulting Engineer, 30, Parliame. -street, Dublin	Jan. 20
Sinking two Pits, *Brynlliw, Groves End*, Pontardulais	.....	Registrar, County Court, Cardiff	No date.
Catholic Church and Presbytery, Barmouth	Ldn. & Dist. Land & Bdg. Co., Ltd.	County Surveyor, Court House, *Nenagh, Ireland*	a...
Erection of Houses, New Barnet	Kent and Canterbury Hospital	T. Williams & Sons, Colliery Proprietors, Llangennech	do.
*New Ward and other Works	.....	W. J. Jennings, Architect, 4, St. Margaret's-street, Canterbury	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
Sanitary Inspector	Lewisham Borough Council	150*l.*	Dec. 14
Head of Building Trades Department	Northern Polytecnic Institute	250*l.*	do.
Assistant in Building Trades Department	do.	100*l.*	do.
Assistant Lecturer, &c. (Chemical Department)	do.	90*l.*	do.
Second Assistant, Engineer's & Surveyor's Department	Twickenham U.D.C.	80*l.*	Dec. 15
Architectural Assistant	Straits Settlements Government	360*l.* &c.	Dec. 21
As-istant Examiners in Patent Office	Civil Service Commissioners	Not stated	Dec. 22
Borough Surveyor	Battersea Borough Council	500*l.*	Dec. 31
Assistant Civil Engineer, Admiralty	Civil Service Commissioners	Not stated	Jan. 7, '04.
Civil Engineering Draughtsman	The Admiralty	Not stated	No date.

* *Those marked with an asterisk (*) are advertised in this Number.* *Competition*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xviii.

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TO CORRESPONDENTS.

K. F. C. (Amount should have been stated).—G. W. L. (Below our limit).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

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All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BISHOP AUCKLAND.—For the execution of sewerage works, Leasingthorne, for the Rural District Council. Mr. C. Johnston, Surveyor, Crofton House, Bishop Auckland:—

G. H. Bell ... £2,629 0 0	G. Hetherington £2,238 13 9
P. Frater, Howden-le-Wear, R.S.O., Durham*, £2,196 10.	

BISHOP'S STORTFORD.—For repairing engines at sewage pumping station and waterworks, for the Urban District Council. Mr. R. S. Scott, A.M.Inst.C.E.:—

Thos. Walker, Oldbury Works, Tewkesbury* £118 5

BRENTFORD.—For the supply of 250 cubic yards of blue Guernsey granite, for the Urban District Council. Mr. Nowell Parr, Surveyor, Clifden-house, Boston-road, Brentford:—

	per cubic yard. s. d.		per cubic yard. s. d.
A. & E. Manuelle ...	15 9	Tray Bros. ...	14 6
Griffiths Bros. ...	15 7	Le Maitre, 51, Grosvenor-road, Westminster* ...	14 5
Sommerfeld ...	15 3		
Mowlem & Co. ...	14 10		

BRISTOL.—For the erection of three shops and dwelling-houses, Gloucester-road, Bishopston. Messrs. Holbrow & Oaten, architects, 9, Clare-street, Bristol. Quantities by architects:—

Eastabrook & Son ...	£2,350	R. Wilkins & Son ...	£2,189
R. F. Bidd ...	2 330	E. Walters & Son ...	2,170
Jones & Hill ...	2,325	J. Hatherley ...	2,167
M. Durnford ...	2,290	J. Chapman ...	2,094
E. Preece ...	2,250	F. Brown ...	2,074
E. Love ...	2,240	J. E. B. James* ...	1,795

* Reduced to £1,690 and accepted.

BURSLEM.—For erecting a generating station at gasworks, Longport, for the Electric Lighting Committee. Mr. Ashton Bremner, Borough Electrical Engineer, Burslem. Quantities by Engineer:—

Thos. Grodwin ...	£2,235	W. Cooke ...	£2,160
Bennett Bros. ...	2,168	W. Grant & Sons* ...	2,100

[Engineer's Estimate ... £2,263]

EASTBOURNE.—For erecting public baths, Old Town, for the Corporation. Mr. W. Chapman Field, architect, Town Hall, Eastbourne:—

F. G. Minter ...	£4,210	Cornwell & Son ...	£3,660
A. J. White ...	4,036	Dennis & Co., Eastbourne* ...	3,548
J. Martin ...	3,759	Mark Hookham‡ ...	2,934
Miller & Selmes ...	3,720		

‡ Withdrawn.

EVENWOOD.—For erecting a branch store for Bishop Auckland Industrial Co-operative Society. Mr. F. H. Livesay, architect, Bishop Auckland:—

Masonry.—J. Teward, Burnt Houses, Cockfield* ...	£626 0 9
Joinery and Carpentery.—Huddlestone, Co-operative Stores, Shildon* ...	362 4 11
Plastering.—Kirby, Durham-street, Auckland* ...	60 18 0
Slating.—J. & R. Muscall, Peel-street, Auckland* ...	83 17 0
Plumbing.—Edward Thompson, Newgate-street, Auckland* ...	86 7 0
Painting and Glazing.—J. T. Barker, South-road, Auckland* ...	54 5 10
	£1,273 13 6
Walton Bros., Crook‡ ...	1,743 10 0
Ward Bros., Coundon‡ ...	1,533 10 6
Todd & Willey, Mainstorth-road, Ferryhill‡ ...	1,518 1 2
G. H. Bell, Bishop Auckland§ ...	1,380 18 0
Wilson & Sons, Barnard Castle‖ ...	928 6 1

‡ Sole tender. § Less carpentry and joinery. ‖ Less plumbing.

ELGIN.—For the erection of a villa in Forteath-avenue, Elgin. Mr. R. B. Pratt, architect, Elgin:—

Masonry.—John McPherson, Bishopmill, Elgin* ...	£750
Carpentry.—J. & A. Robb, Rothes* ...	
Plumbing.—J. Gordon & Son, Elgin* ...	
Slating.—Thomas & Fraser, Elgin* ...	
Plastering.—Jas. Brodie, Elgin* ...	
Painting.—Wm. Fordyce, Elgin* ...	
Ironwork.—Youngson Bros., Elgin* ...	

GRIMSBY.—For heating extensions to Police Department at Town Hall. Mr. H. Gilbert Whyatt, Borough Engineer:—

	Specified Scheme £ s. d.	Alternative Scheme submitted by Contractor £ s. d.
King, Ltd. ...	322 16 6	175 0 0
J. Stott & Co. ...	—	305 16 0
J. Jeffries ...	302 10 0	218 0 0
Wright & Son ...	231 16 0	—
W. Houghton & Co. ...	—	275 0 0
Tomlinson & Milan ...	263 4 0	263 4 0
A. Cook ...	250 9 6	227 14 2
Brearley, Horrox & Co.	237 12 0	—
T. Russell ...	235 2 8	235 2 8
J. Jackson & Co. ...	233 4 0	—
Duke, Ltd. ...	—	213 7 0
A. J. Kalloway ...	216 14 0	201 6 0
D. J. Dolby ...	214 13 0	242 12 6
A. Macintosh & Sons ...	211 15 0	211 15 0
Unity Wood and Iron Co. ...	202 8 0	198 0 0
W. C. Sharpe ...	195 5 0	—
Parker, Ltd. ...	—	195 0 0
Lancashire Heating Co.	—	160 0 0
C. Seward & Co., Britannia Iron Works, Preston* ...	146 19 0	136 19 0

HALIFAX.—For building extensions to works, for the Campbell Gas Engine Co., Ltd. Messrs. Jackson & Fox, architects, 7, Rawson-street, Halifax:—

Masonry.—J. Turner & Son, Halifax*	£1,529 0
Carpentry and Joinery.—J. Halliday, Miall-street, Halifax* ...	390 0
Iron and Steel.—A. Pulman & Son, Halifax* ...	1,290 0
Patent Glaziery.—Heywood & Co., Huddersfield* ...	207 4
Plumbing and Glazing.—Bolton Bros., Halifax* ...	241 0
Slating and Plastering.—Rushworth & Frith, Halifax* ...	300 0
Painting.—S. Ackroyd, Queen's-road, Halifax ...	72 2

HARROGATE.—For erecting four houses, Skipton-road, for Mr. C. Barraclough. Mr. Thos. Godfrey, architect, 83, Skipton-road, Harrogate. Quantities by architect:—

Thos. Godfrey, Harrogate* £1 700.

HULL.—For laying sewers at North Ferriby for Sculcoates Rural District Council. Messrs. Wellsted & Easton, engineers, Prince's Dock-chambers, Hull:—

E. Hawley ...	£1,102 15 6
J. Brunton ...	956 0 0
H. Medforth ...	944 0 0
B. Robinson ...	853 15 0
R. Fisher, 134, Hawthorne-avenue, Hull*	805 8 10

INGATESTONE (Essex).—For re-building Avenue House, for Mr. M. Quinn, from designs prepared by Messrs. Clare & Ross, 1, West-street, Finsbury-circus, E.C., and Westcliff-on-Sea:—

F. Johnson, Chelmsford* ... £1,200.

JARROW.—For alterations and additions to Dunn-street School for Hedworth, Monckton & Jarrow Urban District School Board. Mr. H. M. Adam, clerk of works:—

W. Cowper ...	£768 5 8	Wm. Kennedy	£693 0 6
J. A. M. Henderson ...	704 0 0	Glen & Moffett, Napier-street, Jarrow* ...	577 7 5
J. Barrow ...	701 0 0		

KILMARNOCK (N.B.).—For the construction of generating station and tram-car shed for the Corporation. Mr. Robert Blackwood, Borough Surveyor, Market-bridge, Kilmarnock:—

Dagger Work.—W. Lawson, Kilmarnock§	£4,148 3 8
Chimney Stack.—W. Calderwood, Kilmarnock§ ...	1,704 15 9
Foundry and Smith Work.—Clerk & Son, Ltd., Glasgow§ ...	2,181 9 3
Bricklaying and Masonry.—Muir & Co., Kilmarnock§ ...	4,461 14 6
Carpentry Joinery and Glazing.—Rome & Son, Kilmarnock§ ...	2,607 0 0
Slating.—R. Stevenson, Kilmarnock§ ...	169 15 4
Plumbing.—R. Garven, Kilmarnock* ...	938 10 8
Plastering.—Rome & Son, Kilmarnock§	121 4 2
Painting.—W. Orr Kilmarnock§ ...	122 10 1
Boilers.—Yates & Thomson, Blackburn*	1,765 0 0
Engines and Dynamos.—Dick, Kerr & Co., London ...	3,855 0 0
Overhead Crane.—Cartick & Retchie, Edinburgh* ...	268 0 0
Storage Battery.—Tudor Accumulator Co., London* ...	1,201 0 0
Switchboard and Boosters.—Cox Walkers, Darlington* ...	1,989 0 0

LETTERKENNY (Ireland).—For enclosing recreation ground, &c., for the Urban District Council. Mr. Patrick Dawson, C.E., Town Surveyor:—

James Orr Johnston, Castlehaul, Letterkenny*, £265.

LLANDRINDOD WELLS.—For four houses in Craig road, for Mr. E. Bufton. Mr. E. Peters Morris, architect, Llandrindod Wells:—

George Bullock ...	£2,497	R. Davies, Llandrindod Wells* ...	£2,300
D. Meredith ...	2,418	Lloyd & Lloyd ...	2,260

LONDON.—For the erection of Wenlake-buildings, Roby-street, St. Luke, which are to be erected in pursuance of the London (Garden-row, Roby-street, Baltic-street and Honduras-street, St. Luke) Improvement Scheme, 1899, for the London County Council:—

A. Porter ...	£21,609	F. & H. F. Higgs ...	£20,800
J. & M. Patrick ...	21,300	Leslie & Co. ...	19,660
H. L. Holloway ...	21,090	Kirk & Randall ...	19,474
Spencer, Santo & Co.	21,000	Holloway Bros., Ltd.	19,242
Simpson & Co. ...	20,880	Haslemere Builders, Ltd.* ...	18,861
H. Lovatt ...	20,870		

LONDON.—For the execution of repairs and painting work required on the roofs of the main boiler-house, stores, and workshops at the Crossness outfall, for the London County Council:—

K. Collingwood ...	£966 6 0
Lewis Kazak ...	929 19 9
Vigor & Co. ...	850 0 0
J. Scott Fenn ...	799 16 0
Gray & Co. ...	722 2 2
Ellingham & Sons ...	719 12 10
Woollaston & Co. ...	715 18 0
Woollaston Bros. ...	638 0 0
Enness Bros. ...	614 0 0
Proctor & Son* ...	610 12 4
George Martin ...	537 0 0

LONDON.—For glazed roofing and drainage works for St. George's-in-the-East Guardians:—

G. E. Weston, Wellclose Square, E. £104 17 6

MARGATE.—For construction of a concrete reservoir at Flete, for Waterworks Committee. Mr. Albert Latham, A.M.Inst.C.E., 15, Cecil-square, Margate. Quantities by Messrs. Hovenden and Barber, 30, Bishopsgate-street Without, E.C.:—

Anderson Bros.	£9 565 2 9	A. Osenton ...	£8,034 3 7
H. Shardlow ...	8,592 0 0	A. Fasey & Son	5,984 0 0
H. T. Binns ...	7,030 18 8	H. Ashley ...	5,849 8 6
W. W. Martin.	6,910 0 0	G. Browning ...	5,794 0 0
T. Pedrette ...	7,681 3 7	R. Roberts ...	5,793 8 0
Denne & Co. ...	6,807 0 0	G. Bell ...	5,689 0 0
Castle & Co. ...	6,585 6 7	J. W. Dean ...	5,530 13 3
W. J. Adcock.	6,412 12 6	A. E. Nunn ...	5,487 8 9
F. R. Miskin.	6,274 0 4	Denne & Sons, Walmer* ...	5,479 0 0
Paramor & Sons	6,235 19 6		

NEWCASTLE-UNDER-LYME.—For laying down about 650 yards of 9 in. sewer, &c., for the Rural District Council. Mr. A. E. Jones, C.E., Brunswick-street, Newcastle-on-Lyme:—

Morley & Sons ...	£395	W. Williams ...	£318
G. K. Downing ...	390	Smith & Taylor, Basford* ...	305
F. Barke ...	389		
S. Wilton ...	328		

NEW HUNSTANTON.—For the construction of a sewer, for the Urban District Council. Mr. James C. Walker, Surveyor to the Urban District Council:—

F. Southgate ...	£1,163	W. A. Leach, Hunstanton* ...	£775
John Nelson & Co. ...	1,090		
Reuben Shanks ...	1,025		

NORTHALLERTON.—For the construction of a Sewer in Back-street, Northallerton, and taking out existing sewer, for Urban District Council. Mr. Daniel Hinchcliffe, the Council's Surveyor.

D. Oakley, Northallerton* ... £189 10

PRESTON (Lancs.).—For the execution of paving works, Salisbury-street, for the Corporation:—

Calverley Street.

Chadwick Bros., Backbuttons* ... £372 3 9

Pechell Street.

Chadwick Bros., ,, * ... £583 3 5

Salisbury Street.

John Moxham & Sons, Preston* ... £418 14 0

English Martyr's Place.

John Moxham & Sons, Preston* ... £379 14 4

SHEFFIELD.—For sale-shops and artizans' dwellings, Infirmary-road and Lock-street, for Sheffield City Council. Messrs. C. & C. M. Hadfield, architects, 19, St. James's Street, Sheffield:—

John Webster ...	£4,483 0 0
Dawson, Jones & Co. ...	4,462 12 6
James Fidler ...	4,450 0 0
W. & A. Forsdike ...	4,405 0 0
Matthew Grantham ...	4,400 0 0
Ash, Son & Biggin ...	4,388 0 0
Eshelby & Son ...	4,300 0 0
Arthur Bradbury ...	4,078 0 0
Vasey & Son ...	3,851 9 0
John Robertson ...	3,840 2 6
Boot & Son ...	3,770 0 0
O'Neill & Son§ ...	3,709 0 0

SONNING.—For the erection of two houses, Sonning, for Mr. G. St. Croix Rose. Mr. Arthur Vernon, architect, 29, Cockspur-street, London, S.W., and High Wycombe, Bucks.:—

Y. J. Lovell ...	£1,592	Silver & Son ...	£1,494
G. H. Gibson ...	1,525	H. Flint, Wycombe*	1,485
G. Robinson ...	1,498		

SOUTHEND-ON-SEA (Essex).—For the erection of a Meeting Hall in London Road, from designs prepared by Messrs. Clare & Ross, 1, West-street, Finsbury-circus, and Westcliffe-on-Sea:—

R. Henderson ...	£753	Cubitt & Gotts ...	£676
G. Mathieson ...	708	A. Whur, Westcliff-on-Sea*	630

SOUTH SHIELDS.—For paving works, &c., Whitburn, for the Rural District Council. Mr J. H. Morton, architect, 50, King street, South Shields:—

George Wells ...	£4,692	G. Simpson ...	£3,936
J. White ...	4 576	W. D. Allison, Whitburn* ...	3,660
Thornton & Co. ...	4,556		

[*See also next page.*

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TIPTON (Staffs).—For alterations to the out-offices, &c., Burnt Tree Council School, for the Education Committee. Mr. W. H. Jukes, Surveyor to the Council :—

Thompson & Co.	£285 0 0	G. Holloway	£265 0 0
J. Hunt	284 10 0	Ashphates United, Birmingham*	248 9 4
M. Round	280 0 0		

[Surveyor's Estimate..... £297 11 6]

WALTHAM ABBEY.—For channelling Sun-street and kerbing and paving Farm-hill, for Waltham Holy Cross Urban District Council. Mr. W. T. Streather, Surveyor, High Bridge-street, Waltham Abbey :—

Griffiths & Co., Ltd.	£224 19 9
Joseph Jackson	196 8 6
E. J. Hanchet	179 0 0
S. Kitteringham	178 13 3
Grounds & Newton, South Tottenham*	162 4 0

WEST PENWITH (Cornwall.)—For widening, &c., certain roads for West Penwith District Council. Mr. Thomas Curnow, District Surveyor, Goldsithney Marazion. Quantities by Surveyor :—

St. Erth Roads.

Nicholls & Stevens	£100	John Hocking, Gwinear, Hayle*	£75

Lelant Roads.

John Hocking	£310
Nicholls & Stevens	290
Philip Hurrell, Lelant, R.S.O., Cornwall*	144

WOBURN-SANDS.—For the erection of a pair of cottages, Station-road, for Mr. C. Dudley. Mr. W. B. Stonebridge, architect, Woburn and Woburn-Sands :—

Foster	£685	H. Gregory	£550
W. T. Sharpe	589	C. Sinfield, Aspley*	534

LONDON SCHOOL BOARD TENDERS.

AT the last meeting of the London School Board the Works Committee submitted the following lists of tenders :—

BREWHOUSE-LANE SCHOOL (Wapping). — For building new boiler-room, flue, &c.

Rockhill Bros.	£438 5	J. T. Robey	£225
Belcher & Co., Ltd.	249 15	A. J. Sheffield*	218
G. Barker	225 0		

HINDLE-STREET SCHOOL (Shacklewell). — For repairs, &c., to schoolkeeper's house.—

Williams & Son	£349	Haydon & Sons	£279
W. Martin	337	Barrett & Power	275
Woollaston Bros.	315	Runham Brown*	265
J. F. Hollilay	310		

LAMB-LANE SPECIAL SCHOOL (Hackney). — Alterations :—The old school in Lamb-lane, Hackney, which was formerly used as a day school, is now being used for a school for special instruction. In order that the building shall comply with the requirements of the new rules for building, it will be necessary to carry out alterations to the existing premises, consisting of separating the playgrounds, providing a bath, and girls' lavatory, &c. As it is desirable that this work shall be carried out at once, the Committee, as a matter of emergency, agreed to place it in the hands of Messrs. F. and F. J. Wood, the work to be measured up on completion, and the actual cost calculated on the schedule of prices for repairs. They propose at the same time to divide a portion of the girls' cloakroom so as to form a stock room for the use of the Correspondent, the total estimated cost of the work being £200.

WHITFIELD-STREET SCHOOL (Tottenham Court-road).—Work of Reversing Stepped Flooring, &c., to be executed by local contractor :—

W. Hornett	£333 0	Thompson & Beveridge	£125 0
T. Cruwys	330 0	Marchant & Hirst	121 0
General Builders, Ltd.	159 0	J. R. Sims	117 10
Barrett & Power	£109.		

As the amount of the lowest tender is in excess of the Architect's estimate, the Committee propose that, in this case, the work should be carried out by the Local Contractor for Repairs, and the cost calculated on his Contract Schedule of Prices for Repairs.

WOOD-STREET SCHOOL (Woolwich).—For additional heating in girls' department :—

Stevens & Sons	£170 0	Paragon Heating Co.	£149 15 0
Brightside Foundry and Engineering Co., Ltd.	165 0	Palowkar & Sons	148 0 0
W. G. Cannon & Sons	163 0	J. Defries & Sons, Ltd.*	135 17 6

For structural alterations, &c., at various Schools to be carried out during Christmas holidays :—

FINSBURY (Station-road School):—

Grover & Son	£467 0 0	McCormick & Sons	£369 0 0
Dearing & Son	425 0 0	Stevens Bros.	363 0 0
J. Stones	402 15 6	Barrett & Power	326 0 0
H. Bouneau	380 0 0	A Porter*	290 0 0
Williams & Son	379 0 0		

GREENWICH (Randall-place School):—

H. Line +20% on Schedule		G. Kemp	£436
London School Furniture Co.	£674	H. Groves	427
Rice & Son	525	Leney & Son	398
T. D. Leng	449	Proctor & Son*	383

TOWER HAMLETS (Mortleith-road School):—

H. Bouneau	£392 10	A. J. Sheffield	£331
G. Barker	365 0	A. W. Derby*	215
A. E. Symes	346 0		

WEST LAMBETH (Garret-lane School):—

J. & M. Patrick	£221	R. A. Jewell	£152 0
R. S. Ronald	198	E. B. Tucker	149 13
W. Hammond	165	Galbraith Bros.	129 0
E. Triggs	155	Garrett & Son*	120 0
Lathey Bros.	153		

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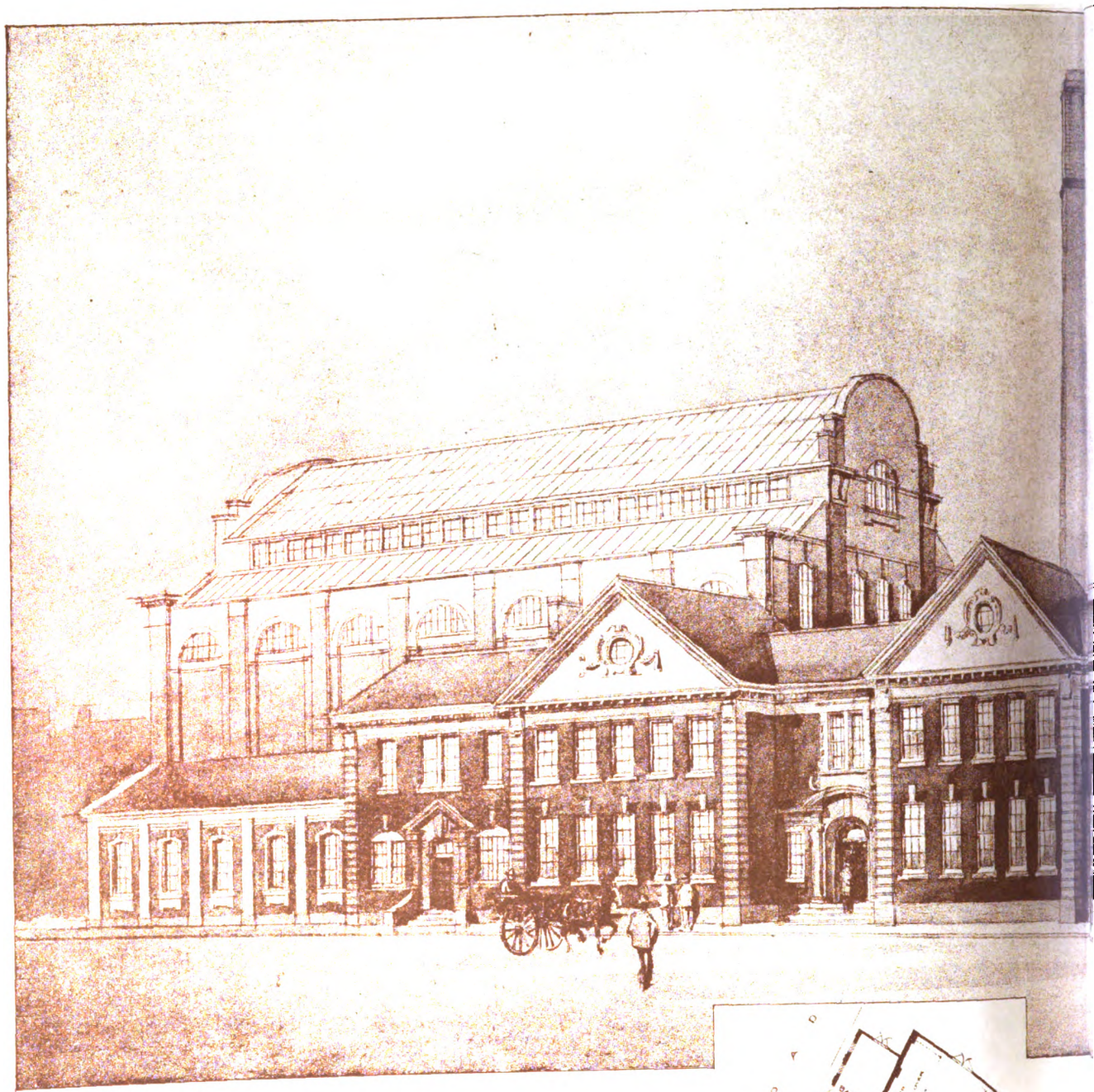

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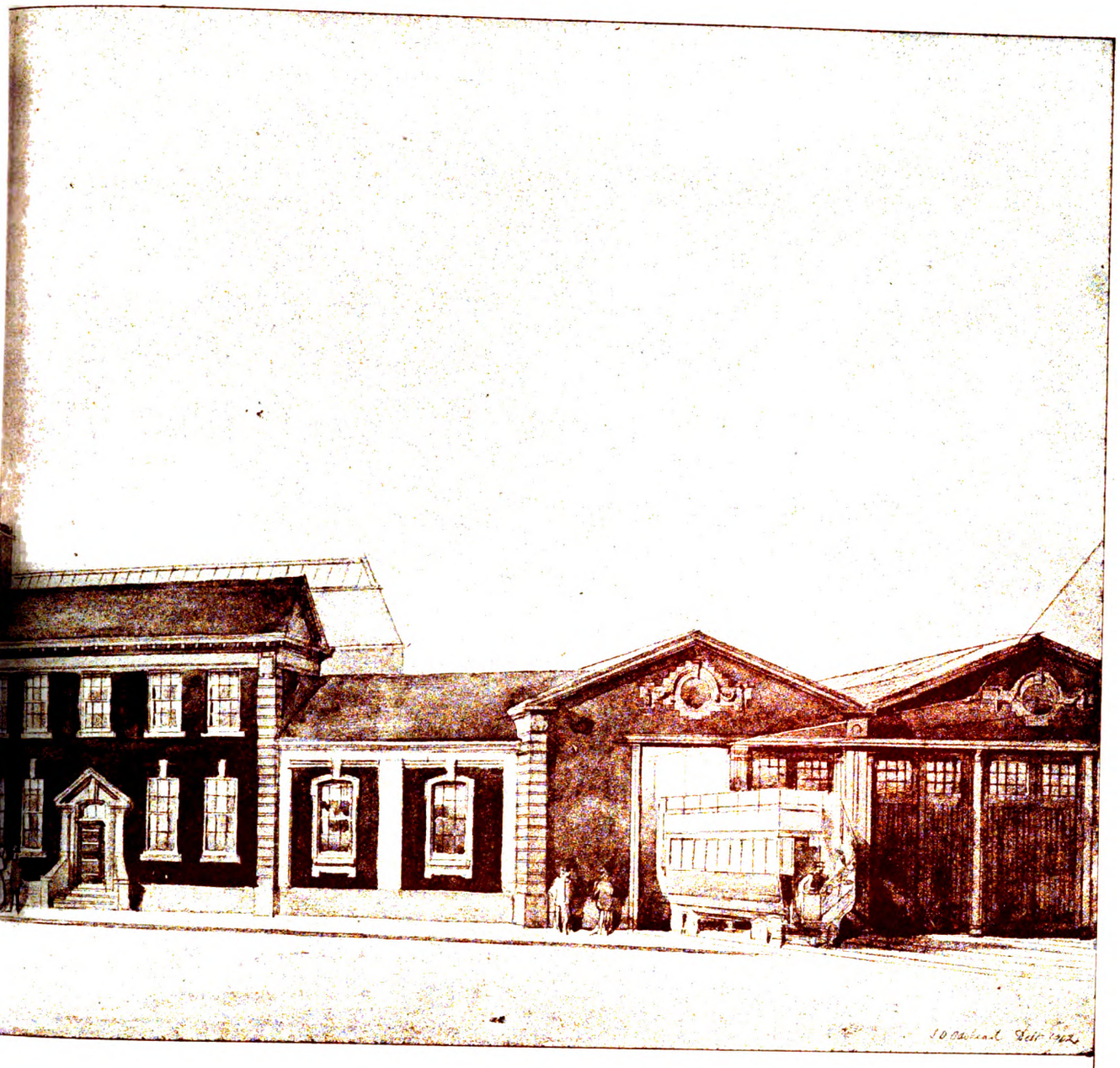

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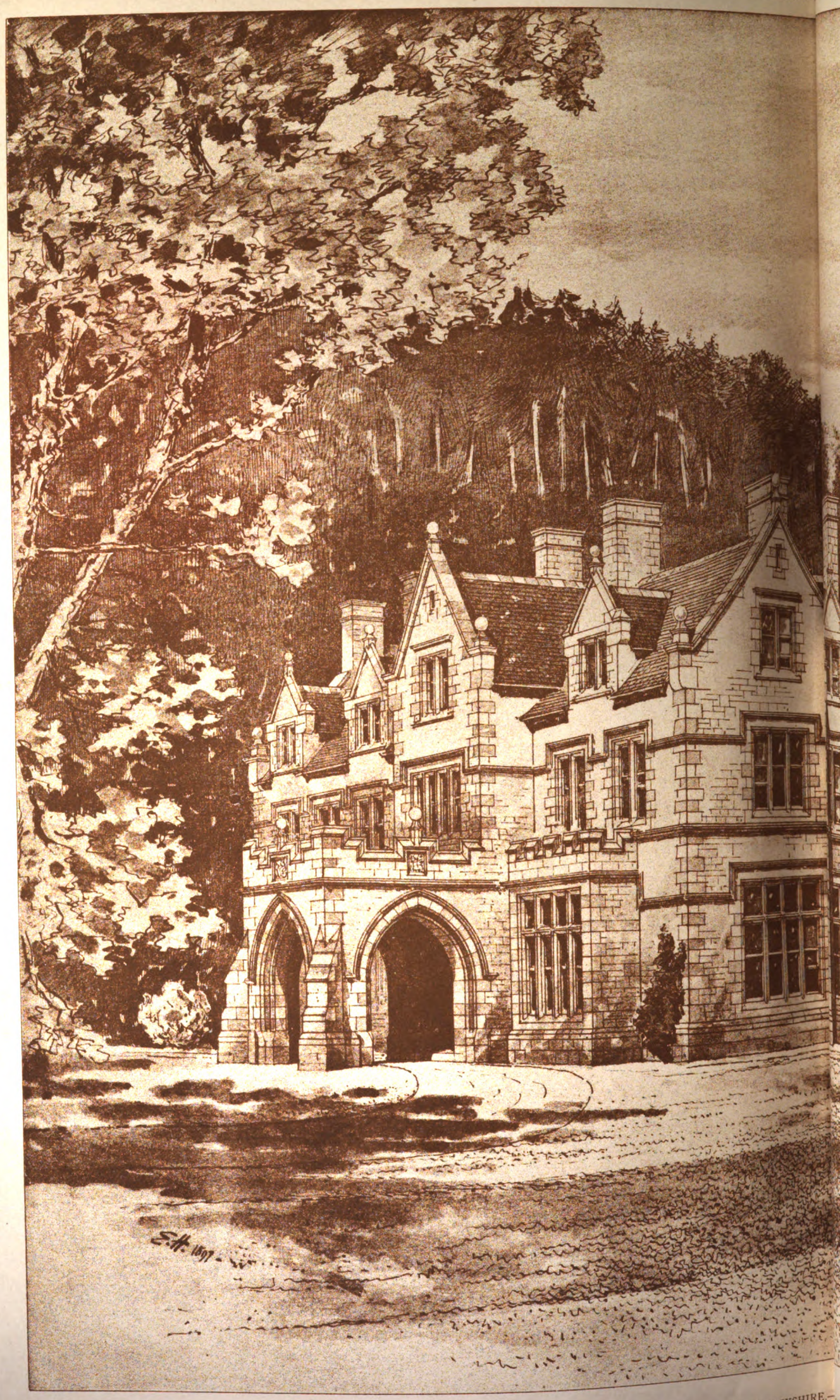

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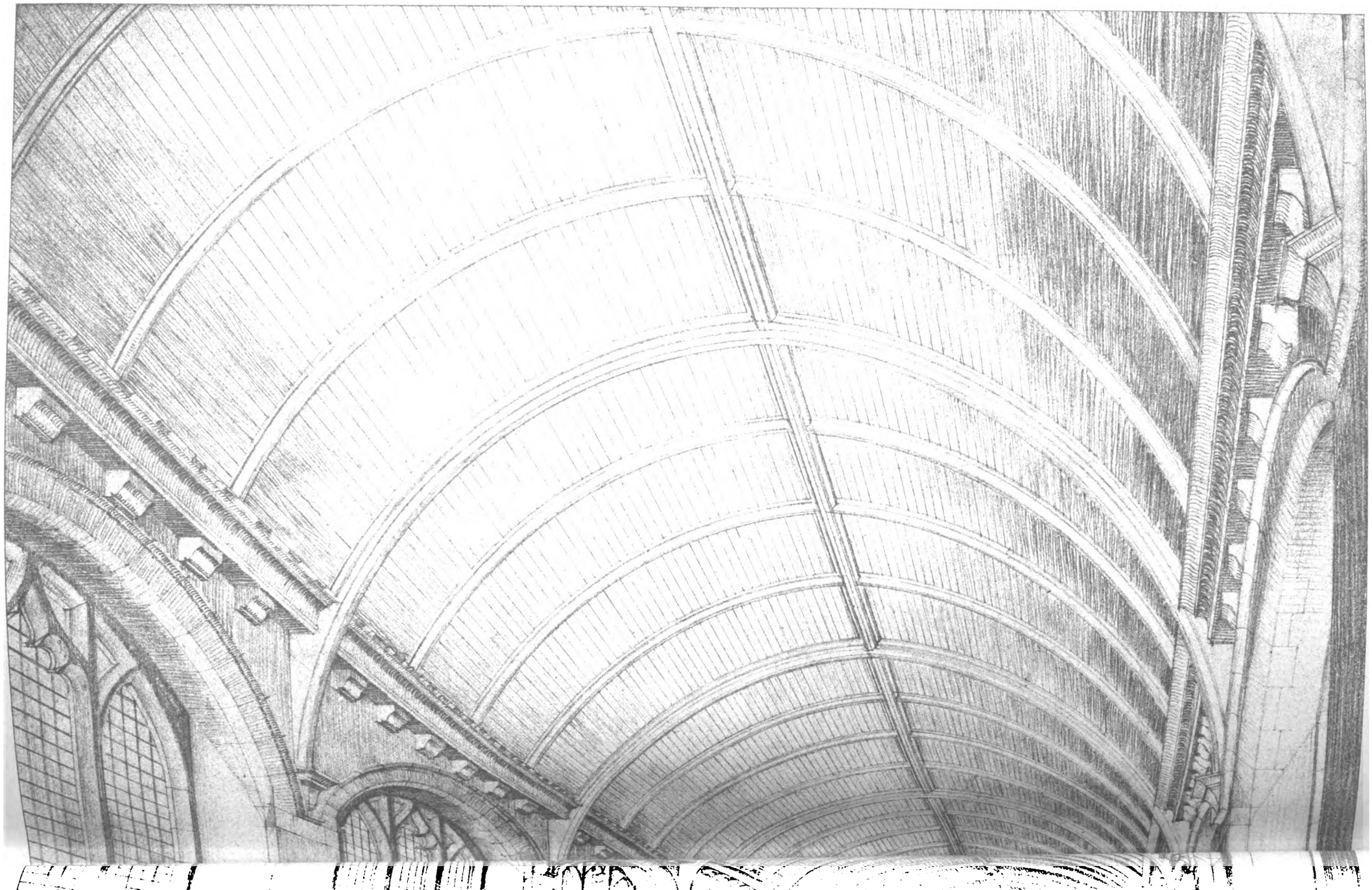

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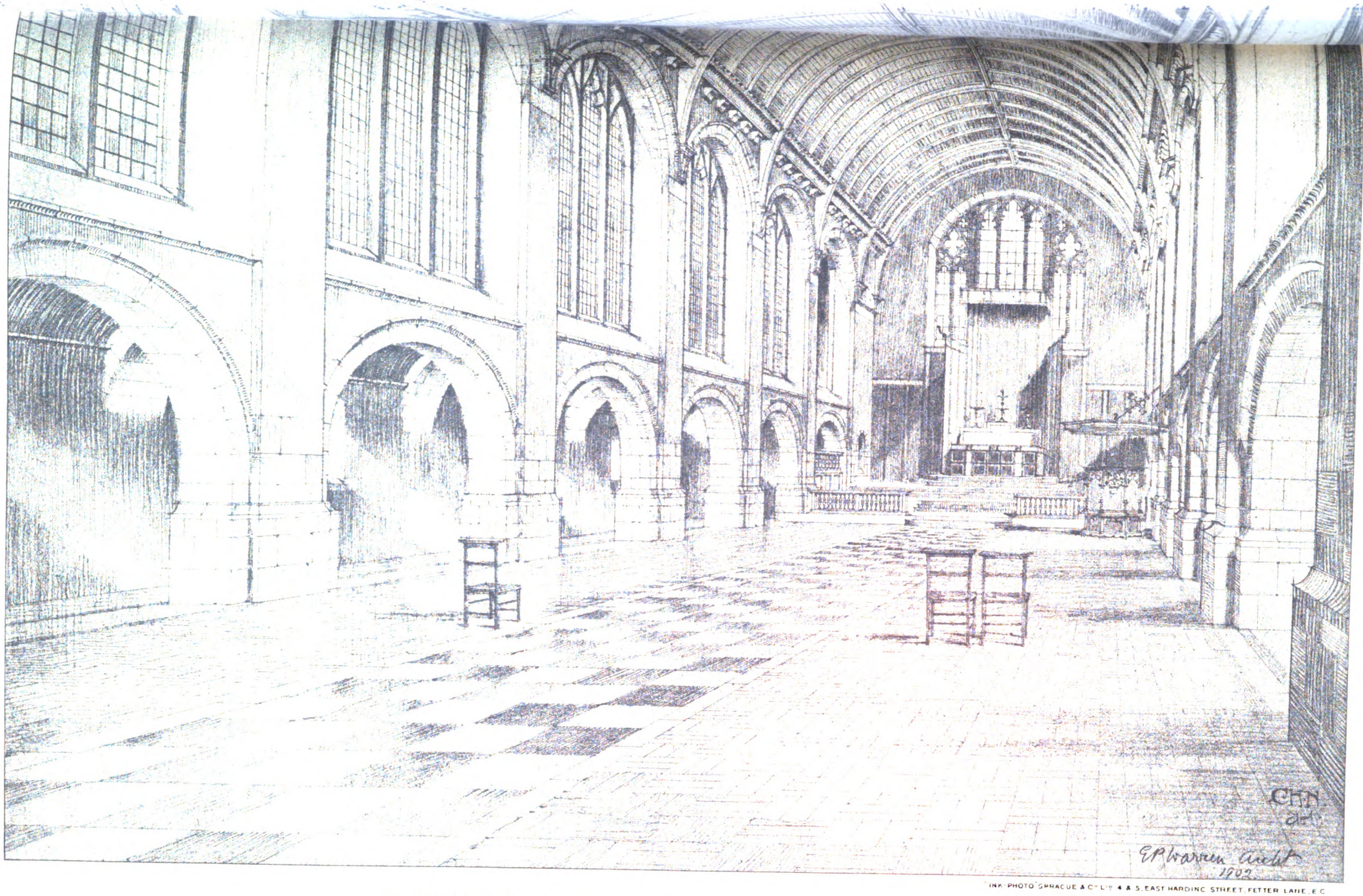

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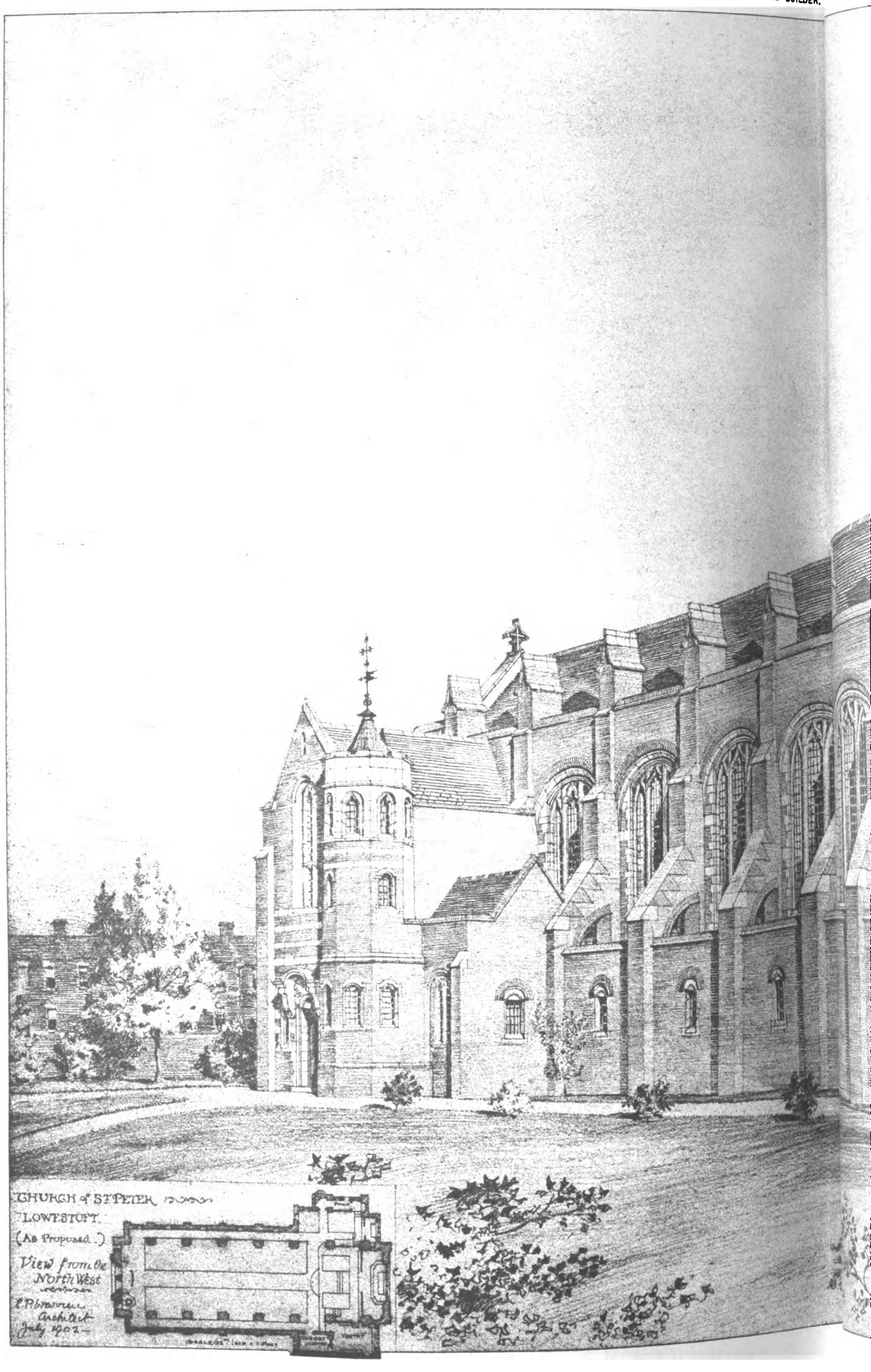

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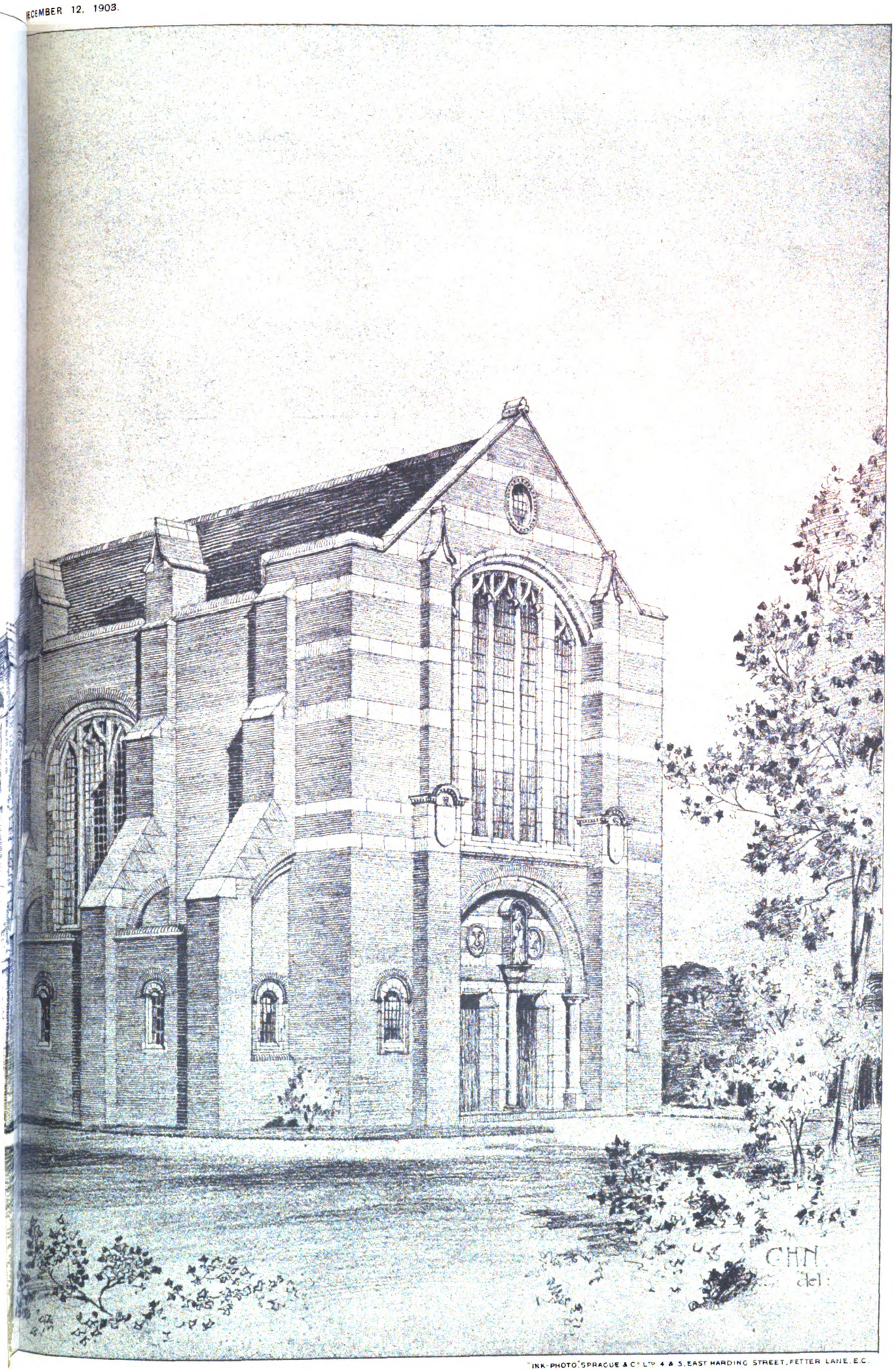

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The Builder.

VOL LXXXV.—No. 3176. DECEMBER 19, 1903.

ILLUSTRATIONS.

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Perspective View
Plans
} By Mr. A. Brumwell Thomas.
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Notes on Harbour Works and Harbour Plant.

I.

THERE are few subjects which are of greater importance to commercial nations than that of the possession of harbours and docks, at once safe and commodious. The old ramshackle jetties, piers, and docks which accommodated the commerce and the ships of a generation or two ago are no longer of much use. Only eleven years ago there were but two liners afloat of over 10,000 tons register, now there are more than sixty. Merchant tonnage has also increased in size, including that of sailing vessels. In the present trade rivalry, the largest and safest harbours and the biggest docks will draw the dues of the big ships. For several years past there has been a steady growth of enterprises of this character of a national or of a private character, familiar examples being Peterhead, Dover, Barry, Southampton, Colombo, Vera Cruz, and South-East African ports. The subject, therefore, deserves wider notice than is usually accorded to it in the technical Press.

The work of harbour making, and that of wharves, piers, quay walls, etc., involving submarine foundations, has been completely revolutionised since the introduction of concrete into this class of construction. Rubble formed the foundation of earlier works of this kind, and after the rubble thrown in had acquired its proper height and natural slope, hewn stone was used for facings. Rubble is still used frequently in crib work, for filling in between the skeleton framings of timber, or steel, and for filling in between sheet piling. But concrete has displaced it for by far the largest proportion of contractors' submarine work, and stone is now chiefly employed for facings.

The forms in which concrete are used are various, including squared moulded blocks, made, and allowed time to set on shore, and deposited in the sea with the aid of cranes; and masses of concrete, which, enclosed in bags or in sail cloth, are deposited in a semi-plastic condition to set hard below the sea. For many purposes, including the making of solid masses and the bonding together of such masses, and for repairs, liquid concrete or grouting is poured in.

Each of these methods employed by the engineer is varied by the circumstances of individual cases. The question is partly one of cost of plant. Generally the preference is given to solid cubical blocks of concrete, set and hardened on shore, and deposited like masses of masonry. The great objection to this method in many cases is the expense of the cranes and plant, and sometimes also in the large yard room required for storage. If the magnitude of the work justifies the expense, it is undoubtedly the best method to adopt, and numerous examples of this may be seen round our coasts, as well as in colonial and foreign ports and harbours.

But the methods just now enumerated overlap, and each will find a place in many works. In the case of an extensive pier or mole, the facings may be of masonry cast on concrete blocks, and be laid first, leaving a central space to be filled up with rubble, or with plastic concrete, or with rubble and grouting. Or sheet piling may be used, and the space between filled up thus. To a certain extent the proximity or otherwise of a good supply of rubble or of shingle and sand will determine the choice of methods.

Bag work again fills a useful place, as affording a simple means by which a level foundation can be prepared without grabbing, on which to deposit square blocks of concrete. It also takes the place of rubble in protecting exposed work from the action of the sea, or the scour of currents. To the casual observer one pier, quay, or wharf looks much like another when complete. But from the point of view of the engineer and contractor, there are scarcely two exactly alike, so greatly does the difference in natural conditions, in various localities, entail differences in methods of construction.

The machinery which is employed on these works varies much, both in character and extent. In some instances local authorities are too poor, or the volume of shipping trade done is so small that the engineers are compelled to execute the works with the closest economy. In others wealthy corporations or Governments sanction a lavish expenditure, which permits the use of the most costly plant. The latter, however on big works may be, and often is, the most economical in the end, as for instance when the work extends over several years, and at the termination of the contract much of the plant has a good market value.

The principal types of machines and plant used in harbour, pier, and breakwater work are the following:—

1. *Excavating Machines.*—These comprise numerous forms of grabs, which are operated by cranes; the excavators so called, or steam shovels, dredger boats, hopper barges, pumps, diving bells, etc. Grabbing is often done within cassions or foundation cylinders, as well as in the open water, and concrete is frequently deposited within foundation cylinders, while cylinders are in some cases of concrete. Besides these there is pile work, both in timber and in iron, which is, however, adopted to but a limited extent when concrete is the material employed for marine structures.

2. *Machines for Mixing and for Moulding Concrete.*—These vary in capacity and output, and in methods of action. They are rotating machines, which throw the materials across from one side to the other, so producing complete amalgamation of the ingredients. They are also fixed, and portable; hand, steam, and electrically operated; some are intermittent. some continuous in action. Adjuncts of the concrete mixers are the skips used in dropping the ingredients into the mixers. The block moulds in which the concrete is deposited form a bulky part of the plant.

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They are of wood, and are made like big core boxes. In them the concrete sets in cubical shape, with provision for holes, or in some cases for masonry facings. Trucks are required on which the blocks are transferred to the sea front. Lewis bars, or clips, are employed in lifting the blocks by the cranes. If bag work is adopted, there are the jute bags, within which the concrete is deposited, and drop bottom skips, or side skips, capable of holding and dropping one bag at a time. Or the hopper barge is used, with a central opening large enough to drop one bag through.

3. *The Machinery for Transporting and Depositing Concrete.*—This is the most important and expensive part of the plant employed in this class of work. Here the greatest differences are found in the capital outlay for public works, as anyone who has seen the immense Goliaths and Derricks at Dover, or the Titans at Newcastle or Peterhead can well understand. The machines comprise Goliath cranes, for hauling and stacking concrete blocks in the block yard; and in some works the same class of crane is employed for the deposition of the blocks in the sea. But in many instances the Titan is employed for the latter work, and the Goliath only in the block yard. Derrick cranes are also used to a large extent for block setting. Some piers have been built with derricks alone, in others, as at Dover, the derrick only builds out the staging at the sea front, and prepares the tracks for the Goliaths to follow. In other cases again, the derrick has been used as a side-setting machine only.

In the work of deposition, as in that of foundations, the diver plays an indispensable part. No great harbour work can be undertaken without divers. They examine the ground, and report, often level it in a diving bell, guide concrete blocks into their proper position, locate faults, and are responsible for all that goes on under water. They are an expensive item in many works.

4. *Miscellaneous Appliances and Plant.*—The harbour contractor has to provide an immense amount of machinery and plant which are only indirectly associated with the work of concrete setting. Cranes are essential about the yard and wharf, the steam crane being the handiest type. Some rolling stock is wanted, and workshops for repairs. The materials for temporary works include timber, or steel constructional work. Pile drivers are generally required. Chains, and ropes also, are a large item.

All sea work is exposed to rough weather during certain seasons of the year. Some localities are more unfavourably situated than others in this respect. Frequently work on the sea front has to be suspended during one-half the year, in some instances during two-thirds of the time.

This often has a determining influence on the choice of methods of construction, and of plant. It will affect the question of the employment of concrete blocks, or of bag work, or of concrete in mass. For the success of the two last, comparatively calm seas are more essential than for the deposition of blocks. The latter cannot be set in rough weather, but the blocks can be prepared during that period, and men thus kept employed all the year round. But bag work and concrete in mass must be deposited immediately after mixing, so that a suspension of work during the bad season is then unavoidable.

The subject is one which is of special interest to contractors, who may have to undertake large works involving the employment chiefly of concrete. Contractors, as a rule, do not possess an intimate knowledge of the machinery which is employed in such works. Even experienced engineers often differ in opinion with regard to the most suitable class of plant to employ on a given contract. Some advocate one class of mixer, crane, or system of operation in preference to others. Methods of working are also dependent on the form in which concrete is used, on the employment of materials other than concrete, or the depth of water in which work has to be done, on the nature of the foundations, and the method of construction adopted. For some classes of work a Titan would be quite unsuitable, for others it is the best possible type of crane to employ, as well as the most economical. Goliaths and derricks are best in some instances and most economical; in other works the reverse would be true. The question of the motions desirable in a given crane has also to be considered, and the motive power to be applied, since each type of hoisting machine is constructed in various forms. The contractor may therefore be pardoned if in the choice of his machinery and plant, which in any case is extensive and costly for harbour work, he is rather bewildered, and wishes that the specialised knowledge of the engineer were added to his own.

The excavating machines may occupy our attention through the remainder of this article, leaving the other matters for discussion in a future paper.

The grab family is a very large one, so that the following remarks bearing on leading characteristics of the types may be helpful when making a choice for different duties.

With regard to the two great groups into which all grabs naturally fall—the single and the double chain types—the choice depends on circumstances. If grabs are required for permanent service, then the double chain is the most satisfactory type. Or, if a grab is to be used where large masses of broken rock form a considerable proportion of the spoil, then also the double chain grab is preferable. But for loose spoil, such as gravel, sand, mud, and moderately stiff clay, a single chain grab is practically as good. If required for occasional service only in any soil a single chain is quite suitable. The reasons for these distinctions are as follows:—

A double chain grab, or dredger, as it is indifferently termed, cannot be worked from a crane of common type, but a special design of crane is necessary for the operation of the two chains, and many jobs that involve dredging will not stand the additional cost of a special crane. Manufacturers who offer single chain grabs therefore always make a strong point of the fact that they can be worked with any crane.

On the other hand, the operation of a grab with a single chain necessarily introduces undesirable mechanism into it, from which the double chain type is free, because the mechanism for opening and closing the buckets is transferred from the crane to the grab. This mechanism in the latter consists substantially of sundry levers or dogs acting in conjunction with a ring suspended from the head of the crane jib, and with a special form of chain barrel on the grab, by which the buckets or tines are opened and closed. In ordinary regular working on average materials no disadvantage results from the adoption of this or other equivalent designs. But delay occurs when operating with lifts of varying heights, because the height of the suspended ring has to be readjusted as often as the height of lift of the grab requires alteration. There is not very much in this objection, however, because work is generally carried on at a constant height for a given job. The same remark applies to making a false grab, *i.e.*, the closing of the buckets without gripping any spoil. A steam crane with a high speed of lift can run the grab up the ring to open the buckets, and lower it again within a minute. The really serious objection to the single chain type occurs in submarine work, when the grab gets hitched among boulders, so that it cannot be lifted without risk of breaking the chain or overturning the crane. Here the double chain grab scores heavily. There is, by the way, one single chain grab with which the writer is familiar that can be opened under water from above without sending a diver down or using gripping hooks—the "Peters"—which has been in successful operation for several years. On the whole the objections to single chain grabs do not carry much weight in practice. Hundreds of them have been made and used on great harbour works, and thousands for other purposes, for grain, coke, and general unloading and loading. But this does not alter the fact that the best all-round grab is one that is worked by a special crane, fitted with two chains, one for hoisting and lowering only, the other for opening and closing the buckets only.

When the question of the mode of operation of grabs has been settled, a much wider range of problems calls for consideration, due to the varying nature of the material to be dredged. Buckets are mostly double, but they may be treble, or even multiple. A few are designed for working within cylinders, but most of them are operated in the open. Some are small, others large in capacity. The character of the buckets is determined by whether the spoil to be dredged is soft or hard, wet and spongy, or stony in character; whether a scooping action alone is wanted, or a very penetrative one. These things govern the design of the buckets and the mass of the grab. For dredging light, open sand and oozy mud a plated bucket, with or without corrugations, is used, and usually without tines or teeth. Such a bucket retains securely the mud, or the loose, watery sand, or gravel, which would pass through buckets fitted with teeth. If some considerable penetrative power is desirable in addition, tines are sometimes riveted on the outside of the buckets, thus affording this power without interfering with the complete closing of the buckets.

For most of the service in harbour work the tined grabs are used. These are subdivided into half and whole tine. The buckets in the first are comprised of about

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half-plate, and half-tines, attached to the plates; the teeth of which interlock, so that the closure is still nearly perfect. This type is used for a very extensive range of work—for dredging gravel, coarse and fine, stiff mud, shingle, soft clay, chalk, etc.

The whole-tine grabs have no plated portions whatever in their buckets, but they are formed wholly of stout teeth, bolted or cottered into a massive steel frame of rectangular cross section. The tines are maintained at their proper distance apart outside of this frame by suitable straps. Everything is massive, and as the grab is lowered rapidly it starts work with a slight penetration. The tine spaces remain open, so that they are not suitable for lifting soft mud. Their duty lies in getting up very stiff clay, shingle, rock that has been previously blasted, or boulders of moderate dimensions.

Grabs for cylinder sinking have two or three claws—the clam shell types. A grab of this kind is of such a size that it will move freely, yet with little play, within the concrete cylinders. As it is seldom of large dimensions it is often weighted above. When such a circular weight is added, it fits within the concrete cylinder and acts as a steady during lowering. The type of bucket generally used is plated, with tines.

There is very little cast iron about a grab. The only important parts are the sleeve within which the chain slides, and the barrel. These are often made of cast steel, because the incessant friction of the chain, often charged, too, with sand, soon wears grooves in cast iron. Practically all the rest of the structure is of mild steel, though some parts have the tine frames of wrought iron.

The cost of grabbing is greater than that of working with the ladder dredger, or the sand pump. The action of the first is intermittent, that of the latter is continuous. A grab will not under favourable circumstances lift more than one load in about two minutes. But each has its own special sphere, and the province of the grab cannot be economically invaded by the other machines. The ladder dredger and the sand pump are special machines; the grab is one adapted for general and miscellaneous duties. It will work in confined spaces, among the false work of piers, breakwaters, and quays in progress. The other machines can only be operated in the open. The grab will lift stiff clay, broken rock, and boulder more efficiently than the bucket dredger. The sand pump is only suitable for sand that is loose enough to be drawn up by suction or forced by pressure. The grab therefore is *par excellence* the dredging machine of the harbour maker.

But though the intermittent work of the grab might seem almost inadequate compared with the vast areas and the deep foundations required in big harbour works, its aggregate is very imposing. Thus the "Hone" grabs at Dover have done some splendid work in preparing the chalky soil for the concrete blocks. One of these has a capacity for 135 cubic feet of spoil, and weighs seven tons. On one occasion it brought up a piece of rock weighing about 10 tons. These, however, are not worked from jib cranes, but from the 60-ton goliaths that set the concrete blocks. But big grabs, operated by cranes of from 7 to 10 tons power will easily dredge from 400 to 600 tons of spoil in a ten-hour day.

The subject of machines for mixing and depositing concrete on foundation areas prepared by the grabs will be considered, and concluded in our next.

NOTES.

Modern Churches.

ON this subject the current number of *Architectural Association Notes* contains some brief but excellent comments by Mr. Bidlake, in reference to Mr. Nicholson's paper recently read at the Architectural Association. Mr. Bidlake regrets that Mr. Nicholson did not devote more attention to the subject of the planning of modern churches. His reason for pressing this point he gives as follows:—

"Owing, probably, far more to the inveterate conservatism of the clergy than the want of initiative of the architect, churches continue to be built after the Mediæval-English model, with naves long and narrow, flanked by comparatively wide aisles containing seating, an arrangement inimical to one of the chief conditions of modern church planning, that is, that all shall be able to see and hear the preacher.

But while the clergy clamour for the fulfilment of this condition, and upbraid architects for not complying with it, they will not forego that arrangement which association and tradition have made dear to them. This spirit breathed in the original limitation of style in the recent Liverpool Cathedral Competition. I imagine no architect who was anxious to win a church competition would venture too far from the beaten track."

All this is perfectly true, and what we have called attention to over and over again. The mediæval plan, especially with transepts, is not suited for modern congregational worship. In our opinion the mediæval style does not express modern religious feeling; but that, we admit, is a more debatable point, and one which could not properly be discussed in our pages. Mr. Bidlake suggests that the model for the modern church might be better found in the wide-naved passage-aisle churches in the South of France, or the aisle-less churches of Anjou; or again, in the Lombardo-Byzantine churches "to which Westminster Cathedral has directed attention anew." And if a mediæval spirit is desired in the architecture, there is no doubt that any one of these forms of plan is more practically suited for congregational worship than the typical mediæval plan. Our own opinion is that the most fitting type of plan for a modern church is that represented on a large scale by Wren's first design for St. Paul's, and on a small scale by St. Stephen's, Walbrook; but of course with more Christianised and symbolical type of detail. Wren's detail is Pagan in its origin and associations; but there is no reason why the same type of plan should not be associated with a very different order of detail.

A Lecture on Mars.

MR. WALTER MAUNDER'S lecture on the planet Mars, at the London Institution on Thursday last, was most admirably and systematically arranged and illustrated, showing a number of drawings of the planet from the earliest period of telescopic observation down to the present day. It is noteworthy what differences there are in these drawings by different observers of the same object; certain salient features being traceable through them all, but with the most extraordinary variations of detail. The culminating point of the lecture was the consideration of the so-called "canals" of Mars. "Channels" was what Schiaparelli really meant to call them; but the Italian "Canali" became Englished into "canals," and perhaps thus set up the idea which has taken hold on the public mind, but of which there is at all events no proof. Mr. Maunder adopted the hypothesis, which has been referred to with some doubt in our pages, that these lines on Mars were really the result of a strain on the optic nerve of the observer. Two points however were brought out in the lecture to which prominence has not been given hitherto. One is, that Schiaparelli built up his net-work of lines from separate observations which were almost momentary in some cases; that is, he glimpsed a certain line for a second or two, and inserted it on his diagram, but lost it again almost immediately; then he glimpsed another in the same fashion, which was in like manner added to the diagram. This is very different, of course, from seeing the whole collection simultaneously. We have put the question more than once—if these lines are illusions of the observer, why are they not seen on Venus, for example, which displays as clear a disc, under favourable circumstances, as Mars. It appears, however, that the American observer, Mr. Lowe, who so strongly supported Schiaparelli, did see straight markings on Venus, and we were shown some of his drawings of them. This is strong evidence on the sceptical side, since it is almost certain that all we see of Venus is her outer atmosphere. The illusion is explained by Mr. Maunder as arising from the eye connecting little points or marks which are nearly in a line with each other, by a continuous line of the imagination. We must admit that Mr. Maunder's argument on the sceptical side, as put in his lecture, seemed very complete and convincing. But there is one thing we should have liked to have seen which we did not see—a photograph of the surface of the planet enlarged for the lantern. Stellar photography is surely capable of that now, and we ought not to be put off with drawings which are very liable to error and illusion.

The Board of Trade Report on South African Trade.

THE Report of Mr. Henry Birchenough, the Commissioner sent to South Africa to investigate and report on the conditions of trade in that country, has rightly attracted very great attention. In addition to a general review of the situation from the point of view of English trade, the Commissioner gives a number of details in regard to many special points. He gives information as to the trade in building materials, and in all articles connected with the erection of houses; he also refers to the work which is being done by the various municipal bodies for which the materials have to be imported. There is an immense field in South Africa at this moment for those who supply articles connected with all kinds of building work, and no one interested in it should fail to peruse this report from beginning to end. It can be obtained by any bookseller from the official publishers for the modest sum of one and

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sixpence, and will place the reader in possession of information to be relied on, and impossible to obtain from any other source.

Compressed Peat. A further attempt is now being made to popularise the use of peat by a new process for converting this material into a marketable fuel. The product obtained is in the form of slabs, consisting of compressed peat, or, as the patentees term it, "peat-coal." It is stated that the calorific value of the fuel is about 9,000 B.Th.U., which compares favourably with ordinary coal. Further, it is asserted that the new fuel possesses the important advantages of burning without smoke, and of leaving no clinkers, while its regular form facilitates stacking and economises space. The cost of production on a large scale remains to be ascertained by actual experience, but the opinion is expressed that the price will be considerably lower than that charged for coal in many parts of the country. If the peat found in Irish bogs and in various districts in England and Scotland can be utilised a most important industry may be established. In Ireland alone the area of peat tracts is estimated at nearly 3,000,000 acres. Any enterprise calculated to promote the utilisation of these extensive peat fields is certainly deserving of support.

An Invalid By-Law. The case of Nokes and Nokes *v.* Mayor, etc., of Islington, recently reported, is one of some importance to householders. The County Council, under section 39, sub-section 1, of the Public Health (London) Act, 1891, have power to make by-laws in relation to closets, privies, etc., in connexion with buildings, whether constructed before or after the passing of the Act. Acting under this section, they passed a by-law that "the landlord or owner of any lodging house shall provide and maintain in connexion with such house water-closet, earth-closet, or privy accommodation in the proportion of not less than one water-closet, earth-closet, or privy for every 12 persons." The appellants were agents for letting the said house and collected the rents, and had ejected some former tenants, and in January of this year had let the house to one Gates at a rack rent of 36*l*. Gates sublet the rooms, and four separate families, sixteen people in all, occupied the house. The sanitary authority left a notice on the premises, and on the appellants, requesting the abatement of a nuisance, *viz.*, insufficient water-closet accommodation. The Divisional Court have held that the by-law is invalid on the ground that it contains no notice such as that furnished by section 37 of the Public Health (London) Act, 1891, calling upon the person complained against to abate the nuisance. The Court particularly pointed out that the absence of some such provision was calculated to work injustice, especially in cases such as this where the complaint was directed against persons who, although not owners, were to be taken to be in the position of owners. It must be borne in mind that had the by-law been valid, it was decided in the case of Salt *v.* Scott Hall, on which we commented in our issue of August 22 last, that a discretion is still left in the magistrates under the Summary Jurisdiction Acts as to whether they shall enforce it. We only, however, refer to this decision here because its effect cannot be too widely known when it is a question of enforcing by-laws not invalid in themselves, but containing restrictions on buildings unnecessary or undesirable to be enforced in the particular circumstances of any special case, as, for instance, in the case of buildings widely isolated.

Repairs to Water-closets. An interesting case has been decided in the King's Bench Division as to the meaning of certain by-laws of the London County Council. The Metropolitan Industrial Dwellings Company had occasion to substitute certain iron drain-pipes for old stoneware pipes at their industrial dwellings, known as Ponsonby-buildings, which had been erected before the confirmation of the drainage by-laws of 1901. As the old traps and pans of thirty-three water-closets were broken during the progress of the work, new traps and pans were fixed, but no alteration was made in the soil-pipe. The Southwark Borough Council attempted to compel the company to fix anti-siphonage pipes to all these closets in accordance with By-law 17, basing their contention on By-law 21, which is as follows:

"These by-laws shall, so far as practicable, apply to any person who shall construct or reconstruct any pipe or drain or other means of communicating with sewers, or any trap or apparatus connected therewith, so far as he shall effect any such works in any building erected before the confirmation of these by-laws, as if the same were being erected in a building newly erected."

The company refused to comply with the Council's notice, and thirty-three summonses were therefore issued against them. The case was first tried by Mr. Chapman, metropolitan police magistrate, sitting at the Southwark Police Court, and his decision was in favour of the Council. The company appealed, and the magistrate's decision has now been reversed. The Lord Chief Justice in giving judgment brushed aside the appellants' contention that the by-laws were *ultra vires*, and declared that if By-law 17 had in terms said that in the case of old houses, when a broken trap was repaired, a certain system of ventilation must be put in, that might be a perfectly good by-law. He saw no reason why it should not. But he laid it down that the local authority ought to have stated in the by-law, in plain words, what repairs were to be regarded as sufficient to constitute a construction or reconstruction of a water-closet. "By-law 21 did not inform a person that if he repaired a trap or pan he was constructing a water-closet." The appeal was therefore allowed. It must be confessed that this decision opens the door to litigation. It is clear enough as far as it goes, but it does not go very far. It shows that the by-laws do not apply to every repair which may be necessary in a water-closet, and is therefore of considerable importance, but it leaves the question open as to what repairs will bring the by-law into operation.

Electrical Recording Instruments. Professor Hospitalier, the President of the Société Internationale des Electriciens, described and showed in operation to the Institution of Electrical Engineers last week various recording instruments which he has invented. The first of these, which he called an ondograph, recorded on a sheet of paper wrapped on a revolving cylinder, in a few seconds, the exact shape of the wave of the alternating current which was supplying the glow lamps in the lecture hall. As the current goes through all its values in the two-hundredth part of a second, this was a remarkable achievement, and the applause with which it was greeted was well merited. The oscillograph with which electricians are now familiar shows the shape of the wave by means of a spot of light falling on a sheet of ground glass, but it is more a laboratory than a workshop instrument. It seems to us that Professor Hospitalier's ondograph will be of great value in the test rooms of the makers of electric machinery. It has been known for several years that the efficiency of alternating current apparatus, especially of arc lamps and induction motors, varies with the shape of the wave of the alternating current with which they are tested. In one case in our experience a motor which worked excellently when driven by a certain alternator, yet when driven by another worked in a most erratic manner, and could only take a small load. The difference in its behaviour in the two cases was due to the wave form of the supply current. In another case there was a difference in the efficiency of a transformer of 50 per cent. at quarter load when tested on two different supply circuits. With an ondograph this would have been discovered at once, and the efficiency on all other wave shapes could have been foretold from one test. The lecturer also showed his "arcoscope" in operation. By its aid an image of an alternating current arc was thrown on a screen and made, apparently, to go through all its values in about half a minute. In reality it went through all its values in a very small fraction of a second, but the instrument only allows images to be formed at certain definite intervals, and owing to the persistence of visual impressions the eye apparently sees the phenomenon taking place very slowly.

The Communication Cord Again. It is not surprising that the action—or inaction—of the North Staffordshire train officials in connection with the recent assault on a passenger in the Harecastle tunnel has provoked much unfavourable criticism. We have ourselves frequently commented strongly upon the failure of the communication cord itself, but in this case, although the apparatus appears to have worked properly, no immediate notice was taken of it. The excuse made is that as the train was so near a station it did not seem worth while to pull up before reaching it; and it is further alleged that the communication cord is frequently tampered with. The obvious answer to this is that every effort should be made to detect offenders, and when caught they should be severely punished. It is to be noted that the railway company have marked their sense of these excuses by suspending the driver and guard. Our mode of travelling makes it imperative that such safeguards as are provided for travellers should be

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thoroughly reliable. The failure of a mechanical appliance is bad enough, but we should be able to place implicit confidence in those responsible for answering to the call of the alarm bell.

Clubs *v.* Private Dwelling Houses.

THE Divisional Court have held in the case of M'Nair *v.* Baker that a club is not "a private dwelling-house" within the exception contained in section 24 (*b*) of the Public Health (London) Act, 1901, and therefore that those responsible are liable under that section if proper steps are not taken to consume the smoke from its chimneys. Reliance seems to have been placed on the fact that there were bedrooms for the use of members on the premises; but quite apart from the fact that there were only five bedrooms and 750 members, it is difficult to see how this could differentiate a club from a hotel, which certainly could not be deemed to be a private dwelling-house, or a school, which for the purposes of a covenant in a lease has been held not to be a private dwelling-house. The legal profession alone seem to have derived much benefit from the decision.

The "Novelty" Locomotive, 1829.

WE learn that this old locomotive has recently been identified as still doing duty in the modified form of a stationary engine at the Rainhill Gas and Water Company's works, near St. Helen's, Lancashire. Braithwaite and Ericson constructed the "Novelty" to compete in the memorable trial that took place on October 6, 1829, preparatory to the opening (on September 15, 1830) of the Liverpool and Manchester Railway; but it broke down, after having run about four or five miles, by reason of a failure of its boiler. George and Robert Stephenson's "Rocket" won the prize of 500*l.* offered by the railway directors, the "Sans Pareil," by Timothy Hackworth, of Darlington, being second. The latter two locomotives have found asylum in the Patent Department of the Victoria and Albert Museum at South Kensington. It is stated that steps will be taken to remove their quondam rival to the same resting-place, where also are preserved M. Hedley's "Puffing Billy," of 1813, which was used until June 6, 1862, at the Wylam Collieries, the original model, in brass, of Trevithick's locomotive of 1802, and a copy of Murdock's locomotive of 1781-4, which is said to be the first after its kind, and is believed to show the earliest adaptation of the slide-valve.

Mr. Collings's Water-colours.

THERE is an exhibition at the Dowdeswell Galleries of water-colour drawings by Mr. C. J. Collings, who had an exhibition of similar work there two or three years ago. Mr. Collings has a true feeling for colour and composition in landscape; his small studies of extended landscape, such as Nos. 11, 17, 25, and 31, are all marked by fine composition and aerial effect, and "Down Channel off Deal" (38) is a remarkable bit of effect, especially as regards the sky. But he has, like some other artists of the new school, taken up that manner of painting only tones and evading texture and detail, which has a very weak effect in scenes in which foreground is more important. Even in one of the landscapes just mentioned—"Near Worth" (17), the foreground meadow is but a wash of colour; apart from its place in the composition, it might be anything; and in subjects where foreground buildings came in, there is no recognisable structural detail or material. In "Yachts Manœuvring for Place" (21) the yachts have practically no hulls, only faint blots without shape or drawing. This is not a thorough or satisfactory way of painting, though it may be admissible for a certain class of subjects.

ACADEMY STUDENTS' DESIGNS.

THIS is not a very good year among the Royal Academy students, except in sculpture. Architecture is certainly not in much force. The subject for the gold medal and travelling studentship in architecture was the important and (we should have thought) inspiring one, "A Domed Church"; but it has not inspired much. Only four competitors have entered for it. Of these, the award of the prize to Mr. L. Upperton Grace was, we admit, the only award that could be given, because it is the only one which has the merit of correctness and completeness of treatment; but it is, nevertheless, a rather commonplace piece of Renaissance design, and gives little evidence of architectural genius. There is more of this quality in the less ambitious design with a low dome on a plain circular drum with small circular lights in it, the mass of the wall rusticated up to the cornice; the interior of this would be susceptible of fine effect; but the problem is much easier than in the prize design, and there is a want of perception of scale about it. The other two designs are more ambitious than successful.

The silver medal for architectural drawing is given to Mr. Leslie Wilkinson for measured drawings of the interior of St. James's Church, Piccadilly, which are quite satisfactory; the other competitors for this medal have done their work conscientiously, and Mr. J. de C. Ballardie gets a second medal for his drawings.

The prize for "Plan of a Building" is not awarded; the prize in perspective drawing for painters and sculptors has attracted no competitors, which has been the case we think before; it is to be regretted, for though sculptors need not trouble so much about perspective, as they work in the round, painters are very much in need of it, as their works do often demonstrate. The prize for perspective drawing for architects only is not awarded.

The 25*l.* prize for "a set of architectural designs" is awarded to Mr. W. E. Brooks for a good set of drawings for a morning chapel to a cathedral, in orthodox and not very strong Gothic, but carefully considered and drawn. Among the others, No. 109, front and plan of "A Branch Insurance Office," is very creditable; so is the elevation (171) for "A Secondary Technical School"; the plan is rather naïve, but the aspects of the rooms are right and a north point is shown. There is also merit in the domed drinking fountain (172). The 10*l.* prize for "Set of Drawings of an Architectural Design" (lower school) is awarded to Mr. Geo. Forsyth for a design for "A Village Church," of a simple Gothic and very pleasing and suitable in character—what a village church ought to be; the others have missed this character, showing designs that are too restless and pretentious, except No. 175, whose design for a church "on the side of a hill" has simplicity and reserve of character, but the details are not very satisfactory. The work of the travelling student in architecture for 1901 does not make a very large or elaborate show, though it contains some good and interesting work, such as the elevation of the Piccolomini Palace, at Siena, and the full-size details from a house-front in the same city.

On the whole one cannot help concluding that an architectural student from the Ecole des Beaux-Arts would think rather small things of the productions of our Academy School in Architecture.

It is otherwise when we turn to the sculpture. Whether among the established artists or the students, sculpture, which not so many years ago was at so low an ebb in this country, seems now to be the art which is in the most vital condition. The subject for the gold medal this year was "Three Generations," a good subject, implying a group of three persons representing old age, the prime of life, and childhood. The general wording of the subject left something to the imagination of the competitors, leaving them free to represent it in any way they pleased. There has been a good competition, and the average of merit is high. Mr. Arthur C. White, in the group to which the medal has been awarded, apparently intends to represent the nude figure of the mother as dead, lying across the knees of her aged father who holds her infant child in one arm. The *motif* is pathetic, and the three figures are composed into one group in a very satisfactory manner from a sculptural point of view. Among the other works No. 135, in which age is represented by an old woman, is very good; there is a spirited effect in No. 136, showing the man on horseback with his father and his young son beside him; and No. 140 is a very pretty group. But to our thinking the most remarkable production, even more so than the prize one, was No. 138, which showed both decorative feeling and poetic conception. A tall, mystical figure of antique Egyptian cast holds in each arm an infant, the two appearing to symbolise Past and Future; she stands on a pedestal planned into four niches, three of them containing each a group of man and woman, lovers; the fourth, at the back, contains a winged nude female figure alone. The symbolism of the whole is rather vague, though we do not like it any the less for that—a vague symbolism in sculpture leaves the spectator all the more fancy-free. The treatment is not exactly that which was probably intended in giving the subject; apart from that we should have thought this design deserved the prize; at all events, it was the most original and the most decorative in effect of the works submitted, and we should expect to hear more of its author. The smaller competition, "Model of a Design," the subject being "David Cutting Off Goliath's Head," attracted a great many competitors. The subject as worded is a bad one, the literal rendering of which would have been somewhat butcherly; most of the competitors have avoided this by representing David making a more or less theatrical sweep of his sword preparatory to the operation. Mr. Leonard Jennings's prize group, a nude David modelled with much spirit, is the best and merited the 30*l.* prize; many of the others are clever.

Historical painting is seldom one of the chief successes of the competition, and this year the prize has been withheld, and no wonder; the subject was "The Meeting of Alexander and Diogenes at Corinth," and of the various conceptions of the conqueror it would be difficult which was the weakest. The Armitage prize for "Design in Monochrome for a Figure Picture" ("Elijah Cursing Ahab and Jezebel in the Vineyard") is also withheld, nor again can we be surprised; the essential point of this sketch competition lies in the conception of the subject, and this was of the weakest in most cases; No. 23 was a better composition than most, and No. 28 spirited in the action depicted. The rest were on the level of ordinary "Bible pictures." The draped figure prize has only attracted four competitors, a smaller number than usual, and we have seen much better works than this year; the designs are weak in line and rather theatrical in manner. The competition for "A Design for the Decoration of a Public Building" has been gained this year by a lady, Miss Lilian Price-Edwards, whose design was the only one showing a true perception of decorative composition in a picture of this type; she illustrated "Charity" (the subject given) by a central seated figure of a nun or sister of charity (rather a limited idea in an intellectual sense) whose ample dark robe falls in broad masses to right and left and seems to bind together the whole composition; a nude figure of a young girl in the group in front of her forms an effective contrast. The want of a grasp of the composition as a decorative whole is the defect in the design of Mr. W. E. Webster, who gained a *proxime accessit* for a picture in which the figures are good in themselves but the composition too scattered and broken up. Among the other designs No. 178 showed, on the other hand, a good composition, but the figures are rather too sketchy and undefined when considered singly.

The Creswick prize, "A Bank of Ferns and Bracken," was well won by Mr. W. Percy Day for a really good picture, notably for the feeling for colour displayed in it, and the absence of those crude greens which are generally too prominent in this competition;

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his treatment of the subject did not, however, keep so close to the wording as some others. The intention of the subject obviously was to promote foreground study; Mr. Day's picture showed a scene in a wood, with a foreground of the kind indicated, but the picture did not depend on that. However, it was undoubtedly the best and most mature in style of the works submitted. Among the others there was merit in No. 23, which also kept closer to the subject; 32 was a good one, but rather too scattered and broken-up in line; 30 better in composition, but not good in colour.

The award of the Turner gold medal seems rather a mistake in one sense. The subject given was "An Express Train at Sunset" (the Council were no doubt thinking of "Rain, Steam, and Speed"), but the very name of "Turner medal" seems to imply, and is usually taken to imply, a competition in landscape painting. The medal has been awarded to what is essentially a figure picture by Mr. J. H. Lobley, who shows a train crossing a road on an elevated viaduct, with groups of persons collected on the street, and a red sun showing in the rear. It is the cleverest picture submitted, and it cannot be said that it does not represent "an express train at sunset," but it seems snatching the prize on a side issue. All the other competitors have treated the matter as one of landscape, with a train, and sometimes a viaduct, introduced. Among them No. 15, on the Derbyshire Midland railway track, had a good deal of merit; No. 16 was better in tone and lighting, though rather too like a large sketch; No. 12, showing a river and a stone viaduct, deserves mention. In one point the competitors all followed the example of Turner; they had taken no more pains to indicate the true proportions and structure of a locomotive than he would have done, or did, in a similar case.

FREE LIBRARY COMPETITION, TAMWORTH.

ALTHOUGH situated in a mining district, Tamworth is to be considered an agricultural town. To the architect, it possesses much that is interesting in its fine parish church, half-timbered houses, Georgian brick buildings, and some nineteenth century work of no mean order. Factories have recently been springing up, and modern progress is everywhere visible, so that the proposal to build a free public library is quite in the order of events.

Mr. Andrew Carnegie has generously given the sum of 2,000*l.* towards the building under the usual conditions which are attached to his widespread benefactions. The Corporation decided to set aside 400*l.* for architects' fees, clerk of works' salary, costs of the competition, and incidental expenses, leaving the sum of 1,600*l.* for the new building, which is to provide for the intellectual needs of the 7,500 inhabitants of the Borough. In response to a small advertisement in our columns over 300 applications were made for the instructions, 267 copies of which were sent out (over 50 applicants being too late), and 148 architects submitted 163 schemes! The premiums offered were 20*l.*, 10*l.*, and 5*l.*, but it should be mentioned that these amounts were *not* to merge into the fees of the selected architect.

It is remarkable that such a small work for so little remuneration should have attracted this large entry; it points to the fact, however, of a free library being a favourite subject, and to the dearth of building works at the present time. Looking broadly at the drawings submitted, one-third, at least, of the designs is the handiwork of beginners, and might have been excluded by the introduction of an entrance fee. Much of the design is excellent, well suited to the purpose in view, and the standard of draughtsmanship is of a high average. It will be readily seen that the strict limit in accommodation and outlay has produced a great similarity in design; the conditions enabled competitors to place windows on all four sides of the site, the frontage of which is 65 ft. and the depth 120 ft. On the north is a disused cemetery, on the west is Corporation-street, whilst a vacant plot of ground belonging to the Borough abuts upon the east and south boundaries.

Mr. J. A. Cossins, of Birmingham, was the assessor, who has awarded the first premium to Mr. E. R. Danford (Northampton), the second to Messrs. Buckland and Haywood-Farmer (Birmingham), and the third place to Messrs. Hodge and Haswell (Teddington).

We find ourselves, after a survey of the drawings, at variance with the assessor in this selection. While admitting that, out of such a large number of schemes, he has taken three which, so far as expense and convenience of plan are concerned, fulfil most of the requirements, we should seriously have considered other claims to the premiated positions.

The design placed first is a compact working plan, with the large reading-room on the south side, which we do not think the best aspect, and, moreover, in this case, it is liable to lose its light in the future development of the vacant site; this room is used more than any other in this kind of institution. Sanitary conveniences are prominently arranged on either side of the main entrance, which is placed in the centre of the street front. There is a hall, lighted from a skylight, used in common by all sections of readers. The difficulty in almost all the schemes has been the question of roofing. Most of the competitions show a central top light with lead flat enclosed by pitched roofs, such as a much larger building would necessarily require, but in the case of this small library it should have been dispensed with. Mr. Danford's section shows a gutter between two roofs, from which it would be very difficult to remove an ordinary depth of snow. His librarian has a small room, with north and east aspects and no lavatory accommodation or external entrance lobby; it is covered by a flat, which makes a most unsatisfactory elevation to the north, and is the weak spot in the design, for this front will be seen perpetually and never be hidden by other buildings, such as are liable to occur on the south side. The maintenance as well as first cost will be heavy on this structure owing to the many dormer windows on the side elevations (not indicated too thoroughly), and to other details. The elevations do not excite much commendation and are the least atractive of the author's numerous schemes and alternatives.

Messrs. Buckland and Haywood-Farmer's design, placed second, should receive the premier position in our opinion for, in addition to avoiding the objections taken to the first scheme, a building has been designed which has considerable architectural merit, both to the fronts and to the interiors. The outlay arising from maintenance would, moreover, be smaller owing to a simpler roof scheme. A central entrance is again introduced, and the sanitary conveniences made less conspicuous. The large reading-room is placed on the north front. Although the cubical contents of this design appeared to us to be practically the same as that placed first, the respective competitors' statements differ considerably. However, we repeat that this well-thought out scheme, merits the first premium.

The design placed third has a plan in several respects similar to that just described, but loses in the librarian's accommodation amongst other minor points), where no fireplace is provided and an inconvenient entrance lobby is indicated. The elevations show a poor rendering of brick and stone material, which is not enhanced by the sloping buttresses and other meaningless features.

Of the other designs submitted, the following deserve reference; the authors' names were not disclosed.

No. 38 has a simple, good working plan, the line of which follows the north boundary; the refernce room has a central position where few noises will penetrate, and faces north; the large reading room is entered without disturbance to the other departments—a point missing in all three premiated plans. The elevations are simple and straightforward, and the drawings are excellent. No. 25 has a set of charming elevations with a fairly good plan. No. 103 places the reference room in the rear of the site to secure seclusion, but the plan is too cut up, and the fronts leave room for improvement. No. 66 is one of several schemes whose authors considered two floors advisable, but it should be remembered that only one librarian is to be installed, who could not possibly exercise supervision of upstairs readers. In all general respects No. 81 has a good arrangement, but 8ft. 6in. to the springing and 13 ft. to the crown of the coved ceilings is insufficient. An ingenious point, and, indeed, the basis of design No. 112, is the placing of the librarian direct in the centre of the various public rooms—in a kind of cage into which external air is admitted from windows, the sills of which are 12 ft. from the floor line; a fireplace is provided for his comfort. No. 154 has misjudged the proportion of the reference room and, accordingly, provides one too large; like No. 153, whose central hall is wasteful, the cost of carrying out would be too great. Another wasteful scheme is No. 84, wherein the lenders' counter is badly placed and top-lighted from the same source as the hall, but the sections do not show how this is obtained. Urinals are provided for men. The scale of the elevations in No. 57 conveys the impression of a large public building; the same may be said of the plan. No. 44 has a clever plan with a long central passage. The elevations are heavy, but with all the parapets and lead gutters, maintenance would be a source of constant expense. The external design of No. 88, which exhibits a correct feeling for a brick and stone treatment, is worthy of a better plan; here the lending and reading rooms are entered direct from the street, and lavatories for men and women open out of the reference room! After a good struggle, No. 105 has succeeded in placing the librarian in a small recess right at the back of his building, from which he can see to every part of the library, at great inconvenience to other requirements; the elevations are beyond our powers of description. At least half-a-dozen competitors have schemed patent revolving doors to the main entrances; one of these is No. 35, whose plan is practical, but the cornice surmounting the fronts is, in scale, worthy of a Florentine palace. No. 36 is another to introduce this patent, and whose plan has a central passage extending to the full length of the building; the reading room is split up into male and female departments separated by lavatories, the approaches to which are well considered. No. 134 has the main entrance on the north side and an independent door to the news' room; the form of buildings is of a narrow character which obviates top-lighting, flats, and skylights; this is an admirable design. A most pleasing design is that marked No. 128 and is well drawn; the reference room lacks supervision. No. 98 is also a delightful design, but the plan leaves much to be desired. Several competitors have sent three or more schemes. No. 7 sends two designs completely worked out, supervision is not considered. Other competitors are fantastic. Of these, No. 51 has an ambitious lay out of the rear part of the site, in which a fountain and garden shed are prominent.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE ordinary fortnightly meeting of the Royal Institute of British Architects was held on Monday at No. 9, Conduit-street, W., under the chairmanship of the President (Mr. Aston Webb, R.A.).

Deceased Members.

The Secretary announced the decease of the following members:—Mr. Charles Fowler, Fellow; Mr. N. Y. Armstrong Wales, Fellow, elected 1901; and Mr. Wm. Warlow Gwyther, elected Fellow 1880.

The President said Mr. Charles Fowler would be known and beloved by a great many of those present that night. He was elected an Associate in 1851 and a Fellow in 1862. His father was one of the founders, and for some time Hon. Secretary, of the Institute. Mr. Fowler held for many years the appointment of Surveyor to the Portland Estate, from which he retired three or four years ago. The deceased gentleman was an active worker for the Institute, having served on the Council and acted as Chairman of the Board of Examiners, and all who knew him personally loved him. Now Mr. Fowler had gone to his rest, and perhaps he might be allowed to propose that a vote of condolence be sent to his widow and family.

The vote was agreed to in silence.

Royal Victoria Hospital, Belfast.

Messrs. W. Henman and Henry Lea, C.E., then read papers on the initiation, design, and equipment of the Royal Victoria Hospital, Belfast, of which the following are abstracts:—

Mr. Henman said there was much that was unique in its inception, original in its design, and novel in its equipment, which had attracted attention to the Royal Victoria Hospital, Belfast. It seemed, therefore, advisable that an authentic description should be published of the reasons which had led to what had been termed a "revolution in hospital design," as well as of the methods and means by which it had been accomplished. If the plan was revolutionary in its tendency he hoped to show that it was a serious endeavour to simplify, and, if possible, to improve hospital design. Whether it was destined to secure permanent approval, or be pointed at as an example to be avoided, depended upon, first,

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whether the essentials in hospital design had been properly appreciated and applied; secondly, whether those having the care and management of the institution would maintain it in efficiency. As regards the development of the design in question, distinct variations in hospital planning had been principally brought about as knowledge increased of the necessity for efficient ventilation and of the means by which it could be secured. Hence, with mechanical means at their disposal, an attempt was made at Belfast to design a hospital that could be efficiently ventilated by such means. The author acknowledged his indebtedness to Mr. William Key, of Glasgow, who had proved the possibility of securing efficient ventilation on the plenum system—the system which had been adopted at the hospital. The wards of a hospital are occupied both day and night by patients in a low state of health, and continuous change of air, with an equable temperature and freedom from draughts, secured without noise or dirt, is necessary to the cure of the patients. The question therefore is, How can hospital wards be designed and arranged so as economically and effectively to secure the desired conditions? Reference was made to correspondence which had appeared in the *Builder* suggesting that in consequence of the proved success of plenum ventilation, combined with antiseptic treatment, it might be possible to dispense with the "pavilion" arrangement of wards, and advocating double wards divided longitudinally by dwarf partitions. This idea had seemed to the author altogether wrong, and he had set forth his views in a letter in the *Builder* of August 8, 1896. Here he suggested that, "instead of erecting detached pavilions of several stories, it might be better to spread out the wards on one story only, placed side by side and lighted by continuous lantern lights. Such an arrangement would secure greater comfort to the patients, simplify ventilation by mechanical means, and very considerably reduce corridor communication as well as dispense with the inconvenience of staircases and lifts, thereby facilitating administration. For the accommodation of the staff there would be no objection to buildings of several stories, but with all the patients compactly arranged on one floor level their wants could be easily supplied, and other difficulties of the pavilion plan would be overcome." The letter concluded: "Only those who study what is possible with the plenum system of ventilation properly applied can realise the practicability of such an arrangement; yet by its employment I feel convinced that some such revolution in hospital planning will be accomplished, and do not doubt that in time it will be demanded, partly in consequence of the great cost of the pavilion plan, but more particularly in consequence of the excessive labour thereby involved."

When the author was requested to meet the Committee of the Royal Victoria Hospital, Belfast, reference was made to the suggestions contained in the above letter, and he was questioned as to the practicability of constructing a hospital such as he had proposed. On attempting to fit together, on entirely new lines, the intricate requirements of a complete hospital for 300 patients and a large staff, he began to realise the difficulties he had imposed upon himself. With the assistance of his partner, Mr. Thomas Cooper, the plan in time, however, assumed the generally symmetrical arrangement in which it now appeared in the erected building.

The author referred to the opposition raised against the scheme before it was finally sanctioned by the Committee. Professor Byers, Member of Council of the British Medical Association, and honorary member of the medical staff, averred that, "when first he heard that it was proposed to place all the wards side by side without intervening open spaces, to light them principally from above, and to have no windows to open, it appeared to him so contrary to all his preconceived ideas on hospital design that he determined to oppose the carrying out of such a plan by every legitimate means, and, to enable him to do so effectually, he set about independently to study the subject in all its bearings; but, to his surprise, the more thoroughly he probed it the more and more convinced he became that Mr. Henman was right."*

* Asked recently for his personal experience of the working of the Hospital, Prof. Byers said that the building "more than fulfilled his expectations, the plenum system worked admirably; and whether from the point of view of administration, ease, and comfort of patients, or adaptability to clinical teaching, he knew no hospital equal it."

The cost of the buildings, including all engineering requirements and a complete steam laundry, was but a trifle over 300*l.* per patients' bed—proof that the arrangement of plan is capable of being carried out at an economical figure. The site is six acres in extent, to which another six is to be added. The hospital stands comparatively high, has a pleasant outlook in every direction, and is readily accessible from most of the large manufactories and works, and from the poorer parts of the city, whence the majority of the patients will come. From west to east there is a fall in the level of the ground of over 20 ft., of which advantage has been taken; by keeping the main floor level well above the ground adequate height is secured for the principal fresh air-duct, which runs under the main corridor, for the branch ducts conveying fresh air to the several wards and accessory rooms, also for a pipe-duct running parellel with the principal air-duct—a necessary provision, so that heat from the steam and hot-water pipes may not penetrate the buildings during the summer months, and that convenient access may be obtained to all piping.

Opening directly from the hall opposite the porch entrance runs the main corridor from east to west, some 450 ft. long and 9 ft. wide. Branching southward are seventeen short corridors, giving access to as many wards, each with fourteen beds, with their accessory rooms, all practically under one roof. The eight wards to the east are for medical cases; then come eight wards for surgical cases, and one for gynæcological cases. To the north are two for ophthalmic cases.

The author described the general arrangement of the rooms—male and female wards, class-rooms, clinical-rooms, operating-rooms, ward kitchens, store-rooms for clothing, nurses' and cleaners' rooms, sanitary conveniences, etc.; also the "Extern," or out-patients' department, with its waiting-hall and medical, surgical, and specialists' consulting-rooms, examination-rooms, dispensary, etc. Intercepting lobbies between wards and conveniences are dispensed with. Open windows with plenum ventilation are objectionable, and without open windows intercepting lobbies are an anomaly. By simple adjustment, air from sanitary turrets is prevented from entering the wards, air pressure in their direction being maintained from the wards outwards. To the ward-kitchens no doors are provided. With plenum ventilation an equable temperature and freedom from draught are secured, consequently inner doors are required only for the sake of privacy, or where difference of temperature is desired to be maintained.

Two small detached buildings at the west end of the site are for isolation purposes. They receive fresh air by a continuation of the main duct underground, and, although at least 600 ft. away from the fans, are amply supplied with fresh air.

The author showed sections through a portion of the ward-block to give a general idea of the method of lighting and of the construction adopted. The windows are not skylights, as generally understood, but may be more properly defined as clearstory windows, slightly sloping, and glazed with half-inch plate glass. The result is most perfect lighting to every portion of the building. Surgeons using the operating-rooms state that nothing could be better for their purpose; the light is ample, well-diffused, and free from shadowing. An advantage of plenum ventilation is that the cubical contents of buildings may be very considerably reduced. Given sufficient floor area for nursing and teaching purposes, the height of wards need be no more than appearance demands, and when lighted, as they are in this instance, the cubical contents are much reduced, being not more than two-thirds of what is ordinarily required.

After referring to the administrative buildings, the author described the various fittings and appointments of water-closets, sinks bathrooms, operating-rooms. post-mortem rooms, pathological and microscope rooms. The whole of the sanitary appliances were carried out from the architects' designs by Messrs. Morrison and Ingram, and fixed by Mr. John Dowling, plumber, of Belfast.

Mr. Henman concluded with a word of caution about plenum ventilation. It is essential it should be applied with full knowledge and by those competent to deal effectively with it. Distrust an engineer who will give a scheme for ventilating any building indiscriminately on the "plenum" or "extraction" system, or by what are termed natural means; but try to realise that every building should be designed for the particular method of ventilation intended to be employed, and that the means for procuring ventilation must be specially designed on scientific principles to meet the actual requirements of the building.

Mr. Henry Lea, M.Inst. C.E., who followed with a paper on the "Engineering Work of the Belfast Hospital," speaking of the ventilation, said that the design which Mr. Henman had originated facilitated to an extraordinary degree a simple arrangement of air-ducts of ample proportions. To emphasise the importance of this point, he mentioned two large buildings now ventilated by mechanical means, each having about 13 million cubic feet of fresh air driven through them per hour. In one building, owing to the liberality with which the air-ducts are proportioned, the total amount of power required to drive the fans was 19 i.h.p.; in the other building, owing to the air-ducts being restricted and very crooked, the power required was 53 i.h.p. Putting this into money value, in one case the driving-power cost 766*l.* per annum and in the other 2,164*l.* per annum.

The main air-duct at the end nearest to the fan chambers has a height of 20 ft. and a width of 9 ft. The full width is preserved to the far end of the wards block, a distance of 443 ft., but the bottom slopes upwards, so that the height is diminished to 6 ft. at the far end. The total cubical capacity of the hospital buildings ventilated on the Plenum system is 703,000 cubic feet. With seven changes of atmosphere per hour in the winter the velocity of the air entering the main duct is 7.06 ft. per second, and with ten changes per hour in the summer the velocity is 10.85 ft. per second. The proportions of the branch ducts and of the vertical air-flues are based upon similar liberal lines, as are also the air-ways through the fan chambers and the water screens. This accounts for the reduction of power for working the system.

Another point in relation to economical working is that the fans are driven by a steam engine, the exhaust steam from which is utilised for heating the water for the baths and lavatories. The lecturer showed that there was a saving under this head of 275*l.* per annum.

The main engineering features in connexion with the ventilation of the hospital having been fully detailed, the lecturer treated of the arrangements for hot and cold water supply. The supply of cold water is brought from the cold-water cistern in the roof of the east wing, and is connected to the return-pipe, so that the cold water, after passing through the rotary pump, enters and is heated by the two steam calorifiers before it passes to the various portions of the building.

The general arrangement of the hot-water circulation includes two hot-water cylinders, each containing 900 gallons of water. To the system of circulation are connected eight subsidiary circulations under the ward block, for the purpose of supplying the baths and lavatories in that block. Other subsidiary circulations are also provided for the ophthalmic block, the extern, and the administrative block. All the hot-water mains and the branch circulations are covered with non-conducting composition. The effect of the rotary pump is such that the hot water is caused to circulate through the whole system about once every fifteen minutes, which ensures evenness of temperature.

The system of cold-water pipes follows substantially the course of the hot-water pipes, with the exception that no circulation arrangements are provided. Wherever the cold-water mains and pipes are exposed to cold air they are covered with non-conducting composition to protect them from frost.

In each of the operating-rooms is an apparatus for sterilising water for surgical purposes. The water for these purposes is first warmed by means of a steam coil, and is then passed through a Berkefeld filter, which frees it from every kind of microbe, and is thereby rendered innocuous for surgical use. The temperature is regulated with the greatest facility.

The laundry is designed so that the articles to be cleansed go through the consecutive stages of treatment without being carried over the same ground twice. The ordinary type of machinery is employed. The exhaust steam from the laundry engine is used to heat the drying closet and water for the washhouse. A fan draws air from the ironing-room, forces it through the heating coils of the drying closet, and thence into the washhouse, upon the

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steamy atmosphere of which it has a beneficial effect.

Electricity for lighting is supplied from the town mains. The system of wiring is that which is now well known and generally used, but which the author believes he was the first to use, namely, placing a suitable number of fuse-boxes about the building; using the same sized sub-mains throughout for supplying the fuse-boxes; using the same sized fuses in all the fuse-boxes; placing not more than five 60-watt lamps on each fuse for 100 volts, or eight lamps on each fuse for 220 volts; and using the same sized lamp leads throughout the whole building. The total number of 16 c.p. lamps, or the equivalent, installed in the establishment, is about 1,100.

Sir J. Holder (Chairman of the Birmingham General Hospital) in moving a vote of thanks to the readers of the papers, observed what a great privilege it was to him to have heard the interesting and instructive description of this unique and modern hospital at Belfast. He was the Chairman of the large hospital at Birmingham which had been designed and built by Mr. Henman. When they decided to build that hospital they had a limited competition, and they had as their assessor a gentleman whose portrait they saw in that building—he meant Mr. Waterhouse, than whom a more charming man he had never met. The competition took place, and they gave Mr. Henman the work, and had every reason to be proud of the work he had accomplished in connexion with the General Hospital. When the building was designed, it was designed for a system of natural ventilation, but after the plans were accepted, a friend of his asked him to see a hospital ventilated on the plenum system. He was very much against the plenum system at that time, and took no notice. Then he got another strong letter from his friend, and the result was that he went and saw the system in operation, and he must say that he became a convert to it. After he came back he called a meeting of the Committee, and four of their surgeons and physicians and a layman went to see the hospital, and they were more pleased with it than he was. What convinced him more than ever was that on the second visit it was a dull, murky, wet day in November, and after going over the hospital Mr. Keith took them to see some schools. They went into a board school with about 1,600 children, who were children drawn from a very poor neighbourhood. He was intensely struck with the sweetness of the atmosphere of the schools, for there was no smell of dirty clothes, although the children had then been in the school two or three hours. He spoke to one of the schoolmistresses, and asked her if she suffered from teachers' headache. She said she used to at her old school, but not in that one. He also spoke to the master, and asked him what he thought of the plenum system, and he replied: "I have only one fault to find with it; between eleven and twelve o'clock I get so hungry that I want to have my lunch." When they came back they decided to adopt this plenum system for the Birmingham General Hospital, although they were much enchanted with the natural system which Mr. Henman had provided. However, they decided to alter it to Mr. Keith's system, and they were very pleased now with that system of ventilation. In the coldest day in winter he had been round the hospital, and the lowest temperature he found was 59 deg.; whereas there was 14 deg. of frost outside. He had gone to the hospital in the hottest day in summer, with a temperature outside of 84 deg. in the shade, and he found that the highest temperature in the hospital was 68 or 69 deg. There was a constant supply of fresh air to the patients, and the nurses breathed fresh air the whole time. Another great consideration was that they got no contamination from diseases there. If they got a case of measles in the wards, or a case of scarlet fever, it was very rarely that they had to close a ward. One patient was not breathing the emanations of another patient, for the air went straight away. They were very proud indeed of their hospital. Some time after their hospital was built he went to America. Before they built their hospital, the Johns Hopkins Hospital, of Boston, was put before them as the great model which they should follow. Well, he had an introduction to the architect of that hospital, who told him that they had improved very much on that building since it was erected. He went over the hospital, and it was certainly a fine institution, but it did not compare with the Birmingham Hospital. He also went over the new hospital of the McGill University, Montreal. They were very proud of their hospital at Montreal, but when he told the authorities who he was, they told him that their chairman had been over the Birmingham General Hospital and was not half so satisfied with his own since. He (the speaker) had also visited the Presbyterian Hospital at New York, and after going over it was all the more satisfied with the Birmingham Hospital. Great praise was due to Mr. Henman, and they were very glad that they had him as their architect. One feature particularly was to be noticed, which was that there was not a single block or door altered from the time the design was obtained till the present time. Sir Wm. McCormack, the great surgeon, came down to Birmingham and went over the hospital, and afterwards attended a meeting of the medical faculty, and he said: "I have been over hospitals in Europe and almost every place, and I must say I have never seen a finer and better equipped hospital than you have at Birmingham."

A member asked if the Birmingham Hospital was on the pavilion plan.

Sir J. Holden said it was, and they had Mr. Keith's system of ventilation perfected by Mr. Henman. He was glad, however, to hear that Mr. Lea had gone in for a better system of heating and ventilation than they had. They had four stations for the intake of air and two fans in each case, and these fans were driven by electricity. They had the electricity at low cost, but the cost was 600*l.* a year for driving the fans. It looked as if they had improved upon that, because by Mr. Henman's unique and novel arrangement he was able to condense the building, which certainly would minimise the cost of upkeep. He had not had the pleasure of seeing the Victoria Hospital at Belfast yet, but he hoped to do so, for from what he saw of the plans it was an admirable structure. It was a bold idea of Mr. Henman's to take the hospital in hand like that and put the wards together.

Dr. Childs said he was afraid he would have to strike a discordant note. He would have liked to have heard a little more from Mr. Henman about the question of inlets and outlets. He did not pretend to be an expert at all, but he had given what time he could to the study of plenum ventilation, and was strongly convinced that it was the best method we have for the ventilation of crowded buildings of any kind. But from what he had seen of plenum systems he had come across a great many defects with regard to position and the relative size and shape of inlets and outlets, and he had not had the opportunity himself of finding that any principle could be laid down with regard to these details. They were certainly most important, because in the ventilation of rooms they had not merely to supply a sufficient quantity of proper air, but they must distribute that air in such a way that each part of the room or building should have its proper share of unpolluted atmosphere. Those who had had opportunities of studying the various systems of plenum ventilation, in schools especially, would find that there is frequently a distinct want of method, and that there were many defects by which the air was frequently short-circuited in some cases or distributed in certain parts, leaving other parts quite stagnant. He hoped that Mr. Henman, from his large experience, and especially from the experience he would have acquired from this new hospital, which they all admired so much, would be able to give them some hints as to these details. He was most impressed with the importance of the question, as he had studied it as an amateur. It was, however, as a physician that he threw in his discordant note. They all recognised the necessity of having a sufficient quantity of pure air, and it was the custom to gauge the purity of the air by certain phenomena—the amount of carbon dioxide, the amount of organic matter, and, in addition, the proportion of microbes in the atmosphere. They all knew that if air in a building was being breathed by human beings which had too much carbon dioxide or organic matter, that air was not to their benefit. This they could gauge by means of the chemist's balance, and they could gauge also the number of microbes by bacteriological methods; but there was one product of air they knew very little about, and that was what was generally described as fresh air. He was greatly impressed with the great benefit of the plenum system in crowded buildings or rooms of any kind, as, for instance, such a room as they were in that night; but when they came to hospitals they had a large floor area, and the question, to his mind, was whether the plenum system, from a health point of view, really succeeded. Did the air contain that invigorating freshness which they recognised was possessed by fresh air? To his mind, this was the one thing wanting in the air provided in hospitals by the plenum system. It was not a matter of imagination when they said they felt the benefit derived from fresh air. They opened a window in a close room to get the fresh air from outside, and it was not merely from imagination that they derived benefit. They saw it illustrated in the effects of exercise. Most of them probably knew the invigorating effect of a swift ride on a bicycle or a motor; or, again, if one was in a valley, one felt a want of energy, and that energy seemed supplied the moment they surmounted the brow of the hill. What was the difference? He did not think this had been sufficiently studied in considering the facts of the plenum ventilation. It was due to the movement of the air over the body. He would point out that in a good system of natural ventilation they asked for 3,000 cubic feet per individual when they were within four walls. They were very lucky if they got it, but in the open air on a moderately calm day they had not 3,000, but 300,000, cubic feet of air passing over the body, and there was some effect which they had not gauged due to that air. That this was not fanciful was shown by the wonderful effects produced by the open-air treatment in the case of phthisis. There could be no doubt about that.

Mr. Henman, interposing, asked if they were not going beyond the scope of the paper. He thought they were not discussing the question of the plenum *versus* natural ventilation, but the particular system in a hospital. Dr. Childs evidently did not know anything about the matter.

The President: Excuse me, we are very pleased to hear Dr. Childs.

Dr. Childs said he merely wished to say that before they accepted the plenum ventilation as the best method of hospital ventilation, they should take the things he had mentioned into consideration. It was true that the plenum system did away with draughts and produced a uniform temperature, but they had to ask whether that was the best for the patient. Any one who had tried the fresh air treatment in a general way, as opposed to the closed window treatment, would say how much freer they were from colds than previously.

Mr. Saxon Snell said that extreme importance attached to the subject. It was extremely important for this reason, that the advocates of the plenum ventilation were introducing to the public generally and to architects a system which had a great attraction as something novel and something complicated, and those who considered that the plenum system was a huge mistake felt that they should do their best to have it argued out. He ventured to suggest that under the circumstances, at that late hour, the debate might be adjourned to a future occasion, when he was sure others would like to discuss it further.

Dr. Childs wished it to be understood that he advocated the plenum system for schools, rooms, churches, theatres, and so on. All he questioned was whether it was best for hospitals.

Mr. H. T. Hare seconded the vote of thanks, and supported the suggestion of an adjourned meeting, as he thought a discussion would prove very instructive.

The President said they had all been extremely interested in the papers on a subject of great interest to architects and all engaged in the erection of buildings of a large and public character. He took it that this plenum system must be confined to buildings of a somewhat large character. If they could possibly arrange for another meeting they would do so, but it was always a little difficult to get the same audience together and take up the threads of a discourse where they left it. He felt, like other architects, very much interested in the system, and he must say that he had been extremely interested in this most novel and bold effort of Mr. Henman to meet the difficulties which a long, extended hospital had undoubtedly presented to many people. They all knew of hospitals which were extended to such an extent that the supervision of them became impossible, or almost impossible, and the idea of bringing it all together on one floor and under the easy control of the staff, must be an enormous advantage in hospital planning. The only question was how far this plenum system

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would sufficiently ventilate the wards, and as to the proper lighting of the wards. He had not seen the Victoria Hospital, Belfast, but had only seen the photographs, and naturally one felt how bold it was to light these wards only from the top. With regard to the ventilation and as to what Dr. Childs had said, he must say that the plenum system seemed to have the advantage of passing the air over the body more rapidly than by any other system he could imagine. It enabled them to some extent to control and regulate the amount of air passing in front of any particular room. With regard to what the disadvantages might be, he quite agreed that the more they could talk it out the better, and, as he had said, they would, if they could, have another meeting to hear both sides. They were all great believers in hearing both sides in order that they might have the truth of the thing. They were very pleased to have Mr. Henman there that night. He used to meet him at the Classes of Design at the Architectural Association a great many years ago, and had often seen him since, and he had also had the pleasure of working with Mr. Lea for a great many years, so that they were both old friends of his, and he was sure those present would join in a hearty vote of thanks to them for bringing the novel and original arrangement before them, which was what the Institute wanted. When any one was bold enough to attempt anything of that sort, and was good enough to bring it before that Institute, they were under a debt of gratitude to them.

The motion was heartily agreed to.

Mr. Henman, in reply, said he would only make one remark with regard to the plenum ventilation. He was perfectly certain that Dr. Childs had never properly investigated a building well ventilated on the plenum system. There were a great many buildings which had been attempted to be ventilated on the plenum system, but as a rule they were very badly done, and Dr. Childs might have come across a bad example. A proof of the advantage to a hospital of plenum ventilation was that they could go into the wards in any one of the twenty-four hours of the day and find the wards absolutely the same in freshness and purity. He had, in going about the country, visited hospitals, and he invariably asked how they ventilated the wards, and he was told that they were sometimes rather smelly, and he had been told that they "simply stank." Nothing of that kind occurred with plenum ventilation, and if that was not good enough he did not know what was. By that system they got the movement of air, but they did not get bad draughts, which often gave patients other diseases which they did not have, and would not have, in wards ventilated on the plenum system. The wards at the Birmingham Hospital and the Belfast Hospital were the same all the twenty-four hours of the day and night.

Mr. H. Lea also briefly responded, and said that he would be glad to attend a future meeting and listen to the criticism offered, and as far as possible answer such criticism.

The President announced that a business meeting for the election of members would be held on January 4, 1904, and that Messrs. G. A. T. Middleton, J. W. Beaumont, J. Woolfall, E. C. Down, and H. Davis had given notice that at the meeting they would bring forward the following motions:—"1. That this Institute is in favour of the general principle of the compulsory examination and registration of architects. 2. That a committee be appointed to consider what steps should be taken to give effect to this principle, and to report thereon to a special general meeting before the opening of Parliament. 3. To nominate this committee."

THE ARCHITECTURAL ASSOCIATION DISCUSSION SECTION:

THEATRE PLANNING AND CONSTRUCTION.

THE following is part of a paper on "Theatre Planning and Construction," read by Mr. H. T. B. Spencer, A.R.I.B.A., before the Discussion Section of the Architectural Association on the 6th inst., Mr. J. H. Pearson in the chair:—

The disposition of the site has naturally the greatest influence on the plan, and the decision as to what extent the building is to be sunk in the ground must also depend partly on the site. It is as well to remember that if the "pit" is sunk in the ground the "gallery" will not be so high above the pavement level, and, therefore, there will be less distance to descend in case of a panic; but, on the other hand the cost of excavation and the provision of necessary vertical asphalte rendering on the walls below ground would counterbalance the saving in the external architectural treatment unless very costly.

The highest part of the area or pit must not be more than 6 ft. above the pavement, and its lowest part must not be more than 15 ft. below it, and must in any case be capable of being drained into a public sewer. The joint effect of these two regulations is that with a level site the theatre must always be sunk to some extent, in respect, that is, to the stage cellar and part of the stores floor; but it imposes a limit which is prescribed by the depth of the sewers. This is the external factor, so to speak, in the problem we have to solve. Another, which may be called the internal factor, is that the stalls people, who will enter from the main thoroughfare, have to get past the pit folk to their seats not far from the proscenium, while the occupants of the pit will generally have to be admitted and seated somewhere between these two points. For this latter reason I may say at once that it is nearly always more convenient to sink the theatre to its maximum distance below pavement level, assuming that the site has no extraordinary features as regards levels, etc.—Remembering that every part of the theatre should be drained, and that the stage cellar, even if there is no well, will be at least 5 ft. below the stalls floor, this floor will probably be between 8 ft. and 9 ft. below pavement level, and about 3 ft. below the back of the pit. By setting up your line of sighting for the pit and dress circle, you will obtain the minimum height of the dress circle back, or foyer, which in this case will probably be 6 ft. of 7 ft. above pavement, and about 15 ft. above the pit back.

We still have the second half of our problem to solve, namely, how to get the stalls people from the crush-room to their seats in the area. This brings us at once to the consideration of two distinct types of plan. There is, however, one usual feature common to both, the above-mentioned open space or wide corridor at the back of the dress circle, used as the foyer, and from which you generally find corridors and staircases on either side of the dress circle tier, leading to lower exits on the tier and to the private boxes.

The two types differentiate on lines which will be dicided by the answer to this question: Shall the stalls people come up from the crush-room to this foyer, and thence reach their seats by the continuation of the staircases at the sides of the dress circle tier, or shall they have an exclusive access to their own part of the house? If the former plan be adopted, it is advisable to keep the dress circle back at its *minimum* distance, and to raise the crush-room by three or four steps above the pavement level in order to reduce the number of steps up to the foyer. This gives at the same time increased headway to the pit saloon, which may conveniently be under the crush-room. The foyer saloon can usually be placed over the crush-room, and, together with the foyer be used jointly by both the stalls and the dress circle. It is convenient in this case to place the joint retiring rooms on the foyer level, and leave the crush-room free as a vestibule, with room for a box-office, with possibly room on the same level for the pit lavatories. If, as in the second type, the stalls are to have separate access to their seats, then you must keep the pit back low down, and the dress circle back as high as possible, keeping in mind the staircases from the crush-room. This allows of the provision of an intermediate landing or corridor between them for the exclusive use of the stalls, provided with staircases therefrom down to the area, and immediately underneath the first described staircases from the foyer. The stalls retiring-rooms will presumably have to be placed at or about the crush-room level. This may necessitate an open-air well being provided for the pit lavatories in the basement, as there would probably not be room to give them external walls above pavement level in compliance with the by-laws. The second type practically deprives the stalls of the use of the foyer and the foyer saloon, and therefore a separate saloon must be provided. This may often be placed somewhere below the crush-room level, which, however, tightens up the space we might otherwise devote to the pit saloon.

Special circumstances must, of course, decide which type is the most suitable, not only for the site, but also for the clientèle the theatre will cater for. But either of these two types will be found applicable to a level site or a sloping site—that is, sloping upwards or downwards from front to back. But whichever way this important question is settled, the planning of the upper tiers is "ceteris paribus" comparatively easy, care only being necessary to ensure good sighting. As you will perceive, the corridors right and left from the crush-room and foyer, giving entrances on each side of the different parts, with opportunities for extra exits therefrom, suggest a symmetrical arrangement of plan about a main axis running through the centre of and at right angles to the proscenium, and, if the site allows of it, of the crush-room as well. This symmetry of plan should always be the aim of the planner. The existence of a street down one side is presumed, and it is generally found necessary to provide a ten-feet private passage at the other. With this duplicate means of access it is easy to get at least two exits from each part, one on either side, and possibly also to dispense with the necessity of using the crush-room as an exit in case of panic. Speaking generally, the tendency of the regulations of the L.C.C., especially those dealing with the site, has been to make theatre plans more regular and the buildings themselves more compact and self-contained, which is a distinct advantage from almost every point of view.

The crush-room or vestibule should be as spacious as space permits, and should contain the box office and the necessary retiring rooms, and should be entered through double sets of doors enclosing a lobby to act as a draught check. The different pay boxes should be in easy communication with the chief box office where possible. The box office should not be too small, and should be comfortably arranged with a fireplace, as it is used nearly all day long. Convenient office accommodation, in addition to the box office, should be provided for the use of the management.

The number, size, and even the position of the saloons to be provided is a question on which the architect often receives definite instructions, which might, of course, considerably affect the plan. But should the settling of these and similar questions be left to him the architect must be guided by what may be called the "genius" of the theatre. In some houses you get almost the same class of people in both the stalls and dress circle, and perhaps to some extent in the "upper circle," and, therefore, there is no object in not permitting them the common use of the foyer and saloon. But in other theatres the stalls would be patronised by a set as distinct from that in the dress circle as the latter is from the upper circle, and, therefore, each has to be separately catered for. These remarks apply more particularly to theatres proper, and not to music-halls, which require a special and different type of plan.

It is only recently that the pit and gallery have been thought worthy of better accommodation, and as their occupants are said, like the third-class passengers on the railways, to be the best-paying clients, it is surprising that more attention has not been paid to them ere this. On the other hand, I may remind you that we have been promised some startling departures, according to recent public announcements, such as the total disappearance of the pit and gallery. I hope I shall not offend the susceptibilities of any enthusiastic pitite when I say that I should not regret the former. I have for some time thought that cheap reserved seats might well be provided in the space occupied by the unreserved pit, approached, perhaps, through the same entrance as the stalls, which would be a distinct economy. There would be no harm, that I can see, in the crush-room being used both by people in evening dress and those in morning dress but, if necessary, it would be easy to separate "the sheep from the goats" during the intervals by providing separate saloons for each. I am sure that reserved seats for about three shillings would be thoroughly appreciated by the general public, and I think that behind the stalls and at the back of the upper circle are the places where one ought to find them—somewhat, I believe, on the American plan.

In respect to the general distribution of seats above the ground floor, theatres are classed as two-tier or three-tier houses, three tiers being the limit allowed by the L.C.C. Sometimes the top or gallery tier is not constructed over the upper circle, but at the back of it, and somewhat raised above it. This is generally a cheaper form of construction, and while setting the back rows further back from the stage it does not raise them so high, and the sighting is, of course, easier. But to my mind the upper circle itself is not improved by this arrangement but by losing its privacy it is, on the contrary, spoilt. It is usual to provide

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private boxes to the dress circle tier close to the proscenium, also to the stalls, and often to the upper circle, though most managers agree that these last are no good.

In important theatres the box on one side of the dress circle is called the Royal Box, being, as its name indicates, used by the Royal Family, in which case a separate retiring-room, with private lavatory, is provided, with a separate entrance from the street, exclusively used as a Royal entrance.

If the sighting be properly arranged, the whole of the enclosed area should be visible to each and every occupant of a seat. To do this comfortably, one must, for one thing, sit more or less facing the proscenium, and not sideways to it. This happy condition may be obtained by keeping the springing of the curve of the circle front back as far as possible; that is, by widening the face of the side boxes, and by keeping the curve somewhat flat and at its greatest distance, not too far back from the proscenium. It is advisable, also, to make the curve of the upper tiers concentric with those of the dress circle. The sighting line of the extreme sides ought to allow of any one sitting there seeing the back line footlights at a point close up by the proscenium jamb. It is not necessary to give a sumptuous view of the stalls and orchestra from the body of the tier; in fact, you cannot do that without setting the centre of the curve further back, and so diminishing the seating area. But, with no extra depth of auditorium at your disposal, it is possible to get more seats in a tier as just described than if the more familiar horse-shoe or semi-circular curve be used, with the great advantage that each seat commands a full view of the stage. . . .

I am prepared to admit that the above-described arrangement tends to the banking-up of the upper tiers, but, within limits, I do not see any particular disadvantage in this.

Tip-up seats are generally provided to the dress circle and upper circle, as well as to the stalls, and so fixed that there is a distance of at least 12 in. in the clear between the nearest points of succeeding rows measured between perpendiculars. If the tip-up seats are automatic, they should be constructed so as to tip back to an angle of about 45 deg. only, otherwise there is the risk of accident from sitting on the floor instead of the chair. The continuous seats of the gallery are sometimes placed direct on the top of the concrete riser, but there is an objection to this, as there is no space left to tuck one's feet away under the seat if so inclined, and the face of the riser is certain to get damaged. It is better, if a little more expensive, to provide seats on standards at the back of the tread. . . .

To facilitate the elimination of columns in the view of the sighting now rightly considered necessary, an ordinary plan is to throw a deep girder right across the auditorium, and rather less than half way back from the front of the tier, with secondary angle girders right and left resting on the main girder and the side walls, and tangential, as far as possible, to the curve of the treads. Through the webs of these run the shaped cantilevers, with their tail ends built into the brickwork at the back, or otherwise weighted down. If there is an enclosed back to the dress circle and upper circle tiers, advantage may be taken of this to provide small columns resting on the tail ends of the cantilevers below, and carrying the girders of the tier above. But, of course, the exigencies of each particular plan decide the best form of steel construction to be used, which, in fact, is generally left to the engineers to work out. The architect must know enough of steel construction to so plan his tiers that the engineers are able to go on the line of least resistance, so to speak, and not have to bring back the scheme with the remark that the plan involves very expensive construction. . . .

The number and size of the dressing-rooms will depend, of course, on the particular kind of performance for which the theatre is intended. If for chamber plays, a few small rooms near the stage level for principals, and some larger rooms to hold three or four each, will be all that is necessary. For musical plays, pantomimes, and melodrama, large rooms for the male and female chorus, dancers, or supers, must be provided in addition. There must be suitable wardrobe accommodation, and also separate and sufficient lavatory accommodation for both sexes. It is usual now to provide hot and cold water services to the dressing-room basins, which are fitted with proper wastes. The large dressing-rooms, and often the principal's rooms, have continuous dressing tables with mirrors, and the lights arranged to light both sides of the face for making-up purposes. Each room will require small stoves for curling tongs and grease paints, heated either by gas or electric current. A passenger lift, that may also be used to carry up the artistes' baskets, is of the greatest convenience, both in the dressing-room block and in the office accommodation. . . .

There is a certain amount of accommodation to be provided on and about the stage that I will briefly note. If limelight is likely to be used, fireproof chambers must be provided for the tanks, with direct ventilation through an external wall. The resident engineer and his assistants, as well as the stage carpenter, should be accommodated with an office and workshop, which must be fireproof chambers with iron doors, and ventilated through an external wall. The stage manager will require an office on the stage level, and, if possible, communicating directly therewith. As most theatres are provided with orchestras, a separate room must be set apart for their use, in which their instruments and music may be locked up, and if music forms an important part of the entertainment, the musical conductor should have a room for his private use. It is unnecessary to provide a painting-room for the use of the scenic artist, as most of the scenes are now painted in the artist's own studios, or elsewhere. A property-room is necessary, and should be a fireproof chamber with iron doors, and direct ventilation through an external wall. There is a tendency to store scenery and properties away from the theatre, which is to be encouraged, for, without a doubt, the accumulation of such material is quite as fruitful a cause of outbreaks of fire as its legitimate use during the performance. . . .

The discussion, which was opened by Mr. Max Clarke, turned largely upon the regulations of the L.C.C., which aim at the prevention of the spread of fire and the safety of the public. Twenty or thirty years ago, said Mr. Clarke, liberties were taken by the builders of theatres, whereupon the authorities had tightened the strings. We were suffering for the sins of those days, as the tendency was not now towards a slackening. But why were such elaborate precautions taken in the structure and yet the scenery permitted to remain so highly inflammable? He did not believe in the fire-resisting qualities of the asbestos curtain. Something more rigid was required. As regards the slope of the stage, there was a tendency towards something less than the ½ in. to the foot, even to making it quite level: but if that were done the slope of the pit floor would require to be considerably increased. He thought the steel stage, after the manner of the example shown at the Earl's Court Fire Exhibition, destined for Covent Garden Theatre, might come into more general use. Mr. Clarke also sounded a warning note as to the use of constructive ironwork without ensuring its being absolutely protected against the action of rust. Some of the iron girders exposed to view in the Metropolitan Railway stations were instructive in this connexion.

Mr. L. Ambler said he could only speak about theatres from the visitors' point of view. He had been struck by the number of theatre architects who had recently come upon the scene, in spite of the difficult and complicated nature of the work. The finding of suitable sites seemed to be the most difficult thing of all, however. The crush-room accommodation was invariably too small in London theatres, and the saloon and refreshment accommodation, especially in "pits," inadequate, and was deserving of better attention on the part of managers and their architects. An endeavour might also be made towards a better architectural treatment or grouping of the various exit doors, instead of their appearing like so many "accidents" in the design. Why not a form of colonnade treatment, which he thought space might, on some sites, permit.

Mr. G. H. Lovegrove said he remembered some years ago going over the old Grecian Theatre while it was in course of demolition, where the weakness of the timber construction formed a remarkable contrast to our more modern work.

Mr. J. W. Stonhold said he thought it was hard on theatre ironwork to compare it with that of the Metropolitan Railway, where it was not only exposed to the weather, but to fumes which acted on the iron. In fact, he thought the tendency in modern ironwork was to err on the strong side. Additional crush-room accommodation was a question of cost. Flanking or rear walls of theatres might with advantage be made a little less like prisons in appearance; a window here and there might well be inserted with some benefit internally.

Mr. T. Sudsuki, by means of the blackboard, gave a most interesting description of the plan and working of the typical theatre of Japan. The "revolving" stage was explained in detail, and its advantages for quick change of scene demonstrated. The theatres are, of course, on account of the frequency of earthquakes, built entirely of timber. Lateral curtains were used; in fact, admiring playgoers were wont to bestow upon the management of the Japanese theatre "presentation" curtains. Special provision, therefore, had to be made at the sides of the proscenium opening for the hanging of these curtains in due order.

The Secretary read a letter from Mr. Ernest Runtz on the subject of the paper, in which Mr. Runtz said that although the regulations of the L.C.C. were in the right direction they might be considerably modified in some particulars and extended in others. He suggested than a conference between theatre architects, managers, and the authorities might be arranged, and if the constitution of a board of arbitration could be agreed upon it would tend to the benefit of all concerned, including the public. In respect to the heights of tiers, pure air was more important than height, and could be obtained if the ventilation was designed on the propulsion system.

Mr. A. Blomfield Jackson, as Special Visitor for the evening, wound up the discussion. He said that the authorities had a difficult task to perform, and that they, as architects, were much indebted to them for the way they endeavoured to carry it out. He could understand the necessity for a minimum width of street on the boundary of a theatre, and that everything which would contribute to the speedy and safe exit of the audience into the street ought to be strictly enforced. But he thought that having enforced every provision for getting the people safely out of the theatre, the duties of the authorities might stop there, and the strictures as to fire-resisting construction, which added so much to the cost of building, considerably relaxed. Although it was quite essential that there be no projections whatsoever on the exit walls, he thought some suitable architectural treatment of a corridor above shoulder height were possible. The proscenium made ventilation and warming difficult, as it was next to impossible to get exactly the same temperature on either side of it when down. When the curtain was raised, therefore, draughts occurred. Self-closing iron doors were in practice no good. As they would not stay open, the stage hands simply *wedged* them open. In the case of a fire, therefore, no one would think of the wedges, and the doors would, of course, not close. The aim, therefore, defeats its purpose. It was a very difficult matter to secure a suitable site in London. Ground rents were enormous, so the planning of the seating had to be largely a matter of returns from the financial point of view. The crowding of the seats, therefore, was not always attributable to the bad planning of the architect, but to pressure from the managers. This also accounted for the smallness of crush-rooms, saloons, etc.

ARCHITECTURAL ASSOCIATION CAMERA AND CYCLING CLUB.

ON the 9th inst., Mr. F. J. Steadman, of the Lumière N. A. Co., gave a demonstration of colour photography, dealing first with the theory of the subject and the colours of the spectrum. He then described the process advocated by the Lumière Co., in which three negatives are taken, the first through a blue screen on an ordinary plate, and the others through red and green screens respectively, on specially-prepared plates which are sensitive to these colours. These negatives are printed on a bichromated gelatine emulsion spread on celluloid or talc, giving a barely visible image which is developed in hot water and fixed in hypo in the usual way, leaving a clear film with almost invisible image. The film is then dried and dyed in a complementary dye; that is, the print from the negative taken through the blue screen is dyed green, that through the red screen blue, and that through the green screen red.

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These prints are then superimposed, and the dyes adjusted; the blue print being taken as the basis, and the other dyes either intensified by further dying or reduced by washing until a perfect transparency in natural colours is obtained. For prints, a thin, flat bromide print is made from the negative taken through the red screen, and toned with iron to a blue tint. Dyed positives on a stripping film are then made from the other negatives, and squeegeed one at a time to the blue print dried and the talc support stripped, the result being a paper print in natural colours. The exposure required for the three negatives is through the blue screen, four times the ordinary exposure; through the green screen, six times; and through the red, from eight to ten times. A white object should be in the pictures as a guide when developing, because its density will be the same in all three negatives, and the negative taken through the blue screen should be taken as the standard for density when developing, as it is less sensitive to the ruby light of the darkroom.

Prints showing the various dyes and the combined result were then handed round and discussed. Mr. Steadman composed two prints from their separate parts during the discussion, to show the ease with which the superimposition was made. The lights were then turned down, and a short demonstration of the theory of colour was given by means of the lantern, after which a remarkable series of photographs of landscapes, fruit, still life, and architecture was shown, which had been prepared in natural colour by the Lumière Co.

Mr. Louis Ambler, in proposing a vote of thanks to Mr. Steadman, referred to the crudeness of colour and lack of atmosphere in the photographs of landscapes shown, and was informed that this was at present unavoidable, but very curiously was only found in landscape work. Mr. Stonhold, in seconding the vote of thanks, suggested the use of the process in photographing stained glass and other coloured decorations in buildings.

Mr. Wonnacott put the vote of thanks to the meeting, and gave a brief *résumé* of the history of colour photography, afterwards inviting the members of the Camera Club to be present as his guests at Sir William Abney's lecture on colour photography at the Royal Photographic Society on December 14.

ARCHITECTURAL SOCIETIES.

LIVERPOOL ARCHITECTURAL SOCIETY.—On the 7th inst., in the Law Libraries, Cook-street, under the chairmanship of Mr. John Woolfall, and the auspices of the Liverpool Architectural Society, Miss Ethel Charles, A.R.I.B.A., London, read a paper entitled "Reflections on Architecture." The President, in introducing Miss Charles, described it as a unique privilege to introduce the first fully-qualified lady architect to his confreres. A moment's reflection would show them that those professions to which ladies had already been admitted had not lost any prestige thereby. As examples he mentioned painting, music, medicine, literature, etc. As to the possibilities of architecture as a paying profession for ladies time alone would show, but he believed they would be useful members of the profession, more especially in domestic architecture and in the planning of houses, where many labour-saving methods were desirable. Miss Charles, in the course of her paper, dealt principally with London modern architecture with the object of showing that its quality was as true and noble as that of the old days. She was cordially thanked on the proposition of Councillor W. E. Willink, seconded by Mr. T. E. Eccles.

MANCHESTER SOCIETY OF ARCHITECTS.—The annual dinner of the Manchester Society of Architects was held on the 11th inst., at the Queen's Hotel. The President of the Society (Mr. J. W. Beaumont) was in the chair. Supporting him were the President of the Royal Institute of British Architects (Mr. Aston Webb), Mr. Thomas Kay, Mr. Alfred Darbyshire, Colonel Eaton, Mr. Henry T. Hare (President of the Architectural Association), Mr. Butler Wilson (President of the Leeds and Yorkshire Architectural Society), and others. The President proposed "The Royal Institute of British Architects." Mr. Aston Webb, replying, made a sympathetic reference to Mr. Alfred Waterhouse, whose name is so closely associated with Manchester as the designer of the Town Hall and Assize Courts, and who, his Manchester friends would be pleased to know, was enjoying a quiet and happy life. They could not but regret that a brain so active and a hand so busy had been stayed, and they accorded him a full-hearted sympathy in his retirement. Mr. Alfred Darbyshire proposed "The Manchester School of Architecture," to which Mr. T. Kay and Professor Capper replied. Professor Capper spoke hopefully of the prospects of the new school, and appealed to architects and the public for support. Mr. Aston Webb suggested that the authorities of Manchester would do well to take counsel with the Manchester Society of Architects in regard to public improvements.

SHEFFIELD SOCIETY OF ARCHITECTS.—The usual monthly meeting of this Society was held in the Lecture Hall of the Literary and Philosophical Society, Sheffield, on the 10th inst., Mr. T. Winder, Sheffield, presiding. A vote of condolence with the family of the late Mr. W. F. Hemsoll, a Fellow of the Society, was accorded by the meeting. Mr. Theodore Fyfe, of London, then gave a lecture upon the "Excavations in Knossos." He referrred to the fact that in the year 1900 Dr. Arthur Evans acquired full rights of digging over the central part of the Knossos Hill. Since then the work of excavation has proceeded steadily for four seasons, and there seems every prospect of a fifth. A great palace has been brought to light (continued the lecturer) larger than any others of the Mycenaean age, on the mainland of Greece, belonging to a period anterior to these, but in many ways historically connected with them. The evidences of an extensive town have also been found, in the vicinity of the palace. The amount of material that has been discovered is enormous. Probably no other site, either in Greece or Egypt, has yielded such a variety of small finds, many of which, as well as the architectural features of the palace, are new, and of the first interest. The term Minoan has been fitly applied by Dr. Evans to the earlier, central, style of Crete. The Minoan dynasty divides itself into early, middle, and late periods. The existing palace belongs to the later Minoan period, but building remains also exist of the middle period. This middle period produced the finest pottery known in the Ægæan—exclusively Cretan, and undoubtedly the main source of all later Ceramic styles known as "Mycenæan." Before Cretan exploration, from about 1500 to 1000 B.C., was generally accepted for the so-called "Mycenæan" age. The chief part of the existing palace at Knossos was probably all built before 1500 B.C., and stretches back beyond 2000 B.C.; the perfection of the Minoan style being probably reached at some time between these dates—about 1800 B.C. Two Egyptian finds at Knossos are evidence of intercourse between the earlier palace period and the Shepherd dynasties of Egypt. The later palace period is more or less contemporary with the Egypt of Thothmes III. In considering the plan of the Palace in detail, the first thing evident is its domestic character. There is no attempt at exact regularity or symmetry; on the other hand, everything seems planned for convenience and comfort. The western portion consists mostly of basement in its present state. Here, we have the more public and administration part of the building with ample magazines for stores, the judicial throne room, and to the west, a vast court with the great ceremonial entrance, where the king may have sat in the gate. The other principal entrance is on the north, and evidences show that a great roadway must have existed here. The eastern portion of the palace contained the domestic quarters of the king and his family; adjoining, we find palace workshops and stores, perhaps kitchen apartments, and magazines for utensils. Here, also, must have existed a great system of halls entering off the western court. From the importance of its fresco finds, Knossos deserves the title of a second Pompeii: the evidence that it affords a highly developed School of the Arts is fully borne out by other finds—works in ivory, crystal, gold, enamelled porcelain, pottery, and fine stone. An astonishing capability of working in any material is evident. The art of painted plaster is extended to the production of full-size reliefs, artistically superior to any hitherto known work of the period. This is all the more remarkable when we consider that this School of the Arts existed hundreds of years before the first beginnings of Greek civilisation. Another extremely important find consisted of some 1,600 clay tablets, inscribed with a highly developed system of writing. These chiefly appear to be palace archives, in the form of accounts. The appearance of the palace in its pristine glory must have been very magnificent, taking into account the large scale and beautiful workmanship of the painted plaster, the fineness and brilliancy of the colouring material, and the effect of judiciously contrasted colours. The only things which can be compared to its frescoes out of Egypt are some Roman paintings, certain Byzantine mosaics, and in our own time some coloured tile work, some frescoes by Puvis de Chavannes, and some example of the revival of coloured plaster relief. But the ancient examples often show a perfection of relief which Donatello might have envied, and a permanence and brilliance of colour which has remained quite unsurpassed. The lecture was illustrated by lantern slides, exhibited by Mr. J. Atkinson, of University College. On the motion of Mr. J. B. Mitchell-Withens, seconded by Mr. C. F. Longden, a hearty vote of thanks was accorded to Mr. Fyfe for his interesting and instructive lecture. —*Sheffield Independent.*

GLASGOW ARCHITECTURAL ASSOCIATION.—The fourth ordinary meeting of the Glasgow Architectural Association was held in the Hall of the Philosophical Society, 207, Bath-street, on Wednesday, the 9th inst., when a paper was read by Mr. Theodore Fyfe, architect to Dr. Evans' excavations at Knossos, which was mainly a repetition of that reported above as read before the Sheffield Society of Architects. A discussion followed the reading of the paper, in which Mr. Newberry, Mr. Bromhead, and others took part.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—A vote has just been taken of the members of the Birmingham Architectural Association upon the question submitted by the Council of the Institute of British Architects of the desirability of a scheme for registration of architects and their admission to the register by compulsory examination. There are 175 members of the local association, and the result was announced on the 11th inst. by the President (Mr. Arthur Harrison) at a meeting of the members of the Birmingham Association, held at the Norwich Union Chambers. The voting was as follows: 64 for, 12 against.

NORTHERN ARCHITECTURAL ASSOCIATION.—A meeting of the Northern Architectural Association was held on the 9th inst., at 36, Northumberland-street, Newcastle. Mr. J. W. Taylor (President) occupied the chair, and Mr. G. S. Aitken (Edinburgh) gave a lecture on "Bothwell Castle," with lantern illustrations. The following nominations were agreed to: Associate, Mr. L. G. Ekins, Jesmond; students, Mr. Ash (Gateshead), and Mr. A. G. Walton (Cullercoats). Votes of thanks brought the proceedings to a close.

ULSTER SOCIETY OF ARCHITECTS.—The annual meeting of this Society was held on the 8th inst., in the Ye Olde Castle Restaurant, Castle-place. In the unavoidable absence of Sir Thomas Drew, Mr. W. J. Gilliland (Vice-President) presided. The minutes of the last meeting having been read and confirmed, the Hon. Secretary (Mr. N. Fitzsimmons) read the report of the Council, which contained the following:—"The work of the past year, although not of the eventful character of previous years, has been none the less satisfactory in that the position of the Society has been materially strengthened, its influence extended, and the various matters affecting the welfare of the profession in this province carefully watched and its interests as far as possible safeguarded. The important question of the registration of architects was fully discussed at a general meeting, and the following resolutions were passed unanimously:—'That the absence of restriction of the use of the title "architect" to those properly qualified to use same is a great injustice to architects who are so qualified, and seriously retards the progress of architecture in Great Britain and Ireland.' 'That it is the duty of the Council of the Royal Institute of British Architects, as representing the profession, to make an immediate and serious effort to obtain statutory powers for the purpose of establishing such restriction.' Copies of these resolutions were sent to the Royal Institute of British Architects and to the Royal Institute of Architects of Ireland, and it is gratifying to be able to announce that the latter body, on the motion of one of your representatives, also carried these identical resolutions unanimously." Mr. Seaver (Hon. Treasurer) submitted a statement of account, showing a satisfactory balance to the credit

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of the Society. The reports were adopted, and the following officers were elected:—President, Mr. W. J. Gilliland; Vice-President, Mr. J. J. M'Donnell; Hon. Secretary, Mr. W. B. Fennell; Hon. Assistant Secretary, Mr. W. Hartley Patterson: Hon. Treasurer, Mr. H. Seaver; Council, Messrs. N. Fitzsimmons, F. H. Tulloch, and R. M. Young; Associate Members of Council, Messrs. T. Houston and E. R. Kennedy; Auditors, Messrs. J. St. J. Phillips and Vincent Craig. The proceedings then terminated. The annual dinner was subsequently held in Ye Olde Castle Restaurant, Mr. Gilliland presiding.

ARCHÆOLOGICAL SOCIETIES.

Bristol Archæological Society.—By permission of the committee of the Literary and Philosophical Club, the first meeting of the winter session of the local members of the Bristol and Gloucestershire Archæological Society was held on the 9th inst. at the club. Mr. F. F. Fox, President of the Council, was in the chair. The President explained the objects of the scheme, which were to promote local archæology, and to pleasantly bridge over the long interval between the autumn and spring meetings. In this way, too, some interesting papers should be provided for the proceedings. They were much indebted to Mr. J. E. Pritchard, the Bristol hon. secretary, for taking up the movement and bringing it so successfully to that stage.—Mr. Pritchard gave a summary of the letters of approval of the scheme, and said plenty of material had been promised in the shape of papers, etc., for three or four evenings during the winter. Canon Bazeley, the hon. general secretary, congratulated Mr. Pritchard and the Bristol members of the Society on this excellent start, and said the example had inspired Gloucester members to do likewise. He hoped that Cheltenham, Stroud, and other towns would follow. The President handed round a copy of a rare seventeenth century book, printed at Rome—"Carminum Jacobi Albani Ghibbes"—bound in vellum and containing a quantity of verse. Mr. W. R. Barker showed and described the bronze dagger found recently at Avonmouth, between Dunball Island and the dock. Mr. Pritchard exhibited bronze weapons found locally. Mr. W. R. Barker then read a paper on "The Warden's Horn of the Manor of Billeswicke," after which Mr. Were offered some criticisms of the Merchant Venturers' Arms, which he said departed in several details from the grant. The picture on the grant, he surmised, was not the original drawing, but one painted over it. The two important departures were the introduction of a ducal crown and the variation of the lion passant to a pion passant guardant. He also protested, in the interests of pure heraldry, against the unauthorised representations of the Arms of the City and the See. Mr. Pritchard then read a paper on "The Mercers and Linen Drapers' Company of Bristol," prepared by Mr. J. Latimer. Dr. Alfred Harvey read a paper on "Agrarian Castles of Went," which dealt with the number of castles between Chepstow and Newport—three in Lower Went, Caldicott, Pencoed, and Penhow; and three in Upper Went—Dinham, Llanvair, and Castroggy. Two others are mentioned in early records—Talgarth and Llanvaches—of which there are no remains. Caldicott was at one time a Royal, and always more than an agrarian castle; the others were all small, consisting of a house and a fair-sized enclosure, protected by strong curtain walls, where tenants or dependents could drive their herds in disturbed times. Penhow alone has a small keep, or peel-tower, though probably Dinham had the same feature. The others were all quadrilateral, with drum-towers at the angles, and with the residential buildings erected against one curtain wall, which at Castroggy and Llanfair was pierced by the windows of the hall. There was no trace of a chapel at any, and a gatehouse at Pencoed only, and that a later one. Most, if not all, had later additions. Pencoed, on the summit of the low range of hills south of the highway, is said to be the earliest. It belongs to the time of Henry III., and was in 1271 the property of De Mora, or Moore, from whose family it passed to the Morgans, who held it to the seventeenth century. It was garrisoned for the King during the Civil War. Pennow, the finest in situation, overhanging the high road, is also the most picturesque and interesting. In the thirteenth century it belonged to the Seymours, or St. Maurs, and was the cradle of both the Somerset and Hertford families. Llanfair, built in the thirteenth century by Robert Pagan, or Fitz-Payn, became afterwards the property of the wealthier Mont Leemer (son-in-law of Edward I.) and his descendants, the Montacutes and Nevilles, and at their hands received large additions, becoming a castle of fair size. Castroggy, the only castle on the northern slope of Wentwood, was built by Roger Bigod, Earl of Norfan, and Lord Manchu, in the reign of Edward I. It is a small castle, near the old road through Caerwent to Usk, in a position of much beauty, but not very accessible, and is much ruined Of the little Castle of Dinham, in a secluded coombe near Caerwent, little remains but a shapeless heap of stones. Apart from their individual and local utility, these castles formed part of a systematic plan for guarding the high road into South Wales, the one landing-place between the Wye and the Usk, and the road from Bristol and the South to Usk and Central Wales.—Votes of thanks were given to the contributors and to the President.—*Bristol Times.*

THE SANITARY INSTITUTE:

THE FLOODING OF BASEMENTS IN LONDON BY SEWAGE.

A sessional meeting of the Sanitary Institute was held on Wednesday, the 9th inst., at the Parkes Museum, when a discussion took place on "The Flooding of Basements in London by Sewage." The discussion was opened by Mr. Maurice Fitzmaurice, C.M.G., M.A., Engineer to the London County Council, followed by Dr. H. R. Kenwood, M.B., and others. The chair was occupied by Sir Benjamin Baker, K.C.M.G.

Mr. Fitzmaurice said the subject was a large one. There were two kinds of drainage in London: the main drainage, which the London County Council deals with, and the local drainage, which was in the hands of the Borough Councils, the City of Westminster and the Corporation of London. Both dovetail into each other, and were absolutely dependent one on the other. If the County Council were not able to carry off the drainage from the local sewers, there was flooding of both the local sewers and the L.C.C. sewers, but if the local sewers were not able to do so, and the sewers of the L.C.C. were, there was flooding only in the local sewers: the local sewers might be overcharged and inadequate, and the County Council sewers with little in them. Although he was officially connected with the County Council, yet he wished to speak on that occasion as a private individual. He had, perhaps more than any one in London at the present time, a knowledge of the amount of flooding which occurred during last summer. The owners of nearly every basement which had been flooded had written to the L.C.C., most of them demanding compensation, and those letters were passed on to him as the Council's Engineer. But those owners had also written to the Borough Councils, and those letters, too, had been sent to him, and he had had two letters of complaint about each flooding. As a result of those letters, a large map had been made showing all the streets on each side of London. The position of those basements about which complaint was made was indicated on that map, and thus a definite record was obtained in regard to each district, and it was possible in this way to see at a glance where the flooding had been most severe. It was possible to judge from the map how very extensive the flooding had been this last summer. On the north side of the Thames, the Boroughs which had suffered most were Hammersmith, Kensington, and Hackney, and on the south side, Battersea, Wandsworth, and Southwark, and the floodings had been among poor people who were least able to bear the cost resulting from their cellars being flooded.

He must divide the floodings into two classes:—(1) Those floodings which were due to the exceptional rainfall of this year, and which had never been flooded before, and (2) those which had been flooded before for several years in succession, and in which, in some cases, the flooding had been increasing year by year. As to the first class, the rainfall this year had been absolutely exceptional, and the fall for the year so far exceeded 40 in. On one day this year there was a fall of 3½ in. in the twenty-four hours in London, on four or five days 1 in. of rain had fallen, and on twelve days during three months there had been more than ½ in. of rain in London. From the G.W. Railway the Thames on several occasions could be seen as a lake, the water extending right up to the houses, with the result that the cellars were flooded. He had not seen it proposed that a second river should be made to carry off this water, but that would be just as sensible as were some of the proposals in regard to the floodings of these basements. To ask the County Council to deal with floodings consequent upon this exceptional rainfall, which might only occur once in 100 years, was obviously unreasonable.

The floodings of the second class were those which had occurred during past years in districts where undeveloped building land had been rapidly covered by houses, and where, in the case of exceptional or heavy rainfall, there was an increasing strain upon the sewers. He thought an attempt should be made to put an end to such floodings, and he wanted it to be known what powers the L.C.C. had in regard to low-lying land. The Council had the right where houses had been built on land which was below the level of high water, to insist that no basement snould be connected with the sewers, and that the basements should be made watertight. That completely prevented these floodings, and he thought it ought to be considered whether basements in other parts of London ought not to be dealt with in the same way. With basements in old houses it was not possible to do this, for although those basements might be cut off from the sewers, there would be floodings through the floors if they were not watertight.

Mr. Fitzmaurice then described the way in which the main drainage of London had developed. Before 1855 the drainage of London delivered into streams which delivered into the Thames, and, of course, the Thames became very much polluted. Moreover, during high water it was not possible for the sewers to discharge into the Thames, and consequently it backed up and lay stagnant. Sir J. Bazalgette then constructed intercepting sewers, and the sewage was carried to Barking and Crossness on the north side of the river. Sir Joseph also built a large number of main sewers, the total length of which, now under the control of the Council, was about 300 miles. This provision made it easy to deal with the sewage, but the difficulty was the storm water, and Sir Joseph dealt with this by a system of overflow storm sewers which delivered into the Thames, and pumping stations were built at certain places in order that the storm water might be lifted into the river at high water. One could not but admire this arrangement, and Sir Joseph ought to have credit for his great foresight in providing a scheme with which, until about 1890, there was little to complain about in regard to the sewering of London. The population of London at the time Sir Joseph designed these works was about 2½ millions, and he designed those works for a population of 3½ millions, and ¼ in. of rain in twenty-four hours. We know that the population is about 5 millions, and that the rainfall entering the sewers had greatly increased. The area had remained constant, but as it had got built over, and as the previous soil had been built over, the rain went into the sewers much more rapidly than it used to do. The sewage was not the difficulty; but the suddenly increased storm-flow was.

One of the first acts of the L.C.C. was thoroughly to investigate the question of the main drainage of London, and for that purpose they consulted Sir Benjamin Baker and Sir Alexander Binnie. These engineers made their Report to the Council in 1891, and the Council gave orders that the necessary plans should be got out in accordance with that Report. In 1895 the Council fully considered the plans, and many members of the Council thought at that time that instead of making an enormous new system of main drainage it would be possible to deal with the storm water alone by taking it from the flooded areas, and the construction of large intercepting sewers each side of the river was therefore put off for some time. That, as was known, did not prove successful. Another reason which made the Council delay the construction of the large works referred to was that at that time the question of bacterial beds was coming up, and it was not desired to do anything which would prevent the Council taking full advantage of any bacterial system which might be adopted, and he thought the Council were wise in not taking up any bacterial system at that time, or even now. Even now there were many people who were not sure what was the right system

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of bacterial treatment. There were several systems and there were advocates of each, and he did not think finality had been reached in regard to bacterial beds, though he hoped there soon would be. He was not oposed to bacterial systems—quite the reverse—but he wanted to be certain before recommending the Council to adopt any system. In 1895 the Council carried out many storm-relief sewers, and they strengthened the pumping power of the various stations, but the result was not what had been expected, and in 1899 proposals were placed before the Council by their Engineer, and these were now being carried out. The Council had to take a much broader view of the matter than might appear to be right in different districts. It was quite possible to relieve floodings in Islington, for instance, but that would immediately increase floodings in Hackney. It was quite easy to relieve floodings in Battersea, and increase them in Lambeth. The County Council had to consider the matter as a whole, and also the purity of the river. The Council decided in 1899 to build new outfalls and new intercepting sewers, and gradually to work westward. As to the Thames, he thought there were very few complaints now as to its purity. He was an advocate for sending the storm water into the Thames, but only when the capacity of the sewers was increased sufficiently to leave ample room for the first storm water to be taken down to the outfalls. After that first water was taken away, the rest could be discharged into the Thames, for it was practically pure rain water. The first flow of storm water off the street was as bad as any sewage which went into the sewers, and it would be a monstrous thing to allow this to go into the Thames. The Council sent an enormous quantity of sludge out to sea at great cost, and if they sent the first storm water into the river, they would be wasting that money. People seemed to think that little was being done, and had been done, as to the main outfall sewers, but this could only be due to ignorance; on the north and south sides of the river great works had been or were being carried out. A work like the main drainage of London could not be built up at once; work involving an expenditure of 3,000,000*l.* or 4,000,000*l.* could not be carried out in the course of a year. The programme of work in 1899 involved an expenditure of 1,250,000*l.* in relief works, and up to the end of 1903 the Council authorised the expenditure of 320,000*l.* As a matter of fact, 500,000*l.* had been spent, and during the next two years they expected to spend another half million on new sewers. This was a rate of work which no one need be ashamed of. The Council were doing their best to deal with the evils which existed, but that would be of no avail if the Local Authorities did not see that their own sewers were capable of dealing with storm waters. If they did not, there would be floodings in the local sewers, while the County Council's sewers would be half empty.

Dr. Kenwood, Medical Officer of Health for Stoke Newington, said he had only just learnt how much energy the Council had recently been displaying in the matter. But he admitted that the London County Council during the last year or two had displayed some energy in carrying out relief works; still, the dreadful and disgusting experience of this year would have been spared the inhabitants in London if the London County Council had not required ten years of complaints, memorials, and reports from their officers, a mandamus issued by the Lea District Board, and a threat to bring the Council's faults in front of the courts of law, before it could bring its mind to act. All the complaints had not reached the Council, for people felt it was hopeless to complain. Workrooms, living-rooms, sleeping-rooms, underground bakehouses, and cellars had been flooded from time to time with 1 in. to 1 ft. of sewage, and oil-cloth, carpets, and other goods were spoilt or injured. These flood-waters left behind them a coating of evil-smelling sewage. Medical officers of health and others felt very strongly the evils of the flooding of the basements of London houses with this sewage. The Council had no doubt done some excellent work, but this necessary sanitary work of London had been shelved too long, while more attractive schemes which appealed to the mass of the Council's critics were dealt with. It was only, he concluded, during the last three years that the London County Council had fully appreciated the great importance of this work.

Dr. Rideal proposed a vote of thanks to Mr. Fitzmaurice and Dr. Kenwood. He said that low-lying land was rapidly being built on which had been subject to this flooding in recent years, and that land, which would be made land, would be infected with organisms, and it ought to be regarded as an insanitary area. Therefore the delay of the County Council in regard to its drainage works had caused this remaining building land of London to be looked upon as suspect by sanitary reformers. The only remedy he could see for preventing the serious effects of floodings in basements was the adoption of some system of disinfection after the flooding. The greasy film which was left behind by the water was allowed to dry, and then it was blown about. Fortunately, this summer had been a cold summer, and there had been no hot suns to dry these deposits quickly, and people had had time to clean away much of the deposit that was left. The "dock-ising" of the Thames might modify the problem the County Council were dealing with. He confirmed all that had been said about the unsavoury character of the first storm flushings of London streets.

Mr. W. Kaye Parry seconded the vote of thanks, and referred to the legal aspect of the matter. He had come to the conclusion that the London citizen was long-suffering; and that the sort of thing that had been happening here would not have been so quietly borne in Ireland. In fact, in the north of Ireland a Sanitary Authority was brought into the courts for flooding the basements of some houses, the owners of which alleged that they had been injuriously affected by the sewers which the Authority had constructed. The case was dismissed on its merits, but the facts showed that there was a question as to how far authorities were liable for injury.

Dr. Butler, of Willesden, said he was medical officer of a district a large part of which drains into the metropolitan sewers, but a district which as yet was not represented on the L.C.C. Quite recently these floodings had become acute in connexion with underground bakehouses, and he had taken up the position that no bakehouse which was liable to floodings should be licensed, which, of course, was a hardship to the owners. He had seen 3 ft. of sewage in rooms in private houses, sewage in bakehouses mingling with the flour bags, beer barrels floating in cellars, and it had come to his knowledge that in the bar above sewage and not pure beer had been drawn. It was the quick, heavy rainfall which led to flooding, and frequently after the rain had ceased. He did not agree with Dr. Rideal as to disinfectants being a remedy. It was quite impossible for any disinfectant to reach all the nooks and crannies above and under the floors where the flood deposits were. In the portion of his district which was subject to flooding the death-rate was about twice that of the rest of the district.

Mr. C. H. Cooper, Wimbledon, exhibited a large diagram in order to show that floodings due to exceptional rainfall had been as great in other years. Remedial works ought not to be left off because of a remarkable rainfall this year. He thought steps ought to be taken to prevent low-lying lands being built on. A large amount of storm water could very well be discharged into the Thames on both sides of the river.

Mr. Dodd said he thought the Council were responsible for the present state of affairs, and he moved the following resolution:—"That this meeting is of opinion that the flooding of London basements with sewage is a great menace to the public health, and regrets that this menace has been allowed to continue for so many years, and it requests the Council of the Institute to urge upon the London County Council to proceed with all possible expedition with the completion of the necessary works upon the main sewers, and relieve London from its present insanitary state."

Mr. Loveday seconded, and Mr. Hodgson having spoken, the vote of thanks was put to the meeting, and carried.

Mr. Fitzmaurice and Dr. Kenwood having replied, the motion moved by Mr. Dodd was put and agreed to.

A vote of thanks to the Chairman concluded the meeting.

THE STUDENT'S COLUMN.—In consequence of the pressure on our columns our Student's Column article is held over until next week.

THE LONDON TOPOGRAPHICAL SOCIETY.—For want of space, our report of the meeting on Wednesday of the London Topographical Society is held over until next week.

ENGINEERING SOCIETIES.

INSTITUTE OF SANITARY ENGINEERS, LTD.—On Saturday last a meeting of the members of the Institute of Sanitary Engineers residing in Lancashire and the West Riding of Yorkshire was held at the School of Technology, Sackville-street, Manchester, with the object of forming a centre in that district. The chair was taken by Dr. J. B. Wilkinson (M.O.H., Oldham), Messrs. E. R. Palmer, N. W. Hoskins, and Arthur E. Ashby (Secretary) being present as a deputation from the London office. The Centre was declared duly formed for the purpose of furthering the interests of the members in that district, and it was unanimously agreed that the Centre would be beneficial to the objects of the Institute in raising the interests of the profession. Dr. J. B. Wilkinson was elected chairman, and Mr. H. L. Jaques (Manchester) Vice-Chairman for the ensuing year, who, together with the following members, will form the local committee:—Messrs. J. Ashton (Manchester), Honorary Local Secretary; G. V. Blaikie, Manchester; P. Leonard, Great Crosby; P. Mooney, Manchester; J. E. Entwistle, Bolton; F. Cartlidge, Leeds; C. R. Southwick, Sheffield; J. M. Lindsay, Manchester; and J. J. Quirk, Leeds.

SOCIETY OF ENGINEERS.—The forty-ninth Annual General Meeting of the Society of Engineers was held on Monday, December 14, at the offices of the Society, 17, Victoria-street, Westminster. The chair was occupied by Mr. J. Patten Barber, President. The following gentlemen were duly elected by ballot, as the Council and Officers for 1904, viz.: As President, Mr. David Butler Butler; as Vice-Presidents, Messrs. Nicholas James West, Maurice Wilson, and Richard St. George Moore; as Ordinary Members of Council, Messrs. Joseph Bernays, George Austin Pryce Cuxson, George Abraham Goodwin, William Henry Holttum, Henry Sherley-Price, Edward John Silcock, Joseph William Wilson, and George Green; as Honorary Secretary and Treasurer, Mr. George Burt; as Honorary Auditor, Mr. Samuel Wood, F.C.A. The President announced that the following premiums had been awarded by the Council for papers read during the past Session, viz: The President's Gold Medal to Mr. Douglas Mackenzie for his paper on "Motor Transport for Goods"; the Bessemer Premium of Books to Mr. Robert J. Thomas for his paper on "Road Maintenance and Administration"; and a Society's Premium of Books to Mr. Albert Gay for his paper on "Mechanical Stokers for Electricity Generating Stations." A vote of thanks was accorded to the scrutineers, and the proceedings terminated by a vote of thanks to the President, Council, and officers for 1903, which was duly acknowledged.

COMPETITIONS.

BOARD SCHOOL, CLARKSFIELD, OLDHAM.—The design of Messrs. Cheers and Smith, architects, Blackburn, have been placed first in open competition for a new Board School, to accommodate 1,200 children, at Clarksfield, Oldham, and to cost 16,000*l.* The second place has been given to Messrs. Woodhouse and Willoughby, architects, Manchester.

FREE LIBRARY, TAMWORTH.—In this competition for a new free library, Tamworth, the design placed first was by Mr. E. R. Danford, A.R.I.B.A., architect, Northampton; the second premium was awarded to Messrs. Herbert T. Buckland and E. Haywood Farmer, architects, Birmingham; and the third premium to Messrs. Hodge and Haswell, architects, Teddington. There were 163 competitors, and the assessor was Mr. Jethro A. Cossins, architect, of Birmingham.

A NEW BOOK ON SILVER WORK.—Mr. Batsford has for some time had in preparation an important folio volume, entitled "Old Silver Work, chiefly English, from the Fifteenth to the Eighteenth Centuries," edited by Mr. Starkie Gardner, F.S.A., with 120 collotype plates, which he intended to issue to subscribers on the 12th instant. The edition was, however, so seriously damaged in the recent fire at Messrs. Leightons, the bookbinders, that he is obliged to defer the issue on account of the reprinting which has become necessary. The subscription price is five guineas, but by some curious error it was mentioned in several newspapers as fifty-four guineas.

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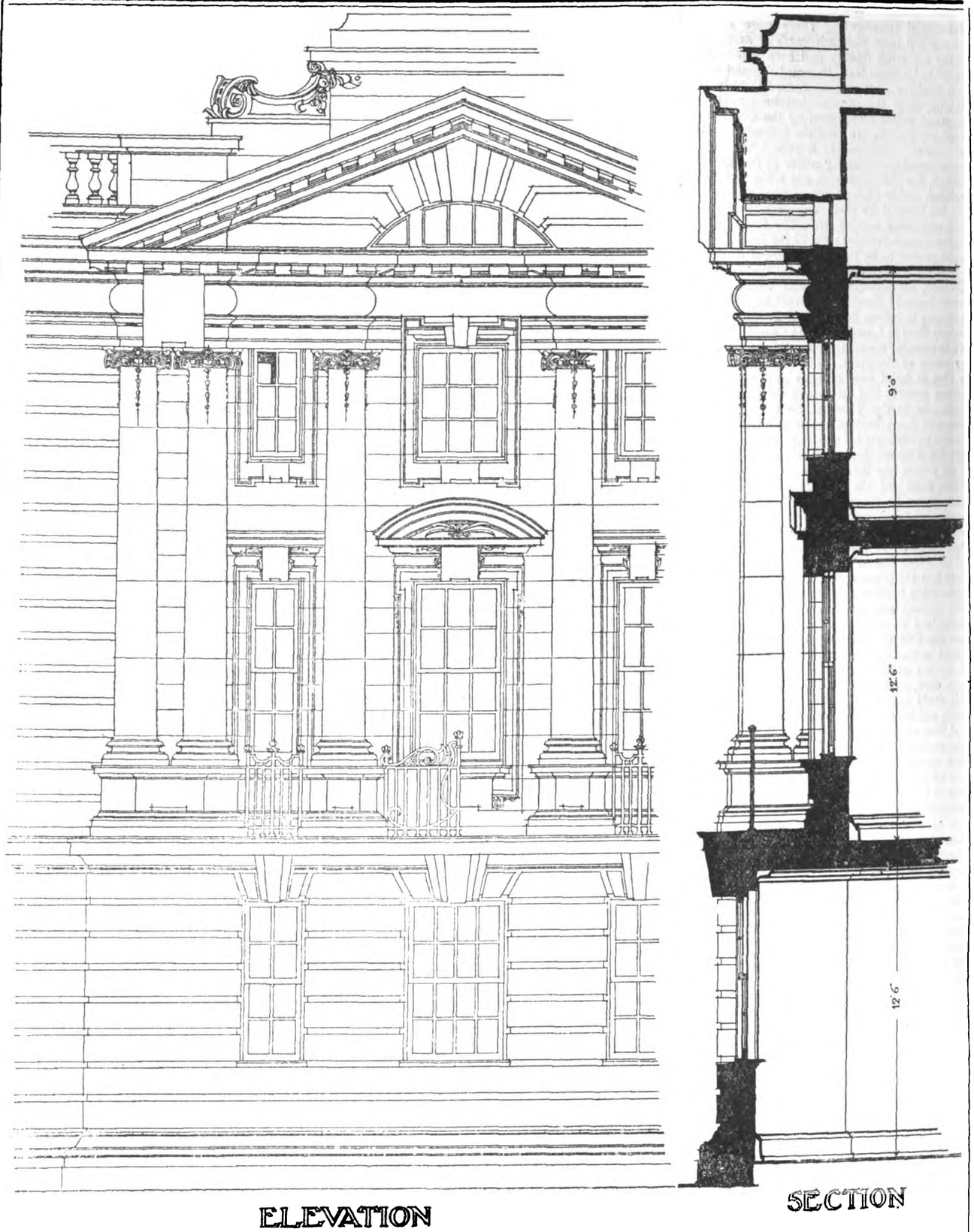

ELEVATION SECTION

Stockport Town Hall Competition. Details of Firs. Premiated Design.

Illustrations.

DESIGN FOR STOCKPORT TOWN HALL.

WE give this week the perspective view and the two principal plans of the design by Mr. A. Brumwell Thomas, which has received the first premium in the competition for the proposed new Town Hall for Stockport. We also give a reproduction of the detail elevation and section.

We commented fully on the design in the article on the competition in our last week's issue.

NEW SCHOOLS FOR GILLINGHAM, KENT.

This design was placed first in the competition recently held for the buildings, the site of which is an exceedingly difficult one. The entrances are quite separate, the boys entering from Napier-road, and the girls and infants from Beresford-road, each department accommodating 300 children.

The buildings are proposed to be fireproof throughout, the roofs being formed of steel principals and purlins, slabs of uralite being placed between the purlins and covered with tiles on battens; the ceilings to be plastered on expanded metal lathing. The exterior is to be faced with stock bricks and red brick dressings, with salt-glazed dado to the playgrounds, and a similar dado to be run round the interior, including staircases and corridors. Mr. J. Hatchard Smith is the architect.

SKETCHES OF METAL WORK.

The Montague Fordham Gallery, started some years ago by Mr. Montague Fordham for the exhibition and sale of the best examples of English handiwork, has recently taken over the workshops and personnel of the Artificers' Guild, an association formed by Mr. Nelson Dawson and Mr. Edward Spencer for the production of metalwork. The gallery is now showing an interesting collection of work designed by these artists, examples of which, from the drawings of Mr. Curtis Green, appear in our present issue, and we think that the designs we reproduce justify the hopes of the artists and craftsmen concerned that in the attempt to revive the spirit and tradition of mediæval handicraft a high standard of practical efficiency has been obtained.

A large proportion in our illustration of the designs are executed in forged steel with an armour bright finish, which provides an admirable contrast to the dull brass and toned bronze of the door furniture and smaller fittings.

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THE LONDON COUNTY COUNCIL.

The usual weekly meeting of the London County Council was held on Tuesday, in the County Hall, Spring Gardens, S.W., Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, the following applications were agreed to: Battersea Borough Council 4,107*l.*, for contribution to street improvements; and 1,187*l.*, for purchase of land; Stepney Borough Council 3,030*l.*, for street improvement; and 600*l.*, for poor law purposes. Sanction was also given to St. Pancras Borough Council to a loan for 5,764*l.*, for street lighting purposes.

By-laws: Vehicular Traffic.—On the recommendation of the Local Government and Taxation Committee the following was agreed to:—

(*a*) That the by-law made by the Council on February 24, 1903, relative to vehicular traffic be repealed.

(*b*) That the following by-law for the good rule and government of the County of London be made by the Council in pursuance of the provisions of section 23 of the Municipal Corporations Act, 1882, and section 16 of the Local Government Act, 1888, and do come into force on May 1, 1904; that the seal of the Council be affixed to three copies of the by-law; and that, in accordance with statute, one copy be forwarded to the Secretary of State for the Home Department—

> "No owner of a vehicle shall drive such vehicle or permit the same to be driven or to be upon any highway unless it be so constructed that the driver thereof shall have a full and uninterrupted view of the traffic of such highway in front and abreast of him on each side, and no person who shall be driving any vehicle upon any highway shall occupy such a position as will prevent or interfere with his having such full and uninterrupted view as aforesaid.
>
> "Any person who shall offend against this by-law shall be liable for each offence to a penalty not exceeding forty shillings."

Main Drainage Extension.—The offer of Messrs. Glenfield and Kennedy, Ltd., to supply, deliver, and erect at the Crossness Outfall for the sum of 805*l.*, an additional penstock, 11 ft. 6 in. in diameter, as an extra upon their existing contract with the Council, was accepted.

Edwardes-square.—On the recommendation of the Parliamentary Committee the Edwardes-square Protection Bill was approved.

Long Grove Asylum: Diversion of Watercourses.—It was agreed, on the recommendation of the Asylums Committee, that the Council give up to the Epsom Urban District Council a strip of land forming part of the Horton Estate on the north-western side of Horton-lane, for the purpose of widening Horton-lane, conditionally on Epsom Urban District Council agreeing to the diversion of certain watercourses on the estate.

Clapham Car-Shed.—On the recommendation of the Highways Committee, it was agreed that, should Messrs. Kirk and Randall complete the erection of the second portion of the Clapham car-shed before the date, November 5, 1904, named in their contract with the Council, they be paid a bonus, at the rate of 30*l.* a week, in respect of the time between the date of completion and that specified in the contract.

Improvements.—On the recommendation of the Improvements Committee, it was agreed:—

That the estimate of 1,483*l.* submitted by the Finance Committee be approved; that the Council's statutory consent be given to the widening of Upper Richmond-road, proposed to be undertaken by the Council of the Metropolitan Borough of Wandsworth; and that a contribution be made on the usual conditions of one-third of the net cost of the improvement, provided that should the total net cost exceed 4,450*l.*, the Council's contribution will be limited to 1,483*l.*

That the offer of the Council of the Metropolitan Borough of Battersea to undertake, at an estimated cost of about 2,920*l.*, the paving and other works connected with the widening of Battersea-rise, authorised by the London County Council (Improvements) Act, 1900, be accepted.

Amendment of the London Building Act.—On the motion of Mr. Johnson, seconded by Mr. Wilberforce, it was agreed that it be referred to the Building Act Committee to consider, in connexion with the proposed amendments of the London Building Act, the desirability of providing for further control over the erection of cranes which, when at work, may overhang a public thoroughfare.

The Council then adjourned.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Hackney, North.—A one-story addition at the rear of No. 150, Tottenham-road, Dalston, with external walls at less than the prescribed distance from the centre of the roadway of Culford-mews (Mr. G. Chamberlain).—Consent.

Lewisham.—The conversion of part of the dwelling-house, No. 54, Laleham-road, into a shop (Mr. D. E. Alflatt).—Refused.

Lines of Frontage and Projections.

Kensington, North.—An iron and glass covered way in front of No. 13, Pembridge-crescent, Kensington (Messrs. Davis and Emanuel for Mr. I. Davis).—Consent.

Lambeth, North.—A two-story addition over the existing one-story building at No. 20A, Old Paradise-street, Lambeth (Mr. A. E. Symes for Mr. J. Reed).—Consent.

Chelsea.—Retention of a wooden oriel window on the ground floor level of No. 31, Sydney-street, Chelsea (Mr. S. H. Egan for Mr. A. P. King).—Consent.

Hackney, Central.—One-story shops upon the forecourts of Nos. 530, 532, and 532A, Kingsland-road, Hackney (Mr. A. K. Stephens for Mr. C. Housden).—Consent.

Hampstead.—An iron and glass washing shed at No. 43, Frognal, Hampstead (Mr. A. Conder for Mr. R. W. Wilkinson).—Consent.

Hampstead.—A motor-house at the rear of No. 160, Fordwych-road, to abut upon Ronduroad, Hampstead (Messrs. Done, Hunter, and Co. for Mr. W. Jones).—Consent.

Lewisham.—Wood and tile pents over the entrances to seventeen houses on the north-east side of Longhurst-road, Lee (Mr. A. Marsh).—Consent.

Marylebone, East.—Four three-story oriel windows in front of buildings on the western side of Albert-road, Regent's-park, at the corner of High-street, St. Marylebone, on the site of Portland-terrace (Mr. F. M. Elgood for Mr. J. A. Michell).—Consent.

Strand.—Retention of an iron and glass illuminated sign over the entrance to Kissel's Tivoli restaurant, Strand (Mr. F. Kissel).—Consent.

Islington, East.—That the Council do make no order upon the application dated November 24 of Mr. F. J. Garlick on behalf of Messrs. C. W. Matthews and A. E. Bailey for permission to retain four bay-windows at the rear of a block of residential flats on the site of No. 14, Highbury-crescent, Highbury-fields, Islington.—Agreed.

Bethnal Green, North-east.—A one-story shop upon the forecourt of No. 394, Hackney-road, Bethnal Green (Mr. A. H. Henderson for Mr. H. Warden).—Refused.

Hackney, South.—A building, with bay-windows and a one-story shop, to abut upon the west side of Chatsworth-road and north side of Elderfield-road, Clapton (Mr. G. Billings for Mr. R. R. Sidnell).—Refused.

Strand.—A building at Nos. 27 to 33, Charing Cross-road, Strand, with a projecting shop front (Messrs. Wimperis and Best for Mr. J. B. Wells).—Refused.

Hackney, Central.†—A one-story show-room addition upon the existing one-story shops at Town Hall-buildings, Mare-street, Hackney, abutting upon The Grove (Mr. J. Hamilton for the Hackney Furnishing Co., Ltd.).—Refused.

Islington, North.†—A motor-car building at No. 56, Crouch-hill, Islington, to abut upon Blythwood-road (Messrs. Dove Brothers for Mr. F. L. Dove).—Refused.

Width of Way.

St. Pancras, North.—Permission to retain forecourt walls on the eastern and southern sides of Greenwood-place, Highgate-road, St. Pancras, at less than the prescribed distance from the centre of the roadway (Mr. J. P. Crosby for Messrs. Maple and Co., Ltd.).—Consent.

Limehouse.—A workshop upon the site of No. 1, Nightingale-lane, Limehouse, with external walls at less than the prescribed distance from the centre of the roadway of the street (Messrs. Watts, Johnson, and Co. for Mr. C. Morrow).—Consent.

Wandsworth.—The formation of an entrance in the iron fence on the west side of Churchlane, Tooting (Messrs. A. and C. Harston for the Metropolitan Asylums Board).—Consent.

Limehouse.—Two water-closets on the forecourt of the Meeting House, Brook-street, Ratcliff (Mr. R. Saunders for the Society of Friends).—Refused.

Peckham.†—Permission to retain the forecourt fences in front of four houses on the east side of Albert-road, Peckham, at less than the prescribed distance from the centre of the roadway of the street (Mr. G. E. Hubble).—Refused.

Width of Way and Line of Frontage.

Limehouse.†—A one-story building in the playground of Dr. Barnardo's Home, on the east side of Bower-street, Stepney (Mr. R. H. Hill).—Refused.

Width of Way and Construction.

Poplar.†—A wood and iron building at Union Wharf, on the south side of Orchard-place, Poplar (Mr. J. Richardson).—Refused.

Space at Rear.

Hackney, North.†—A modification of the provisions of section 41 of the Act, with regard to open spaces about buildings, so far as relates to the proposed erection of Nos. 11, 13, 15, and 17, Alcester-crescent, Mount Pleasant-lane, Hackney, with irregular open spaces at the rear (Mr. J. Hamilton for Mr. W. W. Hayworth).—Consent.

Chelsea.—A modification of the provisions of section 41 of the Act, with regard to open spaces about buildings, so far as relates to the proposed erection of buildings on a site abutting upon the north-west side of Basil-street and east side of New-street, Chelsea (Mr. R. Bennett).—Refused.

Line of Frontage and Space at Rear.

Battersea.—A deviation from the plans approved on the 3rd day of November, for the erection of three buildings on a site on the north-west side of Battersea Park-road and south side of Home-road, Battersea, so far as relates to an increase in the height of the westernmost building (Mr. E. Cannell for Mr. F. Priddis).—Refused.

Deviation from Certified Plans.

Westminster.—A deviation from the plans approved on the 7th day of November, 1899, under section 43 of the Act, for the rebuilding of the "Feathers" public-house on the site of Nos. 32 and 33, Great Chapel-street, Westminster, so far as relates to an extension over the roof of such building of a portion of Queen Anne's-chambers adjoining (Messrs. Rolfe and Matthews).—Consent.

Whitechapel.—Deviations from the plans certified by the District Surveyor under section 43 of the Act, so far as relates to the proposed rebuilding of the "Archers" public-house, No. 24, Osborne-street, Whitechapel, at the corner of Old Montague-street (Mr. J. D. Scott for Mr. J. A. Goddard).—Consent.

Means of Escape at Top of High Buildings, and Projections.

Strand.—Means of escape in case of fire proposed to be provided in pursuance of section 63 of the Act, on the fifth story of No. 7, Golden-square, Strand (Mr. L. V. Hunt for Messrs. J. B. Ellison and Sons, Ltd.).—Consent.

Strand.—A projecting balcony in front of Nos. 6 and 7, Golden-square, Strand (Mr. L. V. Hunt for Messrs. J. B. Ellison and Sons, Ltd.).—Consent.

Cubical Extent and Construction.

Woolwich.—An addition to a "gutta-percha covering" shop at the works of Messrs. Siemens, Brothers, and Co., Ltd., Harden's-Manorway, Plumstead (Messrs. Siemens, Brothers, and Co., Ltd.).—Refused.

Dwelling-houses on Low-lying Land.

Greenwich.—Three dwelling-houses on low-lying land situated on the north side of Trafalgar-road, Greenwich (Mr. E. Mills).—Consent.

Rotherhithe.—Six dwelling-houses on low-lying land, situated on the east side of Bush-road, Lower Deptford-road, Rotherhithe (Mr. J. H. Bethell).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

METROPOLITAN ASYLUMS BOARD.

THE usual fortnightly meeting of this Board was held at the offices, Victoria Embankment, on Saturday last.

Among the correspondence received was an order from the Local Government Board authorising the execution of alterations and additions at the Fountain Hospital at a cost of 15,000*l.*

The General Purposes Committee reported that a settlement had been arrived at in the case of the Managers *v.* Harmsworth Bros., which was an action for an injunction and damages against the proprietors of the *Daily Mail* in respect of nuisance caused by the noise and vibration of their machinery. The settlement arrived at was that the defendants shall keep closed at all times the two sets of iron doors in the basement internal wall of their premises, known as Harmsworth Buildings; the defendants to put and keep in repair the felt with which they have covered the said wall dividing the premises; the defendants to keep shut down and refrain from working the said dynamo and print-

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ing presses between the hours of 7 a.m. and 7 p.m. every day henceforth, and the defendants to keep closed the windows next to the plaintiffs' premises in the stereotyping-room of the defendants' premises. The defendants to pay the plaintiffs' cost of action as between solicitor and client, which are agreed at 52*l.* 10s. The Board consented to and confirmed this agreement.

South Eastern Hospital.—The Hospitals Committee reported that, pursuant to reference of November 11 last, they had had before them the Local Government Board's letter of November 10, in which that authority asked to be informed of the result of the Managers' consideration of the matters referred to at the recent interview between the Chairman of the Hospital Committee, the Managers' architect, the Board's inspector, Dr. Downes, and their architect, and to be furnished with copies of the amended plans. They had informed the Local Government Board, in reply, that the proposed position of the mortuary had been altered so as to avoid its being within 40 ft. of the public roadway, and that the main entrance would be placed in the centre of the road frontage opposite the administrative block instead of on one side, and copies of the plans as amended had been forwarded. According to a report submitted by the Works Committee it appeared that the sum of 13,689*l.* had been expended during the year 1903 on the painting and cleaning of infectious hospitals. The works carried out by direct labour had involved an expenditure of 9,750*l.*, while those carried out by contract had amounted to only 3,939*l.*

North Eastern Hospital.—The same committee reported that Messrs. P. H. Allin and Sons, whose tender for certain alterations and additions to the hot-water apparatus of this hospital were accepted recently, having declined to carry out the work unless allowed an additional payment of 500*l.* and an extension of the contract, the committee had advertised for fresh tenders. The amounts will be found among this week's "Tenders."

Tooting Bec Asylum.—The Committee were empowered to advertise for tenders for the execution of certain additional surface water drainage at the Tooting Bec Asylum, in accordance with the plan prepared by the architects, Messrs. A. and C. Harston, whose estimate is 490*l.*

Leavesden Asylum.—On the recommendation of the Asylums Committee, authority was given for cleaning the internal walls and distemepering the ceilings of this asylum at an estimated cost of 307*l.*

A report was brought up by the Children's Committee dealing with a proposal to purchase a property at Hayes for the accommodation of feeble-minded girls over school age. The consideration of the report was adjourned.

St. Anne's Seaside Home.—The Children's Committee reported also that they had considered a report made by Mr. A. B. Lowry, and forwarded to them by the Local Government Board. Mr. Lowry, in the course of his report, said:—"There is a large dormitory on the first floor from which there is not sufficient means of escape in case of a fire blocking access to the wooden back staircase," and he suggested that a staircase should be provided from the roof of a day-room to the ground, so that in case of a fire breaking out in this part of the building, the children "could get through an attendant's bedroom and out of the window, therefrom on to the roof of a dayroom," and so, by the staircase to the ground. The Committee considered that it would be much better to form a doorway at the end of the dormitory in question at the side of the fireplace and provide an iron staircase from this doorway to the ground. They recommended, therefore, that the proposal to form a door at the end of dormitory No. 17, and to provide an iron outside staircase from this doorway to the ground, be approved, subject to the sanction of the Local Government Board to the structural alteration, and that the Works Committee be authorised to carry out the work.

This was agreed to.

COURT OF COMMON COUNCIL.

THE usual fortnightly Court of Common Council was held in the Guildhall, E.C., on Thursday last week.

The Improvements and Finance Committee submitted a report dealing with several street improvement schemes. Among them was a proposal to construct a new street from Giltspur-street to King Edward-street, across the site of Christ's Hospital, and also to widen the latter street. It was agreed to accept the offer of Christ's Hospital to sell the necessary land for 45,000*l.*

The Streets Committee reported on a letter read from the London County Council, asking the views of the Corporation on an application by Mr. Howard Chatfeild Clarke, on behalf of the Indemnity Mutual Union Assurance Company for consent to the erection of a projecting balcony over the entrance to No. 1, Old Broad-street. It was stated that the London County Council had refused the application before the committee had had an opportunity of considering the matter, and it was agreed to request the London County Council to withhold its decisions on such matters until it was in the possession of the view of the Corporation. It was agreed that the sum of 2,214*l.* be offered for the ground required to widen the public way in front of No. 71, Fleet-street.

The question of Municipal Fire Insurance, which was down on the agenda for discussion, was, on the motion of Mr. Horncastle, adjourned.

ROYAL COMMISSION ON LONDON LOCOMOTION.

AT a sitting of this commission, held on Thursday last week, under the chairmanship of Sir D. Barbour, evidence was given by Mr. F. R. Whirr, Chairman of the Works Committee of the Paddington Borough Council, who referred to the evils caused by the constant breaking up of the roads, as the effect was to ruin the surface of the roadway, particularly in the cases of flint, gravel, and macadamised carriageways. He thought companies should be prohibited from breaking up the roads during December, January, and February, except in cases of great urgency. The Borough Councils should have entire control over the roads and streets in their districts so far as maintenance and upkeep were concerned. He opposed any power being given to the Central Authority to authorise breaking up of streets. He advocated the extension of underground railways and shallow tramways on a comprehensive plan. When roads were widened for tramway purposes the whole cost of the widening should be borne by the tramway authority. Powers should be given to the Borough Councils enabling them to construct in the subsoil under the footways and carriage-ways, short subways for pedestrians, and such subways would enable the refuges to be removed.

Mr. W. N. Blair, Borough Engineer and Surveyor of St. Pancras, gave evidence at considerable length with regard to the congestion in Hampstead-road, Tottenham Court-road, Gray's Inn-road, and Euston-road. The London County Council at present had power to widen Hampstead-road but refused to carry it out unless the Borough Council gave consent to the extension of a tramway down the Tottenham Court-road. Just recently the Borough Council had agreed to the tramway down Tottenham Court-road on condition that the London County Council widened the street. With regard to Euston-road this was laid out about 1827, under an Act of George IV., and was known as "the new road leading from Edgeware-road, near Paddington, to the Great Northern-road, in Islington." It was laid out with a total width of 60 ft., and it was originally provided that no building should be erected on any new foundation within 50 ft. of the sides of the road. Subsequent legislation removed this restriction, and it is now within the power of the London County Council to sanction a building out to the line of the street, and many have been so erected. He suggested that without further delay there should be adopted some definite policy to secure the widening of Euston-road, either one side only or on both sides. He believed that to widen 10 ft. of each side, and to permit the reconstruction of buildings to an advanced line, not necessarily the line of street, but even 15 ft. back from that, could be carried out from Gower-street to King's-cross practically without cost to the public except in the actual alteration of the pavements, as the owners of the land have in several instances indicated a willingness to give up strips of land to widen the road if they were permitted to advance the line of buildings. To continue the same widening between Gower-street and Portland-road Station would be a more costly undertaking for the reason that buildings already exist throughout almost the entire length up to the line of street, but in his opinion the widening was equally necessary, and the longer it was delayed the greater would be the cost.

Mr. W. C. Leete, Town Clerk of Kensington, gave evidence for that Council, and strongly supported the appointment of a Tribunal for the consideration of railway and tramway schemes. They appreciated the desirability in the carrying out of very great street improvements or the foundation of any new main thoroughfare, of the construction of a subway being regarded as an essential feature of the scheme.

The following day, evidence was given by Mr. H. C. Jones, Town Clerk of Holborn, who favoured the construction of underground tramways as against surface tramways. He would like to see subways for foot passengers constructed at busy points. It was high time that Parliament imposed certain restrictions upon the breaking up of public ways. He saw no reason why Borough Councils should not be allowed to make subways without going to Parliament for powers. He considered that where there was a double line of tramway the street should be 100 ft. wide.

Mr. H. C. J. Edwards, Borough Engineer of Lambeth, said it had been considered that the Central Authority, acting as the Street Authority, might bring about the much-spoken-of scheme of utilising for general purposes one material, rather than the variety of materials which now form the surface of carriage-ways throughout London. In this matter again different local authorities are not affected in one and the same manner; that is to say, what may be required in certain parts, the East End, where enormously heavy traffic has to pass over, would not be satisfactory in the West End of London; and again, in the residential quarters of the West End a material is required different from that in many other districts, owing to its more residential character; for instance, in Kensington and that district, the soft wood-paving brings that quiet to the resident which is so very necessary in such a quarter, and although it may be costly and the life not be so long as hardwood, yet, if the circumstances require, it is well that the local authorities should judge for themselves what best suits the purpose. In Lambeth hardwood paving has become the fashion ever since hardwood first came into use (the first piece having been laid in Lambeth in Westminster Bridge-road, in 1889). In the East End of London, granite pitched cubes, known as granite pitching paving, is the more common material, as necessitating a less frequent interference with the roads, and consequently longer periods of freedom of obstruction to traffic. Again, there are roads where tramways exist, and others where tramways do not exist, and the same conditions do not apply with regard to the carriageway paving. Asphalt paving may be laid, as in the City, where no tramways exist; and no more sanitary paving, all would agree, could be provided. But asphalt could not be laid alongside tram-rails, except at a very considerable risk indeed; in fact, he considered that no Surveyor in London would venture to recommend its use for that purpose where tramways exist; so that whilst one might consider that asphalt was the best material, the general feeling is in favour of hardwood paving. The Local Authority, and not the County Council, have to bear the cost of the repair and maintenance of the roads and streets within their area, and no Central Authority should, therefore, decide the material to be used, and the mode in which it should be used. The difficulties more particularly experienced in connexion with traffic might perhaps be very much overcome, or at all events be largely remedied, by judicious street widenings and improvements, especially at points near the bridges, where constant streams coming from and going to what might be called the "throat" of a bridge road must of necessity congest the traffic very considerably. To be able to discharge crowded traffic to a bridge freely from either side would be a great boon. He spoke, of course, from experience in his own district, where such improvements would be very beneficial indeed, having regard to the terminus of tramways.

Mr. Higgens, Borough Surveyor of Chelsea, considered there was need for more tube railways to pass through Chelsea. He alluded to the grievance felt in Chelsea at the action of the London County Council in refusing to contribute to the cost of widening King's-road without they had a tramway. Such a tramway in King's-road would lead to further congestion. They would not object to leaving the decision as to who should bear the cost of widening such a thoroughfare to an independent tribunal.

WESTMINSTER CITY COUNCIL.

THE usual fortnightly meeting of this Council was held at the City Hall, Charing Cross-road, on Thursday last week.

On the recommendation of the General Purposes Committee it was agreed to appoint the Mayor, Alderman T. W. L. Emden, a member of the Metropolitan Water Board in the place of Lieutenant-Colonel Probyn, resigned.

The same committee reported the receipt of a letter from the Clerk to the London County Council stating that that Council was desirous of compiling a register of historic buildings in the parishes in which the new streets Aldwych and Kingsway, and the streets affected by the Westminster improvement are situated, and asking for the co-operation of the Council in the matter. The committee recommended that the London County Council be informed that the City Council were willing to co-operate with them in the matter as far as possible. Councillors Tozer and Walder and the Town Clerk were appointed representatives of the Council on the proposed Association of Metropolitan Borough Councils, on the recommendation of the same committee. It was reported that the Bayswater-road Burial-ground had been

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put into good order in accordance with a recommendation passed by the Council in July last.

The Law and Parliamentary Committee brought up a long report dealing with Bills in Parliament during the last Session, compiled by the City Solicitors and Parliamentary Agents. It appeared from the report that out of eighty-two miles of new tube line projected, four miles only were authorised, and of these about one mile only was in the City of Westminster. Referring to the Charing-cross and Hampstead Railway Bill, which had passed and become law, the report stated that the part of the Bill which concerned Westminster was the clause which gave the company power "to enter upon, take, and use for the purposes of their undertaking certain lands" in the Parish of St. Martin-in-the-Fields, in the City of Westminster. Part of those lands was the eastern portion of the station yard or forecourt of the Charing-cross Station of the South Eastern Railway Company. The South Eastern Company's Act of 1859, under which Charing-cross Station was built, provided expressly that the forecourt should be "maintained forever as an open space." The railway company had often attempted to obtain the repeal of this clause, which was a most important one in the interests of the traffic in the adjoining street. The reason for the tube railway company desiring to acquire the ground was not clear. Even if no superstructure were intended, a station under the forecourt discharging its traffic into that already congested area would be most objectionable. When the Bill came before the Committee of the House of Commons, the Council's case was heard, and the chairman of the promoting company admitted that he would have liked to have used the existing kiosque in the forecourt as an entrance to an underground station. Ultimately a clause was inserted protecting the forecourt of the station, and as amended the Bill became law The Works, Sewers, and Highways Committee submitted a scheme for providing work for the unemployed of Westminster. It was suggested that the clinker formed by the destruction of refuse at the Shot Tower Wharf should be used in the making of slabs for paving. The report was received.

The same committee reported on a letter received from H.M. Office of Works, with regard to a subway from the Imperial Institute to the New Royal College of Science, which letter complained and objected to certain restrictions of the City Council. The committee recommended and it was agreed that the Office of Works be informed that the Council had rights beneath the streets for the construction of sewers; that the subsoil was vested in the Council for other purposes, and that as owners of the soil of the street, they could not see their way to depart from their previous decision.

BOOKS RECEIVED.

MOOT POINTS: FRIENDLY DISPUTES UPON ART AND INDUSTRY. Between Walter Crane and Lewis F. Day. (B. T. Batsford. 1s.)

THE LAW OF COMPENSATION. By J. H. Balfour Browne, K.C., and Charles E. Allan, M.A. Second Edition. (Butterworth and Co., and Shaw and Sons.)

Correspondence.

BRIGHTON AND HOVE HOSPITAL FOR WOMEN.

SIR,—I regret that you are still in error with regard to the omission of accommodation.

The schedule begins, "House surgeon—sitting-room, bedroom." These rooms were provided in a self-contained suite on the first floor. Further on, "Staff dining-room and staff sitting-room" were asked for. As no other rooms of this character were mentioned, it is clear that they were intended to be used by the nurses. In the hurry of finishing the drawings the word "nurse" was used instead of the word "staff," which no doubt partly explains your mistake.

In the Answers to Questions, it is stated that the house surgeon and porter would be the only male residents, that no room for the visiting medical was required, and that competitors were confined to the schedule of accommodation given.

E. P. HOWARD.

*** We regret that we should have done Mr. Howard any injustice; but we may observe that, the drawings not being on view till Wednesday last week, the time for examining them was necessarily very short.—ED.

NEW HALL, CARDIFF UNIVERSITY SETTLEMENT.—The Committee of the Settlement have now chosen as their architect, for the erection of a new hall, Mr. R. W. Schultz.

OBITUARY.

MR. CHARLES FOWLER.—We regret to have to record the death of Mr. Charles Fowler, F.R.I.B.A., who passed away on the 8th inst., at his residence, Abbotsleigh, Farnborough, aged eighty years. Some of our older readers will remember Mr. Fowler's father, who designed Hungerford and Covent Garden Markets. Mr. Fowler was a most accomplished architect, and but for his many appointments would have left behind more architectural works. He joined the Institute in 1857, and was elected a Fellow and life member in 1862, serving at different times on the Council. He was elected District Surveyor of St. Giles and Bloomsbury in 1854, and was succeeded in 1871 by Mr. C. Foster Hayward. He was District Surveyor of Shoreditch (succeeding the late Mr. Robert Warton) from 1871 to 1892, in which latter year he resigned, and was succeeded by Mr. Henry Lovegrove, who had before had South Islington only. He was for some years Honorary Secretary to the District Surveyors' Association, and in due course became president. On the death of Mr. Henry Baker he was appointed surveyor to the Portland Estate, which post he resigned a few years since.

MR. GWYTHER.—We regret to announce the death, on December 10, at his residence, 9, Clifton-hill, N.W., in his seventy-fourth year, of Mr. William Warlow Gwyther, of No. 26, Bedford-row, W.C., architect and surveyor. Mr. Gwyther had been a Fellow of the Surveyors' Institute, and was elected a Fellow of the Royal Institute of British Architects in 1880. Of his principal architectural works we have illustrated in our columns the London branch of the Bank of Scotland, erected by Messrs. Colls and Sons, as general contractors, on the site of Crosby Hall-chambers, Bishopsgate Within, and the new head-offices for the Yorkshire Banking Company, at the corner of Boar-lane and Bishopsgate-street, Leeds. The large copper dome is 40 ft. in diameter and the circular façade presents a single order of attached fluted and polished Corinthian columns, 3 ft. in diameter and 30 ft. high, of Ross o' Mull granite resting upon a massive sur-base of polished grey Aberdeen granite (November 25, 1899, photographs of the exterior and interior). His design for the London branch, in Birchin-lane, E.C., of the Commercial Banking Company of Sydney, includes a classical elevation of polished granite and Portland stone, with Ionic pilasters. Mr. Gwyther was the architect also of No. 61, Kensington-court, S.W.; the branch offices in Silver-street, Hull, of the Yorkshire Banking Company; the Bayswater-road branch, at No. 1, Marlborough-gate, W., of the National Provincial Bank of England; of that same bank's new premises at No. 155, Mare-street, Hackney; and, we believe, of their branch offices in Ramsgate. For the City (now the London, City and Midland) Bank he prepared the plans and designs for their new buildings in Old Bond-street (west side); in Balham High-road (on the site of No. 285); on the site of No. 19, High-street, Marylebone; and on the site of No. 1, Leonard-place, Kensington High-road, all erected during the interval 1897-1903.

GENERAL BUILDING NEWS.

CHURCH, ILFRACOMBE.—The new St. Peter's Church, erected in the place of the old iron one in Highfield-road, Ilfracombe, was opened and consecrated on the 10th inst. The church is a chapel-of-ease to the Parish Church, and has been built to relieve the overcrowding in Holy Trinity. The church is not by any means completed, it being impossible to proceed with the chapel, clergy vestry, west porch entrance, and tower owing to the want of funds. The portion completed consists of the sanctuary, chancel, choir vestry, organ chamber, nave, north and south aisle, and north and south transept base of the tower, and the heating chamber. So far about 6,500*l.* has been spent. To entirely complete the church—that is, to finish the tower, chapel, vestries, and west porch—another 1,500*l.* will be required, making a total of 8,000*l.* for a building which, in case of need, would accommodate over 750 persons. The design of the church, prepared by Mr. Fellowes Prynne, is Late Decorative in style. The plan consists of a nave 85 ft. long by 28 ft. wide, across the church to the transept 59 ft., and across the aisles 19 ft. The chancel and sanctuary are 34 ft. long and 21 ft. 6 in. wide, a passage for returning communicants being placed on each side. The arcade arches in the nave are 19 ft. high, and the walls 24 ft. The height from floor to ridge is 42 ft. The roofs throughout are of waggon construction and stained with a brown oak colour, being decorated with a spiral rope pattern of the fourteenth century style, with moulded principals and cornices. The new church is entirely built of stone throughout, pink limestone outside, and with Cosham stone quoins from Ipplepen, near Newton Abbot, also a red sandstone as a dado, with a grey stone above, from Combemartin and Barnstaple-road quarry. The spinal fluted columns, supporting the arcade arches, are of solid Cosham stone and slate dowelled together.

NEW R. C. CHURCH, MUSSELBURGH.—The Roman Catholic church and priests' house for Musselburgh is now being erected. The design is by Mr. Archibald Macpherson, architect, Edinburgh. There will be accommodation for 500 worshippers.

Y.M.C.A. PREMISES, BALLYMONEY, IRELAND.—The new premises of the Young Men's Christian Association in Church-street, Ballymoney, were opened on the 7th inst. The premises, which occupy a site in Church-street, have a frontage of 36 ft., and extend back for a distance of 245 ft. They comprise reading-room, parlour, classroom, large recreation-room, and dark-room for photography. The architect was Mr. James A. Hanna, C.E., Belfast, and the contractor Mr. John Henry, Ballymoney.

SANATORIUM, BRIDGE OF ALLAN.—A new non-consumptive sanatorium is to be erected at Bridge of Allan from plans prepared by Mr. Charles G. Soutar, architect, Dundee. The principal contractors are as follows:—Mason work, Mr. T. S. Dick, Broughty Ferry; joiner work, Messrs. J. and W. Guthrie, Dunblane; plumber work, MacLeish, Morrison, and Co., Ltd., Perth: roofing tile work, Messrs. Brand and Son, Arbroath; plaster work, Mr. William Peebles, Perth; and glazier work, Mr. W. G. Crichton, Stirling.

COUNTY COURT OFFICES, CARDIFF.—The new Government buildings which are to be erected adjoining the Post-office in Westgate-street, Cardiff, are to provide accommodation for the Registrar of the County Court, the District Registry of the High Court of Justice, the High Bailiff, and the Inland Revenue Department. The material to be used for the front of the building will be similar to that of the Post-office. The basement will contain rooms for the storage of papers, strong-rooms, and a retiring-room for clerks, while the High Bailiff's offices are situated at the rear of the building. The whole of the ground floor will be occupied by the County Court, Bankruptcy Department, the District Registry, and High Court offices. In front of the buildings is a large plaint office, which can be used by the public in connexion with the offices of the County Court, and which is about 48 ft. wide by the same depth. This office contains strong-rooms for the storage of books and papers in daily use. Leading out of the last-named department is the chief clerk's room, the Registrar's office being at the rear, where there are also provided the Bankruptcy offices and the offices of the High Court, together with a waiting-room for solicitors, witnesses, and the public attending upon the Registrar. The District Registry and Bankruptcy offices are approached by a large corridor 11 ft. wide by about 100 ft. long. On the first floor offices are provided for the surveyors, assistant-surveyors, and collectors of Customs for the Inland Revenue, for the Excise officers, and for the clerks employed in those departments. On the third floor there will be further accommodation for the Inland Revenue department, together with necessary rooms for a permanent caretaker. Altogether the building will contain about fifty rooms, besides lavatories and offices. —*Western Mail.*

SALVATION ARMY CITADEL, MASBOROUGH.—On the site of some old cottages situate at the upper end of Park-street, Councillor Cartledge has caused to be erected a hall for the Salvation Army, to accommodate some 340 persons. Messrs. E. Hutchinson and Son, of Rotherham, have been the architects, and Mr. G. Saul, of Kimberworth, the contractor.

HOTEL, HARROW.—The Royal Brewery Co., of Brentford, have just completed an hotel, to be known as the "Rising Sun," at Greenford-road, Harrow. The building has been erected at a cost of 6,000*l.*, from the plans of Messrs. Nowell Parr, and A. E. Kates, architects, of Brentford.

CHURCH SCHOOLS, PUTTENHAM, SURREY.—Puttenham New Church Schools, of which the foundation-stone was laid on June 18 of this year, have been erected to the plans of Mr. A. J. Stedman, architect, of Farnham, by Messrs. Heal and Jackson, of Compton. The new building provides accommodation for 120 children as a mixed school.

AN OLD WORCESTERSHIRE HOUSE.—The tender of Mr. A. Cliff, of Evesham, has been accepted for additions and alterations to The Den, Cropthorne, a charming country house which was originally a group of black and white cottages, of the type of which so many yet remain in the county of Worcester, and which were made into one house for a late eminent surgeon. Since passing into the hands of its present owner, further improvements have been made to the property under the direction of Mr. E. Lutyens and Mr. Drinkwater Butt, the former adding a quaint sunk garden and sundial, and the latter restoring the proper leaded

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lights to the windows, and being now responsible for the new gables, etc. In the whole of the design, the greatest care has been taken to prserve the old work, and to make the new in harmony with it.

ROYAL MILITARY COLLEGE, SANDHURST.—In order to meet the increased requirements involved by the recommendations of the Special Committee upon Military Education, the War Office have resolved to expend a sum of from 300,000*l.* to 350,000*l.* upon an extensive enlargement, with improvements, of the Royal Military College at Sandhurst. The College was opened there in 1812, in place of the former institution at Great Marlow. The main building, which has a Doric octastyle portico, is 430 ft. long, the whole façade extending over about 900 ft. The new buildings will afford room for 300 cadets in addition to the 300 who are now accommodated, and will comprise a new wing, and a block, at the rear, of officers' quarters. The present suites of married men's quarters in the basement will be rearranged as bath-rooms, offices, and so on.

PUBLIC BATHS FOR STOKE NEWINGTON.—On Tuesday night, Stoke Newington Borough Council considered a scheme to provide public baths, which would include first and second-class swimming baths, 100 ft. by 40 ft. and 80 ft. by 30 ft. respectively, 68 slipper and spray baths, with the usual waiting-rooms, offices, etc., and an establishment laundry. The scheme was adopted with modifications, and was referred to a committee to make the necessary preliminary arrangements.

BRANCH PUBLIC LIBRARY, HOLBECK (LEEDS).—The new branch library at Holbeck, which occupies a site at the corner of Nineveh-road and Marshall-street, has been erected under the superintendence of the architect, Mr. William Bakewell, of Leeds, whose design was selected by the assessor, Mr. Leonard Stokes, from those submitted in competition. The perspective view was exhibited at the Royal Academy Exhibition of 1902. The exterior is faced with Accrington bricks and dressings of terra-cotta, the roofs are slated with green Westmorland slates, and the building generally is of fireproof construction. The floors are laid in wood blocks and marble mosaic, and the walls of the public rooms are lined with a dado of glazed tiles. The accommodation provided consists on the ground floor of reading-room, lending library, ladies' room, and librarians' room. The juveniles' room is situate on the lower ground floor, together with the usual offices, etc. The irregular lines of the site on the north and east sides presented some difficulty in obtaining regular-shaped rooms; this has been overcome in the large reading-room by an arrangement of piers, which also permitted the adoption of cross-lighting and ventilation by means of clearstory windows. At the east end a street improvement has been effected by the semi-circular ladies' room, thereby widening the somewhat congested approach to Marshall-street. The principal reading-room is a lofty apartment, being 26 ft. 6 in. from the floor to the crown of the waggon roof, with a view to securing an ample volume of air, and preventing the vitiated condition of atmosphere that generally exists in a public reading-room. The turret is utilised for a ventilating fan, connected by means of trunks and tubes with the various rooms. The fittings generally have been arranged on lines laid down by the Chief Librarian for the purpose of effective supervision, and are executed in teak and oak. The building has been erected by Messrs. Armitage and Hodgson, contractors, Leeds, whose tender for the whole of the trades was accepted by the City Council. The fittings and cabinet work generally have bene carrried out by Messrs. Goodall, Lamb, and Heighway (Manchester), Mr. J. H. Gash (Leeds) supplying the chairs; and the electric light has been installed by Messrs. Wallis and Watson, of Leeds. Mr. H. Jones acted as clerk of the works.

ADMINISTRATIVE OFFICES, BARRY.—New administrative offices are now being erected at Barry Dock, to meet the needs of the Mercantile Marine as well as the Customs officers. With frontages of 96 ft. on one side and 64 ft. on the other side, the area covered will be about 700 square yards. One front will be on the Dock View and the other on the Station-road. The ground floor will be taken up by engagement-room, discharge-room, cashier's offices, superintendents' and board rooms, with waiting-rooms, and other necessary offices, including the shippers' store-room. The first floor will contain the large long-room for Customs purposes, with collectors', examiners', surveyors', clerks', and other officers' rooms. The building will be of brick, with stone dressing, and the total cost will be about 11,000*l.* Mr. Watkin Williams is the contractor, and the plans, etc., have been prepared at his Majesty's Office of Works.

AUDREY HOUSE, ELY-PLACE, LONDON.—This building is situated in Ely-place, not far from Holborn-circus. The structure covers a superficial area of 13,824 square ft., and has a frontage of 135 ft. in Portland stone, the style adopted by the architects (Messrs. H. H. and M. Collins, of Old Broad-street) being Renaissance, freely treated. The building consists of five stories and a basement, and contains over 200 rooms.

BUILDING IN HULL.—The Hull Corporation Works Committee dealt on the 11th inst. with and approved the following plans:—J. Mitchell (amended), hotel, Marfleet; G. Twell, sixteen houses, Scarborough-street; Hill and Stevenson, six houses, Spring-bank West; A. G. Beaumont, six houses, Beverley-road; J. Mollekin, eight houses, Carrington-street; E. Morrison, workshop, West Parade; J. Wilson, stables, Pearson Park; J. Dufton, greenhouses, St. George's-road; Rev. — Hall, alterations, Pryme-street; Sissons Bros., workshop, Bank-side; T. Hill (amended), shed, Beverley-road; C. Webster (amended), cart-shed, Prince's-road; G. Moore, porch, Westbourne-avenue.

OAKWELL JOINT HOSPITAL, BIRSTALL.—The Oakwell Joint Hospital, which has been in course of erection at Foxhall, Birstall, during the past twelve or fifteen months, was formally opened a few days ago. The hospital has been erected from plans prepared by Mr. J. W. Burrows, architect, of Birstall and Mirfield.

FREE LIBRARY, PENARTH.—On the 11th inst., the Penarth Free Library Committee considered plans for the new library prepared by Mr. H. Snell. It is proposed to erect a clock tower at one end of the buildings, and it was decided to recommend the Council to have the exterior consaructed of Newbridge stone, with red tiled roof. The building is the gift of Mr. Carnegie, and the site the gift of Lord Windsor.

RESTORATION OF CHAPEL, CARISBOOKE CASTLE.—Excavations have been begun in connexion with the proposed restoration of the ancient chapel of St. Nicholas, within Carisbrooke Castle, as a national memorial to Charles I. The ancient floor of the chapel has been brought to light about 3 ft. below the present level, and the jambs of the door in the north wall have been discovered, showing an entrance of about 3 ft. in width, with roll mouldings of the thirteenth century. The architect is Mr. Percy Stone, F.S.A.

WESLEYAN CHAPEL, LIVERSEDGE, YORKSHIRE.—Memorial-stones have just been laid of a Wesleyan Church at Millbridge, Liversedge. The building will occupy a corner site at the junction of the Halifax and Leeds to Huddersfield roads. Messrs. Thomas Howdill and Son, of Leeds, are the architects, and the chapel will afford accommodation for about 380 persons. There will be a tower rising to 70 ft. at the south-east corner, and at the opposite end an octagonal chancel.

STAINED GLASS AND DECORATION.

BRETTENHAM, NORFOLK.—The final touches to the restoration of this church have just been made. All the windows have been filled with stained glass, and a carved oak reredos with painted panels of scriptural subjects has been fixed over the altar. A new organ has been placed in the north transept. Oak panelling, sedilia, credence, and choir stalls of very elaborate design have been executed for the chancel. A carved oak rood screen spans the chancel arch. The chapels of the north and south transepts are divided from the nave by a wrought iron grille, and a similar screen divides the tower from the nave. All the walls of the church have been painted and decorated with diaper work. From the roof hang wrought-iron electroliers of elaborate design. The floors are laid with marble slabs, rough, white, and dove colour. A carved oak pulpit and brass eagle lectern were also supplied. The whole of the work was undertaken and executed by Messrs. Percy, Bacon, and Brothers, of London, W., at a cost of 2,350*l.*

MEMORIAL WINDOW, NORTHAMPTON.—A stained-glass memorial window has been placed in the Church of St. Sepulchre, Northampton, in memory of the men of the 2nd Battalion of the Northamptonshire Regiment who fell in the late war. The artist for the work is Mr. Arthur J. Dix, of London.

SANITARY AND ENGINEERING NEWS.

WATER SUPPLY, MARYTAVY, DEVONSHIRE.—Mr. E. A. Sandford Fawcett, M. Inst. C.E., one of the Local Government Board inspectors, held an inquiry at the schoolroom, Marytavy, on the 10th inst., to consider the application of the Tavistock Rural District Council for permission to borrow 2,500*l.* for the purpose of providing a water supply for Marytavy. Mr. G. D. Bellamy, C.E., Plymouth, engineer of the scheme, and others gave evidence.

ELECTRICITY WORKS AND DISINFECTOR STATION FOR BETHNAL GREEN.—In a Report issued on Monday, the Electricity Committee of Bethnal Green Borough Council state they have arranged to purchase for 4,500*l.* the freehold interests of twenty-two houses surrounding Marian-square and the square itself as a site for electricity and dust destructor works. It was further reported that the Public Health and the Finance Committees have decided to erect a disinfecting station, to cost about 3,000*l.*, at Digby-street depot.

WATERWORKS, SWANSEA.—Mr. Hill, the Consulting Engineer, as the result of his last inspection, gives a satisfactory review of the progress of the Cray Waterworks undertaking. The average number of men employed now is 680, compared with 580 at the same time last year. The total quantity of masonry concrete put in the dam is 59,360 cubic yards. The total value of the work done is over 150,000*l.*

FOREIGN.

FRANCE.—M. Georges Berger has been elected a member of the Académie des Beaux-Arts, in place of M. Roujon, who has been appointed Perpetual Secretary. The new Academician is 69 years of age. He was Director-General of the 1889 Exhibition, and is President of the "Union Centrale des Arts Décoratifs"; he is a Deputy of Paris, and Grand Officier of the Legion of Honour.——The Municipal Council of Paris has decided to rebuild the Jean Baptiste Say Schools, from the plans of M. Salard, at an estimated cost of 284,700 francs.——The Department of Fine Arts has just completed the restoration of the Salle des Fêtes and the Salle des Gardes at the Château of Annecy, one of the finest specimens of French mediæval architecture.——A new post and telegraph office is to be built at Lyons.——The jury of the competition opened at Auxerre for new savings' bank, has awarded the first premium to M. Rousseau, of Auxerre.——M. Le Sage, architect, of Rouen, has obtained the first premium in the competition for a new savings' bank at Coutances, and for the restoration of the Hôtel de Ville.——Important additions are being made to the museum buildings at Dijon. A new gallery has been opened, to be devoted to the works of French painters of the latter half of the neineteenth century.——M. Nénot has been elected President of the "Société Centrale des Architectes Français," MM. Lucien Etienne, Bartaumieux, and Bellemain (Lyons), have been elected Vice-Presidents.——A committee has been formed in Paris to raise a monument to Isabey. It is to be completed for the centenary of the artist's death, in July, 1904.——The twenty-first exhibition of the "Société Internationale de Peinture et de Sculpture" is open at the Georges Petit Gallery. It includes portraits by Mr. W. Bartlett and Mr. Sargent, landscapes by Mr. Harrison, and sculpture by M. Bernstamm and M. Mercié.——The Versailles Museum has acquired the celebrated picture by David of Marat in his bath, which belonged to Napoléon.——M. Marcel Lambert, the architect, is at present occupied with the restoration of the great reservoirs at Versailles, constructed under Louis XIV., to receive the water from the Marly aqueduct for the fountains and basins at Versailles.——The Municipality of Orthez is about to undertake the restoration of the historic Château of Moncade, built in 1242 by Gaston de Foix.——The ancient ramparts at Perpignan are to be demolished.——M. Detaille has just completed the sketch for his great composition, the "Chant du Départ," which is to complete the decoration of the Panthéon.——The Municipal Council of Paris has commissioned M. Poilpot to paint a large picture for the Victor Hugo Museum, representing the fête of the centenary of the poet on the Place des Vosges.——The French Government has given a favourable opinion in regard to the metropolitan railway scheme of M. Bérlier, the engineer. His proposed line is to go from Montmartre fortifications to Montparnasse and to Vaugirard fortifications, following the Rue de Vaugirard (with a stoppage at Montparnasse), the Rue de Rennes, the Boulevards Raspail and St. Germain, the Place de la Concorde, the Rues Boissy d'Anglas and Pasquier, to the Gare St. Lazare. Near this part there will be two branch lines, one to the Porte St. Ouen, the other to the Place des Abbesses at Montmartre.

SPAIN.—A recent issue of the *Madrid Gazette* contained a Royal Order appointing a commission charged with studying the hydraulic limes and cements of the country, with reference to their possible application in the construction of public works. This is in view of the establishment of new factories of hydraulic products, as well as the improvement in many cases of old ones.

MISCELLANEOUS.

THE CHRISTMAS HOLIDAYS.—Next week the *Builder* will be published on Thursday, and to ensure attention all communications for the Editor must reach our office not later than Wednesday morning next.

RECENT FIRE IN LAMBETH.—Messrs. John Appleby and Sons, whose works were in con-

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siderable danger from the recent fire in the adjoining premises, ask us to mention that their business is being carried on as usual, all temporary damage having been made good.

LANTERN SLIDE ILLUSTRATIONS OF TIMBER.—Two specimens have been sent to us from a set of new lantern slides prepared by Messrs. Newton and Co., illustrating the growth and markings of timber, its structure, defects, and its appearance and behaviour in conversion for building purposes. Judging from the specimens sent, these slides would be very useful for any lecture on the structure and properties of timber, and supply a want in photographic illustration. The specimens sent show the comparative figure of medullary rays in English oak, beech, plane, and live oak, and a section of English cherry cut when green.

CHAUCER MEMORIAL.—A white marble bust of Geoffrey Chaucer was unveiled in the Guildhall library recently by the Lord Mayor. The bust was executed by Mr. G. J. Frampton, R.A.

RELIC OF AN OLD MANCHESTER DWELLING.—A problem of interest to antiquaries is set by the discovery under some business premises in Market-place of a cellar of curious construction. It is a vault about six yards square, and is a fine example of groining in brickwork. There is a short stone pillar in the centre, and from it rise the arches in the usual formation. There are also arches round the walls. The workmanship is excellent, and it is fresh and well preserved. There is no certainty as to the original purpose of the cellar. Its appearance strongly suggests a crypt, but there is very little to support the theory that the place was ever a crypt. From the evidence of the brickwork it seems unlikely that it is older than the beginning of the eighteenth century. In 1730 or thereabouts a common standard in the size of bricks was adopted. The bricks used in the construction of the cellar are of varying size, and they are for the most part smaller than those used after the middle of the eighteenth century. Underground rooms arched in a similar manner, only without the groining, have been unearthed in several places in the immediate neighbourhood of the centre of the city. This is certainly one of the best constructed, and the excellent groining marks it out among finds of the same nature. It is interesting to remember that it was close to this spot, if not upon it, that the house stood of John Byrom, the eighteenth-century Manchester poet. The site of Byrom's house is accurately known, but it has not yet been ascertained whether the chamber is beneath it. Assuming that it is, the most reasonable theory would seem to be that the place was originally built as the wine cellar of Byrom's house, though this is of course no more than a tentative suggestion.—*Manchester Guardian.*

NEWPORT MASTER BUILDERS' ASSOCIATION.—The annual banquet of the Newport Master Builders' Association was held recently at the King's Head Hotel, under the chairmanship of Mr. W. A. Linton, the President for the year. The Mayor (Mr. Clifford Phillips) supported the President, as also did Mr. A. S. Morgan, the Vice-Chairman, Alderman M. Mordey, Alderman T. Goldsworthy, Councillors T. Parry, F. P. Robjent, F. E. Burpitt, W. M. Blackburn, and H. C. Parfitt, Messrs. F. R. Bates, E. H. Fawckner, A. E. Garwood, Lyndon Moore, Dowling (Bristol Master Builders' Association), John Williams, S. F. L. Fox (Deputy Borough Engineer), H. Gratte, and others. The Chairman, in proposing "The town and trade of Newport" made some remarks upon the commercial and municipal status of Newport. The town had been alive to the true spirit of progress during the last quarter of a century. The population had doubled, the rateable value had been doubled, the number of houses had been trebled, and so also had the area of the town. But there was an obverse side to this picture. There was the town debt. The Mayor, who first replied, welcomed the criticism which the President had passed upon the Corporation, but thought that the administration of the town was thoroughly well looked after, and that there was a great and prosperous future for Newport. Alluding to the tramways as one of the big municipal undertakings, he believed that they would at the end of the first clear year's working be found to be paying a handsome profit. Alderman Goldsworthy also replied. Mr. Wm. Blackburn proposed "The Architects and Surveyors," to which Mr. Bates (President of the Newport Architects' Society) and Mr. Fox responded. Mr. Lyndon Moore proposed "The Building Trade," which was responded to by Mr. A. S. Morgan. A number of other toasts followed.

WORKMEN'S DWELLINGS, NEWCASTLE.—A joint meeting of the Sanitary and Estate and Property Committees of Newcastle Corporation was held on the 11th inst. Mr. Holford, Property Surveyor, presented plans on behalf of the Corporation, for the erection of 88 self-contained cottages, of four rooms, bathroom and scullery, and garden space, to be let at 6s. 9d. per week. It was explained that these houses in course of time would be self-supporting, as the money to be borrowed for this purpose was extended over a period of sixty years; and by the end of that time the buildings would belong absolutely to the Corporation. After considerable discussion as to whether the right class of buildings was being arranged for the right class of tenants, the subject was adjourned until a future meeting, in order that further particulars might be obtained. The sites suggested on which to erect the buildings are in the neighbourhood of Mill-lane and Shields-road, to the east of the car sheds.

SLATE TRADE.—A meeting of the Carnarvon quarry owners was held on the 5th, and it was decided to continue present prices and terms for the coming year. The Dinorwic and Penrhyn quarries are adopting a similar course. The Festiniog quarryowners are receiving large foreign orders, and have good prospects for next year.

"BRITISH ONLY IN NAME."—Reporting on the trade of Para, Brazil, for the year, 1902, the British Consul, Mr. Churchill, writes: "The Portland cement that comes here is British only in name. It comes from various countries, but the bulk originates from the banks of the Elbe. British barrels used to be too large, inconvenient to handle, and liable to break in transit, and to expose the contents to damage by water. British exporters were recommended to reduce the size, but the advice was not acted upon. German cement is put up in barrels of more suitable size, containing 120 kilos. (264 lbs.)."

EDINBURGH AND LEITH BUILDING EMPLOYERS' ASSOCIATION.—The Edinburgh, Leith, and District Building Employers and Allied Trades Association and the Building Trades Exchange held their annual dinner in the Royal British Hotel on the 10th inst., when 160 gentlemen were present. Councillor Neil M'Leod occupied the chair, and in the course of the evening stated that they had changed the name of their Association for the purpose of including in it all the trades which had now joined it, and also for attracting merchants to their membership. Their Association was started in the year 1871, when Mr. James Steel, now Sir James Steel, Bart., was elected President. The wages of masons at that time were 6½d. per hour and labourers 4½d. per hour. In 1876-77 masons' wages rose from 9½d. to 10½d., and work was plentiful and men scarce. In 1878 there was a strike of considerable magnitude among the plasterers. The Association went to the Master Plasterers, contributing to them a sum of 111*l.*, showing that when they liked they could help their neighbours when they were in a difficulty. That same year wages fell to 7½d.; and the following year a council of employers of all trades was formed for the object of having a uniform rate of wages fixed for all trades at 7½d. per hour and 4½d. for labourers. Masters then were far more aggressive than they were at the present time, for he did not think they would now try to face such a proposal. The trades included masons, joiners, bricklayers, lathers, plasterers, plumbers, painters, and, as they all knew, the suggestion was not adopted. In 1891 it was considered that a Conciliation Board should be constituted, with seven from the employers and seven from the operatives, whereby they might be able to settle all disputes that should arise. This did not succeed long. In time the operatives came as delegates with one object in view, from which they would not budge, and that was broken up. In 1897 the masons demanded an eight hours' day, which, after a strike, was agreed to, but in the following year the operatives asked to be allowed to return to the nine hours. The masters had sometimes to save men against themselves, as they had tried to do in this case, and he thought it would be some time again before they asked for shorter hours. In 1900 there was another strike, but the masters stood together splendidly and gained their point. The income in 1872 was 21*l.*, and last year it amounted for the year to 121*l.* 10s. Since their Association was started the joiners and plumbers had amalgamated with them, and this year they had instituted monthly meetings of their Executive, and they had found these a great success. Their Association might indeed become a great strength to the public life of their city if it would only assert itself, and in this connection he suggested that they might help to advance technical education by giving four or more bursaries to apprentice lads attending technical classes—for efficiency in masonry work and building construction, for carpentry, joinery, and construction in timber work, for plumbing and sanitation, for general knowledge of the composition of materials and their uses. The loyal toasts were then proposed by the chairman, and duly honoured, and Mr. Jas. Miller gave "The Imperial Forces," to which Colonel Bennett responded. "The Town Councils of Edinburgh and Leith" was submitted by Mr. James Moscrip. In replying on behalf of Edinburgh, Bailie M'Michael briefly referred to the death of Councillor Purves, than whom, he said, the citizens of Edinburgh had no more capable and devoted public servant. Bailie Craig, responding for Leith, remarked that the citizens of Leith had not given the Dean of Guild Court much work of late. Mr. A. Webster, Glasgow, proposed "The Association." Mr. Thomas Hume and Mr. W. Graham Yooll replied, the former commenting on the prosperity of the building trades in general by the fact that the members employed in those trades had almost doubled in the last thirty years; and the latter referring to the benefits to be derived from the Building Trades Exchange, and the greater success which had attended it of late. Other toasts included "The Architects and Surveyors," proposed by Councillar Forrest, and replied to by Councillor M'Arthy and Mr. J. C. Hamilton.

THE SANITARY INSTITUTE.—At an examination in Practical Sanitary Science, held in London on December 11 and 12, thirteen candidates presented themselves. The following nine candidates were granted Certificates:—G. J. Bridel, Greenwich; M. H. Butcher, Crouch End; E. C. Davies, Eye; W. J. Goode, Wellington; P. G. Jacobs, Assoc.M.Inst.C.E., London; J. E. King, Norwich; L. F. G. Loretz, Chiswick; O. W. Marsh, Dulwich; A. G. Young, Barking.

CARPENTERS' COMPANY TRADES TRAINING SCHOOL.—The prizes gained by students at this school during the year were distributed recently at Carpenters' Hall by Lord George Hamilton, M.P. The Master of the Carpenters' Company, Mr. Percy Preston, presided, and was supported by representatives of the City Guilds associated with the Carpenters' Company in conducting the school. Mr. Wilson, as chairman of the Joint Committee, briefly reviewed the work of the year. There were twelve classes in the school, and eleven were closely connected with the building trade. The school differed from other technical schools and from the polytechnics in the fact that all the students must be connected with the trade as working members before they could be admitted. The institution thus supplied in the best way the instruction which was formerly provided by the apprenticeship system, which had now unfortunately fallen into disuse. There had been a slight falling off in the number of students, and the total was now 241. The Director's detailed report having been read, Lord George Hamilton distributed the prizes.

THE CAERWENT EXPLORATIONS.—A second tesselated pavement from the Roman excavations at Caerwent, near Newport (Mon.), has been fixed in position in the museum of the Newport Free Library. It was found in what is known as House No. 7, from which the first was taken, and the two together form one of the most important discoveries of the kind yet made in Roman remains in England. Each is a very large example of tesselated floor work, and the second is distinctly the finer and more perfect of the two. Busts of the seasons and figures of animals and Cupids are conspicuous objects in the pavements. The chief features of House No. 7 were a small, partially-detached building, which may have been a shrine, and two rooms separated, no doubt, only by a curtain when the house was in use. It was these rooms that contained the tesselated pavements. One underlay the other, and the upper one was of later date and of inferior workmanship to the other, the latter being constructed with far more care as to detail and finish. Careful drawings and tracings of both pavements were made, and both have been removed in sections, and admirably and successfully put together again in the museum, imbedded on cement so durable that they will probably remain in as good a condition as they are now for hundreds of years. In both the rooms of House No. 7 the walls were standing to a height of 3 ft. above the floor level, and the plaster on them was nearly intact. It was, therefore, possible to recover to a considerable extent the colour and design of the wall decoration. It has been determined that the remains removed shall be housed at Newport, but so far the question of a separate building for their reception has not been decided, although there will in time be ample material to form a distinct Caerwent museum.—*Times.*

WATER BOARD AWARD.—At the London Water Arbitration Court on the 15th inst., Sir Edward Fry, the President, announced the award in the case of the East London Waterworks Company. A sum of 7,248,112*l.* was claimed by the company, but the Court assessed the amount to be paid as compensation at 3,900,000*l.* If the decision that the company was subject to the obligations of the "Chamberlain's Sinking Fund" should, however, be reversed on appeal to a higher court, the sum to be paid would be 4,300,000*l.* The Water Board must pay the company's taxed costs.

EXAMINATION OF WATER.—The Water Committee of the London County Council reported as follows at Tuesday's meeting of the Council:—"We have to report that during the months of October and November last 416 sam-

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ples of water were taken by the chemist from the metropolitan water companies' mains, and 156 samples from the Rivers Thames and Lea above the intakes of the water companies. The chemist has submitted to us his report on the results of the analysis and the microscopical and bacterial examination of the samples, and we find that although the quantity of organic matter present in the water was small it was from two to five times as great as that present during the corresponding period of last year. The quantity of nitrogenous organic matter present also showed a remarkable increase. The unfiltered water taken from the Rivers Thames and Lea above the intakes of the water companies contained more organic matter than that examined in October and November, 1902. It is to be noted, however, that water drawn from the mains of most of the companies, which take water from the River Thames, contained on several days during November more nitrogenous organic matter than the unfiltered river water taken above the intakes of the companies. Undoubtedly the water supplied to the consumers during the past two months was very largely of indifferent quality. The chemist has also made a chemical, bacterial, and microscopical examination of a number of samples collected from wells in the Lea valley. Eleven out of thirteen samples were organically of a high degree of purity, while the remaining two were of fair quality. All the samples contained more saline ammonia than is found in the river water. From an analysis of the total solids in the samples it appears that many of them contained a larger quantity of mineral matter in solution and a smaller degree of hardness than much of the water supplied to consumers in London. . . ."

The Church Crafts League.—The fourth annual general meeting of the League was held on Thursday of last week, in the Hall of Clifford's Inn, when the Dean of Westminster presided. In moving the adoption of the annual report, the Chairman referred at length to the work which the Society had accomplished. They had received 387 applications for advice, which had, in every case, been given without cost to the applicant, and they had placed the work of their artists in 94 churches. A number of interesting meetings had been held, which had been addressed by the Bishop of Worcester, Mr. J. T. Micklethwaite, Rev. Percy Dearmer, Mr. F. C. Eeles, and others. He also took the opportunity of saying how much the League owed to their President, the Bishop of Rochester, who was prevented from being present that evening, and also to their Secretary, for his painstaking work on their behalf. The following were then re-elected to serve on the Committee: the Hon. Mabel de Grey, the Dean of Westminster, Mr. Henry Holiday, Rev. Percy Dearmer, Mr. A. G. Walker, and Mr. W. Goscombe John, A.R.A. At the conclusion of the business a lecture was given by Mr. T. M. Rooke, in the course of which he described a deserted chapel of the Carthusians, situated in a wood near Liege, and afterwards exhibited some sketches, showing the twelfth century figure paintings on the walls.

LEGAL.

LONDON COUNTY COUNCIL DRAINAGE BY-LAWS.

On December 11, before a Divisional Court of King's Bench, composed of the Lord Chief Justice and Justices Lawrance and Kennedy, the hearing of the case of the Metropolitan Industrial Dwellings Company *v.* Long was concluded on the appeal of the Company from a decision of Mr. Chapman, the Stipendiary sitting at the Southwark Police-court, who convicted the Company on thirty-three summonses taken out by the Southwark Borough Council.

The case came before the Court in the form of a special case stated by the Magistrate, from which it appeared that the appellants are the owners of Ponsonby-Buildings, which are industrial dwellings, erected before the confirmation of the drainage by-laws of 1901, made under Section 202 of the Metropolis Management Act, 1855. In December, 1902, the appellants, owing to the substitution of an iron pipe or drain for one of ordinary Doulton ware, found it necessary to put new traps and pans connected with thirty-three water-closets in their buildings, as the old traps and pans were broken during the progress of the work, but there was no change in the upright soil pipe. The local authority told them that the new traps must be fitted with anti-siphonage pipes in accordance with by-law 17 of the London County Council drainage by-laws, because by by-law 21 the by-laws were made applicable to new work in old buildings as far as practicable. The appellants refused to comply on the ground that these by-laws were not applicable, were unreasonable, and *ultra vires*. The local authority then took out thirty-three summonses for non-compliance in the case of each of the thirty-three closets, in order that the question might be settled in a court of law. The defendants called evidence that the soil pipes were of such dimension, viz., 5 in. in diameter, that the evils of siphonage could not possibly occur, and that the expense incurred to comply with the by-law was so great as to make the application impracticable. The local authority contended that the magistrate had no right to consider any question except the application of the by-law and its practicability, and the magistrate, with some hesitation, came to the conclusion that this contention was right. He set aside, therefore, the question of whether the by-law was necessary or even useful in this particular case. He did not think there was any evidence that compliance with the by-law was not practicable, and the figures, he said, given for probable expenses went far beyond the case, and he did not think they ought to affect his judgment. He thought, therefore, that the application was practicable, and that the work done involved the application of the by-laws to these traps. The learned magistrate also came to the conclusion that these by-laws under Section 202 were not *ultra vires*, and said he could not hold that they were unreasonable, though he regretted there was no proviso for the case where it was proved that there was practically no danger of siphonage. He therefore convicted the defendants, and fined them 40*s.* and 10*l.* 10*s.* costs on the first summons, and 2*s.* costs on each of the others. Hence the present appeal of the Company.

Mr. Danckwerts, K.C., and Mr. Courthorpe-Munroe appeared for the appellants, and Mr. Horace Avory, K.C., and Mr. Frank Dodd for the respondent.

At the conclusion of the arguments of Counsel, the Lord Chief Justice, in giving judgment, said he had come to the conclusion that the by-law was not sufficient to make that which was done the constructing of a water-closet within by-law 17, and the penalties ought not to be enforced. He did not aggree that by-law 21 was *ultra vires*, but the local authority had not brought within it what was done in this case.

The other judges concurred, and the appeal was accordingly allowed.

CLAIM AGAINST BUILDERS UNDER THE WORKMEN'S COMPENSATION ACT.

In the Court of Appeal, composed of the Master of the Rolls and Lords Justices Mathew and Cozens-Hardy, on the 10th inst., the case of Weavings *v.* Kirk and Randall came on for hearing on the appeal of the applicant from the refusal of Judge Addison, sitting at the Woolwich County Court, to award her compensation under the Workmen's Compensation Act, 1897.

Mr. Ruegg, K.C., and Mr. W. M. Thompson appeared for the applicant; and Mr. Arthur Powell, K.C., and Mr. A. Willis for the respondents.

Mr. Ruegg, in opening the applicant's case, said it was before their lordships on April 22 last (reported in the *Builder* of April 25, 1903) the question raised being whether the accident which admittedly happened to the workman happened in a "warehouse" which was entitled to be called a factory, and secondly, whether Messrs. Kirk and Randall, who were builders and contractors in a very large way of business, were for the time being the "occupiers" of the factory within the meaning of the Act. The facts of the case were these: The respondents, Messrs. Kirk and Randall, had entered into a contract with the Government to put up shelves in a place which formed part of the Woolwich dockyard, on which a large number of goods were to be stored for Army purposes. During the course of the work the applicant's husband, who was in the service of the respondents, fell and was killed. When the case was before this Court on the last occasion their lordships did not think that the evidence was clear as to what Messrs. Kirk and Randall's "occupation" was, and they sent the case back to the County Court Judge for him to finally report to this Court as to the user of the warehouse in question, and, if necessary, to take further evidence as to the "occupation," viz., as to in whose occupation the warehouse was at the time of the accident. The County Court Judge took further evidence and adhered to his opinion that Messrs. Kirk and Randall were not the "occupiers" of the warehouse, and it was from that decision that the present appeal was brought. Continuing, the learned Counsel said that the action originally was brought under the Employers' Liability Act. After hearing the evidence, Judge Addison thought the case under that Act failed, and then application was made to him to assess compensation under the Workmen's Compensation Act 1897. Judge Addison said he was unable to find any user or occupation by Messrs. Kirk and Randall which would make them "undertakers" within the meaning of the Act, but in case the Court of Appeal decided the contrary then he made an award in favour of the applicant for 312*l.*

Mr. Powell, in answer to a question from the bench, said he would admit that the place where the accident happened was a "warehouse" within the meaning of the Act. He understood that the Court of Appeal decided that point on the last occasion when the case was before it.

Mr. Ruegg said that that being so the only question now to be argued was whether Messrs. Kirk and Randall were the occupiers of that factory. He submitted that the facts showed that the respondents had undertaken to do work in a warehouse (the contract price was between 700*l.* and 800*l.*) and that they were for the time being the occupiers of the warehouse.

Mr. Powell, on behalf of the respondents, supported the finding of the County Court Judge that the respondents were not the "occupiers" within the meaning of the Act. A man who was sent to put shelves into a warehouse could not be deemed to be the occupier. To constitute the respondents the "occupiers" within the meaning of the Act there must be occupation *quâ* warehouse. It was not *quâ* warehouse at all that the respondents were in there. In this case Kirk and Randall had only a limited use of a portion of the wall in the room on which they were at work. That was not "occupation" within the meaning of the Act.

In the result their lordships allowed the appeal, holding that Messrs. Kirk and Randall were the "occupiers" within the meaning of the Act.

COLLS *v.* HOME AND COLONIAL STORES, LTD.—HOUSE OF LORDS.*

On Thursday last week Mr. Bray continued his argument for the appellant, and dealt with the expert evidence as to the amount by which the light formerly enjoyed by the respondents would be interfered with. He referred to the rule of thumb usually accepted by architects, and submitted that as the new buildings were of a less elevation than would, taking the road as the base, support an angle of 45 deg., and the business of the respondents not being one that required special light, the interference was insufficient to maintain an action on. The learned Counsel then read the judgments given in the Court of First Instance and that of the Court of Appeal, and submitted that the judgment of Mr. Justice Joyce should be restored.

Mr. O. Leigh Clare briefly addressed the Court on the same side.

Mr. Haldane, K.C., then opened the respondents' case, and mentioned that before the writ was taken out, the Home and Colonial had approached Mr. Colls with a view of getting an undertaking that the new building on the old site should not be erected in such a way as to darken, injure, or obstruct any of their ancient lights, as the same were enjoyed previously to the taking down of No. 44, Worship-street. As these negotiations failed the present proceedings were commenced and an interim injunction applied for, but the buildings then being only of the same height as the old an undertaking was given pending the trial. Since the action the buildings had been carried higher. The learned Counsel then dealt with the expert evidence of Professor Thomas Roger Smith, Mr. Benjamin Tabberer, and Mr. Robert Willey to show that the new building would substantially and seriously diminish the access of light to the ground-floor of their premises. In order to displace their evidence the appellant had called Mr. Robert Vigers, who stated that he had formed the opinion that there would be at least 45 degrees of light left to the respondents' premises after the building was raised, and, as that in his experience was a very important point, he thought there was no real damage to the property, and that the letting and selling value in the ordinary way would not be in the least affected. Mr. Edward Blakeway l'Anson was another witness called by the appellant, and he went further than Mr. Vigers, and admitted in cross-examination that the new building would make a "large difference" to the light.

The Lord Chancellor: May we not take it that Mr. Justice Joyce rightly summed up the effect of the evidence on the one side and on the other? He says that the new buildings would deprive you of a substantial amount of light and cause material damage though light enough would be left for the ordinary purposes of occupancy of the premises as a place of business, and though the selling and letting value of the premises would not thereby be affected.

Mr. Haldane: Yes. Continuing, Counsel said on such a finding of fact the owner of ancient lights was entitled to an injunction. The learned judge had held the injunction ought not to go in this instance, because sufficient light was left for the ordinary enjoyment of the premises, as 45 per cent. clear still remained. But there was no rule of law, no rule of evidence, and no presumption or inference of fact—except per-

* See our last issue, p. 616.

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haps of the very slightest kind—that where the angular height of an erection was less than 45 per cent. the access of light for ordinary purposes was sufficient, and no complaint could reasonably be taken to the interference of ancient lights.

Having dealt with the authorities cited by Mr. Bray,

Mr. Haldane submitted that the Court of Appeal were clearly right in refusing to order an inquiry as to damages. The Court had no power to compel the respondents to sell their property or rights to the appellant or any one else at a price to be fixed by the Court. What the appellant desired to take from the respondents was a right to light which the respondents held to be of great value to them. That right stood in the same position as a right in any other property when viewed merely from the point whether one man for his own interest and advantage had any power to make the owner thereof part from it against his will. The right to light was conferred on the respondents by the Prescription Act. It was an absolute and indefeasible right to the access and use of light to and for their building without reference to the purpose for which it had been used.

Mr. Hughes, K.C., followed. He addressed himself chiefly to the respondents' contention that they were entitled to an injunction, and that the order of the Court should be one to compel the appellant to lower his building by pulling down those parts of it which interfered with the clear access of light the respondents formerly enjoyed.

There was then a long discussion as to whether such an order could issue, their Lordships, by the questions they put, appearing to think that such an order, in face of the fact that there was an alternative remedy, might be one that they should hesitate to make. The learned Counsel was speaking when the further hearing was adjourned till Friday.

On Friday, Mr. Hughes continued his argument, and pointed out that if the new building was allowed to remain as built, the appellant had infringed a statutory right acquired under the Prescription Act, and the respondents had suffered a wrong, which apparently in that case the Court must be taken to have held they had no jurisdiction to remedy.

The Lord Chancellor: There is the alternative remedy of damages.

Mr. Hughes pointed out that if the appellant, instead merely of desiring to acquire the respondents' right to ancient lights, had claimed their premises, and had threatened to take them, no Court would for a moment have held that an offer to compensate the respondents ousted the respondents' right to refuse to part with possession. The parties by agreement could make terms which a Court of law would enforce, but the Court had no power to force either party to accept terms offered by the other, which, whether reasonable or not, they did not choose to accept. There was no question here of the "need of the public." When, for example, a tram company desired to take a man's house, apart from statutory powers because, they or the local authority might in the interest of the public deem it necessary that a dangerous corner should be pulled down, then the right of the individual, subject to compensation, became second to those of the public. No such element entered into the present question. He submitted the appeal should be dismissed.

Mr. Bray in a few words replied.

The Lord Chancellor, after consulting with the noble and learned Lords, said their Lordships will take time to consider, but whatever their decision may be they will not order the building to be pulled down.

The House then adjourned.

BRICKLAYER'S CLAIM UNDER THE WORKMEN'S COMPENSATION ACT.

THE case of Blovelt *v.* Sawyer came before the Court of Appeal, composed of the Master of the Rolls and Lords Justices Mathew and Cozens-Hardy on the 11th inst., on the appeal of the applicant from the decision of the County Court Judge of North Shields refusing to award him compensation under the Workmen's Compensation Act, 1897.

Mr. Ruegg, K.C., Mr. Chester-Jones, and Mr. Harold Morris appeared for the appellant; and Mr. Maynall for the respondent on the appeal.

Mr. Ruegg, in opening the case, said it raised a short point of considerable interest and importance. The facts were shortly these:—The applicant, a bricklayer, in the employment of the respondent, the "undertaker" within the meaning of the Act, at the time the accident occurred was engaged at work on a building 30 ft. high. The dinner hour commenced at 12 noon and continued till 1 p.m. At the trial the applicant said frankly enough that during the dinner hour it was open to him to stay upon the premises for his dinner or to go away and have it; but as a rule most of the men stayed at the works for their dinner. The men had suggested to the employer that a "mess-shanty" should be provided, as there was none, and the employer said he would have one put up, but this was not done. On the day the accident happened the applicant sat down under one of the walls of the building and pulled out his bag in which he had his dinner preparatory to eating it and then the wall fell on him.

The Master of the Rolls: I hope he had not built it himself.

Mr. Ruegg: Well, I think he built some of it himself; but I do not think that any blame attached to him. It was not, I think, suggested that he was guilty of any misconduct.

Continuing, the learned Counsel said that in consequence of the wall falling upon him the applicant was severely injured. Those were the whole of the facts. The County Court Judge said that as the applicant had sat down under the wall for the purpose of eating his dinner the accident did not arise "out of or in the course of the employment." His (Mr. Ruegg's) contention was that the accident clearly arose out of the employment because it was caused expressly by the fall of the building on which the man was engaged. It could not be contended that the accident did not arise out of the employment because it was one of the risks that a bricklayer ran.

Lord Justice Mathew: Was he paid wages the whole time

Mr. Ruegg: I do not know; but I submit that has nothing to do with it. There are a well ascertained number of hours that a bricklayer works in a week, which varies according to the district, and the time of year. But there is always an ascertainable number of hours. I am informed that the man did not actually get paid for the dinner hour.

Lord Justice Mathew: He gets paid for the number of hours in a week he is actually engaged.

The Master of the Rolls: Do not the men commence work at a particular hour, and stop work at a particular hour?

Mr. Ruegg: Yes.

The Master of the Rolls: Well, that embraces intervals during which they have their food.

Mr. Chester-Jones said he thought the practice was fairly well understood. Supposing that the men worked from 8 a.m. to 6 p.m. that would be ten working hours but it would only really amount to nine working hours, because one hour came out for dinner.

Mr. Ruegg said his contention was that the employment extended to the whole of the dinner hour. According to the learned County Court Judge the applicant appeared to have lost his right under the Act by sitting down to take his dinner. His submission was that the learned County Court Judge took too narrow a view of the scope of the Act, and that the accident did arise out of or in the course of the man's employment.

Mr. Maynall, for the respondent, said that the facts were that the applicant was employed by the hour and paid so much an hour.

Lord Justice Mathew: He would have an hour for his dinner. The term of his employment was that he should work so many hours and have an hour for his dinner, and that he should be paid for the number of hours that he worked. He must have that hour for his meal to enable him to do the work.

Mr. Maynall: No, the employment is really only by the hour, and the man could be dismissed at a moment's notice. The applicant received about 2*l.* a week. The week before the accident he said he received 2*l.* 1s. 3d. There was no dispute as to the nature and terms of the employment. In the dinner hour he was not in the employment of the master or receiving pay. The man was at liberty to go where he liked and do what he liked in the dinner hour. The day the accident happened was wet and windy, and the applicant and other workmen thought it more comfortable to sit under the shelter of the wall. It was a negligent act to sit under the wall.

The Master of the Rolls, in giving judgment, said he was of opinion that the appeal must be allowed. He thought, on the evidence, that the applicant was in the employment of the master during the whole of the day, viz., from the time he went to work until he came away, and consequently during the dinner hour, if he stayed on the works for the purpose of eating his dinner. It seemed to him that if the hour during which the man had his dinner could be brought in as part of the time which was given by the workman to the master for some purpose ancillary to the work, such as feeding himself—which was essential for a man to enable him to do his work, it would be stretching the technical view very far to say that the time of his dinner was a break off in his work until he commenced to work again. It was for the master's advantage that the man should have the means of feeding himself, and he would be able to do his work the better by being fed at this particular hour. Having his dinner on the works instead of going away for it might be for the master's convenience. It did not seem to his lordship, as a matter of law, that it could be said because a man was eating his dinner he was not in the master's employment. He thought, therefore, that the finding of the learned County Court Judge that because the applicant was not paid for the dinner hour, and was not at the time of the accident engaged on the main part of the work he had ceased to be in the employment of the master, could not be upheld. He thought that the accident which occurred did "arise out of or in the course of the employment," and that the appeal must be allowed, with costs.

The Lords Justices concurred, and the case was accordingly remitted to the learned County Court Judge for him to access the compensation due to the applicant under the Act.

CLAIM FOR INDEMNITY UNDER THE WORKMEN'S COMPENSATION ACT.

THE hearing of the case of McCabe and others *v.* Jopling and Palmer's Travelling Cradle, Ltd., concluded in the Court of Appeal composed of the Master of the Rolls and Lords Justices Mathew and Cozens-Hardy, on the 16th inst., on the appeal of the Company from an award made by Judge Lumley Smith, K.C., sitting at the City of London Court, under the Workmen's Compensation Act, 1897.

In this case the applicants were the dependents of a workman named McCabe, who was killed by an accident "arising out of or in the course of his employment." The facts were shortly as follows:—In the year 1902 Mr. Jopling, a builder, contracted to paint the outside of two houses for 159*l.* To do the work, Jopling entered into a contract with Palmer's Travelling Cradle, Ltd., for the supply, fixing, and removal of four travelling cradles upon the houses for 23*l.* Timber structures, consisting of 6 ft. jibs lashed with a ledger 22 ft. long, and fastened with wire ropes to the building, and also to weights of 56 lb., were fixed on the roof and between two jibs was fixed horizontal wire rope, from which the cradles were suspended. These cradles could be moved laterally by means of guy-ropes and vertically by pulleys and other ropes, by those using the cradles. This was the only scaffolding used in the work. It was admitted that the houses were more than 30 ft. in height. The cradles were fixed and removed by men in the employment of the Company, and McCabe was employed by the Company in fixing and removing the cradles, the painting work being done by Jopling's men. The painting work had been done about a month before the cradles were removed. While McCabe was engaged in removing one of the cradles from the house he fell to the ground and was killed. The Judge in the Court below held that the house was being repaired by means of scaffolding, and that the removal of the scaffolding was a substantial part of the process of repairing, and that as to this part of the work, the Company were the "undertakers" within the meaning of the Act. He therefore made an award of compensation, as against Jopling as "undertaker" (he admitted he was an "undertaker") under Section 4 of the Workmen's Compensation Act, but held that Jopling was entitled to be indemnified by the Company. Hence the present appeal of the Company.

Mr. S. T. Evans, K.C., M.P., and Mr. Minton Senhouse appeared for the appellants, and Mr. Ruegg, K.C., and Mr. D. M. Hogg for Mr. Jopling.

At the conclusion of the arguments of counsel, their Lordships upheld the decision of Judge Lumley-Smith, and dismissed the appeal with costs.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

25,932 of 1902.—J. W. PEARSON: *Brake Device for Hauling, Paying-out, Lifting, Lowering, and Winding Apparatus.*

A hauling, paying-out, lifting, lowering, or winding apparatus, consisting of a frame carrying a pulley or pulleys over which the rope passes, said frame being connected to a brake whereby the rope when paying-out or descending serves to apply the brake and when hauling or lifting releases the brake.

27,012 of 1902.—S. R. PARKES: *Coin-Operated Locks.*

A prepaid coin operated lock (wherein the coin does not fall into the till until the release mechanism is operated by closing the door) in combination with a coin chute open at its lower tapered extremity, through which portions of a proper sized coin project, two pivotted lever fingers whose lower converging ends retain the coin, an external knob connected to the upper end of the rearward and longer finger, the motion

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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being transmitted through the medium of the aforesaid coin through the forward pivotted finger to the latch bolt, by which action the latter is withdrawn against the action of two springs.

28,003 of 1902.—S. C. Davidson: *Stoves and Apparatus for Heating Air.*

According to this invention the heated products of combustion are caused to circulate around the exterior of the air-heating tubes, which are vertical or inclined and open ended, and enclosed in a suitable chamber, the walls of which also form air heating surfaces fitted with gills or not, and further the said tube chambers are so constructed that the joints of the tubes with the surfaces in which they are carried in the chamber or to one portion of the chamber with the other where likely to be affected by expansion, are made by what may be termed resting contact or joint, that is to say, the weight of one part on the other, together with sufficient surfaces in contact, serves to make a joint efficient for the purpose to prevent leakage of smoke, and at the same time allow the necessary expansion of the parts. In the case of the tubes the upper ends only take their weight by a suitable flange whilst their lower ends make a sliding joint, the upper joint may in some cases be reinforced with red lead or suitable cement.

28,755 of 1902.—A. Koch: *Flushing Tanks for Water-closets.*

The novel feature of the flushing-tank with siphon-bell, which forms the subject of this invention, is that, in consequence of the siphon-tube and siphon-bell being adjustable, quantities or volumes of water, varying according to this adjustment, may be drawn from the tank to the closet basin. The higher the siphon-tube rises or the lower the bell descends in the tank the greater will be the quantity of water drawn or siphoned off. Another new feature of the flushing tank with a siphon-bell and regulateable water supply is that the same has an inlet opening without a floating ball cock in, or close to, the bottom of the tank.

510 of 1903.—B. J. B. Mills. (F. Nuszbaumer.) *Pulley Blocks or Lifting Tackle.*

This invention consists of an improved pulley block or lifting tackle having an extra rapid return movement, in which the worm wheel placed above the endless screw may be separated from this latter by means of a lever operated by a chain or other suitable mechanism, so as to free the lifting chain when this latter is not loaded. Means are provided for preventing the separation of the screw and its worm wheel when the apparatus is loaded, this means consisting of a latch pivotted to the lever operating the worm wheel and passing between the axle of the screw and its stop, where it is nipped by the weight of the load.

1,191 of 1903.—E. Weavers: *Fire Escapes, and Suspension of Doors, Ladders, Scaffolds, Curtains, and the like.*

This invention relates to means for suspending fire escapes and doors, ladders, scaffolds, curtains and the like to buildings. According to this invention around the top of the building is fixed a track, preferably composed of a pair of steel tubes, upon which is mounted a trolley or the like, to which the fire escape, ladder, or the like, is adapted to be suspended. The trolley extends between the slot formed by the two halves of the track, and is provided with rollers, which run upon the slotted portion so that the said trolley can be moved along the track from end to end and carry with it the fire escape, ladder, or the like attached to it. The trolley is advantageously protected from the weather by means of a tubular metallic casing enclosing it, and an elevator can also be suspended from the track, the said elevator being adapted for raising and lowering cars, life lines, rope ladders, and the like, and providing an easy means of access to any window of the building.

1,202 of 1903.—S. Timings: *Furniture Castors.*

In carrying out this invention the horn-piece is made in halves, that is to say the horn-piece is about the same outline shape as an ordinary cast-iron horn-piece, but it is made as two separate castings, the division being on the vertical centre-line from front to back. The vertical pin on which the horn-piece revolves is forged, or otherwise formed with a head at its lower end in place of the usual washer and rivetted over end, so that between this head and the collar of the pin is the part which is made of the proper shape and size to receive the horn-piece. Instead of the two horns of the horn-piece being drilled for the cross-pin of the castor bowl the cross-pin is dispensed with, and on each of the horn-pieces is cast a short inwardly projecting pip or peg of the proper size to enter the ends of the hole in the castor bowl, so as together to form the axle on which the castor bowl will revolve. The two halves of the horn-piece are secured together by a cross rivet which passes through the hole in the same from side to side at right angles to and at the back of the vertical pin, on which the horn-piece revolves, the two halves of the horn-piece being strengthened so as to receive this cross rivet. The outer ends of these holes for the cross rivet are cast counter-sunk to receive the rivet over the ends of the cross rivet. In order to effectually prevent the two halves of the horn-piece from turning on the cross rivet there is cast on the front of one-half a small projection which takes into a corresponding hole or notch in the other half.

1,504 of 1903.—M. Schweder: *Automatically Regulated Apparatus for Heating Water and other Materials.*

A device for the automatic regulation of the gas burner in cooking vessels or boilers which are closed steam tight, such regulation being effected by means of a throttle valve arranged in the gas supply pipe and connected with a diaphragm, characterised in that the said vessel for boiling or cooking is connected with the diaphragm casing in such a manner that the steam pressure in the said vessel is transmitted directly to the diaphragm.

2,210 of 1903.—J. G. Glassford: *Doors.*

This invention is designed to provide an attachment for doors or door frames to prevent draughts when the door is open, and to promote ventilation over the top of the door. It consists essentially in pivotting in front of the door or to the frame a screen or panel approximately the height of the door, which, when the door is partially opened, closes the aperture presented in front of it, leaving an angular space open above it through which a current of air may enter for the purpose of ventilation.

2,370 of 1903.—E. Eaton: *Apparatus for use in the Manufacture of Bricks, Blocks, and the like.*

This invention relates to an apparatus for use in the making of sand bricks, or blocks, in which ground quick-lime, sand, ashes, clinkers, and other ingredients are used. The apparatus is formed of a number of compartments constructed in such a way that as soon as one of the compartments has been filled with lime, sand, or other materials it can be removed, and an empty one put in its place, which would be close to the mixing machine, and the contents of which were ready to be used, would in turn come into position opposite the press, and when emptied would again come into position opposite a mixing and filling machine to be again filled. The apparatus is arranged upon a large turntable, which is revolved by suitable gearing and power, and the mixing chamber feeds each compartment of the apparatus in turn, and in turn each compartment comes opposite the press, and while this compartment is being emptied and used, another is being filled by the mixer, and so on continuously.

18,766 of 1903.—W. H. Wheatley (C. F. Stone): *Window and other Sash Fasteners and Holders.*

As an article of manufacture, a securing device for window sashes or the like comprising a housing, having anchoring gears at opposite ends and openings at its outer side, and lugs formed upon each side of the housing and extending toward each other at right angles to said gears, a single U-shaped spring, the bend of which is engaged by said lugs, the ends of said spring projecting beyond the outer face of the housing, and provided with coincident apertures, and a notched rod passed through said apertures, and received within a vertical passage into the outer wall of the housing and having bearings in the upper and lower outer edges of the outer wall of the housing.

20,927 of 1903.—L. F. Betts: *Gas Burners for Heating and Lighting.*

A gas burning heater, comprising a gas chamber having an inlet nipple and an annular deck, provided with a series of equally spaced jet holes, a centrally located boss on the top of said chamber, a cap having an aperture matching said boss and an annular flange above said deck, provided with a series of openings, each concentric to one of said jet holes, an annular depending skirt on said flange encircling said deck, a standard screwed upon said boss and holding said cap, a flame spreader on said standard above said cap, and a radiator having an inwardly-coned lower face serving as a reflector supported by said standard above said spreader.

21,269 of 1903.—W. Crisp: *Means for Raising Bricks and other Materials.*

A means for raising bricks and other materials wherein is provided a staging within which is free to run up and down the receptacle for the bricks or others materials, the said receptacle being raised and lowered by a chain, one end of which is attached to suspension rods above the receptacle and the other end to the bottom of the said receptacle, the said chain passing over suitably situated guide rollers and over a sprocket-wheel carried on a shaft, supported in a suitable framing and operated by a wheel, means being provided for keeping the chain in gear with the sprocket-wheel for preventing the receptacle running backwards, and for stopping it at any required height.

22,353 of 1903.—R. G. Howson: *Lavatory Basins and the like.*

This invention relates to lavatory basins and the like in which the overflow passage reaches through to the top of the basin. According to this invention, an inspection cover is provided for the overflow passage pivotted at one side so that it can be uplifted from the other. The inspection cover may be held down by spring pressure, which at the same time may be employed to hold it in its uplifted or open position. A lateral aperture or outlet is formed in the upper edge of the basin, which is normally covered by means of a removable grid that may be formed separate from the inspection cover, or secured to it or to the pins or other parts carrying the said inspection cover, or pivotted or otherwise mounted upon the basin, or provided as a downward extension from the inspection cover or otherwise as may be preferred in particular cases.

22,376 of 1903.—T. A. Hearson (O. Schröder): *Artificial Marble Mass.*

An artificial marble mass consisting of a mixture of magnesite, chloride of magnesium, stone, leather, or wood dust, and an animal or vegetable binding material.

22,424 of 1903.—J. Levick: *Flushing Cisterns, and Water-waste Preventers, for Railway Carriage Lavatories and analogous uses.*

In combined siphon flushers and water-waste preventers, the arrangement in combination with a fixed standpipe of a rising and falling bell, the mouth of which is sealed, when in its lowered position, by a valve or equivalent device adapted to exclude water from the inside of the said bell.

22,432 of 1903.—C. M. Dorman and R. A. Smith: *Electrical Ceiling Fittings.*

A ceiling fitting consisting of a box or base without terminal fittings, and an insulating cover to the upper or inner side of which the terminal fittings are attached, the arrangement being such that when the cover is lifted up approximately into position, bared portions of the line wires engage with the terminals, and are fixed in position by screws.

22,476 of 1903.—G. T. Richardson: *Hinge Fittings for Fanlights, Casements, and the like.*

A hinge fitting for fanlights and the like, comprising a plate provided with an inclined flange and having a pivot upon it, and another plate having an inclined slot into which the said pivoted pin projects, in combination with a tongue or stop for preventing the movement of the slotted plate relatively with the pivot.

22,523 of 1903.—J. D. Bennet: *Furniture Lock.*

The lock comprises a casing made up of a front plate and back plate, and enclosing sides or flanges which may be of the usual construction, excepting that the sides are formed with ribs which are adapted to fit into grooves cut in the wood work of the desk or other article of furniture, and not only facilitate the driving of the lock into place, but secure it, without the use of screws, against lateral movement. The top plate of the lock is formed with an orifice through which passes the eye of the keeper, which is in the form of a disc, to facilitate fitting by simply boring out a shallow recess in the wooden lid by means of a boring bit. Within the casing of the lock are pivoted on the back plate two catch levers, pressed inwards by means of springs, also secured on the back plate, the outer ends of the catch levers being curved or inclined, so that on closing down the desk lid the bevelled lower end of the eye of the keeper entering the orifice presses apart the catch levers until it clears the catches, which then enter the eye, and by securely retaining the keeper, lock down the desk lid, the desk being thus self-locking. For unlocking the desk, a duplex or double-leafed key is used, and is inserted through the keyhole, the clefts in the key being made to fit the wards in the lock. On turning the key one quarter turn, the leaves press apart the catch levers to free a keeper, whereupon the desk lid may be raised.

22,525 of 1903.—J. D. Bennet: *Castors.*

The castor comprises an axle carrying two small wheels running freely thereon, said axle having rigidly secured to it a post or pintle, which is embraced by a socket composed of a split sleeve constituting a spigot to fit into a socket, bored out of the leg of a table, the base of a blackboard for schools, or other article of furniture. A concavity is formed in the end of the pintle and in the sleeve, whereinto is fitted a ball to serve as a thrust bearing for the castor, so that the latter may turn freely on a vertical axis.

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1,423 of 1903.—R. GRIMM: *Roofs, Beams, Girders, and like Structures, of Concrete and Iron.*

A concrete and iron girder and the like, in which the metal insertions are embedded whilst under tensional strain in the concrete of the girder, and the bearing portions of the girder are formed by metal insertions projecting from the concrete at both ends of the girder and connected to metal pieces resting freely on the supports of the girder.

4,920 of 1903.—J. SMURTHWAITE and W. FISHER: *Float Valves.*

This invention consists of a cast or otherwise provided metallic body, the upper portion of which is adapted for connexion with the supply pipe in any suitable manner, and has formed therein a central vertical passage for the reception of a vertically operating piston valve, the lower end of which said valve is adapted for connexion with a crank lever carrying the usual ball or other float. The upper end of the said piston valve has a resilient surface of leather or other suitable material, retained in position by a cap having an open top, so that the said valve when raised by the float lever, may close the passage between the said body and the water service, the said body being so formed internally as to provide a circular chamber, around which the incoming water flows when the said piston valve is lowered, by the lowering of the float from which said chamber the water flows into the cistern through an oblong or elliptical passage of larger area than the inlet, thereby spreading the water and directing the same on to the side of the cistern, away from, instead of through, the working parts of the valve as hitherto.

21,912 of 1903.—A. W. ELLIS and F. F. FARRIER and W. M. FRASER.: *Joints or Unions of Rods and the like for use in Cleaning Drain Pipes and for similar purposes.*

This invention consists of an improved joint or union for connecting the ends of rods, consisting in the employment in conjunction with a socket having a right and left-handed thread and a socket adapted to engage with the aforesaid socket, of a collar which screws over both sockets and prevents the male end becoming loose.

MEETINGS.

FRIDAY, DECEMBER 18.

Architectural Association.—Mr. G. P. Bankart on "Old Stucco and Plaster Work, with Reference to Modern Possibilities." 7.30 p.m.

Institution of Mechanical Engineers.—Mr. C. E. Stromeyer and Mr. W. B. Baron on "The Working of Various Water-softeners." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—(1) Mr. C. B. Case on "The Action of the Sea upon the Foreshore." (2) Mr. F. W. Cable on "The Causes of the Loss of Beaches." 8 p.m.

Glasgow Architectural Craftsmen's Society.—Debate: "Should Architects be Final Arbiters in Disputes on Contracts for their own Work?" Affirmative: Mr. R. N. Horn, A.R.I.B.A. Negative: Mr. Isaac Low, jun. 8 p.m.

SATURDAY, DECEMBER 19.

Junior Institution of Engineers.—Visit to the Electricity Works of the Walthamstow Urban District Council. Train leaves Liverpool-street at 2.23 p.m.

Builders' Foremen's Association (Memorial Hall, Farringdon-street).—Monthly meeting, 7.30 p.m.

MONDAY, DECEMBER 21.

Liverpool Architectural Society.—Paper by Mr. E. Bertram Kirby.

TUESDAY, DECEMBER 22.

Institute of Sanitary Engineers, Ltd. (Lectures in Practical Sanitary Science).—Mr. B. R. Tucker on "Ventilation of Dwellings and Public Buildings." 7 p.m.

Institution of Civil Engineers.—Mr. T. E. Stanton, D.Sc., on "The Resistance of Plane Surfaces in a Uniform Current of Air." 8 p.m.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

December 5.—F. PITTIS & SON (At Newport, I.W.)

Arreton, Isle of Wight.—Sullen Farm, 26 a. 0 r. 20 p., f., y.r. 65*l.* £1,200

December 7.—By GILBERT & HOW.

Finsbury Park.—100, Stroud Green-rd. (S), u.t. 64 yrs., g.r. 9*l.* 9*s.*, y.r. 85*l.* 1,050

December 8.—By W. B. HALLET.

Hampstead.—100, King Henry's-rd., u.t. 49 yrs., g.r. 12*l.* 10*s.*, e.r. 75*l.* 550

By MARK LIELL & SON.

Bow.—26 and 28, Spanby-rd., u.t. 59 yrs., g.r. 7*l.*, y.r. 67*l.* 12*s.* 510

By PRICKETT & ELLIS.

Hornsey Rise.—20, Ashmount-rd., u.t. 78 yrs., g.r. 8*l.* 8*s.*; e.r. 52*l.* 485

By EDWARD SIMPSON.

Old Kent-rd.—124, Trafalgar-rd., u.t. 69 yrs., g.r. 7*l.* 7*s.*, w.r. 44*l.* 4*s.* 310

New Cross.—16 and 18, Gellatly-rd., u.t. 55 yrs., g.r. 10*l.* 10*s.*, w.r. 62*l.* £645

Lewisham.—79 and 81, Elswick-rd., u.t. 52 yrs., g.r. 8*l.*, w.r. 67*l.* 12*s.* 535

By ROGERS, CHAPMAN, & THOMAS.

Chiswick.—Devonshire-rd., f.g.r.'s 56*l.*, reversion in 75 yrs. 1,385

Putney.—3 to 21 (odd), Gwallor-rd., u.t. 76 yrs., g.r. 63*l.*, w.r. 364*l.* 2,805

67, Gardener's-la., u.t. 73½ yrs., g.r. 5*l.*, w.r. 36*l.* 8*s.* 310

14 and 16, Emily-ter., u.t. 76 yrs., g.r. 16*l.*, y.r. 81*l.* 840

192, Upper Richmond-rd. (s), u.t. 65 yrs., g.r. 9*l.* 10*s.*, y.r. 90*l.* 1,220

45 and 47, Disraeli rd., f., y.r. 70*l.* 1,055

4, 6, 8, and 10, Bective-cres., w.r. 114*l.* 10*s.* 1,025

Wandsworth.—2, Gorst-rd., u.t. 77 yrs., g.r. 7*l.* 10*s.*, y.r. 40*l.* 450

Pimlico.—25, Sussex-st., and 42, Cumberland-st., u.t. 30 yrs., g.r. 14*l.*, y.r. 128*l.* 8*s.* 625

31, Belgrave-rd. (s.), u.t. 23½ yrs., g.r. 5*l.*, y.r. 160*l.* 1,520

16, Effingham-st., u.t. 31 yrs., g.r. 8*l.*, y.r. 48*l.* ... 455

By G. HASLETT (at Masons' Hall Tavern).

Lambeth.—Stangate-st., The Spread Eagle p.-h., u.t. 39½ yrs., y.r. 125*l.*, with goodwill 15,300

Blackfriars.—Blackfriars-rd., The Bell p.-h., u.t. 19½ yrs., y.r. 180*l.*, with goodwill 4,500

By WARLTERS, LOVEJOY, & TELFER (at Masons' Hall Tavern).

Norwood.—Beulah Hill, The Conquering Hero p.-h., f., y.r. 80*l.* 550

December 9.—By GEORGE BILLINGS.

Hackney.—19 and 21, Bradstock-rd., u.t. 43 yrs., g.r. 9*l.*, w.r. 78*l.* 325

36, Bradstock-rd., u.t. 42 yrs., g.r. 14*l.* 5*s.*, e.r. 39*l.* 235

By WM. CLARKSON.

Poplar.—9, 11, and 13, Ricardo-st., and 1 and 3, Annabel-st., u.t. 25 yrs., g.r. 13*l.*, subject to payment of 30*l.* on a life aged 84 700

By WAGSTAFF & SONS.

Hampstead.—46, Fortune-green-rd., f., e.r. 55*l.*... 250

Fortune-green-rd., f.g.r. 10*l.*, reversion in 95 yrs.

Holloway.—12, Hargrave-rd., u.t. 80 yrs., g.r. 7*l.* 15*s.*, e.r. 42*l.* 400

Tottenham.—40, Braemar-rd., with nursery grounds, area ½ of an acre, f., y.r. 32*l.* 585

2, May Cottages, f., w.r. 39*l.* 470

Avenue-rd., f.g.r. 15*l.*, reversion in 59 yrs..... 370

By J. THORNBOROUGH (at Bishop Auckland).

Bishop Auckland, Durham.—Etherley-la., 8 fields, 25 a. 0 r. 16 p., f. and c. 2,650

Cockton Hill, three plots of land, area 22,366 yds., c. 1,725

South Church-rd., two fields, 5 a. 3 r. 19 p., with hospital and cottage thereon, f. and c..... 1,175

Cradock-st., two fields, 6 a. 2 r. 21 p., f. and c.... 1,185

December 10.—By BEALE & CAPPS.

Bayswater.—32, Kildare-ter., u.t. 47½ yrs., g.r. 7*l.*, y.r. 65*l.* 665

Kensington.—25, Campden-st., u.t. 19½ yrs., g.r. 4*l.* 10*s.*, y.r. 30*l.* 265

By H. J. BLISS & SONS.

Dalston.—7 to 17 (odd), Trederwen-rd., u.t. 79 yr., g.r. 36*l.*, w.r. 249*l.* 12*s.* 1,895

Spitalfields.—1 and 2, Parliament-ct., f., w.r. 124*l.* 16*s.* 600

Bethnal Green.—226, Bethnal Green-rd. (s.), f., y.r. 50*l.* 785

Forest Gate.—52, Claremont-rd., u.t. 73 yrs., g.r. 10*l.* 10*s.*, e.r. 55*l.* 560

Clapton.—Powerscroft-rd., f.g.r. 10*l.*, reversion in 71½ yrs. 225

By CHESTERTON & SONS.

Kensington.—19 and 21, Holland-st., f., y.r. 125*l.* 2,725

Church-walk, f.g.r. 12*l.*, reversion in 16½ yrs. ... 1,100

St. John's Wood.—16, Hamilton-ter., u.t. 31 yrs., g.r. 15*l.*, e.r. 130*l.* 925

Pimlico.—136a, Grosvenor-rd. (The Riviera Studios), u.t. 26 yrs., g.r. 62*l.* 10*s.*, y.r. 210*l.* .. 460

By J. G. DEAN & Co.

Wandsworth.—32, Baskerville-rd., u.t. 75½ yrs., g.r. 12*l.* 12*s.*, e.r. 70*l.* 785

By C. C. & T. MOORE.

Poplar.—55 and 57, Pennyfields, f., w.r. 31*l.* 2*s.* ... 750

By STIMSON & SONS.

Holloway.—Tabley-rd., f.g.r. 21*l.*, reversion in 63 yrs. 550

Junction-rd., l.g.r. 12*l.* 10*s.*, u.t. 63 yrs., g.r. nil 250

Wandsworth.—Bennerley-rd., f.g.r.'s 41*l.*, reversion in 74 and 73 yrs. 1,045

Wakehurst-rd., f.g.r.'s 122*l.* 18*s.*, reversion in 74 yrs. 2,198

Belleville-rd., f.g.r.'s 61*l.*, reversion in 74 yrs... 1,580

East Hill, f.g.r.'s 91*l.*, reversion in 32 yrs..... 2,260

Herndon-rd., f.g.r.'s 89*l.*, reversion in 32 yrs..... 2,255

Knoll-rd., f.g.r.'s 224*l.*, reversion in 32 yrs..... 5,561

Eglantine-rd., f.g.r.'s 95*l.* 11*s.*, reversion in 32 yrs. 2,270

Southfields-rd., f.g.r.'s 27*l.* 12*s.* 8*d.*, reversion in 74 yrs. 677

Haldon-rd., f.g.r.'s 31*l.*, 12*s.*, reversion in 74 yrs. 760

Sedleigh-rd., f.g.r. 15*l.*, reversion in 74 yrs. 380

December 11.—By T. A. CHALLENGER.

Notting Hill.—4, 6, and 8, Hesketh-pl., and 5 and 6, Thomas-pl., u.t. 26 yrs., g.r. nil, y.r. 20*l.*..... 260

14 and 16, Hesketh-pl., u.t. 26 yrs., g.r. nil, y.r. 39*l.* 400

By MIVART & Co.

Regent-st.—26, King-st., f., y.r. 100*l.* 2,970

Marylebone.—244 and 248, Great Portland-st, (s.), u.t. 27½ yrs., g.r. 50*l.*, y.r. 355*l.* 4,950

Hyde Park.—7, Connaught-sq., u.t. 44 yrs., g.r. 17*l.* 4*s.*, p. 270

By VENTOM, BULL, & COOPER.

Acton.—8, 10, and 20, Messaline-av., f., y.r. 160*l.* ... 2,325

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; l.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; ls. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; h.-s. for beer-house; p.h. for public-house; o. for offices; s. for shops; ct. for court.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks.....	1 16 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks ...	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons.....	1 10 0	" at railway depôt
Red wire Cuts ...	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ...	4 4 0	" " "
Do. Bullnose	4 10 0	" " "
Best Stourbridge Fire Bricks.....	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers...	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers...	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed.....	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime ...	21 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime	11s. 6d. per yard, delivered.
Stourbridge Fire Clay in sacks	27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt.....	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt
Beer in blocks	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks ...	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.).....	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto.....	2 6	" "
3 in. Sawn two sides slabs (random sizes) ..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes).....	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	2 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	deld. rly. depôt. per ft. super.
" " " 3 in. do.	1 2½	deld. rly. depôt. " "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly. dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " "	13 10 0	" "
16×8 best "	7 0 0	"
20×10 best blue Portmadoc	12 12 6	" "
16×8 best blue Portmadoc	13 0 0	" "

[See also next page.

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PRICES CURRENT (*continued*).

SLATES.

in. in.		£ s. d.	
20×10	best Eureka unfading green.....	15 2 6	per 1000 of 1200 at rly.dep
20×12	best Eureka unfading green.....	17 2 6	" "
18×10	" "	12 10 0	" "
16× 8	" "	10 5 0	" "
20×10	permanent green	11 10 0	" "
18×10	" "	9 10 0	" "
16× 8	" "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles...	42 0	per 1,000 at rly. depot.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles.....	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and Valley tiles.....	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. Ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles.....	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ...	0 10 0	less than 7 in. and 8 in.
Deals: seconds.....	1 0	0 less than best
Battens: seconds	0 10 0	" " " 0
2 in. by 4 in. and 2 in. by 6 in.....	9 0 0	" 9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ...	8 10 0	9 10 0
Foreign Sawn Boards— 1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.....	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)...	3 5 0	3 15 0
JOINERS' WOOD.		
White Sea: First yellow deals, 3 in. by 11 in.	At per standard. 23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals. 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:— First white deals, 3 in. by 11 in....	14 10 0	15 10 0
" " 3 in. by 9 in. ...	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in,	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ...	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments...	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube ...	0 3 6	0 4 6
Danzig and Stettin Oak Logs— Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ...	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¾ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch.....	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks— per ft. cube.....	0 4 0	—
Prepared Flooring—	Per square.	
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 15 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards ...	0 11 0	0 13 6
¾in. by 7 in. do. do. do.	0 14 0	0 18 0
1in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

PRICES CURRENT (*continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0 ...	7 5 0
Compound Girders, " "	8 2 6 ...	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6 ...	8 17 6
Flitch Plates	8 5 0 ...	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6 ...	8 5 6

METALS.

IRON—	Per ton, in London £ s. d.	£ s. d.
Common Bars	7 10 0 ...	8 0 0
Staffordshire Crown Bars, good merchant quality.....	8 0 0 ...	8 10 0
Staffordshire "Marked Bars".....	10 10 0 ...	—
Mild Steel Bars	8 15 0 ...	9 5 0
Hoop Iron, basis price	9 5 0 ...	9 10 0
" " galvanised	17 10 0 ...	—
(*And upwards, according to size and gauge.)		
Sheet Iron (Black)— Ordinary sizes to 20 g.	9 15 0 ...	—
" " 24 g.	10 15 0 ...	—
" " 26 g.	12 5 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.....	14 5 0 ...	—
Sheet Iron, Galvanised, flat, best quality— Ordinary sizes to 20 g.	16 0 0 ...	—
" " 22 g. and 24 g.	16 10 0 ...	—
" " 26 g.	18 0 0 ...	—
Galvanised Corrugated Sheets— Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0 ...	—
" " 22 g. and 24 g....	13 5 0 ...	—
" " 26 g.	14 0 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker.....	11 15 0 ...	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0 ...	—
" " " 26 g.....	14 0 0 ...	—
Cut nails, 3 in. to 6 in. ..... (Under 3 in., usual trade extras.)	9 5 0 ...	9 15

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	13 17 6 ...	—
Pipe in coils	14 7 6 ...	—
Soil pipe	16 17 6 ...	—
Compo Pipe	16 17 6 ...	—
ZINC—Sheet— Vieille Montagne .....ton	26 5 0 ...	—
Silesian	26 0 0 ...	—
COPPER— Strong Sheet.....per lb.	0 0 10½ ...	—
Thin..... "	0 0 11½ ...	—
Copper nails ..... "	0 0 11 ...	—
BRASS— Strong Sheet ..... "	0 0 10 ...	—
Thin " ..... "	0 0 11 ...	—
TIN—English Ingots..... "	0 1 3 ...	—
SOLDER—Plumbers'..... "	0 0 6 ...	—
Tinmen's ..... "	0 0 8 ...	—
Blowpipe ..... "	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2d. per ft. delivered
" fourths.....	1½d. " "
21 oz. thirds	3d. " "
" fourths.....	2½d. " "
26 oz. thirds	3½d. " "
" fourths.....	3d. " "
32 oz. thirds	4½d. " "
" fourths.....	4d. " "
Fluted sheet, 15 oz.	2½d. " "
" 21 oz.	3½d. " "
⅛ Hartley's Rolled Plate.....	1½d. " "
⅛ " " "	2d. " "
¼ " " "	2½d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels...	per gallon	0 1 8
" " " in drums.....	"	0 1 11
Boiled " " in pipes or barrels...	"	0 1 11
" " " in drums.....	"	0 2 2
Turpentine, in barrels	"	0 3 8
" in drums	"	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	"	19 0 0
Best Linseed Oil Putty.....	per cwt.	0 7 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak.....	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal.....	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish.....	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TO CORRESPONDENTS.

W. G. (Amounts should have been stated). M. T. W. (Below our limit).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to J. MORGAN) should be addressed to the publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers) can ensure receiving "The Builder" by *Friday Morning's Post.*

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Nat. Tel. 6112 Gerrard. Telegrams, "The Builder, London."

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COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

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*** Stamps *must not* be sent, but all the sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge.* Letters will be forwarded if addressed envelopes are sent together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed) 1s.

TENDERS.

*** Owing to the Christmas holidays, the *Builder* will be published next week on Thursday instead of Friday. All communications for the Editor must therefore reach our office not later than 10 a.m. on Wednesday morning.

* Denotes *accepted.* † Denotes *provisionally accepted.*

ALLINGTON.—For rebuilding old inn, for Messrs. Gibbs, Mew, & Co. Messrs. John Harding & Son, architects, Salisbury:—

F. Dibben	£778 0 0	T. Stiles, Southampton*	£597 18 0
Light & Son.....	745 0 0		
W. Quint Cole ...	738 0 0	Cockerill & Son	444 10 0
Wort & Way ...	699 17 9		

BELTON.—For erecting house and farm buildings for Mr. G. A. Maw. Mr. H. Kelsey, architect, Queen-street, Epworth:—

Basindale & Laggett...	£851	T. Dawson, Epworth, Doncaster*	£659
W. Barton.....	826		
T. Bramford.....	764	E. Pearce	640
R. Stewart	734	Harrison & Leggett ...	622

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BERWICK-ON-TWEED.—For the supply of whinstone, for the Sanitary Authority:—

	s. d.	
M. Appleby, Embleton, Northumberland.....	10 11 per ton mashed rubble.	
	16 5 „ „ 5×10 kerb.	
	15 5 „ „ 6×5 flats.	

BRANDON.—For water-supply works (contract No. 1), for the Rural District Council. Messrs. H. Walker & Son, engineers, Albion Chambers, King-street, Nottingham:—

Farren & Son	£5,264 0 0	J. G. Cowell ...	£3 738 0 0
Boughton & Sons	4.590 10 0	H. Shardlow ...	3,700 0 0
H. Ashley	3.995 0 0	Davies, Ball, & Co.	3,615 0 0
Jenkins & Son	3,923 0 0	J. H. Vickers, Ltd., Nottingham* ...	3 520 0 0
J. F. Price.....	3,900 0 0	Langley & Westmoreland.....	3.461 4 4
F. Pattinson...	3,863 15 0	F. C. Thurman	3.449 0 0
Hutchinson & Son.....	3,800 0 0		
Ernest West ...	3,793 0 0		
T. Barlow	3,777 2 6		

BRANDON.—For water supply works (Contract No. 2), for the R.D.C. Messrs. H. Walker & Son, engineers, Albion-chambers, King-street, Nottingham:—

F. Bradley	£1,032 15 7	Clay Cross Co....	£871 13 9
Birtley Iron Co.	933 7 0	Biggs, Wall, & Co.	854 9 6
Cochrane & Co.	923 15 9	Watson, Gow, & Co, Ltd.	850 0 9
Stevenson & Co.	894 18 7	Oakes & Co., Ld.	850 0 0
Butterley Co., Ltd.....	890 12 6	Sheepbridge Coal & Iron Co.....	848 12 4
J. S. Roberts, Ld.	886 0 0	A. G. Cloate	820 17 3
Stanton Iron Co., Ld.....	879 14 7	Staveley Coal & Iron Co., Ld., Chesterfield*..	817 4 11
Holwell Iron Co., Ltd.....	873 2 7		

BRENTFORD.—For making up Clifden-road, for the Urban District Council. Mr. Nowell Parr, Surveyor, Clifden House, Boston-road, Brentford:—

Barry	£874 0 0	Mowlem & Co....	£721 0 0
J. Ball	860 0 0	Neave & Son ...	713 0 0
London County Builders.....	833 14 0	Lamble	679 0 0
Morecroft	795 0 0	Nowell & Co. ...	679 0 0
W. Parker.....	794 0 0	Watson	654 6 3
Lawrence & Thacker.....	725 0 0	Wheeler, Southwark	579 0 0

[Surveyor's estimate, £700.]

CARNARVON.—For gymnasium at County School, for the Carnarvon Local Governing Body. Mr. R. Lloyd Jones, County Architect, 14, Market-street, Carnarvon:—

Roberts & Bro.	£855	Williams & Roberts,	
Edward Parry	645	Carnarvon*	£618

CHESTER-LE-STREET.—For making-up private streets, Chester-le-Street, Durham, for the R.D.C. Mr. G. W. Ayton, Highway Surveyor, Chester-le-Street. Quantities by Highway Surveyor:—

R. Gardiner ...	£3,549 10 5	G. Wells.....	£1,349 1 6
Hardy & Atkinson	2,562 12 6	J. Carrick	1,304 2 1
J. W. White ...	1,558 1 2	J. McMalaren	1,208 16 9½
Catherall & Co.	1,409 6 1	Thompson & Son, Chester-le-Street* ...	1,279 13 11
C. Groves	1,374 4 4		
G. E. Simpson	1,364 4 11		

[Surveyor's estimate, £1,371 18s. 7d.]

CLONMEL (Ireland).—For two artisans' and ten labourers' dwelling houses, for the Corporation. Mr. James J. M'Auley, architect:—

Lonergan & Bros.	£1,680 18 6	James Boles,‡ Clonmel‡ ...	£1,498 10 0
Cleary & Sons	1,550 0 0		

‡ Recommended for acceptance.

CROYDON.—For constructing two relief stations in Church-road and Sanderstead-road respectively, for the Croydon Guardians. Messrs. Wills & Anderson, architects, 4, Adam-stret, Adelphi:—

	Church-road.	Sanderstead-road.
Leonard & Mason	£1,275	£1,334 0
Williams & Son	1,160	1,220 0
T. Peace	1,050	1,050 0
Smith & Sons	975	1,140 0
Robson & Moon	960	992 16
A. W. Grace	912	1,125 0
C. Jackson.....	899	999 0
G. E. Everett	897	983 0
T. R. Young	889	—
D. W. Barker, Croydon*...	829	915 0
[Architect's probable estimate.....	832	950 0

DEVONPORT.—For taking down old buildings, and erecting new printing works, for Messrs. W. G. Swiss & Son. Mr. E. M. Leest, architect, 14, St. Aubyn-street, Devonport. Quantities by Messrs. Leest & Adams, surveyors, Devonport:—

Littleton & Son ...	£539 0	A. Sleeman	£469 0
F. Watts.....	514 2	H. Hanbury	465 0
Smith & Son	499 15	Jenkin & Son*	453 0
A. H. Northcott ...	483 0		

DEVONPORT.—For alterations to the Jubilee Inn, Fore-street, Torpoint. Mr. E. M. Leest, architect, 14, St. Aubyn-street, Devonport. Quantities by Messrs. Leest & Adams, Devonport:—

Smith & Son ...	£319 15 0	R. Kent.....	£2:7 13 10
G. F. Kingdom	250 16 7	S. E. D. Ough, Saltash*	214 0 0
Snell & Son	230 0 0		

DEVONPORT.—For alterations to The Half Moon Inn, George-street, Devonport, for the Plymouth Breweries, Limited. Mr. E. M. Leest, architect, Devonport. Quantities by Messrs. Leest & Adams, Devonport:—

Taylor & Son.....	£490 0	Smith & Son,	
Blackell & Son	421 0	Devonport*	£371 15
Pearn Bros.	397 0		

DEVONPORT.—For alterations to the Rose and Crown p.h., Pembroke-street, Devonport, for Messrs. Ash & Son. Mr. E. M. Leest, architect:—

T. May, Plymouth £441 15

HALTWHISTLE (Northumberland).—For erecting Board room and offices, for the Guardians. Mr. J. M. Clark, F.S.I., Haltwhistle:—

W. Strachan, Haltwhistle* £1,325 10

HARDINGSTONE.—For construction of a sewage tank, Mill-road outfall, Cogenhoe, for Hardingstone R.D.C. Messrs. Sharman & Archer, architects and surveyors, Wellingborough:—

Seddons & Freeman	£316 0	W. Wright	£278 0
W. G. Wilmott	310 0	Brown & Sons	260 0
W. Smart	295 10	J. C. Sharman, Cogenhoe*	247 9
H. Clayson	289 0		
A. T. Chown	285 0		

ILFORD.—For levelling, metalling, &c., roads, for the U.D.C. Mr. H. Shaw, A.M.Inst.C.E., Surveyor to the Council, Town Hall, Ilford:—

D. T. Jackson, 104, Ripple-road, Barking.	£188 1 8	Brisbane-road.
	211 1 3	Dunedin-road.
	283 6 2	Thoroid-road.
	463 11 8	Seven Kings'-road.

LIMPSFIELD.—For additions and alterations to Stoneshill, Limpsfield, Surrey, for Mr. F. O. Osmaston. Messrs. Wills & Anderson, architects, 4, Adam-street, Adelphi, London. Quantities by Messrs. J. Leaning & Sons, 28, John-street, Bedford-row, W.C.:—

George Wade.....	£3,886	John Brazier	£2,977
Maides & Harpur ...	3,417	Strange & Sons, Tunbridge Wells*	2,926
Henry Young	3,014		

[Surveyor's probable estimate, £2,975.]

LONDON.—For the erection of Cubitt Town library building, for the Poplar Borough Council:—

A. J. Sheffield	£6,134 0 0	Patman & Fotheringham, Ltd. ...	£5,223 0 0
Sabey & Son ...	5,715 0 0	Lawrence & Co.	5,277 0 0
Thomas & Edge	5,614 0 0	Jas. Parsons...	5,258 0 0
Wm. Downs ...	5,570 0 0	Chas Gray Hill	5,253 0 0
Geo. Sharpe ...	5,516 16 0	Foster Bros. ...	5,248 0 0
Sharpington ...	5,452 0 0	Ferguson & Co.	5,190 0 0
Moss & Co. ...	5,425 0 0	Nightingale ...	5,068 0 0
Spencer, Santo, & Co., Ltd....	5,334 0 0	Roome & Co....	4,987 0 0
H. Lovatt	5,270 0 0	A. Faulks	4,815 5 5
Somerford & Son	5,233 0 0	Watts-Johnson & Co.*	4,796 0 0

LONDON.—For alterations and fitting up premises, 15, New Broad-street, E.C., as a hair dressing saloon, for Mr. Stewart Anderson. Mr. Walter Graves, architect, Winchester House, Old Broad-street, E.C.:—

Sumner & Co.	£479	Little & Senecal, Hatton-wall, E.C.*.....	£379
Spencer, Santo, & Co...	459		
Styles & Son	379		

LONDON.—For making up the roadways and paving footways of Hornshay-place, Sarah-place, and Tolhurst-street, for Deptford Borough Council:—

J. E. Etheridge, 8a, Rollinsstreet, Old Kent-road, S.E.	Hornshay-place	£119 13 0
	Sarah-place.....	117 0 6
	Tolhurst-street	163 11 6

LONDON.—For erecting library buildings, Cubitt Town, for the Borough Council. Mr. C. H. Norton, architect, 14, Bedford-row, W.C. Quantities by Mr. Henry Theobald, F.S.I., 6, South-street, Finsbury-pavement, E.C.:—

—	Amount of Tender.	Monk Park Bath Stone for Terra Cotta.	Bradford's Grano-Concrete for Coke Breeze Concrete, Floors and Flats.	Bradford's Grano-Concrete for Artificial Stone Stairs, &c.
		Deduct	*Add*	*Add*
	£	£ s. d.	£ s. d.	£ s. d.
A. Faulkes	4,950	134 14 7	224 3 8	3 0 0
Watts-Johnson, & Co.	4,967	171 0 9	237 0 0	4 0 0
				Deduct
Roome & Co.	4,998	11 0 0	280 0 0	3 0 0
Ferguson & Co.	5,120	—	208 5 6	—
				Add.
B. E. Nightingale	5,218	150 0 0	275 0 0	9 0 0
		Add		
C. Gray Hill	5,223	30 0 0	290 0 0	3 0 0
Foster Bros.	5,248	—	247 0 0	13 0 0
		Deduct		
Lawrence & Son	5,297	20 0 0	258 0 0	—
				Deduct
J. Parsons	5,318	60 0 0	278 0 0	11 0 0
				Add
Patman & Fotheringham, Ltd.	5 323	100 0 0	270 0 0	4 0 0
Somerford & Son	5,328	95 0 0	271 0 0	7 0 0
			Deduct	
H. Lovatt	5,440	179 0 0	11 0 0	15 0 0
			Add	*Deduct*
Spencer, Santo & Co., Ltd.	5,500	136 0 0	282 0 0	5 0 0
T. G. Sharpington	5,588	136 0 0	243 0 0	—
			Deduct	
G. Sharp	5,590	83 4 0	243 17 5	24 17 6
			Add	*Add*
W. Downs	5,680	110 0 0	295 0 0	8 0 0
Thomas & Edge	5 732	118 0 0	303 0 0	6 0 0
Moss & Co.	5,750	325 0 0	262 0 0	—
Sabey & Son	5,820	105 0 0	315 0 0	12 0 0
				Deduct
A. J. Sheffield	6.381	247 0 0	211 0 0	12 10 0

LONDON.—For Hampstead Hospital. Messrs. Young & Hall, architects:—

Order if Portland Stone.	Name.	Carcase.	Finishings.	Boundary Walls, &c.	Total.	Deduct if Victoria Stone.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1.	Wm. Willett.....	14,660 0 0	15,025 0 0	902 0 0	30,587 0 0	610 0 0
2.	Holloway Bros.	13,246 0 0	15,766 0 0	1,058 0 0	29,870 0 0	122 0 0
3.	Leslie & Co.	12,966 0 0	15,043 0 0	1,019 0 0	29,028 0 0	264 0 0
4.	C. Brightman	13,069 17 0	14,790 0 0	1,050 0 0	28,909 17 0	555 0 0
5.	Knight & Son	13,411 0 0	14,513 0 0	942 0 0	28,866 0 0	351 0 0
6.	S. J. Scott	12,910 0 0	14,929 0 0	1,024 0 0	28,863 0 0	322 0 0
7.	W. Downs	12,738 0 0	14,811 0 0	993 0 0	28,542 0 0	220 0 0
8.	Ferguson & Co.	12,960 0 0	14,400 0 0	1,137 0 0	28,497 0 0	674 10 3
9.	Pattinson & Sons	12.890 0 0	14,631 0 0	909 0 0	28,430 0 0	65 0 0
10.	C. Ansell	12,775 0 0	14,660 0 0	971 0 0	28,406 0 0	255 0 0
11.	Holliday & Greenwood	12,577 0 0	14,861 0 0	933 0 0	28,371 0 0	312 0 0
12.	B. E. Nightingale	12,399 0 0	14,866 0 0	999 0 0	28,264 0 0	164 0 0
13.	Lawrence & Son	12,449 0 0	14,695 0 0	1,005 0 0	28,149 0 0	316 10 0
14.	Gough & Co.	12,700 0 0	14,440 0 0	900 0 0	28,040 0 0	140 0 0
15.	W. Whitehead	12,235 0 0	14,780 0 0	950 0 0	27,965 0 0	128 0 0
16.	G. Henson	12,622 4 0	14,459 8 9	877 3 0	27,958 15 9	392 10 0
17.	H. Martin	12,385 0 0	14,530 0 0	862 0 0	27,777 0 0	379 0 0
18.	J. & M. Patrick	12,600 0 0	14,000 0 0	870 0 0	27,470 0 0	227 0 0
19.	Patman & Fotheringham	12,227 0 0	14,273 0 0	900 0 0	27,400 0 0	250 0 0
20.	Kerridge & Shaw	11,688 0 0	14,373 0 0	978 0 0	27,039 0 0	234 10 0
21.	Perry Bros.	11,997 0 0	13,897 0 0	1,127 0 0	27,021 0 0	237 0 0
22.	Godson & Sons	11,198 0 0	13,881 0 0	924 0 0	26,003 0 0	232 0 0

[See also page 64.

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CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
*Heating & H.-W. Supply Apparatus, &c.	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	Dec. 18
Sewering, Paving, &c., Vernon-street, Moston	Manchester Corporation	Surveyor's Office, Town Hall, Manchester	Dec. 21
Paints, Oils, Varnish, &c.	Cardiff Corporation	J. Woosey, Town Hall, Cardiff	do.
Steel Footbridge over Canal, Copley	Halifax Corporation	J. Lord, Civil and Borough Engineer, Town Hall, Halifax	do.
Excavators' and Masons' Work for Footbridge, Copley	do.	do.	do.
Pipes, &c., for Waterworks	do.	R. J. Hartley, A.M.Inst.C.E, Waterworks Eng., Gibbet-st., Halifax	do.
Wood Benches, &c., Offices & Wkshops, Springwell-st.	Street Lighting Department	City Engineer's Office, Municipal Buildings, Leeds	do.
Gymnasium Fittings, Moorfield-road, Armley	Leeds Corporation	do.	do.
Gymnasium Fittings, Western Flatts Pk., L. Wortley	do.	do.	do.
Portswood Schools, &c.	Southampton Corporation	Borough Engineer's Office, 123, High-street, Southampton	do.
Villa, Hough-lane, Wombwell	H. S. Winter	J. Robinson, Architect, Park Cottage, Wombwell	do.
Making-up Grafton-road-lane, &c.	Plymouth Corporation	J. Paton, Borough Engineer, Municipal Offices, Plymouth	do.
Reading-Room, Ebchester	.....	W. T. Spence, Architect and Surveyor, Shotley Bridge	do.
300 tons Road Metal	Dumbarton Corporation	J. Briggs, Borough Surveyor, Dumbarton	do.
680 yards Pipe Sewers, &c., Farnley, Corbridge	Hexham R.D.C.	J. E. Parker, Civil Engineer, Post Office Chambers, Newcastle-on-T.	Dec. 22
Tank and Filters for Sewage Disposal, Farnley	do.	do.	do.
250 tons of Cast-Iron Pipes	Horwich U.D.C.	P. Taberner, Clerk to Council, Council Offices, Horwich	do.
Roofing over Loading Mound, Goods Depot, Liverpool	Lancs and Yorks Railway	Engineer's Office, Hunt's Bank, Manchester	do.
Furniture, Kingseat Asylum	.....	C. B. Williams, Clerk to District Board, 20, Union-terrace, Aberdeen	do.
Master's House, Cwmystwyth	Llanfihangel-y-Croyddin U.Bd.Sch.	J. A. Jones, Architect, 7, Queen's-terrace, Aberystwyth	do.
Alterations, St. George's Hall, Bridlington	J. Taylor	J. Earnshaw, Architect, Carlton House, Bridlington	do.
Tea House, Collins Fields	Harrogate Corporation	F. Bagshaw, Borough Engineer, Municipal Offices, Harrogate	Dec. 22
Iron, Steel, Fireclay Goods, &c., at Gasworks	Halifax Corporation	J. Wilkinson, Engineer, Gasworks, Halifax	do.
Stores and Materials	Handsworth U.D.C.	H. Richardson, A.M.Inst.C.E., Sur. to Coun., C. House, Handsworth	do.
Labourers' Cottages, &c., Lusk, Dublin	Balrothery R.D.C.	A. Scott, Civil Engineer, 34, Lower Sackville-street, Dublin	do.
Additions to Workhouse, St. Austell	St. Austell Guardians	J. Mutton, Architect, Charlestown, St. Austell	do.
Stand, Tattersall's Enclosure, Brighton Racecourse	Brighton Borough	F. J. Tillstone, Town Clerk, Brighton	do.
*New Stand, Brighton Racecourse	Brighton Borough Council	Town Clerk, Town Hall, Brighton	do.
72 tons of Oxide of Iron, &c.	Wilmslow & Alderley Edge Gas Co.	W. Severs, Engineer, Gasworks, Wilmslow	do.
Street Works, Adwick-road and Spencer-street	Swinton U.D.C.	R. Fowler, Surveyor, Council Offices, Swinton, Rotherham	do.
Deepening Well	do.	do.	do.
Steam Mains, Workhouse, Selby Oak	Guardians, King's Norton Union	T. B. Hall & Jones, Engineers, King's Court, Colmore-row, Bir'ham	do.
New Streets, Bradley-crescent, &c.	Barton Regis R.D.C.	J. A. Henderson & H. H. Howell, Coun. Offices, Westbury-on-Trym	Dec. 24
Dwelling House, Luck-lane, Marsh	.....	P. Taylor & Co., Architects, Central Buildings, Milnsbridge	do.
Galvanised Engine-Shed at Detritus Chambers	Rugeley U.D.C.	W. E. Rogers, Surveyor, Anson-street, Rugeley, Staffs	do.
Stores	Wingate Grange Colliery	W. Fleetham, Cashier, Wingate Grange Colliery	do.
Colliery Stores	Owners of Colliery	Garforth Colliery, near Leeds	do.
Cottage, Dairy, &c., Inverallout	Mrs. Head	L. & J. Falconer, Architects, Fort William	Dec. 25
Church, Hodge-street, Falkirk	Committee, Eskirne A.F. Church	A. & W. Black, Architects, Falkirk	Dec. 26
School Furniture and Fittings, Heworth Jnr. Schools	Fellings Education Committee	G. Bolam, Council Buildings, Felling, R.S.O., Durham	do.
Stores	Alliance &c. Consumers Gas Co.	F. T. Cotton, Secretary, D'Olier-street, Dublin	Dec. 27
Twenty-four Houses	Stanley U.D.C.	W. Forster, Architect, Front-street, Stanley	Dec. 28
Cast-Iron Pipe Cover, &c., Clapham-road, Bedford	Bedford Corporation	N. Greenshields, Borough Engineer, Town Hall, Bedford	do.
Alterations, Lochmaddy Public School	Forth Uiss School Board	R. F. Matheson, Claddach, Kirkibost, Lochmaddy	do.
*Street Works	Droylsden U.D.C.	Council's Surveyor, 10, Ashton-road, Droylsden	do.
Street Works, Buxton-lane, Droylsden	U.D.C.	C. Hall, Surveyor to Council, 10, Ashton-road, Droylsden	do.
Underground Convenience, Cheriton-street	Cheriton U.D.C.	Surveyor's Office, Public Offices, Cheriton, Kent	do.
Diversion and Culverting of Fallowfield Brook	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
Private Improvement Works, June-street	Bootle Corporation	Borough Engineer's Offices, Bootle	Dec. 29
Taking Down House, Ebor Villas, &c.	Tramways Com. Salf'rd Corporation	Borough Engiuer, Town Hall, Salford	do.
Subway, Beaumaris Pier	.....	R. Lloyd, Pier Gates, Beamaris	Dec. 30
Warehouse and Offices, Beaumaris Pier	.....	do.	do.
Outside Fire Escape Staircases, Upton Asylum, Chester	Asylum Visitors	H. Beswick, County Architect, Newgate-street, Chester	do.
Iron nongery, Castings, &c.	Corporation of Oxford	City Engineer's Office, Town Hall, Oxford	do.
Roadmaking Machinery	Tipperary County Council	County Surveyor, Court House, Nenagh, Ireland	do.
Separation Wards at Workhouse	Farnham Guardians	Friend & Lloyd, Architects, Grosvenor-road, Aldershot	do.
Underground Conveniences	Working U.D.C.	G. J. Wooldridge, Surveyor, Bank Chambers, Woking	do.
Flooring Schoolroom, Worehouse, Sundridge	Sevenoaks Guardians	G. F. Carnell, Clerk to Guardians, Sevenoaks	do.
District Library, Bridgeton	Glasgow Corporation	J. Ritchie, 180, West Regent-street, Glasgow	Dec. 31
Nurses' Home Married Couples Quarters, &c.	Stafford Guardians	H. T. Sandy, Architect, Stafford	do.
Alterations and Additions to Lent Hill, Ashburton	Hon. R. Dawson	F. W. Vanstone, Architect, Palace Chambers, Paington	do.
Two Small Buildings at Gasworks	Devonport Corporation	S. E. Stevenson, Engineer, Gasworks, Devonport	Jan. 1
Six Houses, Castlebrook	F. A. Guy, J.P.	J. M. Robinson, Architect, 7, East Wall, Londonderry	do.
Coastguard Station, Herne Bay	.....	Works Department, Admiralty, 21, Northumberland-avenue, W.C.	do.
Forming, &c., Cross-streets, Kelloe	Coxhoe Parish Council	M. H. Seymour, Clerk's Office, Main-street, Kelloe	do.
*Sewerage and Surface Water Drainage Works	Walmer U.D.C.	Beesley, Son, & Nichols, 11, Victoria-street, S.W.	do.
*Filtering Tank and Sludge Beds, Enfield	Cheshunt U.D.C.	Council's Clerk, U.D.C. Offices, Manor House, Chesthunt, Herts	do.
*Coastguard Station at Herne Bay	The Admiralty	Works Department, Admiralty, 21, Northumberland-avenue, W.C.	Jan.
*New Portswood Schools	Southampton Corporation	Borough Engineer, 123, High-street, Southampton	do.
Free Library Building, Lurgan, Ireland	Lurgan U.C.	H. Hobart, Architect, Dromore, County Down	do.
Extension of Trinity Hall, Ton-y-pandy	.....	R. S. Griffiths, Architect, Excelsior, Buildings, Ton-y-pandy	do.
Roofs and Supports, &c., to Market (three Contracts)	Neath Corporation	D. M. Jenkins, A.M.Inst.C.E. Gwyn Hall, Neath	do.
Main Drainage Works (Marton Beck Sewer)	Middlesborough Corporation	F. Baker, Civil Engineer, Borough Engineer, Middleborough	Jan. 5
*Goods Shed, St. Austell Station, Cornwall	G.W.R. Co.	The Engineer, Plymouth Station	do.
Fifteen-ton Steam Roller	East Ham U.D.C.	A. H. Campbell, A.M.Inst.C.E., Town Hall, East Ham, E.	do.
550 Lineal yards of 9 in. Stoneware Sewer, &c., Toft-rd.	Bucklow R.D.C.	J. M'D. M'Kenzie, Engineer & Surveyor, 7, Market-st., Altrincham	do.
Iron Castings	Bury Water Board	R. B. Rigby, Waterworks Manager, Parson's-lane, Bury, Lancs	do.
*Taking down Church &Bdg. New Church, Whitehaven	.....	J. S. Moffat, Architect, 53, Church-street, Whitehaven	Jan. 6
Timber Wharf, 750 ft. long, &c., River Dee	Aberdeen Harbour Commissioners	R. G. Nicol, Harbour Engineer's Office, Aberdeen	do.
Deeping Harbours, Constructing Breakwater, &c.	St. Monan's Harbour Commissioners	D. & C. Stevenson, Civil Engineer, 84, George-street, Edinburgh	do.
*Lunatic Wards at Whipp's Cross-road, Leytonstone	West Ham Union	Clerk's Office, Union Workhouse, Leytonstone, N.E.	Jan. 11
Collection and Removal of House Refuse	Hambledon R.D.C.	F. Smallpiece, Clerk, 138, High-street, Guildford	do.
Refuse Destructor & Electric Light Bdgs., Cambuslang	Lanark County Council	W. L. Douglas, Civil Engineer, District Offices, Hamilton N.B.	do.
Brick Chimney Stalk, 100 ft. high, at Wellshot	do.	do.	do.
*Carnegie Library at Manor Park	East Ham U.D.C.	Engineer and Surveyor to the Council, Town Hall, East Ham	do.
*Annual &c., Contracts	Borough of Wandsworth	Town Clerk, Council House, Wandsworth, S.W.	Jan. 12
*Extension of Workhouse, Harrow-road	Paddington Guardians	F. J. Smith, Architect, Parliament Mansions, Victoria-street, S.W.	do.
*Two Iron Fire Escape Staircases at Workhouse	do.	E. Howley Sim, Architect, 8, Craigs Court, Charing Cross, W.C.	Jan. 16
7,100 yds. Concentic Armoured Cables, &c.	Borough of Camberwell	J. A. Crowther, E.E., Electric Supply Works, Sea View-rd., Liscark	Jan. 19
*Annual Contracts	Wallasey U.D.C.	Borough Engineer, Town Hall, Camberwell, S.E.	Jan. 20
Electric Power Plant	Ennisworthy District	H. J. Harris, Consulting Engineer, 30, Parliament-street, Dublin	Feb. 1
Additions, &c., to Victoria Hall	Sunderland Corporation	J. Eltringham, Architect, 62, John-street, Sunderland	do.
Additions and Alterations to Victoria Hall	Sunderland Corporation	do.	No date.
Electric Installation	Corporation of Irvine	J. Dickie, Town Clerk, Irvine, N.B.	do.
Cooperative Premises and Alterations, New Br ompton	Carlisle South End Co-operative Soc.	T. Taylor Scott, F.R.I.B.A., 43, Lowther-street, Carlisle	do.
New Ward & Alterations, Kent & Canterbury Hospital	.....	W. J. Jennings, Architect, St. Margarte's-street, Canterbury	do.
Furniture, Kingseat Asylum	.....	C. B. Williams, Clerk to District Board, 20, Union Terrace, Aberdeen	do.
Elec. Light, Tynemth Vic. Jubilee Infirmy., N. Shields	.....	C. B. Williams, Clerk to District Board, 20, Union-terrace, N. Shields	do.
*Buildings for New Printing Works, N. Kensington	Messrs. Lane Bros., Ltd.	J. W. Meadows, Secretary, 43, Howard-street, N. Shields	do.
50 tons Flanged Rails, &c.	.....	W. Daniel, Architect, 61, Lydford-road; Paddington, W.	do.
Sinking a Shaft	Sanfield Lea Colliery	Secretary, Hoyland Silkstone Coal & Coke Co., Hoyland, Barnsley	do.
		The Company, Shield Row Station	do.

[See also next page.

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PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
Manager for Sewage Farm, Irthlingborough Grange	Wellingborough U.D.C.	125*l.* &c.	Dec. 22
*Assistant Examiners in Patent Office	Civil Service Commissioners	Not stated	do.
*Executive Engineer (Public Works Dept.)	Hong-Kong	480*l.* &c.	Dec. 24
*Assistant Engineer (Public Works Dept.)	do.	360*l.* &c.	do.
Art Teacher	Cork Technical Instruction Comm.	120*l.*, with expenses	Jan. 1
*Valuer and Surveyor (Valuation Office, Ireland)	Civil Service Commissioners	Not stated	Jan. 28
*Civil Engineering Draughtsman	The Admiralty	Not stated	No date.

Those marked with an asterisk (*) are advertised in this Number. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvii.

TENDERS (*continued*):—

LONDON.—For new branch library at Lower Sydenham, for the Public Library Committee, Lewisham:—

T. G. Thaysington	£5,358	Leney & Sons	£4,425
Chessum & Sons	4,991	F. Athey	4,411
Roberts & Co.	4,819	R. & E. Evans	4,387
Charles North	4,815	J. Renwick	4,386
Creaton & Co.	4,775	H. Heathfield	4,383
Godson & Sons	4,690	G. Parker	4,315
T. D. Leng	4,620	Henry Kent	4,333
Staines & Son	4,593	Ferguson & Co.	4,310
Smith & Sons	4,591	Bullock & Co.	4,305
J. & C. Bowyer	4,547	Jerrard & Sons	4,283
Patman & Fotheringham	4,523	Appleby & Son	4,264
R. E. Nightingale	4,473	F. W. Green	4,242
Whitehead & Co.	4,460	Foster Bros.	4,180
Enness Bros.	4,440	Chas. Jackson	4,141
H. L. Holloway	4,432	W. Wallis	4,079
		Perry Bros., City-rd.*	4,027

MERTHYR.—For rebuilding No. 15, High-street, Merthyr, for Mr. H. Davies Butcher, Merthyr. Mr. Charles M. Davies, architect and surveyor, 113, High-street, Merthyr Tydfil:—

J. Williams	£2,293 0 0
Shepton & Sons	2,197 0 0
J. Jenkins, Canal Wharf, Merthyr	2,130 6 6

MIDDLESBROUGH.—For alterations to stables, Local Board Yard, for the Middlesbrough Corporation. Mr. Frank Baker, Borough Engineer:—

Allison Bros.	£256 0 0	Bastiman Bros.	£235 0 0
Doughty & Sons	238 0 0	B. Crisp	226 6 10
Hudson Bros.	237 0 0	Vintner & Davison*	226 0 0
H. Walker	236 0 0		

[Borough Engineer's estimate, £226.]

RADCLIFFE.—For butcher's premises and manager's house, for the Co-operative Society. Mr. J. G. Crone, architect, 26, Cloth Market, Newcastle-on-Tyne:—

J. McEwan	£2,635 19	A. Douglas	£1,170 0
Gordon Bros.	1,327 15	Elliott Bros.	1,167 0
R. & G. Brown	1,248 0	Carse & Son	1,142 0
Braithwaite & Co.	1,243 0	W. S. Anderson	1,118 9
W. C. Tyrie	1,189 0	T. B. Shilling, Sunderland*	1,064 0
R. Brown	1,180 0		

RATHFARNHAM (County Dublin).—For road making and other works, for the South Dublin Rural District Council. Mr. T. J. Byrne, Surveyor to the Council, 1, James'-street, Dublin:—

G. P. Walsh	£348
T. Reilly, 41, Rutland-square, W., Dublin*	£271

RAUNDS (Northants).—For sinking well, for the Raunds Urban District Council. Mr. Thos. Yorke, engineer and surveyor, Raunds:—

Trial Well.

Joseph Smalley	£2,036	John Crompton	£745
J. F. Price	1,640	Geo. Chesswas	571
Chas. Chamberlain	1,419	W. Smart	497
Thos. Adams	1,315	Wm. Crossland	461
Barnes & Sharpe	865	Tanner Bros., Raunds*	275
Walter Barrick	865		

[Surveyor's estimate, £475.]

Trial Boring.

J. F. Price	£742	Wm. Antrobus	£421
Timmins & Son	600	Le Grand & Sutcliffe	405
Matthews & Co.	590	Potter & Co	397
Geo. Chesswas	574	Joseph Smalley	360
Duke & Ockenden	562	J. Wallis Fitt	319
Chapman & Sons	562	Wallace A. Ockenden	312
Thos. Matthews	499	Isler & Co.	312
Vivian's Boring & Exploration Co.	497	Bacon Air-Lift Co.	308
Brown & Co.	451	John Thom	308
Cheeld & Co.	442	J. J. Hymes	285
Barnes & Sharpe	423	J. E. Noble, Bowen, E.*	261

[Surveyor's estimate, £350.]

RISCA (Mon.).—For the erection of a church mission room and school, Pontymister. Mr. E. N. Johnson, architect, Risca. Quantities by architect:—

Scheme 1.

C. Lock, Newport, Mon.	£1,789
J. Charles, Newport, Mon.	1,763
E. C. Jordan, Newport, Mon.	1,750
C. H. Reed, Newport, Mon.	1,658
J. Pritchard, Pontymister, Mon.	1,542

[Accepted scheme.]

Scheme 2.

C. Lock	£1,475
C. H. Reed	1,391
E. C. Jordan	1,387
J. Charles	1,367
J. Pritchard	1,250

Boundary Walls and Footways.

E. C. Jordan	£220
C. Reed	217
J. Charles	200
C. Lock	198
J. Pritchard	175

ROCHESTER.—For alterations to central tower, Rochester Cathedral. Mr. C. Hodgson Fowler, F.S.A., architect, The College, Durham. Quantities by Mr. Geo. R. Boreham, Sunderland:—

G. Gates	£29,335	Bowman & Son	£6,000
Shillitoe & Son	7,950	Thompson & Co.	5,886
J. D. Corke	7,860	West Bros.	5,782
C. E. Skinner	7,663	S. F. Halliday, Stamford*	5,292
Wallis & Sons	6,776		
R. Bridgeman	6,108		

RYTON.—For an outfall sewer at Addison, for U.D.C. Mr. J. P. Dalton, Surveyor to the Council, Ryton:—

Jas McEwan	£192 13 5	W. A. Armstrong	£116 1 1
M. H. Nicholson	149 19 11½	McLaren & Son, Gosforth*	115 5 6
Walter Craig	120 9 9		

[Surveyor's estimate, £120.]

SENGHENYDD (Wales).—For the erection of a Baptist chapel and schools, for the English Baptist Church. Mr. Harry Snell, architect, Penarth:—

D. C. Jones	£2,825	George Haywood	£2,414
John Wood	2,712	Richard Jones, Aberdare*	1,995
W. J. Morgan	2,500		

SOUTHEND-ON-SEA.—For the execution of street works, &c., Salisbury-avenue, for the Corporation. Mr. E. J. Elford, C.E., Town Hall, Southend-on-Sea:—

Salisbury-avenue.

G. Bell	£2,194	W. Iles	£1,680
E. T. Bloomfield	1,931	Buxton & Jenner	1,638

[Borough Engineer's estimate, £1,721.]

SOUTH TOTTENHAM.—For alterations and additions to the hot-water supply apparatus at the North-Eastern Hospital, South Tottenham, for the Metropolitan Asylums Board:—

W. Reason	£949 0 0
Tamplin & Makovski, Ltd.	923 0 0
Thomas & Taylor, Ltd.	920 0 0
Benham & Sons, Ltd.	865 0 0
Wenham & Waters, Ltd.	794 0 0
Russell & Co.	670 0 0
Beaven & Sons	665 0 0
R. H. and J. Pearson, Ltd.	650 0 0
Cannon & Sons	625 0 0
Stubbs, Alexander, Ltd.	590 0 0
Richmond & Co., Ltd.	564 0 0
Brightside Foundry & Engineering Co., Ltd.	541 10 0
Werner, Pfleiderer, & Perkins, Ltd.	499 17 0
G. & E. Bradley	497 0 0
W. Freer	487 10 0
Roeser & Russell, Ltd.	480 0 0
Watford Engineering Works	475 0 0
Joel & Co. and Potter & Sons, United, Ltd.	459 10 0
Defries & Sons	448 0 0
T. Cole	432 0 0
J. & F. May	410 0 0
Reed & Sons, Ltd.	403 18 6
G. Fawley & Son, Ltd., Saville Park, Halifax*	386 8 6

[Engineer's estimate, £350.]

SWINDON.—For the erection of a detached residence in Westlecott-road, for Mr. W. O. Hill. Messrs. William Drew & Sons, architects, Regent Circus, Swindon. Quantities by the architects:—

J. Williams	£1,530 0 0	C. Hunt	£1,258 15 7
Tydeman Bros.	1,300 0 0	J. G. Norman*	1,250 1 3
A. J. Colborne	1,264 0 0		

WEDNESBURY.—For the electric lighting of public buildings, for the Corporation, Mr. F. J. Warden-Stevens, Consulting Engineer, 34, Victoria-street, Westminster, S.W.:—

Town Hall, Municipal Offices, Art Gallery, Public Baths, and Public Library.

W. Preston, Junr.	£657
Whittaker Bros.	624
Alliance Electrical Co.	567
Birmingham Installation Co.	529
Arundale & Robottom	492
Edwards & Armstrong	480
National Electric Construction Co., Ltd., London and Wolverhampton*	465

Electricity Sub-Station.

Carpenter & Mayfield	£60
National Electric Construction Co., Ltd.	59
Ross, Price, & Co.	58
Edwards & Armstrong	52
Whittaker Bros.	52
Arundale & Bobottom	45
W. Preston, Junr., Wednesbury*	40

WEDNESFIELD.—For construction of foul sewer, Vicarage-road, for the Urban District Council. Mr. R. E. W. Berrington, Engineer, Bank Buildings, Wolverhampton:—

R. Moss	£232 15 0	H. Holloway	£200 6 0
Currall, Lewis, & Martin	226 10 0	W. H. Reading	195 0 0
T. Allsopp	223 0 0	J. Owens, Wolverhampton*	191 12 0
Tary & Son	217 12 3		

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board the Works Committee submitted the following lists of tenders:—

The interior cleaning at the following schools will be executed between 19th December, 1903 and 9th January, 1904:—

BAILEY'S-LANE:—

H. Runham Brown	£189 10	J. Haydon & Sons	£144
Barrett & Power	179 0	A. Porter	128
J. Stewart	158 5	W. Silk & Son*	107
F. Bull	153 10		

BATH-STREET (B, G, I, & Special):—

Patman & Fotheringham, Ltd.	£377 0	Gavin Bros.*	£285 10
Belcher & Co., Ltd.	358 0	Marchant & Hirst	276 0
H. Runham Brown	286 0	Stevens Bros.	275 0
		Parrott & Isom	224 0

BOW-CREEK:—

A. J. Sheffield	£105 0	Vigor & Co.	£81 10 0
A. W. Derby	100 0	W. Banks*	64 19 6
R. Woollaston & Co.	83 10		

CAMDEN-STREET (old portion):—

Viney & Stone	£265	*Thompson & Beveridge	£208
T. Cruwys	250	Marchant & Hirst	194
H. Wall & Co.	212		

CANTERBURY-ROAD (J.M. & Schoolkeeper's house):—

Bargman, Son & Co.	£124 0	W. V. Goad	£108 0
H. J. Williams	118 10	W. J. Howie	102 0
Rice & Son	111 0	W. Sayer & Son*	100 0

CAPLAND-STREET:—

T. Cruwys	£295	Holloway Bros. (London), Ltd.	£242
Thompson & Beveridge	266	W. Densham & Sons*	209
W. Chappell	£195.		

COBOURG-ROAD:—

H. J. Williams	£363 0	H. Line	£300 0
Maxwell Bros., Ltd.	355 0	E. Triggs	270 0
Rice & Son	343 15	W. Sayer & Son*	264 0

COMPTON-STREET:—

Parrott & Isom	£345 0	Marchant & Hirst	£237 0
Patman & Fotheringham, Ltd.	315 0	Gavin Bros.	234 17
Belcher & Co., Ltd.	265 0	Stevens Bros.*	198 0
Greenwood, Ltd.	254 0	C. & W. Hunnings	193 11

COTTENHAM-ROAD:—

Patman & Fotheringham, Ltd.	£345 0	G. Kirkby	£285 0
Bate Bros.	320 0	C. & W. Hunnings	233 15
J. Stewart	298 5	Stevens Bros.	223 0
		Marchant & Hirst*	226 0

DEAL-STREET:—

Wollaston Bros.	£248 0	R. Wollaston & Co.	£210 0
A. W. Derby	231 0	Vigor & Co.	184 15
J. Haydon & Sons*	£177 15		

GIPSY-ROAD (B., G., I., & J. M.):—

Maxwell Bros., Ltd.	£239 4	Leney & Son	£230 0
G. Kemp	255 0	J. & C. Bowyer	215 0
C. G. Jones	249 0	Lathey Bros.*	199 0
A. J. Acworth	235 0	M. E. Allen	113 10

GLOBE-TERRACE:—

W. Shurmur & Sons, Ltd.	£375	F. Ball	£251
W. Silk & Son	345	Barrett & Power	249
H. Bouneau	265	Woolaston Bros.	238
		Collis Willmott & Son*	230

HUNGERFORD-ROAD:—

Patman & Fotheringham, Ltd.	£314 0	H. Bouneau*	£271 0
Thompson & Beveridge	296 0	Stevens Bros.	267 0
		Marchant & Hirst	257 0
		C. & W. Hunnings	227 10

KENDER STREET:—

W. Hayter & Son	£355	Holliday & Greenwood, Ltd.	£176
W. J. Howie	221	G. Kemp*	160
E. P. Bulled & Co.	184		

LATIMER-ROAD:—

Macey & Sons, Ltd.	£342 4 3
General Builders, Ltd.	273 0 0
Holloway Bros. (London), Ltd.	211 0 0
F. Chidley & Co.	169 10 0
W. Brown & Sons	137 10 0
W. R. & A. Hide*	136 10 0

[See also next page.

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MONTEM-STREET:—

Patman & Fotheringham, Ltd.	£559 0	McCormick & Sons	£383 0
C. & W. Hunnings	398 18	Stevens Bros.*	340 0
G. Kirby	383 0	Marchant & Hirst	339 0

OLDRIDGE-ROAD:—

Hudson Bros.	£313 0	Laney & Son	£251 0
Williams & Sons	300 0	Rice & Son	238 0
Johnson & Co., Ltd.	295 0	Garrett & Son*	214 0
W. Read	294 14		

ST. ANDREW'S-STREET:—

J. R. Sims	£279	E. B. Tucker	£260 11
J. & M. Patrick	278	R. S. Ronald	250 0
Johnson & Co., Ltd.	277	Lathey Bros.	215 0
Rice & Son	269	Garrett & Son*	206 0

SHILLINGTON-STREET:—

J. & M. Patrick	£353	E. Triggs	£240
C. Gurling	300	Martin, Wells & Co., Ltd.	235
Williams & Sons	265	Garrett & Son*	219
Curd & Sons	250		

SLADE (except portion affected by new sanitary work):—

W. Hayter & Son	£299 10	J. Garrett & Son	£237 0
Holliday & Greenwood, Ltd.	279 0	H. Groves	216 0
W. Hornett	260 0	P. S. Howard*	196 10

SOUTHWARK-PARK (old and new portions):—

Holloway Bros., (London), Ltd.	£262 0	E. Triggs	£227 0 0
H. J. Williams	234 0	W. Banks	219 17 6
John Greenwood, Ltd.	232 13	W. Sayer & Son	207 0 0
		W. Hooper*	183 10 0

THORNHILL-ROAD:—

Dearing & Son	£388	Grover & Son	£294 0
McCormick & Sons	368	C. & W. Hunnings	292 6
Patman & Fotheringham, Ltd.	355	Marchant & Hirst	291 0
Williams & Son	333	Stevens Bros.	283 0
		F. W. Harris*	239 0

UPPER KENNINGTON-LANE:—

W. Downs	£303 0	W. Read	£227 17
J. F. Ford	233 0	Maxwell Bros., Ltd.	216 0
E. B. Tucker	229 6	Rice & Son	196 0
		E. Triggs*	£179.

WALLER-ROAD (old and new portions):

G. Kemp	£[illegible] 0	J. & C. Bowyer	£159
W. Read	178 11	H. Groves	139
W. Banks	175 0	M. E. Allen*	107
C. G. Jones	169 8		

WESTMINSTER BRIDGE-ROAD:—

Macey & Sons, Ltd	£278 6 9	Rice & Son	£219 0
W. V. Goad	267 0 0	J. R. Sims	207 0
J. F. Ford	252 0 0	H. J. Williams*	199 0
Holloway Bros. (London), Ltd.	223 0 0		

WESTVILLE-ROAD:—

C. F. Kearley	£368 10	W. Hornett	£274 0
General Builders, Ltd.	358 0	G. H. Sealy	241 10
S. Polden	358 0	W. R. & A. Hide	218 0
		W. Brown & Sons*	210 19

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Patman & Fotheringham, Ltd.	£304 0
J. Stewart	280 9
Viney & Stone	273 0
W. Hornett	261 10
Thompson & Beveridge	237 0
Holloway Bros. (London), Ltd.	221 0
G. S. S. Williams & Son	208 10
W. Chappell*	185 0

The interior cleaning of the following Schools will be executed between 19th December, 1903, and 9th January, 1904; and the exterior painting (if any) between 31st March and 28th April, 1904:—

BERGER-ROAD—Except portion affected by new sanitary work:—

F. Bull	£425 0	H. Bouneau	£280 0
Shurmur & Sons, Ltd.	397 10	Barrett & Power*	272 0
J. Stewart	381 11	Woollaston & Co.	244 0
Silk & Son	360 0	Belcher & Co., Ltd.	230 0

CREED-PLACE—Also painting:—

Hayter & Son	£654 10	Harry Groves	£419 0 0
W. J. Howie	454 0	S. E. Musgrove	410 15 10
G. Kemp	440 0	C. G. Jones*	391 4 6
Holliday & Greenwood, Ltd.	429 0	Woollaston & Co.	383 0 0

"OLD PALACE":—

A. J. Sheffield	£220	J. F. Holliday	£176 0
A. E. Symes	210	H. Bouneau	175 0
A. W. Derby	182	Woollaston & Co.*	146 10

ST. JOHN'S-ROAD:—

F. Bull	£439 0	Grover & Son	£444 0
Shurmur & Sons, Ltd.	605 10	H. Bouneau	435 10
Silk & Son	540 10	Williams & Sons	434 0
Gavin Bros.	480 7	Haydon & Sons*	356 16

THOMAS-STREET—B., G., I. and J.M.:—

A. W. Derby	£397	J. F. Holliday	£372 10
A. J. Sheffield	386	A. E. Symes	370 0
Woollaston & Co.	376	Vigor & Co.	328 10
		Woollaston Bros.*	240 0

VITTORIA-PLACE—Also painting:—

Macey & Son, Ltd.	£650 10	Gavin Bros.	£520 10 0
Barratt & Power	569 0	G. Kirby	498 5 0
Patman & Fotheringham, Ltd.	564 0	A. Porter*	496 0 0
Dearing & Son	547 0	Stevens Bros.	477 0 0
		Woollaston Bros.	456 0 0

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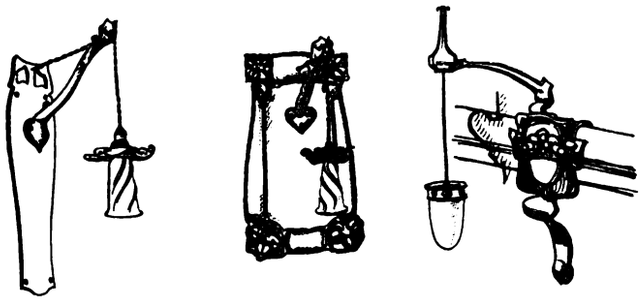

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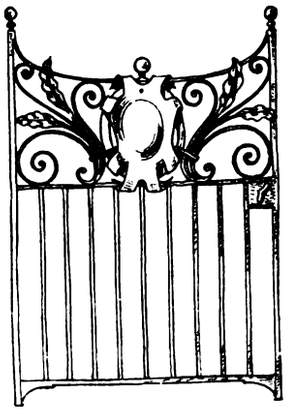

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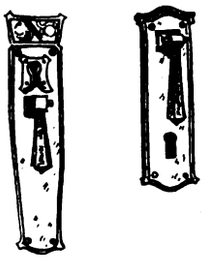

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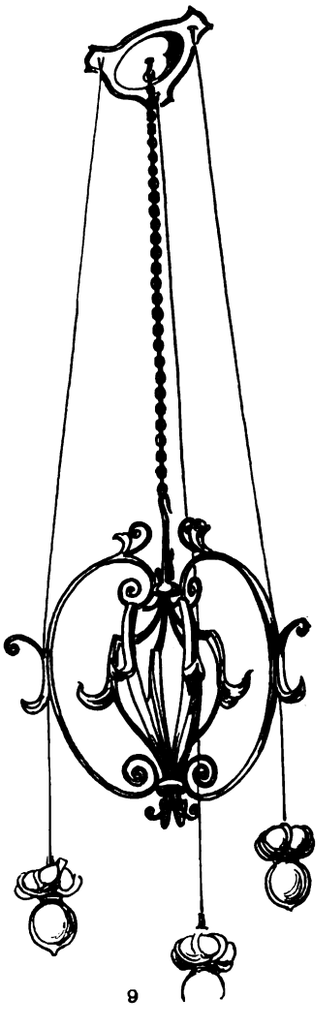

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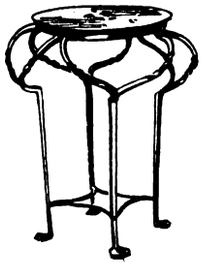

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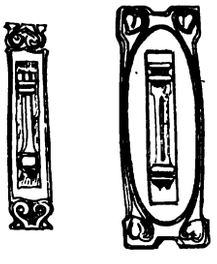

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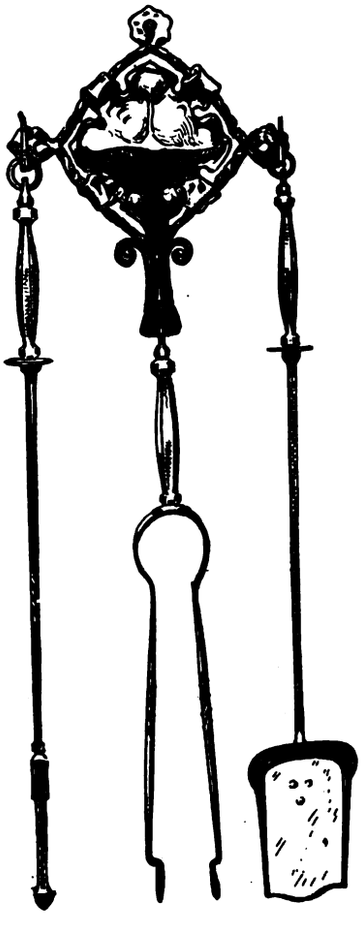

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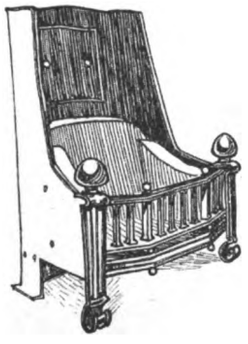

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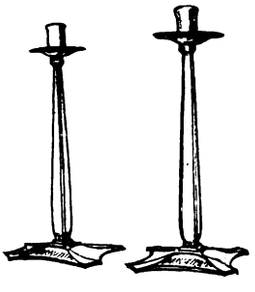

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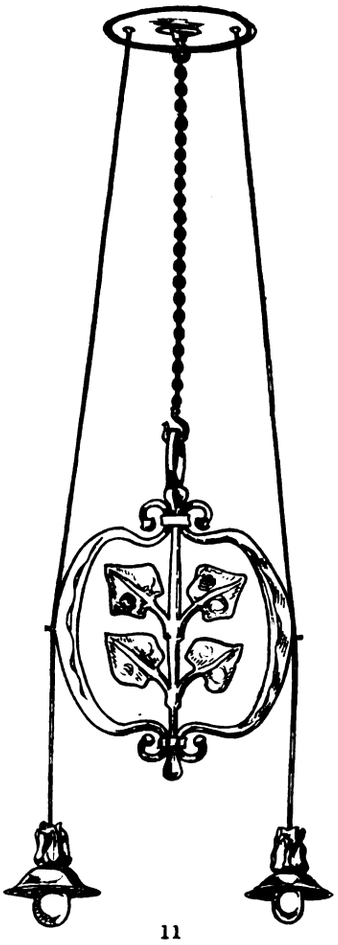

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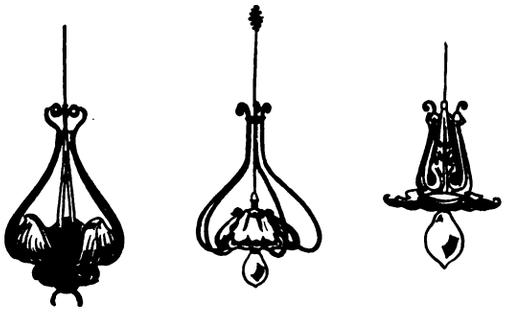

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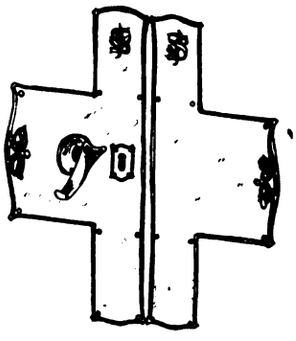

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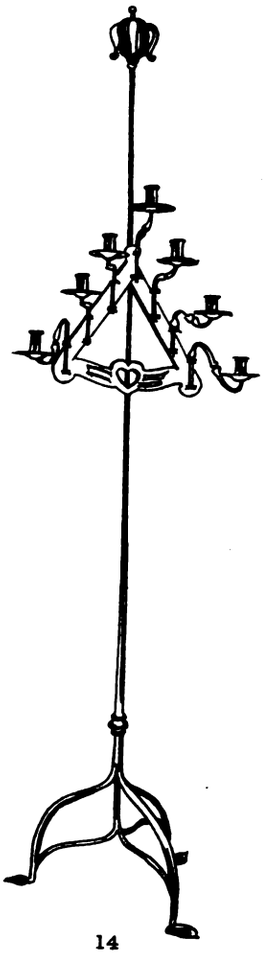

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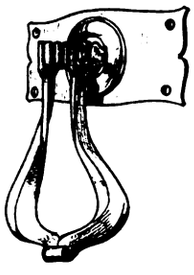

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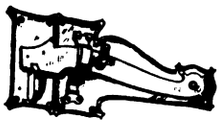

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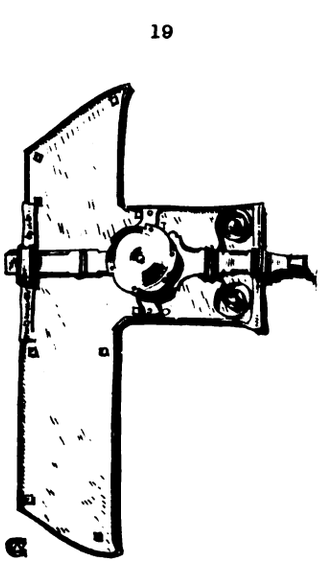

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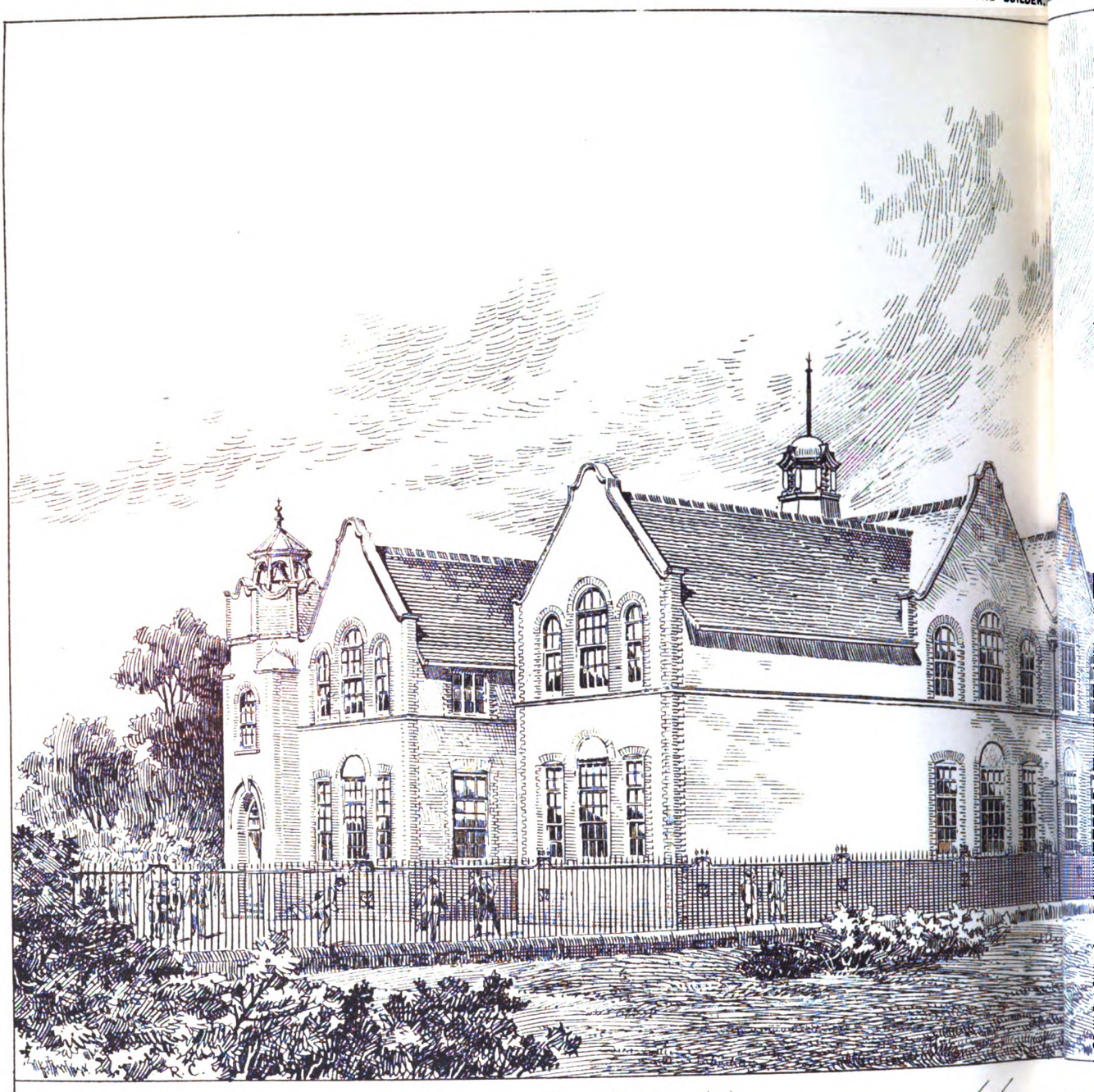

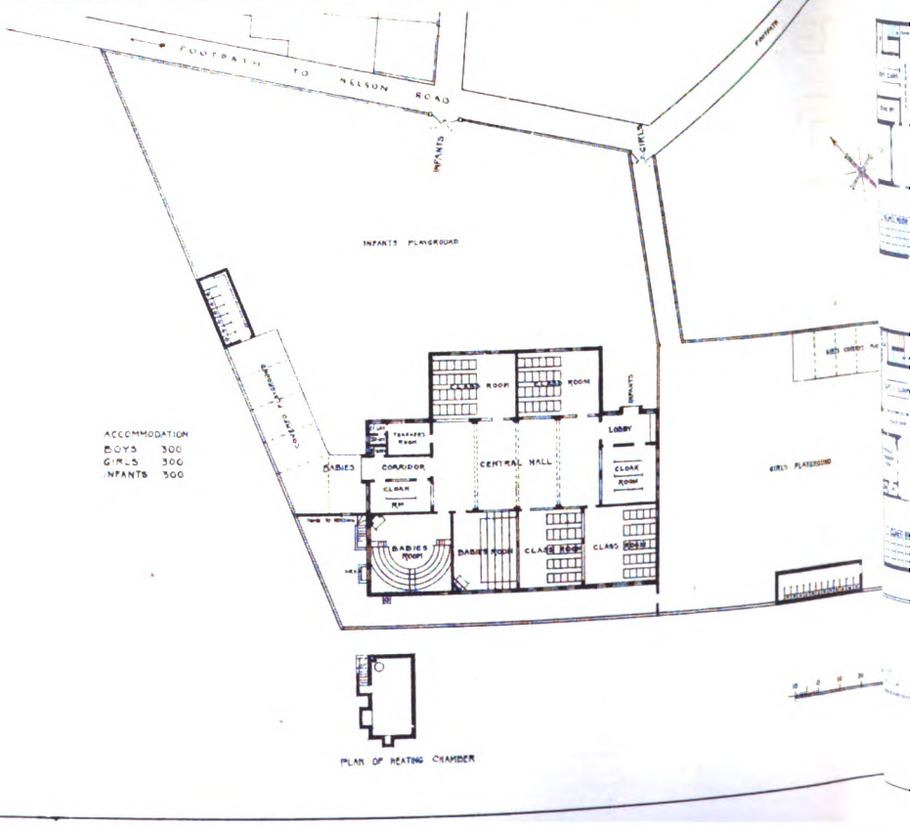

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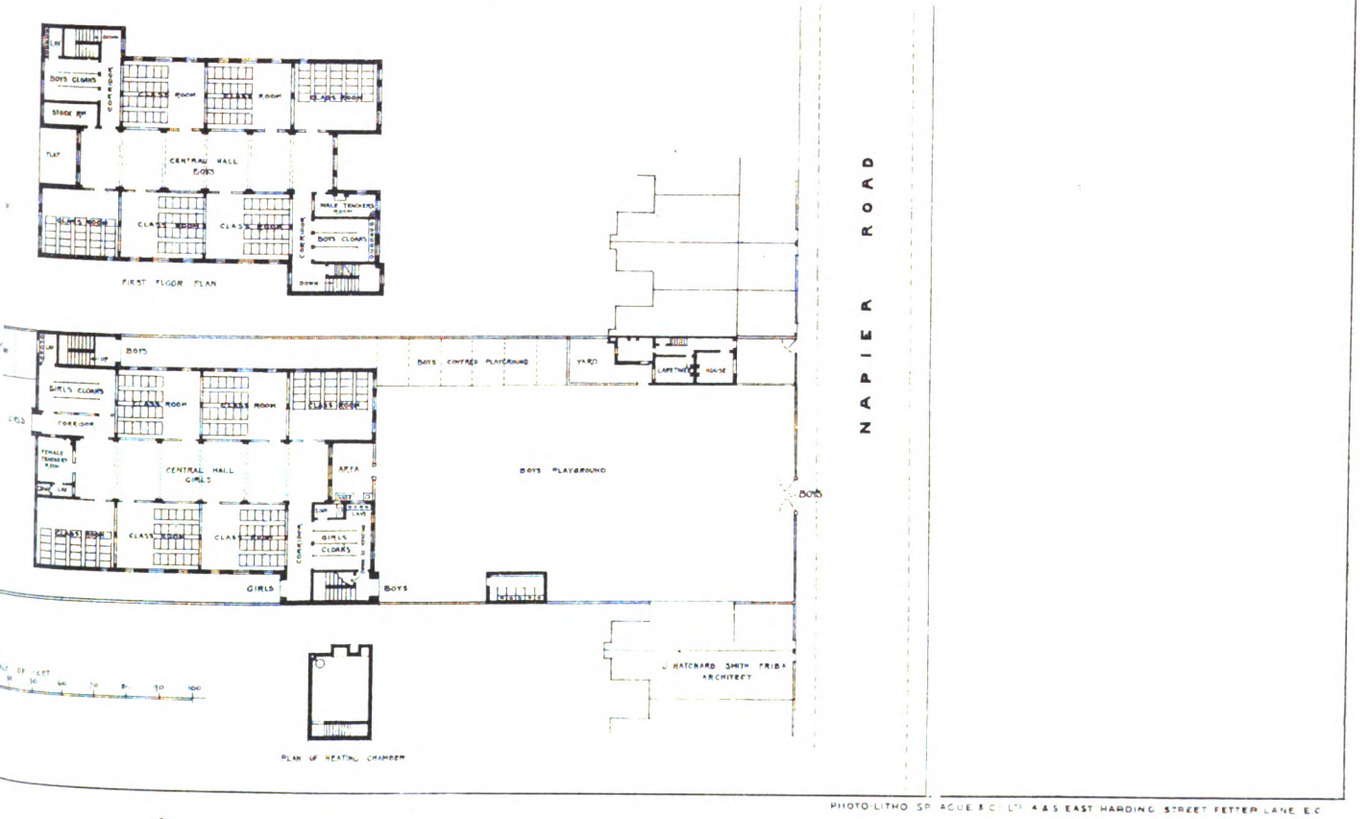

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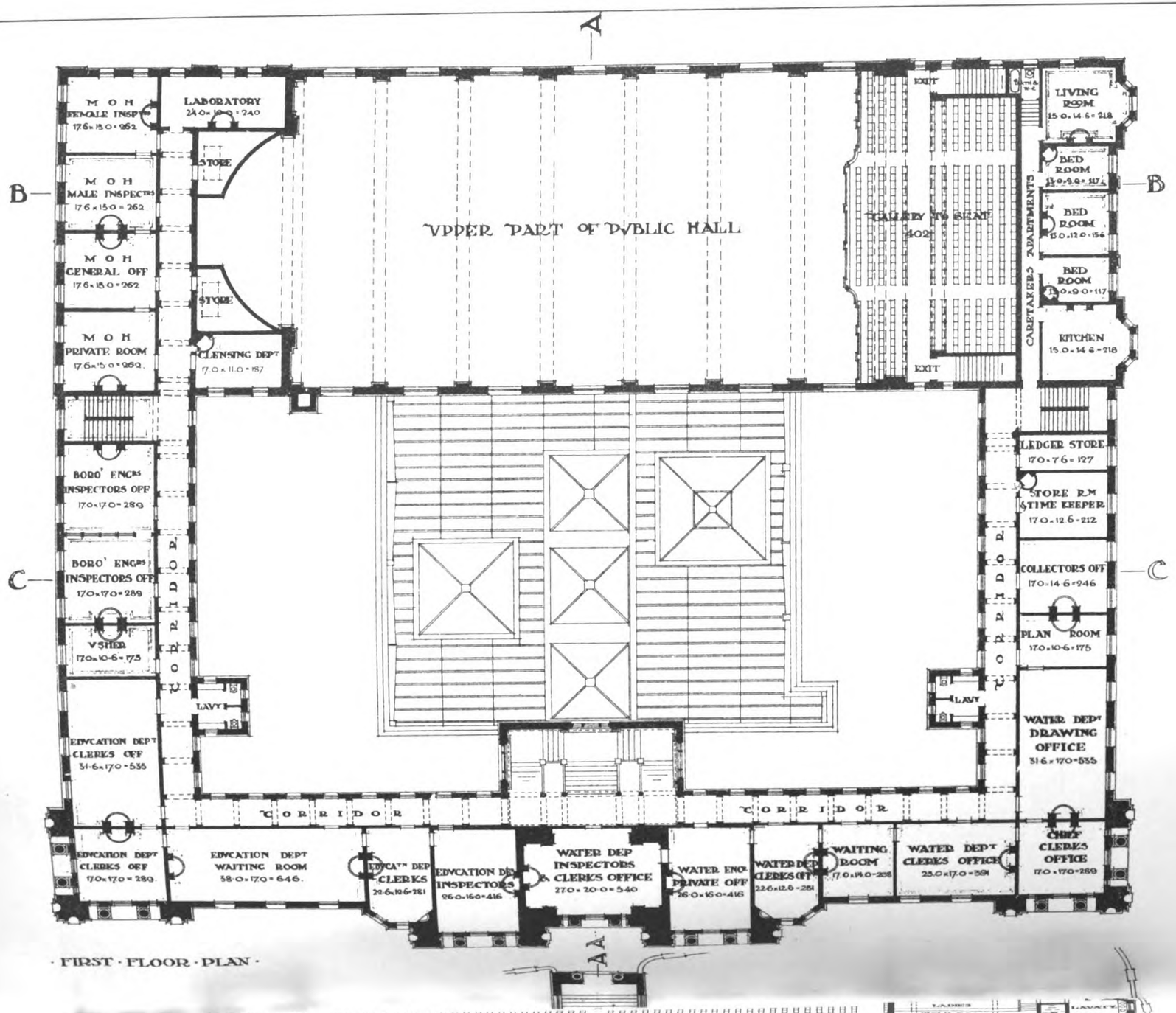

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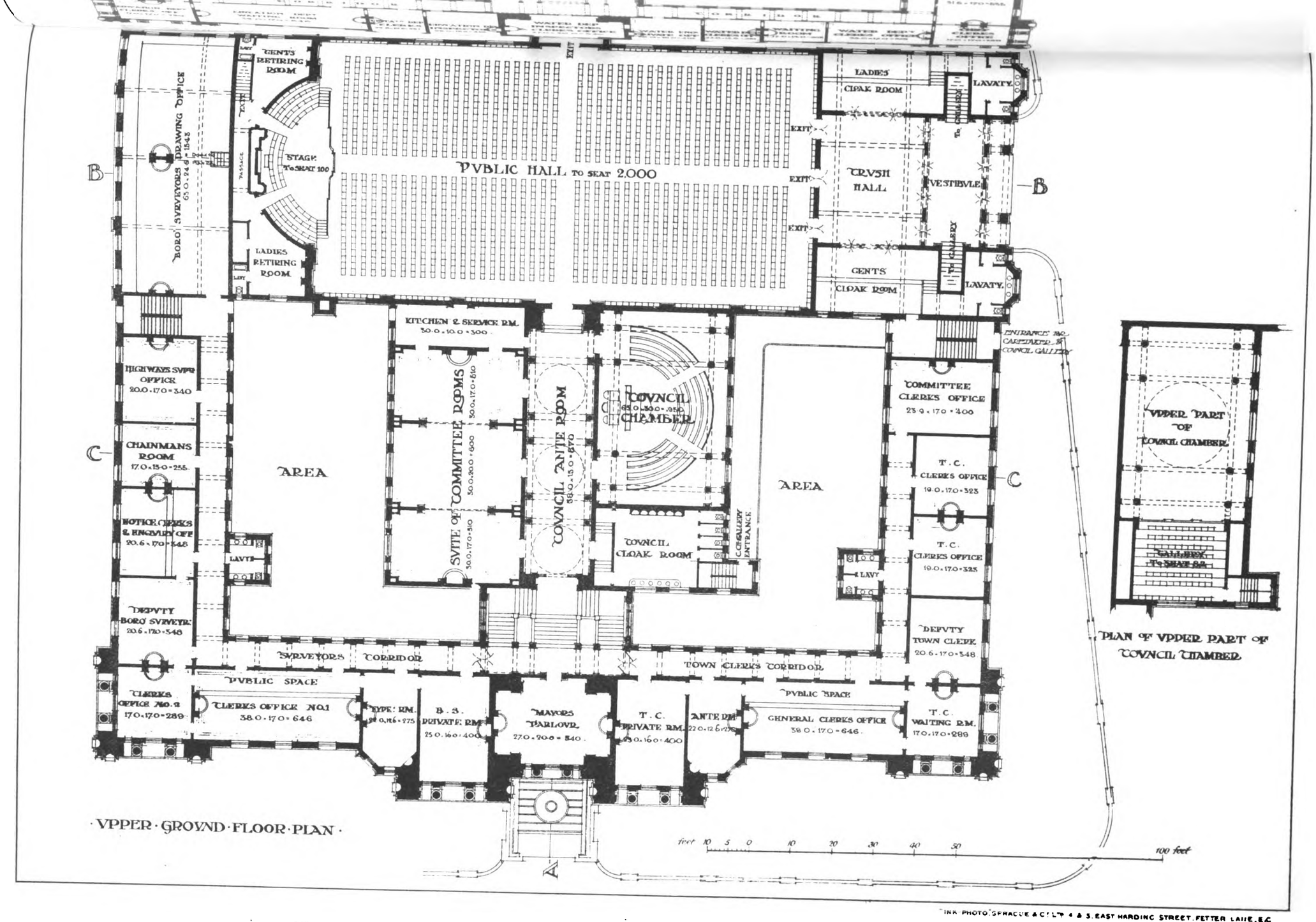

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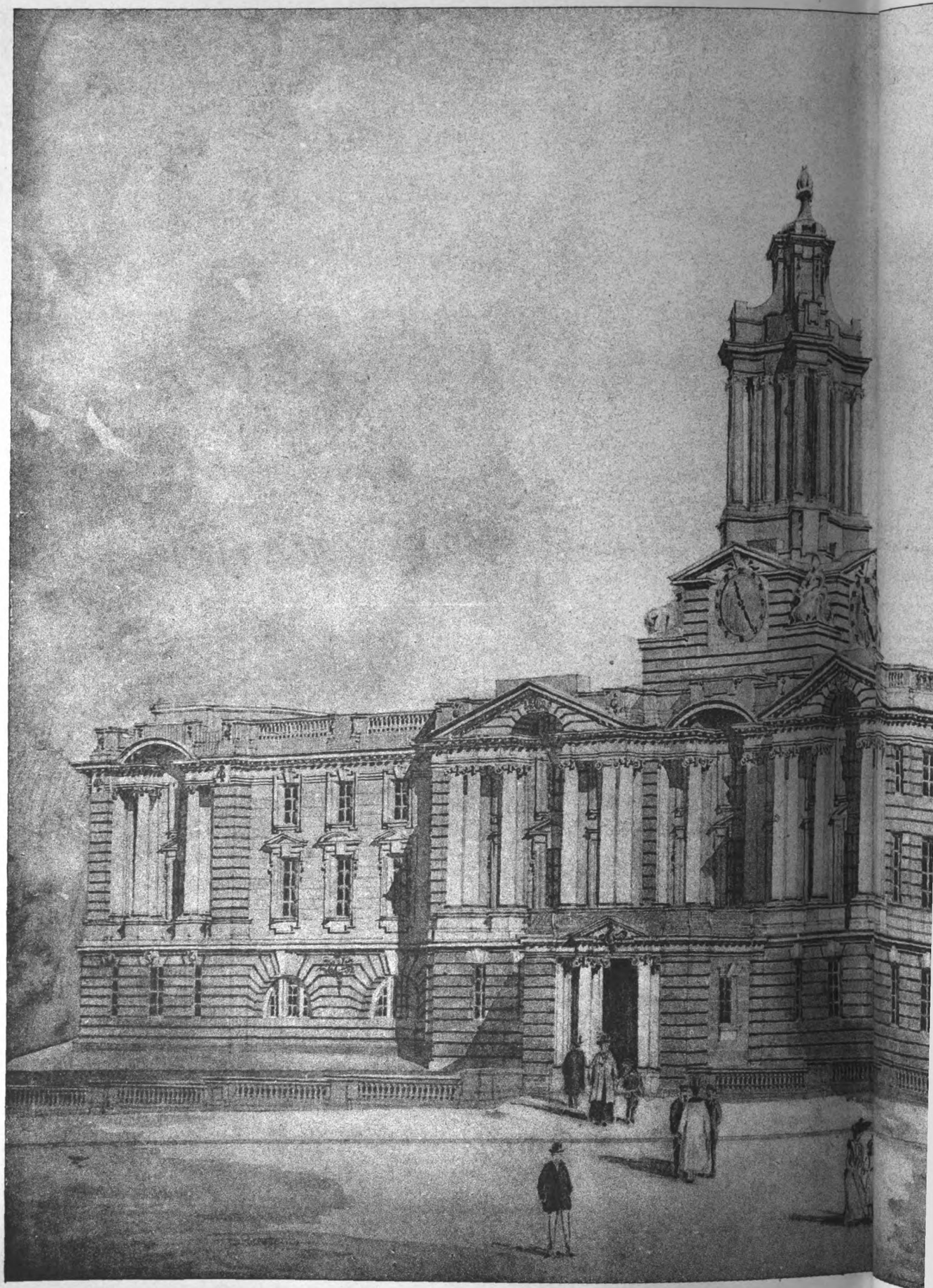

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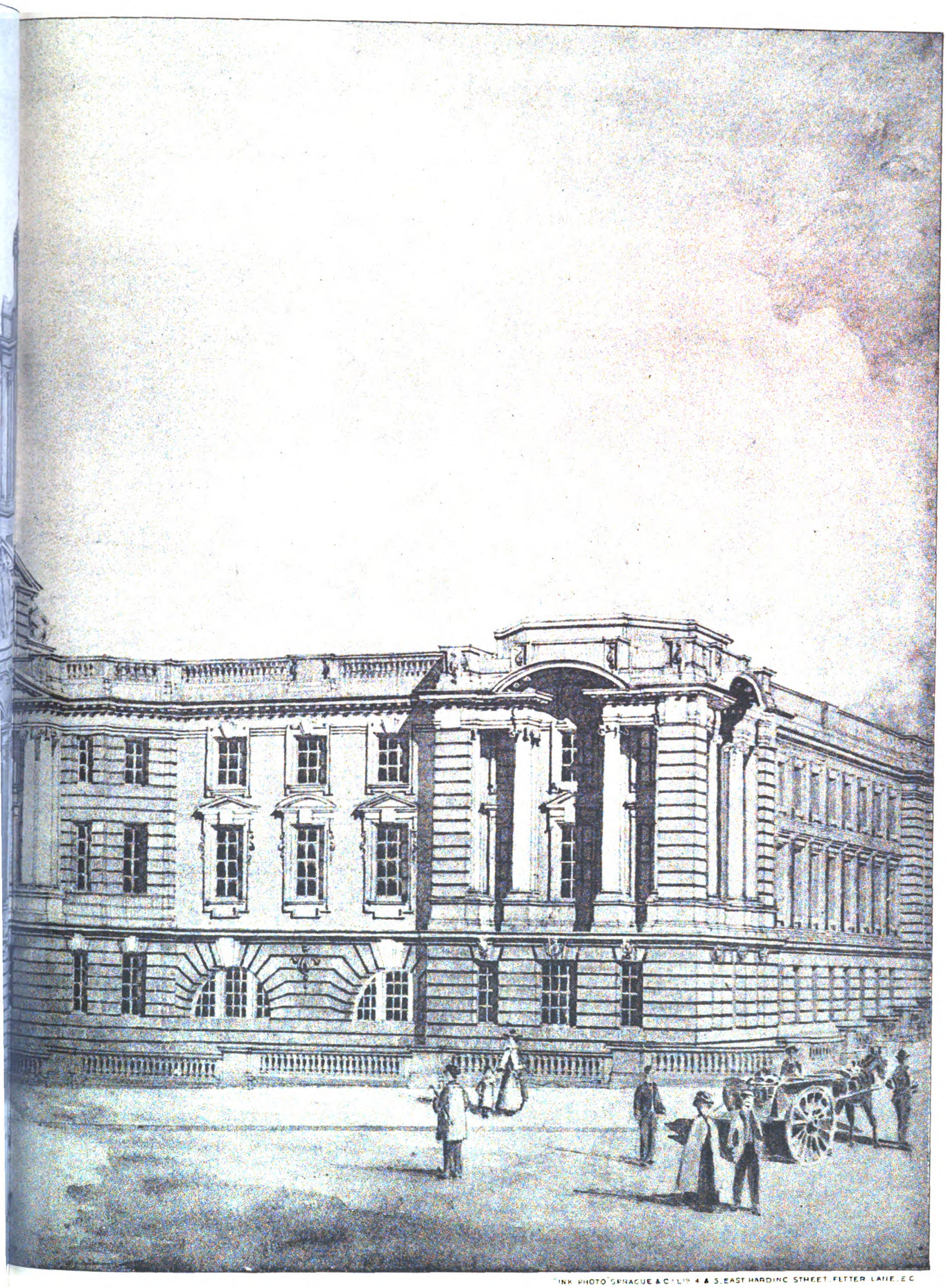

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Church of St. Birinus, Morcan's Vale, Salisbury ..... Mr. C. E. Ponting, F.S.A., Architect.
Design for Church at Fulham ..... By Mr. E. P. Warren.
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Cow House, Porter's Hall, Shenley, Herts ..... Mr. C. J. Harold Cooper, Architect.

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Harbour Work and Harbour Plant.—II.

THOUGH harbour makers would prefer to work in the dry, it is rarely possible to do so until after a good deal of preparatory work has been done under water. On the nature of the soil depends the area of the foundations, and the character of the excavations, if such are necessary. Soft soils must be excavated deeply and widely to enable deep and broad foundations to be laid. A rocky bed, on the other hand, if moderately level, may not have to be broken up at all, or it may be partially levelled by blasting, or its inequalities may be filled up. The problem is often much complicated by the scour of tides, or tidal streams, as at Newhaven, or by the exposed position of the works, notable examples of which occur at Colombo, East London, Guernsey, Peterhead, Dover. In all such cases the foundations must go down well below the sweep of the scour, or the dash of the breakers. The diver is more in request than ever, by reason of the boldness and extensive character of the undertakings which are now carried on under water. The early engineers, who just threw rubble in, or drove piles at random, trusted much to chance, and rarely saw their submarine work. Those of the present day go down and work much as they would on terra firma, provided the depth does not exceed about 60 feet. At greater depths they cannot stay down long. The divers go down and cut and blast away rock in some places, pile up stones and bags of concrete in others, pour in liquid cement into cracks, find out faults, and set things right, and all in as leisurely a fashion as if they were working on the shore. They communicate by a code of signals with the men above, who operate the Titan, or Goliath, or derrick cranes. And in the case of diving bells, the electric light sheds a good light on the operations, and telephonic communication up to the surface enables the workers to speak, and direct the operations with ease.

The employment of concrete in various forms has given immense impetus to harbour work, and done more than anything else to bring it to its present state of perfection. It has been the direct cause of the development of the great types of cranes built specially for harbour work, and for the equally vast and costly plant which is required in carrying on these works.

Most piers are now built with solid blocks of concrete, bonded and united with cement into one vast monolithic wall, nearly as solid as though hewn entirely out of a quarry. Only in the central space between the solid walls is rubble tipped to form a hearting, and this often, too, is converted into a solid mass with liquid concrete. Experience has shown that bonding the blocks is a very necessary precaution to resist the force of the waves, which in exposed situations has often detached masses of forty tons weight and formed big breaches in the piers. The blocks are therefore secured by breaking joint, by joggling, and by pouring liquid cement into grooves formed on opposed faces, and by other devices which have been adopted to suit local conditions and costs.

An important aid to the bonding of concrete blocks is the capping of breakwaters with a solid thickness of concrete in mass, that is, concrete laid on while in a plastic condition. This is generally done now, and its neglect has been the occasion of the displacement of blocks, notably in the case of the Manora and of the Madras breakwaters. And lest the winter's waves should undermine and wash out the base of the broad piers, they are protected with rubble, or with bags of concrete, or even with solid concrete blocks like quarried stones. Alternatively to the use of these blocks is that of concrete in bags and concrete in mass, the latter producing, when set, absolutely monolithic work. To withstand the wasting of the pier faces also granite blocks are used on the outer surfaces.

The importance of the concrete block and all that concerns its manufacture and manipulation may be inferred from the numbers and mass of blocks that are required in large works. At Colombo Pier 9,656 blocks were used, aggregating 124,984 cubic yards. At Libau Harbour 15,753 blocks were used, ranging from 25 to 30 tons each. At Bilbao blocks of 100 tons weight were deposited. Generally, blocks average from 30 to 40 tons in weight each. Concrete in mass deposited within a frame is a device that was employed more than sixty years ago, but the use of moulded blocks is more recent. The first large work of this kind, we believe, was done at Madras Harbour in 1869.

The system of employing moulded concrete blocks is closely associated with the name of the late Sir John Coode, who adopted it to the almost entire exclusion of other methods. Objection has often been made to it, on the score of the great expense which it entails for making and handling the blocks. There are several points, however, which are in its favour. One of the principal is this, that with this system work need not be at a standstill during the stormy season. Though block setting has to be suspended during the winter months in the northern climates, and during the period of the monsoons in India, the work of block making can be carried on all through the year.

The cost of piers built of concrete varies much. Reckoning materials, labour, and machinery, Aberdeen cost 23s. 9d. for each cubic yard laid, Kurrachee 23s. 11d., Dublin 34s., Colombo 41s. 7d., Newhaven 22s. 4d. But a mere statement of cost of concrete work per yard or foot is of no value if taken alone without the conditions being also stated. To a large extent it is a question of depth of water in which the work has to be deposited. Thus, at Alderney the work was carried down 120 feet below low water, but at Newhaven only 15 feet. The cost at Newhaven was 58*l.* 10s. per lineal foot, while at Alderney

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it was 190*l*. Portland breakwater goes down 45 feet; its cost was 120*l*. per lineal yard. Holyhead cost 160*l*., Plymouth 300*l*., Algiers 122*l*., Cherbourg 219*l*., Dover Breakwater 360*l*. The cost of the latter was increased by a facing of granite.

Machines for mixing concrete are of two main types—those which mix intermittently and those which are continuous in action. The method of mixing adopted in these machines is that of throwing the materials from one side to the other of a revolving chamber. The Messent mixer, one of the earliest, and still one of the best of the intermittent kind, is made with its interior facets at numerous angles, so that the position of the materials is changed four times during each revolution of the mixer on its axle. The Ridley mixer is cylindrical, but has the axis around which it rotates set at a wide angle with the axis of the cylinder. Intermittent mixers are driven by hand or steam, and recently by electricity. A very efficient installation of the latter, adapted to Messent's mixers, is in use at Dover.

The Carey-Latham portable machine, which was designed specially for mixing the large quantities of concrete required for the Newhaven breakwater, mixed at the rate of 70 cubic yards an hour. The mixer is a revolving cylinder, with its longitudinal axis set at a low angle, to deliver into wagons or into the timber framing within which the breakwater was built. The proportions of shingle and sand are measured by revolving dredger buckets. The cement is measured and lifted into the cylinder by an inclined screw creeper. The cement is carried in a van behind, whence it is shovelled into a hopper over the lower end of the creeper. This machine, propelled by an engine, took the place of hand labour previously employed, reducing the cost from 1s. 2½d. per cubic yard of raw materials to 5½d. per yard.

Mixers are, of course, necessary, no matter in what ultimate way the concrete is used. But the method of moulding the concrete depends on the manner of its employment, whether in the form of cubical blocks, or in bags, or in a plastic state. Let us look at these in turn.

If concrete blocks are used, then block moulds are required. These are constructed of 3½ in. or 4 in. deals, framed together to interior dimensions corresponding with the size of the blocks of concrete. They contain timber strips for making holes to receive the lewis bars by which the blocks are handled about and lowered into place. If granite facings are to be used, as on outer walls, provision is made for receiving these in the box, to be set and cemented *in situ* by the concrete. The concrete is ran over the moulds, dumped in, and distributed by men with shovels. When full, the mass is left to set, then removed from the mould and allowed to harden for periods ranging from three months to a year.

Trucks are required for conveying the concrete blocks from the store yard to the pier. These are built on the railway wagon style, flat-topped, but more stiffly. A Goliath is required to lift the blocks on to the trucks, spanning the tracks on which the latter run. The trucks are sometimes allowed to descend by the action of gravity from yard to pier, the rails being inclined for the purpose, and a hand-brake being fitted to each truck; but, preferably, a yard locomotive is employed to pull them along.

Before the invention of the Titan crane piers were built by the aid of staging erected against the external faces of the intended pier walls. This method was dispensed with when the Titan was designed. The first Titan ever built in England was designed by the late Mr. Parkes, who wanted a crane for the construction of the Manora breakwater at Kurrachee. This was about the year 1869. The crane was afterwards used at Madras, where it was finally blown over into the sea and lost. At the same time Mr. Hutton constructed a similar crane for the Amsterdam Harbour works, and others followed later. The framing of this, however, was made of timber, like those for Tynemouth piers, while that for Manora was built of wrought iron, the girders being lattice braced.

None of the early Titans were made capable of revolution; they simply set straightforward. The Kurrachee Titan had two cantilever girders carried high up on a travelling framing, propelled through pitch chains by a steam engine. The concrete blocks were thus deposited at the scar end of the work, the Titan travelling on rails laid as the work progressed. The deposition of the blocks across the pier was accomplished by the transverse movement of the crab, and the setting was done by divers below. There were some obvious disadvantages in this method, which were avoided in later machines by imparting a range of radial movement to the jib, which was especially valuable in side setting. At the present time, and for many years past, practically all Titan cranes have radial movements, and mostly through a complete circle. In several instances, however, the motion takes place through an arc of a circle only.

There is a great amount of improved detail in these cranes, which has been worked out as the result of experience in their working. The most important of these is the fitting of springs to the axles, the system of live rollers used for slewing, the use of wire rope in preference to chain, and the substitution of framings of steel for those of wrought iron, or in several instances of wood.

A Titan crane is not economical on all classes of work. More can be got through by Goliaths and derricks on piers of great length, like that at Dover, where there is no Titan used. As it is, several Goliaths can be operating at one time at intervals, while a derrick ahead builds out the staging at the front, forming a temporary way for the Goliaths to follow. For most harbour work the cranes used must have a wide margin of power. Thus, for lifting 40-ton blocks the Goliath or Titan should be tested at from 50 to 60 tons.

In bag-work the concrete is prepared in mixers, and the bag—of stout jute canvas, sewn up on five sides, leaving one end or side open to receive the concrete—is contained in a tipping skip or truck. The latter is brought under the concrete skip, the plastic concrete poured in, the bag sewn up, its skip ran out to the allotted place, tipped, and the bag dropped into the sea to set in position.

In order to ensure the success of bag-work, the concrete must have been emptied in directly the materials have been amalgamated in the mixer, and the bags must be deposited as soon as possible after being filled. No time should be lost, or any disturbance take place, as that would interfere with the proper setting of the concrete. The deposition of concrete in mass in bags from a hopper barge was invented by Mr. Cay, who first employed it at Aberdeen. The system has also been adopted at Fraserburgh, Newhaven, and at New Plymouth breakwater, New Zealand. Bags have been used thus, containing from 12 tons up to 50, or to 100 tons of concrete each.

At Newhaven the sacks were made of jute canvas, each containing 400 yards of canvas, having a single thickness at the bottom, and a double thickness at the sides and top. They were deposited through the well of a hopper barge, having an opening 42 feet long and about eight feet wide. The bags were laid transversely in relation to the intended breakwater, in one length only. In the direction of the width they were made to break joint. Over these a timber framing was erected, the uprights being sunk into wrought iron sockets, and confining 3 in. planking, between which plastic concrete was deposited. The latter rose from about two feet above low water to a height of 28 feet, with a width of 30 feet at the top. Forty lineal feet of concrete took three days to lay. At Colombo 712 bags, each containing ten tons of concrete, protect the top of the rubble next the sea wall. The concrete sacks at La Guaira were 40 feet long and 70 tons in weight, and were tipped from a special machine.

Though bag work has been very successful at Newhaven and elsewhere, the advocates of block work nevertheless have a strong case. Blocks can be examined before deposition, and condemned if faulty, or if badly deposited they can be hauled up and reset. But when bags are once dropped their position cannot be altered, and if the cement is faulty it must remain so. Bag work, moreover, is not necessarily more economical than block work. Experience has shown that with a good Titan crane something like double the amount of work can be set in the same time in the form of blocks than in bags. Besides this there is the fact that in exposed positions the block-making is not suspended during the long, stormy season in which sea work is impossible. In many cases only about a hundred days are available for the latter during the year. In bag work this would limit the time available for construction, because the concrete must be mixed just before use. But using blocks the mixing, moulding, and drying can occupy the men during the winter months, leaving them free for the work of rapid deposition on the return of summer.

Monolithic concrete work is, as its name signifies, that in which immense masses of solid concrete without a joint are employed. It is accomplished by employing concrete in a plastic state and depositing and ramming it into suitable framings of timber. It may be pointed out, though, that in the modern system of jointing rectangular blocks the work is practically monolithic in character if due care is taken to secure the blocks by bonding.

The late Mr. Kinipple was a strong advocate of the use of plastic concrete, as well as its originator. On the other hand, the late Sir John Coode made use of set

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concrete blocks in most of his work. Many examples of both systems may be seen at various harbours in the United Kingdom and elsewhere. Engineers still differ with respect to the relative advantages of the deposition of concrete in a plastic state, or in that of cubical blocks previously hardened. Advocates of the first say that the fewer joints there are in sea work the less chance is there for the sea to affect it. Also, that the enormous monolithic masses are practically immovable, while there are many instances of blocks of 30 or 40 tons weight having been dislodged by the force of the waves. Moreover, block-making and setting requires special plant, which can be dispensed with by the use of plastic concrete. A good deal of cheap work has been done by the latter, which could not have been produced at so low a price had block setting been adopted. The latter, however, has been employed most successfully on very big Government contracts. Using plastic concrete, there is no trouble about blasting and dredging rocky, uneven bottoms, or in levelling them up to form a base as when cubical blocks have to be laid. Rubble hearting may also be dispensed with, or its proportion reduced.

Plastic concrete in mass holds an indisputable place as a capping to piers, helping to secure the upper blocks, which are otherwise exposed to the full fury of the waves. At Colombo a mass of solid concrete extends along the pier wall 4,212 feet in length. Its width ranges from 48 to 31 feet, and its depth is four feet at the centre, sloping off to three feet six inches at the sides. It was deposited from skips, several being carried on a single railway waggon. Concrete in mass was also used for the pier head. Two such masses were deposited, one measuring 62 feet in diameter and 27 feet high, surmounted by another 60 feet in diameter and 11 feet high. The lower mass, being deposited under water, was enclosed in a circular caisson or tank made of ¼ in. steel plates, stiffened with tee and angle irons; floated out, suitably ballasted and sunk in position. In this instance bags of concrete were used to stop a gap in the caisson made by a heavy sea, which tore away a length of 50 feet by 14 feet in depth of the plating. This was filled up in five days by 107 bags of concrete, each weighing ten tons. In using plastic concrete below water it must not be thrown in loosely, as this is likely to result in portions of the cement being washed out. The ingredients are mixed and lowered in skips to their bed and deposited slowly.

Skips are required for filling bag work, and hopper barges for depositing concrete in mass. The skips are of the drop bottom type. Hopper barges are also used for depositing bags of concrete, alternatively with huge side depositing boxes.

The question of monolithic or mixed work cannot be settled by general considerations alone. Solid blocks of concrete, or concrete in mass deposited in a plastic condition, are both more expensive than rubble, and much more costly when rubble exists in abundance on the spot. Using blocks, or plastic concrete alone, a breakwater would cost more than one in which the hearting was of rubble. Employing the latter freely, a wider structure can be built at less cost than a narrower one of solid material. Width means mass and stability, and therefore the wider structure, even though hearted with rubble, is not only the cheaper, but also the more stable.

NOTES.

Private Streets Works Act. THE case of Wakefield Corporation *v.* Cooke commented on by us in our issue of July 21, 1903, has been carried to the House of Lords, and the Lords have confirmed the decision of the Court of Appeal, which had reversed that of the Divisional Court. The decision is one of great importance on the Private Streets Work Act, 1892, since the Private Act of the Wakefield Corporation under consideration was drawn in similar terms with this Act. The Wakefield Corporation in March, 1897, had issued the requisite notices in respect of a certain street or part of a street bearing the ominous title of Sludge-lane, but certain of the owners had objected before the Court of Summary Jurisdiction that this was a highway repairable by the inhabitants at large, a contention that had been upheld by the Justices. In 1900 the Corporation had again issued notices in respect of the same street, but including an additional length of 80 yards, and it was then contended that the decision of the Justices in 1897 had concluded the matter, and it was *res judicata*. The House of Lords have now decided that this contention is well-founded, that a decision under this section is, in legal parlance, a judgment *in rem*, and finally determines the status, so to speak, of the street. The whole litigation has really resulted from a decision given in 1881 in the case of Reg. *v.* Hutchings, but the distinction between that case and the present one is this, that in that case, which was decided on the Public Health Act of 1875, the decision by the Justices was really only as to whether certain contributions were due from the owner in respect of certain works, and the question of whether the street was repairable by the inhabitants at large under that section was not the subject of direct decision, as it is under the Private Street Works Act.

A view of London in 1710. THE London Topographical Society have lately published a reproduction of the bird's-eye view drawn and engraved by John Kip in 1710, of which there is a later edition, 1726, upon eight sheets. The earlier edition, which is dedicated by Kip to Wilhelmina Carolina, Princess of Wales, consists of twelve sheets, measuring in all 80 in. by 53 in. The prospect is taken as from an elevated point in front of (old) Buckingham House by one who looks north-eastwards along the Mall, and the Green, Close, and Long Lime walks in St. James's Park, which is walled in on the southern side; the nearest figures are quite 2 in. high; the river turns in the distance. Kip, more solicitous it seems for the general effect than for strict accuracy, greatly reduces the angle of the bend, so that Lambeth and Southwark appear as squeezed together upon a long, narrow tongue of land, and London Bridge stands east and west. The foreground presents a fine view of Green and St. James's parks, with "the quality" taking the air in Sedan chairs and six-horsed coaches, and milk-sellers with their cows; that traffic continued to our time in "Milk Fair" at Spring Garden. To the spectator's right is Rosamund's Pond—filled up in 1770—of which Hogarth painted two pictures. It is fed by a rill from the Tyburn that flowed through Cowford Pool in the vale of Green Park and around the front of Buckingham House. The straight canal laid out, together with the Park, by Le Nôtre and Dr. Morison for Charles II., and altered by Nash, leads to the Decoy, Duck-island, and the Tilt-yard of Whitehall Palace—since the Horse Guards' Parade. In Birdcage-walk we see Charles II.'s round "Coc'pit Royal," where "mains" were fought until 1816. Close by are the "Quare de la Reine" (Queen-square), and the "Chapelle Neuve." On the left are Cleveland, formerly Berkshire, House, where is now Bridgewater House, St. James's Palace, and Marlborough House, then just completed by Wren, with two principal floors and a high balustrade. In the middle distance, at the extreme edge of the view, is delineated Peterborough, afterwards Belgrave, House, the town house of the Earls of Grosvenor, at the remoter end of Millbank, which remained until 1809. A windmill, perhaps for a pumping engine, appears on the south shore opposite the Savoy, and northwards the "Veue et Perspective de la Ville de Londre," etc., includes Bloomsbury and St. Giles-in-the-Fields. Then, beyond, the houses and churches to the east of Temple Bar and Holborn are, for the reason we surmise, spread out, and we see the City and East London as though from the south instead of from the end of the Mall.

The City and South London Railway. MR. P. V. MCMAHON, the engineer to the City and South London Railway, read a most instructive paper on the working of this railway to the Institution of Electrical Engineers last week. As the City and South London is the pioneer, both of deep-level railways and of heavy electric traction, the working results obtained on it are of great interest, extending, as they do, over fourteen years. The author in this paper confined himself to describing the results obtained since he converted the line into a three-wire system. Originally the line was worked on a two-wire system at five hundred volts, but when extensions were made the engineer converted it into a three-wire system. The voltage of the insulated conductor between the rails on the up line is positive and equals 500, and the voltage of the other between the rails on the down line is negative, and equals 500; so that there is one thousand volts between the two insulated conductors. This system was criticised severely at the time by some experts, but the working results have proved very satisfactory. We were surprised when a site was chosen for the new generating station that one was chosen which was not close to either a main line or the river. The cartage of three hundred tons of coal per week must add appreciably to the working expenses, and Mr. McMahon's paper confirms our contention. In the early days the light in the carriages was very unsteady, but this has been remedied by making the engines at the generating stations govern more closely, and by preventing the heavy drop of pressure in the cables by accumulators. From the point of view of first cost and subsequent working expenses the

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electric passenger lifts at the stations have proved very satisfactory, but they are not so easy to control, and do not work as steadily as the hydraulic lifts. Mr. McMahon gives reasons for believing that the cost per ton mile on heavy gauge railways will be cheaper with electric locomotives than with steam locomotives. In the subsequent discussion Professor Carus Wilson stated that he thought the three-wire system could only be used with electric locomotives. If this system were used with trains in which every carriage carried its own motors, like the trains that will be used on the Metropolitan District lines, then, in his opinion, the fire risks would be considerably increased.

THE ARCHITECTURAL ASSOCIATION.

An ordinary fortnightly meeting of the Architectural Association was held on Friday last week in the Meeting Room of the Royal Institute of British Architects, No. 9. Conduit-street, Regent-street, W. Mr. Arnold Mitchell, Vice-President, occupied the chair in the absence of the President, Mr. H. T. Hare.

Mr. H. Tanner, jun., hon. secretary, having read the minutes of last meeting, which were confirmed, and Mr. Louis Ambler having read some nominations, the following gentlemen were elected members of the Association:—Messrs. A. W. Wilson, C. W. Berry, H. J. West, H. Bromley, and A. Welford.

New Premises Fund.

The Chairman announced the following donations to the New Premises Fund:—Messrs. Farmer and Brindley, 10*l.* 10s.; T. E. Pryce, 10*l.* 10s.; and E. R. Howard, 1*l.* 1s. On the motion of the Chairman a hearty vote of thanks was accorded to the donors.

Sketching and Photography.

Mr. Ambler announced a joint meeting of the Discussion Section and Camera and Cycling Club, on January 6th, when Mr. F. Lishman will read a paper on "Sketching from an Architectural Point of View," and Mr. G. H. Lovegrove will follow with one on "Photography."

Classes Commencing.

Mr. Ambler also stated that the following classes were commencing:—January 6, "Elementary Physics," Division I., Mr. H. B. Ransom, lecturer; January 7, "Drainage and Water Supply," Division II., Mr. Max Clarke, lecturer; January 13, "Ornament and Colour Decoration," Mr. Cole A. Adams lecturer; January 14, "Greek and Roman," Division I., Mr. Hugh Stannus lecturer.

Old Stucco and Plaster Work.

Mr. G. P. Bankart then read the following paper on "Old Stucco and Plaster Work, with Reference to Modern Possibilities":—

Of all the arts associated with that of building, none can perhaps lay claim to more general use than what was once the art of the plasterer.

The very commonness of the material, its cheapness, and facility of manipulation are at one and the same time its virtue and its misfortune.

It combines extreme ease of manipulation with great durability. To no other material do the associations of our daily lives cling more closely than to the plaster with which the very walls and ceilings of our homesteads are covered. From the humblest cottage to the sumptuous palace it is used as a clothing to the rougher material composing the structure, and it may be this very serviceableness, this very familiarity, which has bred the contempt with which it has for so long been treated. In my opinion, it is this very serviceableness, this very commonness which may make it worth the while of some of us to pause over, to consider what has been done with it—what is being done with it—what may be done with it—what are its possibilities and limitations as a material. It is intensely sympathetic, a medium which has been used by some of the world's greatest artists of all times but the present, and yet of all the materials in the employment of men few—if any—have been subjected to greater vulgarity of treatment than the plaster of the last century. It can be modelled, it can be cast or incised, coloured, stencilled, or stamped, with equal freedom, from the size of a cameo to the vastness of a dome. It may be set as a jewel or applied to the façade of a palace. The main purpose of my address is not so much the mapping of a history of the material—although this is necessarily involved—but the notification of some of the methods of working it when it was an art in order that we may better realise its capabilities and limitations for the present and the future. If in the pursuit of this purpose, if in the examination of works executed in the past, my remarks may appear to favour the craftsman more than the architect, or *vice versâ*, I pray that it may not be mistaken for disrespect toward either calling, for I myself, belonging to both, would be first to acknowledge the virtues and last to unduly expose the vices of either.

Assuming the architect to be to the craftsman as the conductor and the composer to a fine orchestra, let us examine one of the parts, one of the instruments, one of the players. The composer and the conductor cannot play all the instruments himself, although he may know much about them, but he can arrange, combine, and control them into one body, one harmony, one whole. In like manner, I take it that the instrumentalist may be as good a musician as the conductor or composer, either in combination or solo, but whose work and art it is to swell the harmony in the finest manner his skill commands, his inspiration permits, and his will imparts.

I see little or no difference between oral harmony and optical harmony or constructive harmony, where all are good. The one of sound, another of form and colour, the last of constructive form.

Research gives us various materials which were applied to wall surfaces in ancient times. It will suffice us to know, briefly, that plaster was used in very ancient days, and that it developed into a great art is amply proved.

The Egyptians covered their buildings with a slight coating of stucco to conceal the seams of the stones and receive the painted decoration. The pyramids of Memphis were lined with a coat of stucco, the remains of which are still to be seen. The question of the use of stucco among the Greeks opens up a rather extensive subject, and one, so far as I know, about which nothing consecutive or comprehensive, has been written. The almost universal use of stucco in Greece is very generally overlooked.

In early times it was usual to use inferior materials for building with—mud bricks or rough kinds of stone—and to cover their surface, wherever visible, with a thin coating of stucco, which was frequently ornamented with fresco painted decorations or other motives.

This applies to all architectural members of early temples before the use of marble became prevalent, and even after, when marble could not be easily obtained. For houses, and other similar buildings, it probably remained the custom of all times, as the walls were mostly made of unbaked brick.

The quality of the early Greek stucco is wonderfully fine. In early times, as far as I know, the stucco was always a mere thin coat, covering exactly the forms below; but in later Greek times examples of capitals of columns, bulls' heads, etc., are known to have been modelled or cast with it.

This rough stone they used was like the Roman travertine, very porous, and not capable of taking a fine surface, so they stuccoed it over, polished it, and sometimes decorated it with paintings. Traces of this are found in the Doric monuments at Sicily, at Pæstum, etc. At Mycenæ the stucco used in archaic times yet exists. The Byzantine Greeks used plaster generally in cornices and enrichments, also in their window framings. Their mosaics were also bedded in a plaster composition.

Viollet le Duc tells us "that the Romans used stucco very frequently both for public monuments and private dwellings." It is useless here to quote the numerous examples of the use of stucco in Italy in ancient times. Its use was passed down to the Gauls, and there is not a single Gallo-Roman building in which the remains of stucco coatings, polished and painted, are not found.

Building methods suffered the same fate as the arts. They were lost in the West towards the end of the Roman Empire, and the rare fragments of monuments of the early centuries show us nothing but coarse coatings made of inferior materials, badly dressed, and covered with rude paintings.

The Gauls, however, had not lost the custom of covering quarry-stone facings and even rough courses with a coating of lime and sand, as thin as possible, to conceal the defects and joints of the stone, and to take on the paint, but these plasters have no longer the beautiful polish that marks the stucco of *Grecian* antiquity and the best times of the Roman epoch, *nor* their solidity.

They have consequently been rarely preserved, and their absence is too apt to make us believe that Carlovingian buildings, for instance, allowed the rudely finished courses to be seen both inside and outside. Far from this, however, these buildings, though rude and barbarous, were covered with coatings and paintings both in the interior and outside, and these coatings, sometimes decorated with engravings ("sgraffitto") and ornaments in slight relief, are real stucco work

A genuine example of such, belonging to the Carlovingian period (752-986), was recorded by M. Viollet le Duc as existing in the little Church of Germigny des Prés (Loiret), the building of which goes back to the beginning of the ninth century.

A mosaic in the Greco-Byzantine style adorns the vault of the Apse—the only mosaic of its kind in France.

Formerly, the walls of churches were adorned with stucco-work, engraved and painted. These coatings, which have disappeared at the lower parts, are now only seen inside the central steeple, and particularly in the bays of this latter, which are composed of an archivolt resting on two small attached columns. These archivolts and columns are made entirely of a white stucco, fine and very hard, chiselled out whilst still soft.

Art in a barbaric age by no means excludes profusion of ornament. In fact, it is more often quite the contrary. There can be no doubt that Carlovingian architecture, though of rude design, and habitually carried out by the aid of materials of no value, badly chosen and even more badly used, included ornamentation very rich, but obtained by cheap and rapid means.

Stucco was well adapted for this style of current decoration, and of all the traditions of art handed down from the Romans this was bound to survive by reason of the facilities offered by the use of such processes.

The method most readily followed by the simple architects of the first period of the Middle Ages was evidently to raise walls of quarrystone, and when the work was roughly finished to conceal the irregularities and first attempts by a coating on which chisellers and sculptors cut out ornamental designs taken from Eastern tapestries, furniture, and utensils.

The process did not require the calculations or foresight of the Masters of the twelfth and thirteenth centuries.

"Some Carlovingian buildings show traces of stucco work on the vaults, and even on the capitals. The large capitals of the old narthex of St. Rémi of Reims, those of the crypt of St. Laurent of Grenoble, and even of the capitals of the Apside of the Church of Issoire, are simply baskets of stone covered with figures or ornaments in stucco. At a later period in France, stucco work was nothing but a delicate application of ornaments, trellis, and flowered chequer work on even surfaces to soften the bareness."

The foregoing remarks are sufficient to show that the properties of stucco and plaster were well known in very ancient times; but, whereas a full knowledge of the capabilities of stucco was arrived at very early, that of plaster did not reveal itself until comparatively modern times.

Stucco has for its base carbonate of lime—generally the burnt limestone or chalk of the rocks and hills. Vitruvius, writing on architecture about 2,000 years ago, gives very detailed instructions as to its preparation. The stucco of those days was far more carefully compounded than now; the lime was most carefully chosen, burnt with wood, and subjected to a very gradual process of slaking for a long time before being used. It was constantly beaten with heavy sticks and chopped up with heavy hammers or axes. It was mixed with fine, sharp, and very carefully washed sand, or a white marble dust, which enabled it capable of receiving a fine polish. In the old method of preparing it various ingredients were used to toughen and regulate its setting qualities, such as rye dough, juice of figs, hog's lard, curdled milk, blood, and other things of

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which we are now more sparing than economical—viz., *time* and *great care*. It was generally applied in three coats, or as many as the nature of the wall required. The first coat was of rough stuff, with broken marble, and the remainder of finer stuff; whilst the finishing coat was of very fine marble dust, which, when dry, was polished with marble dust and chalk.

The more recent work was stone-coloured from the use of powdered travertine, whitened with lead ground in water.

With such a medium the modelling was done direct, as it set very slowly, and was smooth and hard. It was absolutely impervious to wet or climatic variations. So good and smooth and hard was this preparation that jewellers used it in preference to wax, and modelling of such exquisite delicacy was done with it as to rival gem-engraving. Vitruvius tells that it was capable of receiving so fine a surface that it was sometimes polished and used for mirrors. Its durability was such as to "weather" better than marble. Such was the stucco used for the walls and plain surfaces for painting upon. It is only natural to suppose that the Greeks used this material to model with, knowing as they did its nature and pliability. Unfortunately, nothing remains to us of the masterpieces of Greece beyond the skeletons of some of their private and public buildings.

There is a long history connected with this subject that, by your own instructions, must be condensed into a few minutes; so I must abbreviate.

As the Romans carried off the Greek treasures for the adornment of Rome, undoubtedly they carried with them the art of the decorative stucco worker. A glance at the Roman work shows a strong Greek influence. This is to be seen in the wall and ceiling decoration of a Roman house of the time of Augustus, in the garden of the Villa Farnesina, Rome, presumably belonging to the first half of the first century, A.D. There is also the stucco modelling of a tomb in the Via Latina, the type of which is rougher and more incised, and intended to be seen by tirchlight only. The value of the lesson this early work teaches it is impossible to overrate, combining as it does purity of line and mastery of execution, no matter how simple. Such art as this could not well have been acquired in Rome or attained without prolonged experience.

With the barbarism following the decadence of Rome this work passed into obscurity, to be resurrected again in the sixteenth century through investigations and researches organised by Cardinal Giovanni de Médici in seeking for sculpture of Classic times.

To cut a long story short, Raphael and a number of his fellow-workers succeeded in reviving the art of stucco work in Italy, doing much work at the Vatican, Raphael's own house, and other notable buildings. It then passed to Mantua, Venice, and other Italian cities, and was carried from there to France (Fontainebleau and Versailles, etc.) at the time of François première, and thence to England by Henry VIII. in jealousy of the French king. Henry introduced stucco extensively into the palace of Nonesuch, which stood on the hills between Epsom and Cheam, and within reach of Hampton Court.

It is a question for us all to consider *how far* the elimination of the Gothic element injured the plastic art. So far as the figure was concerned, the time was not ripe for any Italianisation of the human form. The native workmen, unlike the Italians, were not conversant with the delineation of the human figure, nor could they grasp the foreign idea, and this inability resulted, with rare exceptions, in failure to the point of burlesque. However, the introduction of Italian workmanship into England was followed by the raising of a school of English craftsmanship which rapidly spread the art throughout the country. But stucco-duro gradually gave way to the employment of coarser stuff or "pargé" work, which became rather later the medium of the native workmen.

About 1547 we have record of an English stuccoist named Chas. Williams, who had travelled in Italy, and probably was the first to work in England and at Nonesuch.

Time went on, and a cheaper and commoner material brought "degeneration" with it—of a kind. This coarser stuff was modelled and stamped, and was known as "pargetting," and consisted of the ordinary lime, hair, and sand, which was applied to any part of the structure, internal and external. To witness—Wyvenhoe, Clare, and elsewhere. Then followed the wave of plaster work, particularly our own:—

1. The arrangement of panelling and radiating ribs based on the fan tracery of stone.

2. A pendentive system superseded and outlived the above, as at Audley End, in the "Fish Room."

3. Modelled foliage sometimes replaced the radial ribs, giving effect of Gothic diaper.

4. Pendentive system superceded by geometric arrangement of ribs—not limited to straight lines, ceilings abounding in interlacing lozenges, quatrefoils, circles, ovals, and other forms, spaces between ribs being filled with armorial bearings and personal devices and other emblematical forms; figures very seldom, unless of armorial character.

5. Size of sub-division gradually expanded until

6. Ceiling area became divided into four parts large or small, quarter bearing the design.

This developed into the Jacobean system of interlacing strapwork and patterns.

Earlier ceilings had plain moulded ribs—like groin ribs. As power of execution grew, flat surfaces became introduced between two sets of mouldings, with improved decorations done off a revolving stamp.

Elizabeth's time had moulded ribs, with sprays or sprigs of flowers or medallions of floral ornament.

These ribs or medallions were cast or run *in situ*.

Sprays and medallions in early days were nearly always modelled by hand.

Afterwards they were stamped; later still, they were cast in plaster of Paris.

Sometimes sprigs were "butter-pressed" into the moist plaster.

In later years, the methods were almost exclusively confined to casting in plaster of Paris.

This system was productive of a beautiful softness and dulness suitable to the material, and was quickly done compared with earlier methods, and less expensive.

Against this one has to put the *sacrifice* of intellectual effort on the part of the worker.

In Scotland much good work was done about this time at Kellie, Holyrood, and elsewhere.

In the reign of Charles I. (1625-49) the net-like arrangement of ribs became less noticeable.

Later, in Inigo Jones's time (1652) the compartment became less prominnt.

In the centres and smaller compartments, exquisite bas-relief, with decently-modelled figures.

Sparrow House, Ipswich, followed, and showed that stucco still flickered during the disturbed condition of affairs.

With "the Restoration" design improved.

During the reign of Charles II. and James II. the influence of Louis XIV. became manifest, floral festoons, etc., being much used.

Modelling became more minute and wax-like in texture; detail the chief thought; the general conception at a discount.

William III. (1689-1702).—The Italian influence flickered for a time.

Gibbs (Wren's pupil) employed Italians—Artari and Bagutti.

Chamber's influence brought more severity

Joseph Wilton, Thos. and Chas. Clarke, eighteenth century (in Ireland), and Somerset House.

Joseph Rose and Thos. Papworth (d. 1814).

Compo-work of Bros. Adam, and down the incline rapidly, to the state of cast-iron plaster-work.

What do we learn from the old work?

The plaster is widely different from ours.

Examine a piece of old plaster. It is coarse and rough, and contains little bits of gravel and other inequalities which modern architects would *condemn* without doubt. Where should we draw the line?

The old ceilings were not die-level and polished; they were full of delightful, but very slight undulations; the ribs and strapwork were not painfully exact, as ours are.

The old work lacks that strain and mental limit naturally associated with office confinement, and the ever continual abuse of drawing as an art instead of a means to an end.

Hand and eye judgment rather than exact measurement, was evident everywhere.

Moulds were carried from one job to another, and frequently made to fit in as they would, or were altered to suit circumstances.

The workmen had their moulds, tools, and traditions—perhaps some rough plan for guidance, instead of a fussy and pretty drawing of what it *would not*, and could not, look like—to tempt and deceive a client.

All sorts of funny things occurred, quips and cranks and things attributed by some to the genius of the age, but very possibly due to accident.

Ornaments designed and worked for seilings will be found combined with others, and used as a frieze elsewhere, or into an interlacing pattern in some lunette. All sorts of things done for one, or several places, combined in an overmantel or wall space between dado and ceiling.

Much modelling was done with metal tools, and sometimes with the fingers and hand. The lime must have been in a very different condition when used in those days to what it is now, or men's fingers could never have worked it! In many ways their methods of procedure were different from ours—more intellectual, less mechanical.

"In the Eastern counties," says Professor Lethaby, "plaster-work repairs in out-of-the-way cottages still clumsily match the deft pattern work, which, after being perfected by the use of hundreds of years, is now done no longer.

"By careful inquiry you may find an old workman who remembers seeing it done when young, who can describe the tools and knows the names of the patterns—'tortoise-shell,' square-pricking, and the rest.

"He will add that modern plaster is quite unfit for work of this sort. The old material was washed, beaten, stirred, and tested so carefully, and for so long at a time, that when laid it was, my informant said, as tough as leather."

Think of the many quaint patterns done on the outsides of buildings (cottages and houses) by the common village plasterer or mason, with the pointed "fan" of sticks, still used by our own plasterers for "pricking-up," as they term it. Think of the quaint patterns done with end of the trowel in various ways. These patterns are confined to the particular district radius in which the man lived and worked. Some of this "pargeting" work is not only clever, but complicated, in the arrangement of symmetrical, flat, strapwork patterns, in panels sometimes, at other times over the whole surface of a wall. Some of this work is suggestive of natural form, and it is here interesting to note how the influence of Nature affected this art when first introduced into England.

At that time the stucco-worker undoubtedly went to Nature for inspiration, as is evidenced by the friezes at Hardwick Hall, St. Michael's Mount, and other places. This may have been because the Art was *new*, and *then* held no traditions which could be followed.

The plasterers' craft did not share the fate of the other crafts, whose traditions were paralysed and crushed out at the time of the great upheaval in Henry the Eight's reign. On the other hand, it was inspired with a new use, a new life, a new purpose, and was developed with a vigour and freedom strongly akin at times to the wonderful work at Venice and the early Gothic work.

Take, for instance, one example only—the Long Gallery ceiling at Knowle, Kent, in which are combined the vine, rose, pink, honeysuckle, columbine, marigold, lily, oak, etc., etc. These flowers occupy spaces formed by waving bands of enrichment, and are modelled quite as admirably as such a dull material as plaster can, or ought to, be modelled. It is very simple, broad, big, straightforward work, free in every way, has little variety of relief; the line curvature is gentle and refined, although vigorous. There are no sharp curves, no under-cuttings, or "sparkle" of effect that might be appropriate and desirable in a harder material, such as stucco, or wood, or marble, but it has a *dulness* and a *softness* quite natural and charming in such a medium. There is no attempt to "copy" Nature, but only to give so much of her as would express the vital quality, freshness, and vigour of growth, combined with fulness and convenience of arrangement and disposition.

"*Realism*" was admittedly beyond the limits of plaster, unnecessary, and even undesirable. With such limited means at hand, the plasterer contented himself, and rightly so, too, with a mere *suggestion* of Nature, and compromised matters between his material and the suitability of his design to the material. Simplicity, breath, reticence, were his watchwords, and sincerity of purpose his most faithful companion.

The contrast between the past and the present is sufficiently palpable. We are now chiefly concerned with what is open to us at the present time, and this brings with it various

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little difficulties. Being myself an architect, as well as a craftsman, I am in a position to realise both sides of the question. We cannot, if we would, get away from the employment of plaster as a material. We therefore are confronted with the question of what can or should, or what cannot or should not, be done with plaster work.

What are its capabilities and limitations as a material?

"Plastering," says Professor Lethaby, "once the art of the stucco-worker, is now barely represented in the 'three-coat work' of specifications. How should it be otherwise, when we think?

"Would it not be irony, on the face of it, to put in the bill of quantities 'supply and fix one work of Art'?

"The crafts of the mason, the carpenter, the plasterer are even now being finally destroyed by a system in which design is divorced from work, the present system in which the designer has no hands to execute and the worker no head to think. These last remnants of long-gathered traditions are being forgotten because they are no longer required by the paper architect.

"Indeed he *must* crush them out of sight and mind, his ideal being so much mechanical work organised for the 'good of the profession'; a profession which lectures, examines, takes premiums, travels a little, and sometimes sketches—for those who think the profession should be artistic do actually sketch!

"It is the very mission of such an architect to teach the builder and workman his proper place and due ignorance. How else should he show the necessity of building in the material of North Italy? How else should he get reputation when he informs the Press that his 'designs' are 'Spanish Renaissance,' of 'French of the Loire freely treated'?"

"I have purposely spoken here of the simplest of the building arts—crafts that should be as near to nature as the digging and dressing of the land. If we examined the work of the old joiners, smiths, glaziers, stone and wood carvers, the story would be the more evident, but it is already either known that these as arts of the workman are destroyed, and that utterly, for the time. Craft degradation has gone so far that what is called "painted decoration" is done by "firms" to the order of numbers of our profession."

"Were it not that painters have maintained their independence, architects would certainly provide and fix portraits and landscapes "as specified."

"It is to be noted that these things have not changed because of a change in man's nature. Wherever handicraft has not been intercepted from material by the intervention of a learned profession, work is still as perfectly beautiful as ever it was, be it in the windmills of the millwright, the fishing smacks of the shipwright, or the wains of the waggon-builder—romantic with quaint chamferings, gay with bright paint."

"What we want are housewrights, and let who will play at examination in the art of passing examinations.

"When the arts of building are all of them killed out finally, and the memory of their doing dead, who shall build them up again? Will being examined in architectural history, practising a mechanical system of drawing, and acquiring the completest equipment of all the routine of the profession, give back to us the skill and delight of the craftsman?"

Such a sympathetic and sensitive medium as plaster can be used rightly or wrongly, and from its fatal facility of handling the latter course is the more easy, and, from long habit, the more likely to be expected and the more usually demanded. We are all familiar with the modern "sugar"-confectionery of the plasterer. At the present day we have the same materials open to us as before, viz., stucco-duro, ordinary lime and sand plaster, and plaster of Paris—not to mention cements of various kinds.

The controlling elements are, first of all, *cost*, which is naturally a wise and binding consideration.

Then, clients' idiosyncracies, architects' ideals, and craftsmen's individualities—sometimes all combined!

The employment of "stucco" goes hand-in-hand with freedom of thought and handling, which none can dispute. The idiosyncrasy of clients, where architects are not strong enough to influence them for the better, is hopeless and fatal. Architects' ideals are often possible, with the exercise of freedom and of individuality on the part of the craftsman, when he is a genuine craftsman.

The craftsman's sympathetic handling is the last, and perhaps most hopeful, means of success, where such individuality is strong, unaffected, and reliable. Everything depends on his knowledge of, and sympathy with, architecture, his knowledge of past methods and forms; his knowledge of his material, its capabilities, and limitations; his power of imagination; his grasp of the teaching of Nature; his gift of selection, and of the power of expressing himself; and his constructive instinct. Granted a full share of these qualifications, there is little to fear so far as he is allowed a reasonable amount of freedom. And here lies the hinge of the matter—a subtle hinge, to be opened and closed at will by the architect and by the client.

I believe you wish me to express my opinion as to what should be done.

Putting "stucco-duro" aside as undoubtedly the finest and most permanent, though more expensive, method of expression, let us resort to less expensive ones. We next have a system of modelling in clay and casting in plaster of Paris, *sulphate* of lime, from plaster moulds, as the case may be—either solid or fibrous. Here the craftsman has a fair chance of various nice treatments, in the *placing* of his enrichment, and the *relief* of his enrichment, according to the funds at his disposal and the liberty allowed (either of restraint or otherwise). In such manner beams may be clothed, flat spaces treated as flat spaces, with flat or projecting bands of soft enrichment in endless ways.

Before referring to a still simpler and important treatment open to development, I would desire a few words about deeply undercut enrichment cast in plaster of Paris from gelatine moulds. I do not consider this type of work a practice to be encouraged. Beautiful as it is in stucco—which is a very hard material as well as a subtle one, allowing of crispness, thinness, deep-modelling, and undercut relief, with beauty of texture and every other possibility—it is not a legitimate one for a *soft* material that is easily rubbed and broken, and will not take sharpness of treatment without injury. I admit the beauty of this type of work; but it is illegitimate, too easily injured, and unsuitable to the material.

My objection to this system of work, apart from its cost, is—

First, that it is an apology and cheap substitute for the work of another material—that of "stucco-duro," which would be woven into a gossamer of loveliness;

Second, that in the system of casting from gelatine moulds the work degenerates rapidly from the moment the model leaves the modeller's fingers.

The system is unsatisfactory to begin with. The clay has to be coated with shellac instead of being cast direct from the actual clay surface. In the process of making a plaster case to receive the gelatine a layer of paper has to be laid over the modelling and a thin layer of clay over that, in the process of which the sharp edges and arrisses (legitimate in a hard material, which is not afterwards touched) become doubled with the pressure of the clay, and the damage is completed afterwards by pulling the gelatine out of the soft plaster casting, which must perforce suffer where fine edges exist. Apart from this, the gelatine deteriorates with every casting taken, and is greatly affected by the variation of temperature, becomes "woolly," distorted at times, and very difficult to manage, and when done is not, and cannot be, that which it is supposed to "ape," and in my opinion can never take the place of stucco and its endless possibilities.

This work, of course, *has* to be cast in fibrous plaster, about which there appears to be much difference of opinion.

Fibrous plaster, although a modern process in this country, is by no means a modern process in itself, and many architects and craftsmen are prejudiced against it as being (1) not strictly a solid plaster process; and (2), as some imagine, not a permanent process.

The first objection is a matter open to discussion for and against. The latter objection will hardly hold good, since the process appears to date back to the Egyptian pyramids, when the mummies were wrapped up in canvas dipped in burn gypsum—so I am informed, at least.

The process was introduced in England in 1859-60 from France (*again*, you see), by a Frenchman named De Sachy. His system was to dip small pieces of canvas, about 4 in. square, into the plaster of Paris, and dab them all over the mould and over each other. He employed girls in this work, but was not successful in making much of it then.

In 1861 De Sachy sold the patent to a London firm. But at that time little headway was made with it, and the patent was not renewed.

Smaller firms experimented with it from time to time, until it became more constructive and improved.

The French used tow in the loose form, instead of the woven and open-sheet form as at the present time, with wood laths in the form of "strutting." A well-known architect told me that he disliked the system owing to having put up a ceiling thirty years ago which had rotted, and had to be taken down again. This was undoubtedly due to the use of boiled plaster instead of baked or burnt plaster. The difference in the two plasters is great, the former being soft and the latter hard in comparison.

Then comes the method of dealing with the ordinary lime, sand, and hair plaster.

Why should we architects allow this beautiful material to be smoothed and polished up, as we so commonly know it? Why not *demand* of the plasterer the surface *most natural to it*? Its own *granular* surface.

I know you are thinking of hygienic considerations. Granted this, but it is carried, perhaps, too far, excepting in special instances. However, I am not here to dictate, but to promote discussion. A few words about this ordinary material, and what can be done with it in lieu of the cast-work. To begin with, it is capable of being stamped, and modelled, and floated in bands, and "run," and stencilled through perforated wooden templates. The stamping process is delicious; so is the modelling, when treated with breadth and simplicity. With regard to the "running" of plaster-mouldings, we are again to blame in allowing the mechanical, die-level, sharp-arrised process. It is wrong in principle, whilst we can get interesting work out of simple sections made up of soft, rounded, and wave-like forms, flat, undulating, segmental or subtle lines, natural to the "dragging" of a granular material. Again, why the inevitable and hackneyed moulded cornice across the angle of wall and ceiling? One way of avoiding the rigidity of this method of "running" where mouldings are desirable is in the working of a short piece in clay which can be slightly worked-on with the fingers and afterwards produced by casting. Of course, it is possible to work the *plaster* with the fingers, if the lime is old enough and sufficiently deadened, but not under present circumstances of "running" lime as required. Otherwise, no man's fingers can stand it!

Why the inevitable guaging the plaster of Paris, bunging up the pores of the last coat, the "skimming" coat? Why not finish our wall surfaces with the grit stuff most natural to it, and far more pleasant to rest one's eyes upon? In the old work, simplicity and bigness will be found to be the roots of much of its success.

So, also, it must be with good modern work. I have heard it protested that simplicity is synonymous with "poverty." It may be so in some cases, where reticence and breadth are misunderstood, and texture and quality of material are lost sight of, or play a subordinate part. We have good materials at the present day, capable of good treatment—unfortunately the art of working them has long since been divorced from craft work—and the plasterers' craft is practically a thing of the past.

Designer and worker are two distinct creatures—the one not knowing the nature of the material, the other not knowing the nature of the *man* whose work he is *supposed* to put *into material*, and tries to do with a mechanical skill truly appalling in the finished result!

In a material such as plaster, designer and worker should properly be one and the same person, and he must be well alive to the possibilities of his material before he can know how to use them to advantage in a decorative sense. The strain, ever constant, of preventing the operator from obliterating the work of the thinker, is horrible.

If we can get a certain amount of rhythm or harmony into our work, it will be *something*, at least *interesting*—possibly mistaken—if even dull, awkward, or clumsy. Dulness is, in fact, an acceptable quality for plaster. It shows the process of workmanship, and is the natural effect of adding and pressing a soft

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material on-to a surface of similar nature. This feeling is particularly desirable in the treatment of large, plain surfaces. You will say it will be a long time before we can expect anything different from what we are now getting from the modern journeyman plasterer. Possibly so. Possibly as long *as until* architects *insist* on having something less laboured. I believe the remedy is not beyond us if we will undeceive ourselves, and admit other facts which I will refer to in a few moments. I believe the kernel of the matter lies in the gulf separating designer and operator. The *system* is at fault, but time seems to produce reaction upon reaction, and gives some hope. This brings us to another point, and not altogether an unimportant one, and a rather delicate one, which reflects to a certain extent on our educational system and schools. Modern architects appear to be divided into two distinct schools of thought and action—the one engaged in the copying and rearrangement of the forms and lines of past styles, the other in the arrangement and development of forms based almost entirely on the simple and natural construction of materials to suit modern purposes, according to modern methods, and requirements.

It is a great art to be able to draw well—but it is not "design"—and it is a great gift to possess the art of "design." But before we can design naturally and beautifully in any material we must be familiar with the capabilities of the same, have served an apprenticeship with the works of the past, have held constant intercourse with them, and gather from them *how* and *why* many things were done.

We must also be in touch with living men who practise crafts and learn from them their aims and methods. We must also be in touch with Nature, and pick up from her all that which is good and necessary for our refinement, our delight, and inspiration. We can only fully grasp the capabilities and limitations of a craft by absolutely personal acquaintance and natural perception, and our knowledge can only come of the actual fingering and handling of our material and by quiet perseverance in the art of working it. I believe the intensity of our Art must be in accordance with the intensity of our interest in the creation around us generally—in construction, and in our broad *grasp* of the whole art of building, past and present. I take it that design is the expression of this delight and interest, conveyed in an harmonious manner according to the limitations of the materials dealt with. But what of the delicate matter we are all of us so apt to overlook (so far as ourselves are concerned), and trip-up over—I mean the gift of *selection* and *discretion*, dividing man from man, or uniting them, which passes under the name of "individuality," if there be such a thing! This is subject enough for a "paper" in itself, and affects the whole educational system from the very elements.

It is not my province to-night to open up the question of design, but I believe much more might be done than is being done in the nice management of straight lines, and slight curvature, rather than the orthodox late nineteenth century "School of Art Curve" we see so much of—the very curse of the age, born of drawing-paper conceptions and lack of thought in material.

I believe all the crafts must draw blood from the ranks of architects to bring about a thoroughly healthy condition; and I believe, also, that there will be a time when architects' work will be less minutely detailed in offices than now, and the working-out of things done by sympathetic groups or amalgamations of workers where architects and craftsmen co-operate and work in concord and unity, when every architect or artist who transfers his attention to craft work will be regarded as a distinct gain to the Art of building, and to (what we now call) the "architectural profession."

There is plenty of scope for such men; plenty of demand for such good work as the value of their previous office training can add to technical manipulation. Each individual is as much responsible to himself as to the public for his actions in the encouragement or the discouragement of personal craftsmanship as are the general mass of architects, and on individual effort depends the future of craftsmanship; and, furthermore, the art of building will more nearly approach its long-past state of vitality, will again be imbued with a new hope, a new life, a new vigour, and a real and living purpose when men of refinement, intellect, and discretion draft themselves from the practice of paper architecture into craftsmanship—when architects again become craftsmen, and craftsmen architects.

At the present day the relationship between the architect and the craftsman is rather curious. In the present transitional condition of affairs it is not to be surprised at, in the hurry and scurry of getting work done, one is rather apt to forget one's principles in practice. In the anxiety to please one's clients, and to increase one's business, we are apt to let some things slide, and to do things absolutely against the laws we frame for ourselves and are so determined to renounce. Here it is that little matters crop up which are as disappointing to the craftsman as to the architect.

It is sometimes a matter of extreme delicacy, I know, but perhaps not beyond remedy and further resolve. Personally, I have little cause for complaint, and yet I know the evil exists. The relationship between architect and craftsman, one might say, is a matter of influence and sympathy? Not altogether so. It is gradually becoming so, and, I believe, will ultimately be so; but there are serious drawbacks, where able men are denied opportunities of doing good individual work. I know many such instances. For example, we hear of men deserting "office architecture" for some craft or another, for the good of architects generally and of the building world. Men who are architects, and who have practised long enough to feel the disappointment of the results of designing on paper only, and the seeming impossibility of extracting refined work from the ordinary British workman, until such times may come that the designer and the operator converge and work together. Men who have strong convictions, which most of us acknowledge to be at least sincere, and which decides them on abandoning the one system for the purpose of carrying into practice these convictions, and yet they are often asked by sympathetic men to do the very thing which, as architects, they have purposely turned their backs upon, and as craftsmen they have resolved to strive against. It is sad, but it is true! Time alone will possibly alter this. It is, I take it, due in a great measure to the unequal fermentation in the evolution of Art matters. It is even necessary in many cases, one would say. I believe it to be so. There cannot be cause without effect; but sometimes it has a detrimental effect—an effect which *stifles* the best intentions of a good workman, extinguishing rather than invigorating. If he is healthy, and strong enough to refuse and withstand this negative influence, all well and good; but there *are* men of delicately-strung fibre who are unable to withstand it, and sink into oblivion through this influence. Their hearts are crushed out of them.

Another controlling influence is the matter of price. I say little against it, as I believe it has its good influence in restraint, as also its evil influence in other ways. But it is worthy of consideration, if not of discussion. I know, as an architect, the various causes from which it arises, and how in many cases it might be avoided. Sometimes it arises from the haphazard assessment of prime costs on the part of the architect; sometimes from the unsympathetic, cut-and-dried system of the quantity surveyor, often from necessary economy; sometimes, I believe, from a desire to get the utmost possible for the client; at other times from an incomplete knowledge of *actual working cost* of things; sometimes by the unreasonable idea that good work can be done at the price of inferior. A very great deal of disappointment to architect, client, and craftsman might, I think, be averted by a little consultation and consideration of the matter before the issue of bills of quantities.

I think it would also be a great help to all parties, and save endless waste of time and energy, if a maximum sum could be named where it is difficult to provide more than very modest means for possible decorative purposes. I speak generally.

With a craft such as I have elected to follow there are numerous ways of doing simple work in a quite nice manner with ordinary materials and methods, properly handled, which it would be impossible to indicate on a drawing. You understand me? Matters, merely of texture and handling, only to be realised by a man knowing his material, as an artist knows his paper and colours, and what can be done with them.

The architect with much work has not the time, if he would, to acquire *all* the technical qualities of materials as they present themselves by accident and experience to a craftsman on the look-out, nor has he the same opportunities of rightly knowing the actual working cost of different methods as he who is conversant with them by finger-touch and constant association.

In conclusion, allow me a few words concerning the actual cost of craftwork and architects' estimates, and prime-cost allowances.

I am well aware of the monetary difficulties we, as a rule, have to face in planning-out of new building schemes, and I know, too well, how they often have to be reduced.

We sometimes have to cut the coat according to the cloth; but there is one habit some men have, whilst desiring to encourage sympathetic work, which habit seems generally inconsistent—I refer to the matter of under-esitmating prime-cost amounts provided for this, that, and the other, including decorative work, of imagining that respectable craft work can be had at the price of "inferior"—that good work and bad pay are synonymous.

The under-estimating of prime-cost amounts must mean one of three things—that either one's client must be asked to spend more than he at first bargained for; or that the scheme must be reduced; or that the craftsman has to do the work at a personal sacrifice, or at so low a cost as to barely get-home over the transaction. Again one hears the argument that a certain kind of work will not bear more than a certain cost. This is, I believe, an argument based on inexperience, or ignorance of process, and of circumstances controlling it.

It is curious that this argument is never applied to the cost of the fabric, or shell of a building, but only to various kinds of craftwork where modest skill is concerned. It should, at least, bear its own working cost, and a living profit in addition, otherwise where is the inducement for the good workman or craftsman to excel in his calling. And yet, this method of judgment is frequently brought to bear by men who swear by all that is good and true.

To compare the relative cost of the two kinds of work is most difficult. Take, for instance, an ordinary enriched plaster cornice. This moulding can be "run" in the usual way by the non-union plasterer; the enrichment can be bought from the Italian plaster-worker and stuck up in the ordinary way. In this way no skilled labour is required in the fixing of the work. The modelling can be turned out by any stone carver modeller who knows little of his craft, accustomed to work at starvation wages, and is ignorant of even the right method of handling clay; the casting is done by Italian *boys*, who work for a mere pittance, and when finished the cornice, to the casual observer, looks what is called "handsome" by some persons and passes muster with the crowd, and then people say, why is your work more expensive?

But to put this work by the side of a cornice in which the enrichment is modelled by a man who regards his craft as something *more* than a means to supply himself and family with bread and cheese—the casting and fixing done by skilled workmen earning the wage he is worth—is a most unfair proceeding, and, if persisted in, means crushing the heart out of good work and workmen, to the advantage of the inferior in both.

Architects who are accustomed to—and only accustomed to—the every day cut-and-dried stuff, can only estimate for the work they want done by the average cost of the material they have been in the habit of using, and many find a difficulty in estimating for anything different. They will certainly find themselves very much "at sea" if they persist in prime-costing superior work at the same rate they have been in the habit of allowing for inferior work so much in vogue. This fact seems to be somewhat incomprehensible to many architects who would quickly grasp the fact that good workmanship is worth more than inferior in anything apart from their own "profession."

This system is not likely to encourage "sympathetic" work, and must sooner or later stifle any attempt to elevate craft-workers, no matter what the medium, from unthinking mechanical drudges into intelligent, capable craftsmen, and in the end, men who know better, and desire better, will be compelled to revert to old trade methods and systems which are so offensive to their æsthetic susceptibilities.

Boiled down, this all means that the architect must educate, educate, educate his clients, and furthermore must insist upon his own views

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being carried, even when opposed to those of his client, or otherwise it means grind, grind, grind on every hand as a matter of principle.

The Chairman said he would at that late hour venture to call on Mr. E. Guy Dawber to propose and Mr. J. D. Crace to second a vote of thanks to the lecturer. Mr. Dawber had known the lecturer for a long time, and Mr. Crace was shortly to read a paper before the Royal Institute of British Architects on a similar subject.

Mr. Guy Dawber said it was a privilege to be called on to move a vote of thanks to Mr. Bankart for his interesting paper. The subject was so large and interesting that at least two evenings should have been devoted to it, and it was regrettable that a beautiful set of lantern slides had to be hurried over—the most beautiful set of slides on the subject that he had ever seen in that room. He was sorry that Mr. Bankart had not shown some of his own work, for it ranked with the majority of the specimens of old work they had seen that evening. Perhaps the most interesting slides they had seen were those dealing with outside work on buildings at Wivenhoe and Bideford, and it seemed to him that nowadays, when there was such a great revival in the country of houses finished in plaster, that the treatment was not only legitimate, but very beautiful. It might be done on the outside of stucco houses—rough cast or cement—at a comparatively small cost, and with very beautiful results. He would go so far as to say that plaster work outside houses might be introduced into towns and cities. It was only in the last hundred years that the art of plastering had become degraded to its present level—so much so, that when they mentioned plaster and stucco to people they were met with contempt. In Austria there were towns in which all the houses were done in painted and coloured plaster, and the effect was most charming. The difference between that work and our work of the last hundred years was that in Austria plaster had been treated as a plastic material, whereas we endeavoured to treat it to look like stone, which rightly enough brought it into contempt with both architects and the public. If they treated the front of a building in plaster—keeping it flat and refined—the whole thing treated as plaster, then it was a perfectly legitimate material to use. In London, where the question of painting every two or three years was not a serious difficulty, plaster treatment might properly be adopted more than it had been in the past. The paper had covered a wide field, and there were many interesting matters referred to which one would like to touch on if there were more time. Architects were only too anxious to produce the beautiful work which had been shown, but it must be remembered that it was all traditional work and that tradition was now dead, and to try and instil into the British workman the feeling and refinement which were so noticeable in some of the examples shown, was impossible. It could not be got nowadays, and if they suggested it, the workmen seemed to think that they wished the work to be done slovenly and roughly, and, in despair, the architect generally had to let them do it their own way, with the usual cast-iron finish. What they could do was to finish the plaster with a wooden hand-float, which gave a rough texture to work upon when they distempered. As to the question of architect *v.* craftsman, in theory he sympathised with Mr. Bankart, but in practice he did not think that what he had said was practicable at all. Mr. Bankart was a brilliant exponent in two of the crafts—in plaster and leadwork—but he could not have time to take up any other craft. Which craft should an architect take up if he was to become a craftsman and give up "paper architecture," as Mr. Bankart called it? In the case of any building of any size there must be one master mind—one man to design and direct the whole thing—and how could they do that if they were concentrating their efforts on hammering out wrought-iron hinges, for instance, or dealing with some small piece of decoration? It was quite impossible. Our greatest architect of all—Sir Christopher Wren—was not, so far as he had been able to discover, an actual craftsman himself; but what Wren did was what some architects of the present day were doing. He gathered round him a body of craftsmen who carried out his ideas. Wren formed a school which interpreted his wishes and designs, and produced the beautiful work which we knew. This was what should be done now, but to instil into the minds of young architects that they should be craftsmen was wrong. Architects should mix with fellow-workers in the crafts and allied arts, and study their methods and ways, and that would advance the whole profession more than by acting on the idea that to become an architect a man must necessarily work in the material he was designing and specifying. There were brilliant architects who knew as much about the limitations and capabilities of the materials they were designing and working in as any craftsman, but they could not do the work themselves with their own hands.

Mr. J. D. Crace, in seconding the vote of thanks, referred to the wonderful collection of slides they had seen. As a collection, these slides were quite remarkable, and he had no idea that there was such a careful series of photographs of plaster work. As to the long preparation of the lime for the stucco work, that was undoubtedly very important, and it seemed to have been recognised as important from very early times, for Pliny wrote:—"The older the mortar is the better it is in quality. In the ancient laws for the regulation of buildings" (so they had Metropolitan Building Acts in Rome even then) "no contractor was to use mortar less than three months old; hence it is that no cracks have disfigured the plaster of their walls. These stuccos will never present a sufficiently bright surface unless there have been three layers of sanded mortar and two of marbled mortar upon that. . . . . In Greece it is the practice first to pound the lime and sand used for plastering with wooden pestles in a large trough." In the remarks made by Mr. Bankart about finishing the stucco in the rough there were two or three points which seemed to have been left out of account. It was all very well so to finish off a ceiling or ornamentation which they never expected to paint or carry further, but to leave the sanded surface without a finish when intended for painted decoration would be a great mistake. Mr. Bankart alluded to what had been evident to everyone who had examined them—*i.e.*, the extreme fineness of the old Greek stucco which was decorated, and also the stucco used on the Egyptian monuments, which was as fine as anything done in our days. It was finished off with the greatest care, and almost to a polish. Mr. Bankart alluded to some of the Roman work being finished so finely that it could almost be used as a mirror. Lime and sand work, of course, was only suitable in a country house where people were content to have their work finished in a more or less slight way. No doubt texture was a valuable quality. Among examples of English work, it was perhaps well to mention that there were extremely good examples of fruit and flower treatment which prevailed in the seventeenth century, and of which there were fine examples at Euston Hall, Barrington Court, and elsewhere. A great deal of the work done in the first half of the eighteenth century still existed in London, and there were very complete examples of it at Mereworth Castle, in Kent, which was not a castle but an imitation of the Villa Capra at Vicenza.

The Chairman said he would not detain the meeting except to say that Mr. Hare regretted his inability to be present, and to suggest that Mr. Wonnacott be included in the vote of thanks for working the lantern. The Chairman was entitled to a few minutes in which to sum up, but on this occasion he thought they would prefer to have some more of Mr. Bankart's slides instead.

Other slides having been shown, and the vote of thanks having been heartily agreed to,

Mr. Bankart, in reply to Mr. Dawber, said that he did not advocate a "*revival*" of traditional work as practised in the past, but he thought that we, at the present time, might steer a middle course, might give more value to the materials of the present age by teaching and restraining the men who worked them up into an unnatural state, and by the personal handling of one craft or another setting a better example ourselves by being able to think *in material*. It was not a question of reviving and going back to past traditions, but of forming new traditions, resuscitating new life, and stifling out some of the superficiality born of office routine. In answer to Mr. Crace, he (Mr. Bankart) maintained that the *fineness* of stucco was its beauty, just as the granular nature of our modern grit plaster was *its* beauty. The two materials were entirely different and could not be compared. He did not see why we should spoil the beauty of the one in trying to approach that of the other. Each had its own particular beauty and merits. [Mr. Crace: "Up to the point where it has to be treated afterwards."] Quite so; the *stucco* was used very extensively for colouring upon, but he did not suppose the modern plaster would or could be used for colouring upon in the same way. Stucco was undoubtedly coloured in "tempera," and he would plead for a revival of both media where good and permanent work was required.

The Chairman announced that the next meeting will be held on January 8, when Mr. Hugh Stannus will lecture on "Egyptian Architecture," illustrated by lantern slides.

The meeting then terminated.

LONDON TOPOGRAPHICAL SOCIETY.

Mr. Laurence Gomme, F.S.A., presided on Wednesday, last week, at the Rooms of the Society of Antiquaries, Burlington House, over the fifth annual meeting of this Society.

The fifth annual Report stated that the steady growth of the Society previously reported had received some acceleration during the past year, which the Council attributes chiefly to the stimulus given by the Earl of Rosebery in his Presidential address at the last annual meeting. Since that date twenty-eight new members had joined the Society, and the total membership is now 156. There were now forty-four public libraries and societies belonging to the Society, including seven American institutions and one Colonial. Reference was made to the publication by the Council of Kips View of St. James's Park, and of the completion of the Kensington turnpike plan. The Council entertained the opinion that in the reproduction of maps, and plans, and views of London, and of pictures of streets and houses, there is work for the Society for many years to come.

On the motion of Mr. H. B. Wheatley, seconded by Lord Belhaven and Stanton, the Report was adopted.

Various suggested alterations in the rules were explained by Mr. T. Fairman Ordish, F.S.A., and the revised rules were adopted on his motion, seconded by Mr. Norman.

The new officers were elected, Lord Rosebery being re-elected President, and Mr. G. Laurence Gomme and Lord Belhaven being added to the list of vice-presidents. The new members of the Council elected were Messrs. T. Blashill, J. P. Emslie, J. G. Head, and A. M. Torrance.

Mr. T. Blashill moved a vote of thanks to the retiring Council and officers for their services in the past year, and urged that Borough Councils should be asked to assist the Society by registering anything of antiquity.

Mr. J. P. Emslie seconded the motion, which was carried.

The Chairman, in the course of his Presidential address, said he predicted for the Society's continued success, for their work was so good and their object so great. Their object was no less than to depict the progress of London from a community occupying one square mile to a community occupying 120 square miles. Not only this, but the community which had grown was an historic community second to none in the world, for it represented the capital of this great Empire. Historical personages had trod over almost all its pavements for almost all times in British history—the Roman governor, the Saxon prince, the Norman Duke: statesmen, soldiers, poets, historians, and all types of English genius. Every day we came across new facts which illustrate how English men of genius have either lived or died in this great London of ours. There was scarcely a spot which had not become sacred by great human associations. Unfortunately, Londoners, as a rule, took little heed of all this. They pulled houses down as readily as they pulled down trees, and erected barracks and hovels in preference to architecturally beautiful buildings. But in spite of it all we could not destroy the beauty of London, for it is a beautiful city. Quite recently he had had illustrations of this fact from three or four different parts of London. A few months ago it was his privilege to stand in the drawing-room of Marlborough House, and he looked out on the Mall, which was one of the most historical parts of London, and one might have been miles away in the country, and in a supremely beautiful country. A few weeks ago he stood in the library where Lord Macaulay finished his great work, and looked over that garden of which Lord

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Macaulay had left his own record, and he felt that they were in a supremely beautiful city. And then again, in a much more humble way, the beauty of London came home to him when in the London County Council a few weeks ago they were discussing as to whether the licence of a cow-house should be granted in Poplar, and the member for Poplar asked if the members had ever been to see this much-debated cow-house. It was an old cow-house at the back of High-street, Poplar, where the houses, so far as the backs were concerned, were still country houses. A few years ago business took him to Robin Hood-lane, Poplar, and he passed from the front of the houses to the back, and to his extreme surprise he came to beautiful gardens—real country scenes at the back of the rather disagreeable views of the front streets. Naturally one asked why this should be so, and fortunately in the unnoticed items of London history one was able to discover why it was that the backs of London houses are still often beautiful, while the fronts could not always be so described. He found an Act passed in 1771, which recited that certain streets in the parish of Aldgate were greatly obstructed by posts, projections, and other nuisances, and it was enacted that in future all houses to be built or refronted, should rise perpendicular from the foundation, or otherwise it should be in the power of the Commissioners to remove such building. This rebuilding and refronting of old houses had gone on to an enormous extent, and was the reason why there were such uninteresting fronts, behind which were often extremely beautiful backs. This instance of local Acts dealing with architecture in the way he had described could be multiplied in almost every parish in London, and the extraordinary way in which our ancestors prevented nuisances by destroying the beautiful, was an example they might well take to heart, lest in another direction they might sin somewhat on the same lines. London was changing in other directions. It was changing in consequence of individual enterprise; for instance, there was the erection of the Hotel Russell, which had destroyed Russell-square, and they had the threatened destruction of Edwardes-square, Kensington. By public enterprise there were also considerable changes, as, for instance, the National Memorial to Queen Victoria in St. James's Park. Personally, he regretted that that very beautiful retreat would become more public, for he loved to think that sometimes one could walk underneath the trees where Charles I. walked on his way to his execution, and where great men had passed, and great events had happened. Then there was the Holborn to Strand improvement, and he might be permitted to allude to the interest which the public had taken in this particular improvement in seeing that it was worthy of this great London. Quite recently a distinguished body of experts, the Royal Institute of British Architects, urged the L.C.C. to make an alteration in the line of frontage on the northern side of the Strand. The Council could not see their way to do it, and he would like to urge that apart from the question of expense there was a great deal of wisdom in the decision. If they walked from east to west, the plea was that a fine view of the Law Courts could be obtained. Well, he felt that a finer view of the Law Courts was not altogether a desirable thing, and after all was said and done, the Law Courts was a mere imitation of ancient architecture without the glories of ancient architecture. But it was to be remembered that there were two beautiful churches which were built for narrow thoroughfares, and in walking from east to west they came gradually to these two churches, and he believed every one would agree that the decision of the Council was a wise one, not only on the score of expense, but on account of the beauty of the new improvement. Mr. Gomme proceeded to deal with the streets which had been swept away by the new thoroughfare, and said that Wych-street, particularly, was historically extremely interesting. The earliest documents alluded to a place called Aldwych, which had a wide street, practically occupying the site of the present Drury-lane. The district had its own church, its stocks, and its pound; and what did that indicate? It indicated that there was a Danish settlement just outside the walls of London, which had everything complete for self-government. This view was confirmed when they came down a little later in history, because they found that in the reign of Edward I. there was a court of justice held in the Strand at a huge monolith, which stood immediately opposite the site of Somerset House. The court was held in the open air, and the only possible explanation of such an extraordinary thing was that it was carried on traditionally from a preceding state of things, and they found that this open-air court of justice existed in the Danish settlements of Dublin and Rochester. He was glad to say the name of Aldwych would be preserved, and, further, in the name of Kingsway they would record that great king in English history—Alfred. As the result of the creation of the Borough Councils, also, topographical changes had been brought about. They had lost the name of St. Olave, but had had restored to them the name of Stepney. Many interesting topographical points came out in the arrangement of the new boroughs, and one point was the peculiar position which the Tower of London occupied in London topography. How was it that the City of London had two remarkable features which were not repeated in any other city in Britain or in Europe that he had heard of? The Government of the City was at Westminster, and its chief place of defence was outside the City. He would not go into the history of the reason for the Government being at Westminster, but the question of the tower being outside the City was very interesting. The City was never conquered by William the Conqueror, but by negotiations he became possessed of it, and his first business was to erect a defensive position on the Essex side, which was finished, by the beautiful keep they now knew as the White Tower. The other parts of the Tower were subsequently added. The Tower was the seat of the King's Justice, but old chronicles showed that the citizens were always fighting against any encroachments on them, and one could not help thinking that instead of the Tower being a place of defence for the citizens, it was really a Norman stronghold to overawe them. He made notice of these few points because they were not noticed in any history of London that he had seen, and it was most interesting that in pursuit of topographical knowledge, as apart from the general history of London, they were able to get points like these.

On the motion of Mr. Hilton Price, seconded by Mr. J. G. Head, a vote of thanks was passed to Mr. Gomme for his services to the Society.

INSTITUTE OF SANITARY ENGINEERS, LIMITED:

ANNUAL DINNER.

THE annual dinner of the Institute of Sanitary Engineers, Limited, was held on Wednesday last week at the Holborn Restaurant, W.C., Mr. W. J. Dibdin, F.I.C., President, in the chair. There were also present Dr. J. C. Thresh, M.O.H., Dr. W. R. Smith, Colonel Dixon, Messrs. G. Reviers, B. R. Tucker, W. H. Maxwell, Horace Davies, L. A. Dibdin, and A. E. Ashby, secretary.

The toast of "The King" having been honoured,

Mr. Horace Davies proposed the toast of "The Institute." As one of the legal representatives of the Institute, he wished their society long life and prosperity. Their secretary had in two or three words expressed the objects of the Institute, *i.e.*, "To raise the status of sanitary engineers." That was undoubtedly a worthy object, and one which everyone must wish them success in the accomplishment. It was the wish of a number of members of the Institute that they should start a journal in order to record the doings of the Institute, and he thought that was an admirable proposal. In that way the doings of the Institute in its infancy would be put on record, to the advantage of future sanitary engineers. Another matter he would refer to was the institution of local centres, which he felt sure would be productive of great good in the sanitary engineering world. Another matter of interest was the series of Saturday afternoon visits, which would be of great good to the Institute. He believed that the day was not far distant when the certificate of the Institute of Sanitary Engineers would be recognised as a guarantee of the efficiency of the holder. With the toast he coupled the names of the President and Colonel Dixon.

The President, in replying, referred to the fact that that afternoon Mr. W. H. Maxwell had been elected as President for the ensuing year. As to the past year, he might give a few facts in regard to the Institute. It was formed in 1895 with a membership of 100 members, but that number had steadily increased, until at the present time the Institute numbered 504. There were 266 Fellows, 19 members, and 218 Associates, and 3 student members. During the present year 7 Fellows, 36 Associates, and 2 student members had been elected, and from this it would be seen that the Institute was a progressive body. The objects of the Institute were to provide an organisation for sanitary engineers, with the view of promoting the interests of the profession and to elevate its status. With this view, examinations were held and certificates issued on their results. It was originally felt that such an institution as that of the Institute of Sanitary Engineers would reach members of the sanitary world who were not in touch with existing institutions, as it was felt that whilst theoretical considerations were already fully provided for, there was room for an association dealing more closely with practical workers. That this had been found to be the case was fully evidenced by the remarkable advance in the number of members who had qualified themselves for admission into the Institute in the short period of eight years. No doubt that as the essentially practical objects of the Institute were better known amongst those who had the direction of sanitary work—especially borough engineers and town surveyors—a large increase of membership would be recruited from their ranks, as they would thereby be brought into closer touch with those who had the more immediate control of much of the sanitary work of the country. The work of the past year might be looked upon with satisfaction by the Council. Two examinations had been held in London and one in Manchester. At the London examination twenty-one candidates presented themselves: in Manchester, the first of the provincial examinations held as an experiment, five candidates. Of these, fourteen satisfactorily complied with the requirements of the examiners, and were consequently admitted as Associates. Next year it is proposed to hold an examination in Liverpool. During the past year twenty lectures had been given to students by men eminent in their respective professions, the subjects embracing mechanical physics, building construction, sewerage, water supply, ventilation, lighting, and sanitary law. The number of students attending these lectures was thirty, who had shown great assiduity and attention. During the past year an organising committee had been formed for the purpose of obtaining increased membership, organising summer meetings and exhibitions, promoting popular lectures in London and the provinces, conducting examinations, the institution of students' classes and lectures, obtaining papers for sessional meetings, arranging visits to works, etc. One of the most useful features of the work of the Institute had been the arranging of Saturday afternoon visits of members and students to various places of interest where sanitation can be studied under practical conditions. Among the most successful of these trips might be mentioned that to the new Naval Hospital at Chatham, to the Metropolitan outfall works at Barking Creek, to Ealing Sewage Works, and to the Houses of Parliament to inspect the sanitary and ventilation arrangements and appliances. It was clear that such work as this could not be without valuable results on the education of the rising generation of sanitary engineers. One of the features of the year's work was the annual summer meeting, held at Wolverhampton in July last, when meetings were held on three successive days in the Council-chamber of the Town Hall. It was evident that the Institute was filling a useful place in the work of the day, and that with such results to point to the Council and members had every reason to feel satisfied that their efforts to promote the best interests of practical sanitation were not misplaced, and that there was every reason to look forward to a bright and prosperous career in the future without trenching on the special functions of older institutions. The Institute had had difficulties to contend with, but the way was now clear. He thoroughly agreed that in the future the certificate of the Institute would have something more than an academic value.

Col. Dixon also replied. As Chairman of the Council he had had an opportunity of watching the work of the various members of Council, and he knew with how much energy they worked. The Institute was a live Institute, and it had overcome the difficulties which in early days beset it. In Mr. Ashby they had an excellent secretary, and he was glad that

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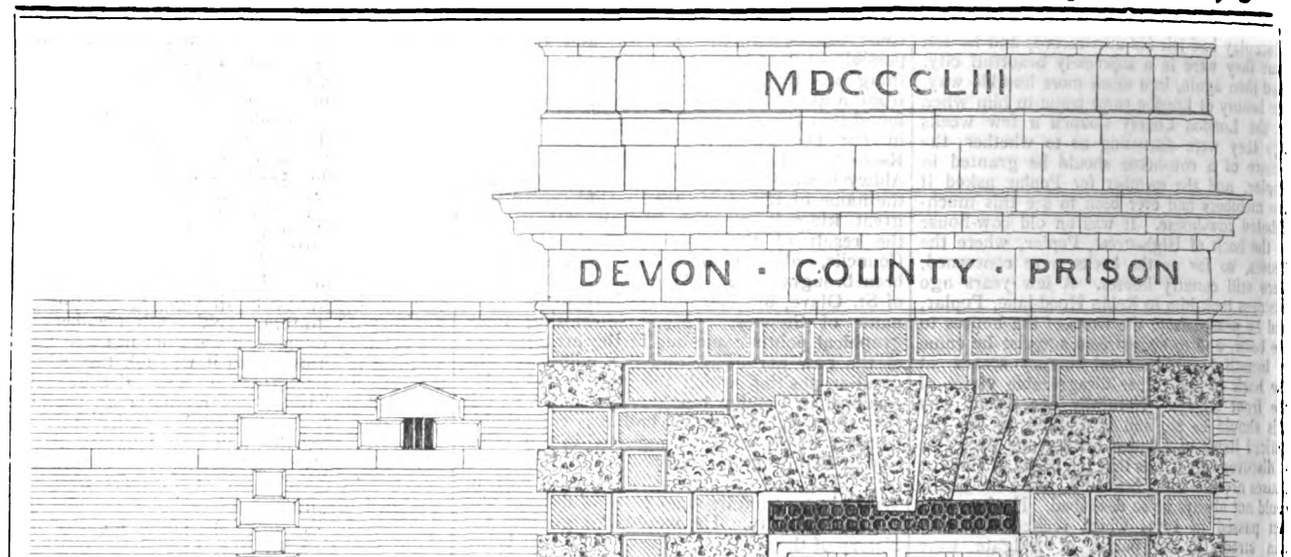

several young men were coming on the Council, though they must not forget others, like Messrs. Wells, Dove, and Farley, who had worked so well for the Institute. As to the provincial centres, that had been a matter of great concern with the Council. As had been said, one centre had been started at Manchester, and they were now engaged in making arrangements to start one in Exeter early next year. They would like to see another centre started in the South or South-East of England, for there was room for one there. He was quite sure that the work of these provincial districts would help the Institute more than its work in London. He would like to impress on the members the importance of having their own journal, for he thought that they had a sufficient number of practical engineer members who were competent to give most useful information to others, and he hoped that it would be possible to start a journal. He desired to refer to Mr. Hoskins, the honorary Treasurer, to whom they were greatly indebted. That gentleman was also editor of their literature and Chairman of the Organising Committee—a committee which was doing a great deal of very useful work.

The toast of "The Imperial Forces" having been honoured (proposed by Mr. A. F. May, and acknowledged by Brig. Surg. Lieut-Col. W. R. Smith, V.D.),

The Chairman suitably proposed "The President-elect, Mr. Maxwell," who appropriately responded.

Other toasts were "The Visitors" and "The Press."

ARCHÆOLOGICAL SOCIETIES.

British Archæological Association.—The second meeting of the Session was held at 32, Sackville-street, on the 16th inst., Dr. W. de Gray Birch, F.S.A., in the chair. Mrs. Collier exhibited a portfolio of plates, reproductions of rubbings taken from the very curious-figured rocks in the valley of Fortanabla by Mr. H. C. Bricknell, of Bordighera. The historian Geoffredo, about 1650, wrote of these figured rocks in his history of the Maritime Alps, reprinted at Turin in 1824. The rocks are of various colours, engraved with a thousand figures of quadrupeds, birds, fish, mechanical, rural, and military implements, shields, etc. Mr. Bricknell's investigations have been recorded by the Ligurian Society of Natural Science at Genoa. Mr. Gato Worsfold exhibited several specimens of ancient ironwork discovered in various parts of London, one being an iron tally with the numerals 3½ upon it, from the site of the old Bear Pit, in Southwark, another being the top of a halberd or spear, dug up in Whitechapel. He also exhibited as a caution one of the many forgeries of "Billy and Charlie," in the shape of a medal, which was found when excavating at Charing Cross Station in 1860. Miss Bentley exhibited a tray full of tokens of various dates—one of Van Dieman's Land. Mr. Compton read a paper on "Treasure Trove," as affected by the recent decision of Mr. Justice Farwell in the case of The Attorney-General *v.* The British Museum"—the gold articles discovered by a ploughman 1½ in. beneath the surface, on the shores of Lough Foyle, in 1898. After changing hands on two separate occasions, they were ultimately purchased by the Trustees of the British Museum, who entirely overlooked the rights which the Crown might assert, and which were asserted in the above proceedings. The defendants pleaded that by the Charters of James I. and Charles II., for the settlement of Ulster, after the Rebellion, the land on which the articles were found, and all liberties and privileges, including treasure trove, became vested in the Fishmongers' Company of London, and that the Crown had in consequence parted with their right, if any, and they produced evidence of experts in support of a theory that these articles were a votive offering to a river god. The judge decided that the circumstances under which the articles were discovered showed that they were treasure trove, and that they did not pass to the Fishmongers' Company, not being expressly named as such in the Charters. He also decided that there was no evidence to show that votive offerings of the sort suggested were ever made in Ireland, and that it was by no means certain that there was any Irish sea god at all, or any Irish sea kings or chiefs who made offerings to a sea god if any such god there were. He therefore gave judgment for the Crown. This decision left the question whether, in any event, votive offerings could be within the law of treasure trove, a subject worthy of being dealt with on a future occasion. Mr. Worsfold, Mr. Goddard, Mr. Hughes, and the Chairman took part in the discussion which followed.

BOOKS RECEIVED.

Beams: Standard Sections, issued by the Engineering Standards Committee. (Crosby Lockwood and Son. 1s.)

ENTRANCE TO DEVON COUNTY PRISON.

This grim and powerful piece of masonry design, which rather recalls the character of old Newgate, is the entrance to the Devon County Prison, placed between the higher blocks of the prison buildings on each side. It was the design of the late Mr. John Hayward, a nephew and pupil of Sir Charles Barry.

The illustration is from a measured drawing by Mr. C. J. Tait.

THE CHAPEL OF THE PYX, WESTMINSTER ABBEY.

In March, 1901, the custody of the Chapel of the Pyx was transferred by the President of the Board of Trade to H.M.'s Office of Works. The Office of Works, who are custodians, also, of the adjoining Chapter House, will make arrangements for artificially lighting the vault and opening it to the public. The chapel, which is entered through two strong doors from the east cloister, and is made fast with seven locks, lies between the vestibule of the Chapter House and the cellars underneath what had been the monks' dormitory and is now the big schoolroom of Westminster School. Its two bays, forming a portion of Edward the Confessor's buildings, are divided at their middle point by a detached and short cylindrical column which supports the vaulting. The masonry shows the wide joints and traces of the use of the hand-axe frequently recognised in contemporary work. Upon the column are vestiges of a wall, or partition, which was subsequently placed against it, and on that side of it the capital has been rounded off and partly carved with inclined grooves or flutings; on the other side the capital shows no carving, but its angles have been roughly canted off. Beneath the heavily-barred window in the east wall of the bay into which one descends by the steps, is a plain and well-preserved stone altar; in the middle of the table is cut out a large circular depression. The altar—which a tradition claims as the tomb of Hugolin, chamberlain and treasurer of the Confessor—stands in a squared recess, at the corner of, which is a detached piscina in the shape of a column, and seemingly of thirteenth century workmanship. That portion of the ancient Abbey was used as the store-house of the Royal Treasury and formed the scene in May, 1303, of the robbery by Richard de Podelicote, William the keeper of the Palace, and the sacrist, of a vast hoard of money,

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plate, and jewels which Edward I. had laid by for prosecuting his wars against the Scots. Soon after the robbery an alteration was made, for better security's sake, in the treasure house, by walling off the passage of entry on the north side, and so reducing the extent of the old treasure house to that of the later pyx-chamber.

In our own time the chapel has served as the jealously-guarded depository of a chest containing the standard pieces and plates used for the periodical "trial of the pyx"—the "pyx" being the box wherein the coins to be assayed are kept at the Mint. When we visited the chapel a few years ago we saw there a large collection of tally-sticks, with several curious old chests, in which some muniments and public records had been kept until the breaking out, in 1731, of a fire in the cloister.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

THE eighth annual meeting of the British Association of Waterworks Engineers was held at the Geological Society's Rooms, Burlington House, W., on Saturday, December 12. Mr. J. E. Swindlehurst, C.E., of Bolton, President, occupied the chair, and there were present Professor H. Robinson, Westminster; Baldwin Latham, Westminster; F. J. Bancroft, Hull; Humphreys, York; P. H. Palmer, Hastings; Percy Griffith, Secretary, and others.

At the outset, Mr. Percy Griffith, Secretary, presented a Report on the recent conference held by the Worshipful Company of Plumbers at the Guildhall, and it was announced that the Council had appointed Mr. P. H. Palmer, Hastings, and Mr. Percy Griffith, Secretary, as representatives of the Association which had been appointed.

Storage of Flood Water.

Professor Henry Robinson, M.Inst.C.E., read a paper on the storage of flood water. The year 1903, he said, would be long remembered for its excessive rainfall, and the consideration of the oft-discussed subject of the storage of flood water might, therefore, be regarded as an appropriate one to again bring before this Association. He was indebted to the Astronomer Royal for the following records of the rainfall at the Greenwich Observatory:—

Monthly Rainfalls for 1903 (January to October).

	Rainfall. In.	Average for 50 Years (1841-1890). In.	Departure from Average. In.	Number of Rainy Days.
January	2·13	1·99	+0·14	18
February ..	1·37	1·48	−0·11	10
March	2·20	1·46	+0·74	18
April	1·85	1·66	+0·19	11
May.....	1·95	2·00	−0·05	15
June	6·07	2·02	+0·05	10
July	5·27	2·47	+2·80	13
August	4·82	2·34	+2·47	17
September ..	2·24	2·25	−0·01	15
October	4·44	2·81	+1·63	24
Total to end of October	32·34	20·49	+11·85	151

From the table it would be seen that there were three months with over 5 in. of rainfall, whereas since 1858 there had been no two consecutive months with over 5 in. Seven days in the year at present had exceeded 1 in., and two others had exceeded .90 in. In 1878 (which was the wettest year) there were five days exceeding 1 in. The average rainfall for the forty-five years ending in 1902 (as given in "British Rainfall") was 24.99, so that this year was already 9.96 in. above the average.

The proper utilisation of the rainfall of this country was one of national concern, and deserved and demanded a more comprehensive treatment than it had hitherto received, although the necessity for such treatment had long been recognised.

The President of the Surveyors' Institution, in his address last month, pointed out that, whereas in 1870 the urban population was 15,097,000 and the rural 15,787,000, the urban population in 1900 had increased to 29,559,000, but the rural had decreased to 11,898,000. As the water to supply this increasing urban population was derived from rain falling on an area which remained constant, there was need for grave consideration as to how the future was to be met.

The subject was considered at a conference at the Society of Arts in the year 1878, and it was hoped that some action on the part of the Government would have followed. It was then suggested, as it had often been since, that the existing unsatisfactory boundaries of districts admitted of modification with a view to making watersheds the natural boundaries. The same view was expressed at the conference which he presided over in London in 1900 on water supply and river pollution.

Legislation had hitherto been initiated by authorities who aimed solely at providing for the necessities of their own communities, and this had been the basis on which watersheds had been placed under control. Nothing, however, had been attempted to deal with this important matter in a statesmanlike way, with a view to the proper conservation of all available water for the needs of the future.

The monopolisation of large sources of water supply, and the requirements of smaller populations than the sources were capable of serving, resulted in communities being deprived either now, or at no far distant time, of what was necessary for their existence.

That a new Government department should be created to deal with this subject had been urged constantly, and although past experience did not make one too hopeful of seeing this much-needed action taken, yet it behoved them to be insistent as to the necessity of it.

Besides the utilisation of the rainfall for domestic and trade purposes, there were many cases where the flow of water from a high to a lower level admitted of its employment for developing power. But few attempts had as yet been made to effect this for public purposes in this country.

The question of river pollution was a factor to be taken into account, but in legislating to prevent pollution care must be exercised to meet the varying conditions that obtain in different rivers, because considerable elasticity as to standards, etc., was imperative.

It was at one time regarded as an axiom that river water which was once polluted remained polluted, and was incapable of being utilised for the supply of towns. Years ago he combated this view with others who held the opinion that organic matters passing into polluted rivers met with conditions unfavourable to their producing harmful results except for a limited time, and that they disappeared during the flow of the river owing to the oxidisation and the action of aquatic vegetation. Temperature, light, vegetation, the absence of suitable food, and the general environment were unfavourable to the permanent existence of organic impurities and to their propagation.

The passage of water through a large reservoir from the point where it was admitted to where it was withdrawn, was attended with a well-recognised purifying action. It might now be taken as settled that the old restrictions which were placed on storing flood water had been removed, and no longer applied unless the pollution was of an exceptional character.

The exclusion of what were called doubtful streams, and the objections to flood water, caused many sources of supply in the past to be only partly utilised, which, in view of present experience and change of opinion, now admitted of being brought into use. He might give, as an example, the River Thames. He had had to examine the valleys of several of its tributaries with a view to the construction of impounding reservoirs, and could state that flood waters could be conserved at small cost from more than one gathering ground that he had investigated in detail, which would meet the future requirements of the metropolis. At the same time that this could be accomplished the volume flowing in the River Thames in periods of dry weather could be increased, whereby the river would be greatly improved both from a sanitary and a navigable standpoint.

The Secretary then read a communication from Mr. C. H. Priestley, of Cardiff, in which he stated that the rainfall this year on the Cardiff gathering grounds in Breconshire was 109.81in., and had exceeded the average rainfall of the last fifteen years by 40 in. The quantity of water passed over the waste weir from the 4,000 acres of gathering ground at present utilised had exceeded 8,000 million gallons.

Dr. Mill, London, said it was a fact they did not require to forget that water was the largest import into this country. The quantity of water annually imported was two hundred thousand million tons on the average, and that quantity had been increased this year by fully one-half.

Mr. Jones, Leyton, said the water which fell within the area of the Thames Valley gathering ground was more than sufficient to supply any possible needs of the inhabitants of Greater London if the population were doubled. There was no need to go to Wales for peat water to supplement the white water that was available in the Thames Valley.

Mr. Sainty, Windsor, said the storage of flood water would save them a great deal of anxiety in Windsor, and would be a benefit to the country at large.

Mr. Preston, Grantham, thought they might consider whether there were places where some of the flood water might be favourably stored underground.

Mr. Humphreys, York, Mr. Percy Griffiths, Secretary, and the President also took part in the discussion.

Reservoir, Hoylake and West Kirby Waterworks.

Mr. Alfred J. Jenkins, Assoc.M.Inst.C.E., Waterworks Engineer, Jersey, presented a paper on the new reservoir for the Hoylake and West Kirby Waterworks. He said the first service reservoir, having a capacity of 585,000 gallons, had up to the present time sufficed for the Company's requirements, but the recent and prospective growth of the district made it desirable that increased storage should be provided. The Company therefore obtained power to construct an additional reservoir, and he was requested to prepare the necessary working drawings. At that time the greater part of the excavation was done. The work was almost entirely below the original ground level, and in substantial but porous rock, so that the chief consideration in designing the walls was that they should carry the roof and at the same time be capable of holding water under a considerable hydrostatic pressure. There being no reason to anticipate upward thrust, he considered he could not do better than introduce Callender's bitumen sheeting, with thin inside and outside protecting skins of brickwork and concrete respectively.

The adoption of an orthodox type of roof of brick arches supported by brick columns would not only have involved a prohibitive cost, but would have necessitated columns or piers of such dimensions that the effective capacity of the reservoir would have been seriously reduced. The author determined, therefore, to design a light roof of concrete strengthened with expanded steel, supported by steel joists and arched channel ribs, resting upon steel stanchions. The contract for this portion of the work was placed with the New Expanded Metal Company, who guaranteed the strength of the roof.

For the walls and floor, concrete was mixed in the proportion of 6 to 1—the best of the stone obtained in excavation—with shore sand from the Dee estuary and sand obtained by crushing the local stone being used as aggregate.

The minimum thickness of the floor was 12 in., consisting of 8 in. of concrete (6 to 1), carefully screeded to form a level bed for the bitumen sheeting, 3 in. of concrete laid over the sheeting, and the inner face rendered with 1 in. of cement mortar (1½ to 1) trowelled to a perfectly smooth surface. The bases for the columns were 3 ft. 6 in. square, and were of 6 to 1 concrete. These bases were of varying height to allow of the stanchions being of uniform length and yet permit the roof to be sloped from the middle in each direction. The stanchions, girders, and arched channel ribs were of British steel, and after being painted were all completely encased in concrete and cement rendering. The method of enclosing the stanchions was to surround them, after erection, with expanded metal-netting, and to fill in the spaces between the flanges with fine concrete; the whole of the stanchion was then rendered with cement plaster, for which the netting afforded an excellent key. This rendering was put on in two coats, and gave the finished stanchions a very neat appearance. In the cases of the girders and ribs, the lower flanges were covered with netting, and the wood centring for the roof so arranged that the remainder of the girder or rib would be completely encased in concrete. After removal of the centring, the exposed netting was rendered.

The roof itself consisted of one slab of concrete, 5 in. thick, in the underside of which were built sheets of expanded steel of 3 in. mesh, of which the strands had a section of 5-16ths in. by ⅛ in. The roof was divided up into bays, which measured 16 ft. 6 in. by 7 ft. 6 in. from centre to centre of supports; the clear span was slightly under 7 ft., and the slab was calcu-

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lated to support an evenly distributed load of 3 cwt. per foot super, with a factor of safety of 4. Upon the completion of the concrete, the roof was covered with Callender's bitumen and 18 in. of earth.

The outlet from the reservoir was 18 in. diameter, and upon it was fixed a Venturi meter, with a throat ratio of 1 to 12, which would record a minimum flow of 9,000 gallons per hour, and a maximum of 130,000 gallons per hour.

These figures were adopted in order to provide for a greatly increased consumption in the near future, and also to permit of the registration of small flows.

The capacity of the reservoir was 2,530,000 gallons, and the net cost had been 8,950*l.*, exclusive of the mains beyond the valve-chamber, the Venturi meter and house, and the roadway and boundary wall, which had cost 1,150*l.*

The only point of interest raised in the discussion was a complaint by engineers of municipal water undertakings that the Local Government Board generally refuse loans for the armoured steel form of construction for supporting the roofs of reservoirs and similar work.

Cardiff Waterworks Extensions.

Mr. Neil J. Peters, Assoc.M.Inst.C.E., assistant waterworks engineer, Cardiff, read a paper on the Cogan extensions of the Cardiff Corporation Waterworks. He said the Penarth Docks were situated at a level not exceeding 30 ft. above O.D., while Penarth town was at a higher level, reaching a maximum of 235 ft. above O.D. near the parish church. That being much above the top water level of the Cogan reservoir, the Company carried out in the year 1861 a high-level scheme for the supply of the Penarth district by erecting a pumping station adjoining the Cogan reservoir, constructing a high-level reservoir at Llandough, and laying a pumping and gravitation main, 9in. diameter, from the above reservoir to the pumping station, and thence to Penarth.

The following works were proposed: (1) to construct a reservoir of 2,000,000 gallons capacity on a site at a higher elevation than the existing Llandough reservoir; (2) to lay an 18 in. diameter main from the proposed reservoir to the Cogan pumping station; (3) either to increase the pumping plant at Cogan, or lay a gravitation main from the high-level reservoir at Rhubina to the proposed reservoir near Llandough. The cost of the alternative schemes was estimated to be:—Additional pumping plant capable of pumping 600,000 gallons per twenty-four hours (thus duplicating the existing engine power with modern and economical machinery), 2,480*l.*; laying the proposed gravitation main, 18 in. diameter, capable of discharging 1,000,000 gallons in twenty-four hours, 23,572*l.* This gave a difference of 21,092*l.* on the initial cost in favour of the pumping scheme, but it was further necessary to arrive at the annual charge, taking into consideration the repayment of the capital being spread over a number of years, together with interest and working expenses. The Waterworks Committee approved of the recommendations of the engineer, viz., to construct the proposed reservoir at Leckwith, to lay 18 in. gravitation main from the Leckwith and Llandough reservoirs to the Cogan pumping station, and to increase the pumping plant at Cogan.

Mr. F. J. Bancroft, of Hull, was elected President, and it was decided to hold next year's summer meeting at Hull, and to adjourn to Antwerp to accept an invitation from the Antwerp Waterworks Company made to the Association by Mr. Devonshire, Chairman of the Company.

ARCHITECTURAL SOCIETIES.

Leeds Architectural Society.—A general meeting of the Leeds and Yorkshire Architectural Society was held on the 15th inst. at the Society's Rooms, Park-street, Leeds, when Mr. J. B. Mitchell Withers gave a lecture on "Sir Christopher Wren: his Time and his Works." After describing the architectural and social condition of London in the years of Wren's youth, Mr. Withers proceeded to speak of the unique opportunity which the Great Fire of London presented to an architect of genius. In Evelyn's "Diary" we learned that the author submitted a plan for the improvement of London within two days of the extinction of the fire, but Wren had been before him. The scheme met with the King's approval, but, unfortunately, and to the kingdom's loss, it was never adopted. Wren had previously been appointed assistant Royal architect to make good the deficiencies of the King's poetical official, and he then had occasion to report upon the old Cathedral of St. Paul's, which had recently been repaired by Inigo Jones. A renewal of the fury of the flames, brought about by a big gale, resulted in the demolition of the old cathedral, and thus it was that Wren came to have the designing of the new edifice. Mr. Withers then proceeded to tell of how Sir Christopher Wren, in face of much hindrance and opposition on the part of the Commissioners of St. Paul's, succeeded in the erection of a cathedral the pride of all Englishmen, and one of the finest examples of a domed sanctuary in the world. Perhaps the only wise thing the Commissioners did in treating with Wren was when, at the commencement of the undertaking, they told him to submit a design for a cathedral which he thought suitable to the site and worthy of the position, and that they would then have to see about the money. After commenting upon the distinctive style of Wren, as revealed in St. Paul's, and touching upon some of the criticisms passed upon the innovations he introduced into the architectural construction of the building, the lecturer went on to describe the way in which Wren suffered at the hands of the Commissioners. One of Wren's foremost ideas was to leave the view of the High Altar unobstructed from the western end of the Cathedral, but this was prevented from being realised by the building of the organ at the entrance of the choir. It was also his desire to see the interior of the dome decorated with mosaics, and to this end he made elaborate inquiries as to suitable marble and qualified artists and workmen. His labours were, however, set at naught by the Commissioners, who instructed Sir John Thornhill to paint the inside of the dome. A proposal which Wren made, that a low wrought-iron rail should enclose the Cathedral, was also strongly opposed and radically altered by his masters, for the building was given the appearance almost of a birdcage by the erection around it of a high cast-iron rail. Perhaps the greatest annoyance which he suffered, however, was in connexion with the balustrade. The Commissioners suggested that a balustrade would be necessary, but although Wren was sternly opposed to the idea, the balustrate was designed and erected. The numerous other churches and public buildings in London which Sir Christopher Wren designed were also described by the lecturer, who was aided by numerous old engravings, prints, maps, and plans. In conclusion, allusion was made to the way in which Sir Christopher Wren passed away, at the age of ninety-one, after having been deposed from his position as surveyor to George I., and to the deplorable way in which he had been neglected by Court and country. The lecturer was afterwards accorded a hearty vote of thanks, on the motion of Mr. R. P. Oglesby, seconded by Mr. H. S. Chorley, and supported by the President (Mr. Butler Wilson).

Dundee Institute of Architecture.—Mr. W. Fleming Wilkie, of Messrs. Thoms and Wilkie, architects, Dundee, delivered a lecture on the 15th inst. before the Dundee Institute of Architecture on "The Celtic Stones of Scotland." Mr. A. A. Symon, Arbroath, presided. Mr. Wilkie, whose lecture was illustrated by numerous slides and rubbings from actual stones, stated at the outset that he would attempt to demonstrate the existence of a series of art relics, and direct attention to the remains of an early culture, which was even now but little known and less regarded. Proceeding, he described in detail notable sculptured stones discovered at the old church of St. Vigeans, Arbroath, at Aberlemno, Kirriemuir, Glamis, Meigle, Longforgan, Rossie Priory, etc. The ornamentation of these monuments, he showed, was the same in style and character as the ornamentation of the manuscripts, metal work, and leather of the Celtic period. Looking at the various groups, it was to be noted that the area in which the purely Celtic type was to be found was practically restricted to their own immediate neighbourhood—that portion of the Celtic area along the east side of Scotland (Pictland). The most distinctive characteristic of Celtic art was the absence of foliage. The prevailing characteristic was a decoration of panels or spaces separated from each other by borders, and treated as complete surfaces, the ornamentation including interlaced, fret, and spiral work. These the lecturer fully described. Proceeding, he said the best manuscripts were as early in date as the close of the seventh century, and the best stones came close to the eleventh and twelfth centuries. The natural inference, therefore, was that the art was perfected by the scribes before it was adopted generally by the sculptors. The spiral ornament would be looked for in vain in the art relics of any other nation, and it formed the peculiar characteristic of the earlier school of Celtic art. It occurred on the stones with nearly as much frequency as the interlaced patterns. Mr. Wilkie next described the figure subjects which form part of the sculptured decoration of the slabs. These, he said, might be divided into three classes—conventional symbols, ideal representations, and forms having an actual existence. The Celtic stones were crowded with symbols which did not occur in any instance out of Scotland, and must therefore be regarded as of independent origin. Having described the symbols in detail, he said they were plainly products of a highly-conventional phase of art, which followed arbitrary rules unknown to us. While the same symbols continually occurred on different stones, yet on no two stones was the arrangement the same. In spite of their association, and its obvious suggestion that they had a meaning to unfold if they could be made to speak, they were still surrounded with impenetrable mystery. To have produced those intricate and beautiful designs implied a culture of the imagination, a refinement of taste, and a faculty of art composition which were not always found among men who were specially instructed, and which did not exist at all among the masses of the community. No expense was grudged by the authorities nowadays in obtaining sculptured representations of the ancient art of other countries to enrich our museums, while the wealth of unique material which existed in our land and in our immediate neighbourhood was still left scattered, and in many cases unprotected, to decay and perish. The first duty they owed to them was their preservation, as their destruction would mean the disappearance of a series of records which time and the elements had spared, to be deliberately effaced in an age of the highest and most widely diffused culture. Mr. Wilkie was awarded a cordial vote of thanks.—"The Ordnance Survey: Its History, Organisation, and Aims," was the title of a paper read by Mr. Charles Ower.

THE BRIDGE CHAPEL OF ST. MARY, WAKEFIELD.

The vicar of St. Mary's, Wakefield, makes an appeal for funds wherewith to carry out some repairs of the Chauntry Chapel of the bridge which stands, in his parish, on an island in the Calder, and is, we believe, the only remaining chapel of that character which is still used for worship. In 1847-8 the fabric was restored—indeed, practically rebuilt—at an outlay of some 3,000*l.*, by Sir G. G. Scott, who used on the exterior Bath stone for the front, Caen stone for the sculptured figures, and a magnesium limestone from near Milford for the two sides. Those materials have suffered greatly from the impurities of the atmosphere, and a gale blew down two of the buttresses ten years ago. In the interval a reparation of the bell-turret, the two panelled side-parapets, and the leaden roof has been effected. The Chapel of Our Lady was re-built after the Decorated style by Edward IV. in memory of his father Richard, Duke of York, who fell in the battle of Wakefield Green on December 31, 1460. The bridge itself was, *teste* Hall, the scene of the young Earl of Rutland's murder by Lord Clifford. It projects down the stream, and as in the case of the similar structure at Rotherham, its narrow and wedge-shaped base is worked into one of the piers, so as to offer least resistance to the stream; the extra width of 20 ft. for the superstructure being obtained by corbelling out on either side. It measures 41 ft. in length by 17 ft. internally, the chancel is 14 ft. long. At the north-east corner is a winding stair which leads up to the roof and ends in a shapely bell-turret. The stair descends to a small crypt at that end which communicated with the two priests' lodging on the island that was pulled down in 1866. The elaborated front has five ogee-headed divisions separated by buttresses, and contains a middle and two side doorways. The top panels are filled with sculpture representing the Annunciation, the Birth of Jesus, the Resurrection, the

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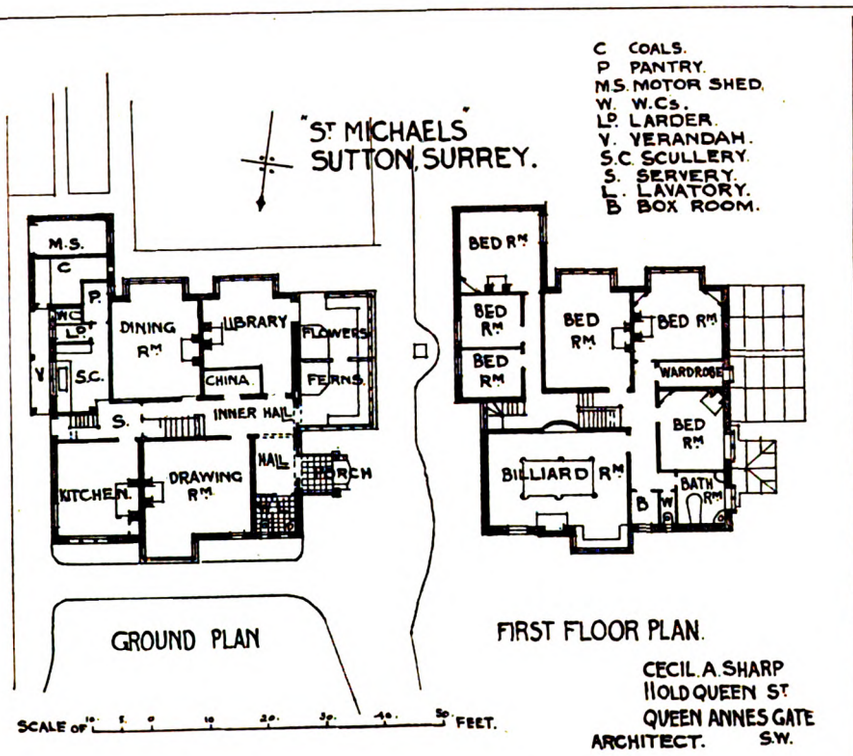
"St. Michael's," Sutton, Surrey. Mr. Cecil A. Sharp, A.R.I.B.A., Architect.



Ascension, and the Descent of the Holy Ghost upon the Disciples. The battlements above are flanked with pinnacles. Rich decorated tracery fills the large five-light east window and the three three-light windows in each side. Illustrations, with a ground plan, of the bridge will be found in our number of November 22, 1890, after drawings made by Mr. Roland W. Paul. There are others by Toms, after George Fleming, 1743; by Lodge, in Thoresby's Ducatus; and after Cawthorne, *circa* 1800. At the restoration by Scott, the former front was removed to Kettlethorpe Hall, near Sandal, not far distant.

We may add that in his two treatises of 1828-43 upon wayside chapels, Norrison Scatcherd ascribes the date of St. Mary's Chapel to 1357, and, comparing it with Prior Craunden's chapel at Ely, 1321-40, he says he is "almost persuaded" they were both built by the same architect, Alan de Walsingham. The bridge chapels at Wakefield and Rotherham form the subject of a work by the two architects, J. C. and C. Buckler, printed at Oxford, 1843. They were of opinion that the former was early fourteenth century work. Thomas Allen, in his "History of York," and one or two other writers aver that the chapel was originally built by the townsmen, *temp.* Edward III., and that a bridge of eight arches was built in that reign: Leland mentions the number of arches as being nine.

"ST. MICHAEL'S," SUTTON, SURREY.

THIS house is now practically completed, and has been finished internally with much care, money being expended in this direction rather than upon architectural features externally.

The house is situated upon a good site of about half an acre. The principal rooms face south, and kitchen and offices, etc., north and east, the latter being entirely cut off from the reception portion of the house by a single door and the servery to dining-room.

The materials used for the walls are: stock bricks, faced up to the first floor with local red sand-faced bricks, and cement sand faced above this; a small moulding separating the two materials. The roofs are boarded, felted, battened, and laid with green slates (very thick). The rooms, internally, are finished in a substantial manner, the dining-room and library having the walls panelled in wood as a dado, also the ceilings panelled in wood. The billiard-room has a curved ceiling, also panelled out in wood.

The design is by Mr. Cecil A. Sharp, of Westminster, and the house was carried out under his supervision by Mr. E. J. Burnand, of Wallington; the slate-work by Messrs. Bingley, Son, and Follit; locks and furniture by Messrs. James Hill and Co.; cast iron waste and rain-water heads (in imitation of cast and beaten lead) by Messrs. Lockerbie and Wilkinson; sanitary goods by Messrs. Doulton and Co. (all of London); and the electric light and bells by Mr. W. Newton, of Clapham.

The amount of the contract was 2,000*l.*, including laying out and making road and paths to house.

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ST. BARTHOLOMEW'S HOSPITAL:

SOME NOTES ON THE PRESENT BUILDINGS.

At a General Court of the Governors of St. Bartholomew's Hospital, held on Thursday, November 5, about seventy of the two hundred and fifty Governors being present, several resolutions were carried, with only one dissentient, concerning the proposed rearrangement and improvement of the existing buildings, after plans and designs which, we learn, will be prepared by Mr. E. B. l'Anson, architect and surveyor to the hospital, in collaboration with Mr. Rowland Plumbe. In terms of one resolution, the Governors will apply to Parliament in the course of next Session for powers to take the site of the Church of St. Bartholomew-the-Less and the adjoining burial-ground within the hospital precincts, and for the union of the parish with that of St. Bartholomew-the-Great. The church stands near the great gate, built in 1702, of the hospital. It was originally a chapel appertaining to the hospital founded in or about 1102 by Rahere, first prior of St. Bartholomew-the-Great, and his friend Alfune, who (as is recorded in one of the Cottonian MSS., "Vespasian," ix.) had founded St. Giles's, Cripplegate, and was by one account first master of the hospital. Rahere obtained from King Henry I. a piece of waste ground whereon to build a hospital for the sick, which after the surrender Henry VIII. re-endowed in 1545 with an annual revenue of 500 marks at the instance of Sir Richard Gresham, the City agreeing to bestow an equal sum. St. Bartholomew-the-Less then became a parish church for those who lived within the confines of the hospital. Hatton, in his "New View of London," 1708, describes the fabric as measuring 99 ft. by 42 ft., with a chancel and a northern chapel. The structure having fallen into decay, George Dance the younger, architect and surveyor to the hospital, was directed by the Governors in 1789 to make certain alterations and repairs. Dance first destroyed the interior, and then constructed an almost new church, forming an octagon within the original rectangular plan. He preserved the old walls together with the square tower and the vestibule or lobby in the tower. The interior he executed in wood, using for the angles of the octagon solid pieces of timber cased with deal in the shape of clustered columns. In the course of a few years dry-rot set in; in 1823 a general rebuilding was begun by Thomas Hardwick, who removed all the timber work and replaced it with stone or iron, leaving the plan as he found it, but quite altering the details. He used Bath stone for the columns of the octagon and iron for the roof. On taking down the decayed wooden columns and the linings of the walls he found that Dance had needlessly injured many fine features, including a canopied altar-tomb in the south wall, of the old church. The tower and body of the church are now covered with composite. Over the south wall, which has four pointed windows, is seen the octagon clearstory. The entrance is through a low Tudor doorway in the tower at the west end, opening into the vestibule. The lower portion of the tower forms the lobby, having bold clustered columns, banded at the middle, moulded arches, and a small stone staircase in the angle. The columns and arches of the octagon carry a clearstory having four windows. The ceiling is groined by the large and numerous moulded ribs that spring from the columns. Some of the monuments, brasses, and epitaphs cited by Stow, Weever, Gough, and others have been preserved. In a recess on the north side of the altar is a tablet that commemorates the wife of Sir Thomas Bodley, founder of the Bodleian Library; the two brasses of John Shirley, the famous traveller, and his wife Margaret, 1456, have, it seems, been lost.

The Governors further resolved that in the general scheme of rebuilding provision should be made for (*a*) additional operating theatres; (*b*) new casualty and out-patients' departments; (*c*) new nurses' home; (*d*) new quarters for the resident medical and surgical staff; (*e*) an isolation block and other new ward blocks in place of those to be demolished; (*f*) new mortuary, post-mortem rooms, and pathological department; and (*g*) an internal structural rearrangement of the east, west, and south wings. During recent years many improvements have been effected in the interior of the four isolated wings which constitute the main quadrangle. They were originally erected on the site of the two former courts by public subscriptions, Dr. Radcliffe being a munificent contributor, and were begun in June, 1730, after plans and designs by James Gibbs, who used Bath stone for the ashlar facing, the earliest instance, some say, of the adoption in London of Bath stone for that purpose. The four wings were encased by P. Hardwick. The great court is now laid out as a garden, with shelters for the nurses and convalescent patients, and a fountain. There are subways through the grounds. A lecture theatre was built for Abernethy in 1791. In the interval, 1822-35, anatomical and medical theatres and a library were erected. The Governors established a college for resident students in 1842. The present casualty and out-patients' departments, together with a college for twenty-six resident students, stand at the north-east angle with frontages to West Smithfield and Little Britain. In the south-west corner, and just within the boundary line of St. Bartholomew's and Christ Hospitals, stands a range including the chemical theatre, dissection-rooms, anatomical and medical theatres, together with the new library and museum fronting Giltspur-street, that were erected in 1879-86, at a cost of 50,000*l.* after the late Edward I'Anson's plans and designs. About ten years ago Mr. E. B. I'Anson carried out important sanitary improvements in the west and south wings of the great quadrangle and in the surgery "side" at a cost of 9,593*l.* The main drainage works were at the same time completed, the old sewers being broken up and removed; the works were executed at an expense of 6,397*l.* by Messrs. Mowlem and Co., contractors.

Hogarth was elected a life Governor for his paintings, on the grand staircase, of "The Good Samaritan," "The Pool of Bethesda,' and other subjects. Some paintings are ascribed to Laguerre, who, however, died in 1720. In the court-room are portraits of Abernethy, by Lawrence; Perceval Pott, by Reynolds; and Dr. Radcliffe, by Kneller.

The Governors, who have various sets of plans under their consideration, are agreed thus far to carry out the recommendation of the Mansion House Committee in regard to the rebuilding of the out-patients' department, and to proceed, firstly, with the new casualty, out-patients', and special departments, dispensary, etc., the new operation-theatres, and the new nurses' home. In the meantime they will arrange for the temporary use, as may become necessary, of the remaining buildings of Christ Hospital.

The buildings stand upon a total area of about five acres, which has been experimentally valued to be worth from one million to one million and a half sterling. Lord Balfour of Burleigh, as arbitrator between the two parties, made his award in February of last year of 238,781*l.*, which was paid out of savings and capital for the purchase of the 67,680 sq. ft. of adjoining land on the south from the Almoners of Christ Hospital. The income of the hospital, largely derived from landed property in London, amounts, it has been stated, to more than 80,000*l.* gross per annum. The Governors had rejected, as being too costly, Sir Henry Burdett's scheme for an estimated outlay of 600,000*l.* upon an entirely new hospital; but on December 10 the House Committee and the Committee of Treasurer and Almoners unanimously decided to recommend the Governors to take steps to ascertain the possibility of acquiring further addition to their site—that is to say, an additional part of the land recently vacated by Christ Hospital. In making that recommendation the two Committees have the cordial support of the medical and surgical staff of the Hospital.

Crystal Palace Engineering School.—The "Wilson Premium" for the best paper read before the Crystal Palace Engineering Society during the present session has been awarded by the Council to C. G. Everington for his paper on "Gold Mining Machinery." Other papers read during the session were "Mining," by C. E. Fradgley; "Historical Locomotives in the South Kensington Museum," by A. Maude; "Tubes and Subaqueous Tunnelling," by D. W. Murray; and "The Abatement of the Smoke Nuisance," by T. O. Pepper.—The Premium was presented to Mr. Everington by Sir E. H. Carbutt, Past President of the Institution of Mechanical Engineers, on the occasion of the ninety-third distribution of certificates at the school on the 17th inst.

THE LONDON COUNTY COUNCIL.

The last meeting of the London County Council previous to the Christmas recess was held on Tuesday, in the County Hall, Spring-gardens, Lord Monkswell, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, the following loans were agreed to: Battersea Borough Council, 20,000*l.*, for the erection of working-class dwellings; Stepney Borough Council, 2,178*l.* and 3,820*l.*, for street improvements; and Deptford Borough Council, 6,252*l.*, for site for Town Hall and offices, and 10,000*l.* for their erection. Sanction was also given as follows: Camberwell Borough Council, 5,000*l.*, for erection of buildings, and 6,496*l.* for paving works, and 1,610*l.* for purchase of site for housing purposes; Deptford Borough Council, 30,428*l.*, for erection of Town Hall and offices; St. Pancras Borough Council, 12,055*l.*, for electric light installation and meters; and Shoreditch Borough Council, 1,058*l.*, for purchase of site for housing purposes and electric wiring of tenements.

Tramways.—The Highways Committee recommended, and it was agreed, that the estimate of 90,000*l.*, submitted by the Finance Committee, be approved, and that expenditure not exceeding that amount be authorised in connexion with the reconstruction, for the conduit system of electrical traction, of the cable tramways between Kennington and Streatham.

Improvement: Hampstead-road Widening.—On the recommendation of the Improvements Committee it was agreed after discussion that the estimate of 245,500*l.*, submitted by the Finance Committee, be approved; and the expenditure not exceeding that amount was authorised for the purpose of the widening of Hampstead-road at the southern end, sanctioned by the Council on July 30, 1901, and other dates.

Underground Rooms in St. Pancras.—On the recommendation of the Public Health Committee the following recommendation was agreed to:—

"That the St. Pancras Borough Council be informed that the London County Council, while glad to hear that the Borough Council is taking steps to enforce the provisions of section 96 of the Public Health (London) Act, 1891, with regard to underground rooms in the borough, hopes that the Borough Council will give instructions for notices to be served at more frequent intervals, so as to secure compliance with the law as soon as reasonably practicable."

New Theatre, Aldwych.—The Theatres and Music Halls Committee reported that Mr. W. G. R. Sprague had submitted plans of a theatre which it is proposed to erect at the junction of Aldwych and Catherine-street. The site complies with the Council's regulations, as three sides of the theatre will abut on streets of considerably more than the required width. The theatre will have seating accommodation for 1,667 persons. Approval was given to the plans on certain conditions.

Alterations at Asylums to Minimise Risk in Case of Fire.—The Asylums Committee reported as follows:—

"A sum of 10,000*l.* was provided in the rate estimate for the current financial year for alterations necessary to the asylums to minimise risk in case of fire. The following works, which were of an urgent nature, have been put in hand during the year, viz.:—

Banstead—	
Alterations to corridors, removal of single rooms, providing additional exits, staircases, and fire-alarm boxes	£610
Cane-hill—	
Connexion of asylum main with the East Surrey Water Company's main, extension of fire-alarm system, additional doorway and escape ladders	300
Claybury—	
Extension of water main and hydrant system	60
Colney-hatch—	
Alterations to doors to open outwards	280
Hanwell—	
Alterations to corridors at temporary buildings, provision of additional exits, substitution of fire-proof for wooden partitions in main buildings, provision of additional fire-escape staircases, etc.	1,500

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Heath—
Provision of additional fire-escape staircases and conversion or windows into doors £150
Horton—
Alteration of outer doors to open outwards 480
Manor—
Substitution of fire-proof walls in lieu of wood, construction of breaks in corridors, additional exits, etc. ... 2,650

We recommend:—

That an expenditure of 6,030*l.* for the alterations necessary at the Banstead, Cane-hill, Claybury, Colney-hatch, Hanwell, Heath, Horton, and Manor asylums, to minimise the risk in case of fire, be approved."

The recommendation was agreed to.

Lamps on Waterloo Bridge.—Captain Swinton asked the Chairman of the Bridges Committee who was responsible for the removal of the old lamp standards and lamps on Waterloo Bridge, and the substitution of the most ugly lamps in London.

Mr. J. E. Sears, the Chairman, said that what was being done was only the carrying out of a decision arrived at some six years ago. The old standards were not suitable for the electric light. The cost of the work was 500*l.*

The Building Act and London Factories.—Mr. Smith asked the Chairman of the Building Act Committee a question in reference to a recent factory fire in London.

Captain Hemphill said that for twelve years it had been known that the building was a dangerous one from the point of view of an outbreak of fire. From the plan he produced, the Council would see that the building was a perfect death-trap. The number of factories in London in which people worked, but which did not come under the Factory Acts must be at least 30,000 or 40,000, and the Council had no adequate means of ensuring flats and workshops being under proper control. In the proposed amendment of the Building Act, now under consideration, would be a provision which, it was hoped, would prevent such a fire occurring in the future.

Fire Stations.—The following recommendations of the Fire Brigade Committee were agreed to:—

"That expenditure, not exceeding 7,674*l.*, for the work of erecting the Limehouse sub-station be authorised; that the work be executed by the Council without the intervention of a contractor; and that the drawings, specification, quantities, and estimate be referred to the Works Committee for that purpose.

That expenditure, not exceeding 755*l.*, in connexion with the electric light installation at the Limehouse sub-station, and of incidental expenses arising out of the erection of the building, be authorised.

That expenditure not exceeding 700*l.* be authorised in respect of drainage and sanitary work and the provision of a recreation room and new washing troughs at the Camden Town station; that, in the event of the Works Committee being satisfied of the sufficiency of the architect's estimate (to be reported after the Christmas recess), the work be executed by the Council without the intervention of a contractor, and that the drawings, quantities, specification, and estimate be referred to the Works Committee for that purpose; and that, in the event of the Works Committee not being satisfied of the sufficiency of the architect's estimate, tenders for the execution of the work be obtained.

That the estimate of 13,875*l.* submitted by the Finance Committee in respect of the erection of the new Kensington fire station be approved, and that tenders for the work be invited by public advertisement."

Protection of British Museum and Natural History Museum from Fire.—The Committee recommended, and it was agreed:—

"That the chief officer of the Fire Brigade be allowed, during the pleasure of the Council, to undertake the periodic inspection of the fire appliances in the British Museum and the Natural History Museum, and the instruction in the use of such appliances of the museum employés; it being understood that neither he nor the Council accepts any responsibility in the matter, and that no payment is to be made to him by the trustees for his services."

Tramways.—The following recommendations of the Highways Committee were agreed to:—

That expenditure on capital account of a sum not exceeding 80,210*l.* 4*s.* be approved, for the purchase of track and slot rails, conductor-tees, etc., required in connexion with the reconstruction of certain portions of the Council's tramways north and south of the Thames, and for the construction of certain authorised tramways.

That, subject to the result of the usual inquiries proving satisfactory, the tender of Messrs. Bolckow, Vaughan, and Co., Ltd., be accepted for the supply and delivery, for the sum of 43,748*l.* 9*s.*, of the track rails and fastenings required for the purposes stated in the foregoing resolution; that the solicitor do prepare, and obtain the execution of, a contract to give effect to the tender; and that the seal of the Council be affixed to such contract, when ready.

That, subject to the result of the usual inquiries proving satisfactory, the tender of the Frodingham Iron and Steel Company, Limited, be accepted for the supply and delivery, for the sum of 36,461*l.* 15*s.*, of the slot rails and conductor-tees required for the purposes stated in the above resolution; that the solicitor do prepare, and obtain the execution of, a contract to give effect to the tender; and that the seal of the Council be affixed to such contract when ready.

That the tender of Messrs. A. H. Marshall and Co., amounting to 2,203*l.*, be accepted, for the wiring for electric lighting of sub-stations and car-sheds in connexion with the London County Council tramways."

It was also agreed, after discussion:—

"That the estimate of 150*l*, submitted by the Finance Committee be approved; that expenditure not exceeding that amount be authorised for the inquiries to be made in pursuance of the Council's resolution of December 8, 1903, with regard to the conditions of labour obtaining abroad; and that the Clerk of the Council do take all necessary steps in connexion with the conduct of the inquiry."

Holborn to Strand: Paving, etc.—The following recommendations of the Joint Highways and Improvements Committees were agreed to:—

"(*a*) That the working drawings, specification, bills of quantities and estimate of the cost (36,000*l.*) of the paving and other works, including the construction of a portion of the tramway subway at the junction of Kingsway and Aldwych, be approved, and be referred to the Works Committee with a view to the works being carried out without the intervention of a contractor.

(*b*) That the employment, at a cost not exceeding 200*l.*, of a Resident Engineer and a clerk of works in connexion with the works at the junction of Kingsway and Aldwych be authorised."

The Improvements Committee also recommended, and it was agreed:—

"That the working drawings, specification, bills of quantities, and estimate of the cost (4,100*l.*) of the paving and other works in Catherine-street and in the eastern spur street between the Strand and Aldwych, be approved, and be referred to the Works Committee with a view to the works being carried out without the intervention of a contractor.

That expenditure not exceeding 375*l* be authorised in connexion with the planting, during the present season, of trees in the new streets from Holborn to the Strand."

Improvement.—It was agreed:—

"That the estimate of 4,000*l.* submitted by the Finance Committee be approved; that the Council's statutory consent be given to the widening of Trinity-road, proposed to be undertaken by the Council of the Metropolitan Borough of Wandsworth . . . ; and that a contribution be made, on the usual conditions, of half the net cost of the improvement, provided that if the total net cost exceeds 8,000*l.* the Council's contribution will be limited to 4,000*l.*"

The Council, having transacted other business, adjourned for the Christmas recess.

A NEW CATALOGUE FILE.—The "Ideal Syndicate" send us a description and a specimen of their book-form file for trade catalogues. As far as large bound catalogues with a title on the back are concerned, they may probably as well be placed on a shelf in their original form as inserted in another book; but in the case of thinner unbound catalogues it is convenient to have a book-form case to put them in, collecting together those which refer to the same class of subject. The back of the file is prepared for systematic labelling, and one good point is an arrow pointing one way on the back, which is to indicate the direction on the shelf in which further catalogues of the same class will be found.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Westminster.—(*a*) That the resolution of October 13, consenting to the erection of one-story shops in front of Nos. 129 and 131, Victoria-street, Westminster (Mr. J. Eden for the Aerated Bread Company, Ltd.) be rescinded. (*b*) One-story shops in front of Nos. 129 and 131, Victoria-street, Westminster (Mr. J. Eden for the Aerated Bread Company, Ltd.).—Agreed.

Lines of Frontage and Projections.

Wandsworth.—Retention of a block of residential flats on a site abutting upon Oakhill-road and Upper Richmond-road, Putney (Messrs. Flew and Co.).—Consent.

Marylebone, East.—A porch at the entrance to a proposed drill hall on the site of Nos. 88 and 90, Henry-street, St. John's Wood (Messrs. Hudson and Hunt for the 5th West Middlesex Volunteers).—Consent.

Peckham.—Retention of a porch in front of the Polytechnists' Arms public-house, Nunhead-green, Camberwell (Mr. G. W. Thompson for Mr. J. M. Booth).—Consent.

Strand.—Projecting cornices to the Gaiety Restaurant, Strand, (Messrs. E. Runtz and Ford for the New Gaiety Restaurant and Hotel Company, Ltd., and Short's, Ltd.).—Consent.

St. George, Hanover-square.—That the Council do not accede to the request of Mr. T. Pearce, for S. Allsopp and Sons, Ltd., for permission to retain two projecting signs in front of the Green Dragon public-house, Maddox-street, St. George, Hanover-square.—Agreed.

Woolwich.—A house with shop upon the site of No. 150, High-street, Plumstead (Mr. A. E. Habershon for Mr. W. F. Cook).—Refused.

Finsbury, East.—Buildings on the site of Nos. 197 to 207 (odd numbers only) inclusive, City-road, Shoreditch, to abut also upon Westmoreland-place (Mr. E. Haslehurst for Mr. M. Bromet).—Refused.

Clapham.†—The retention of a show-case upon the forecourt of No. 81, Clapham Park-road, Clapham (Mr. G. Garner for Mr. W. Whitemail).—Refused.

Width of Way, Line of Frontage, and Construction.

Rotherhithe.—An iron and concrete gangway to connect, at the fifth floor level, premises on the east and west sides of Lafone-street, Bermondsey (Mr. J. M. Kennard for Butler's Wharf Company, Ltd.).—Consent.

Space at Rear.

St. George, Hanover-square.—An addition at the rear of a building on the north side of Farm-street, St. George, Hanover-square (Mr. J. W. Bradley for the Council of the City of Westminster).—Consent.

Formation of Streets.

Battersea.†—That an order issued to Mr. J. C. Radford, sanctioning the formation or laying out of a new street for carriage traffic upon the Lavender Lodge estate, to lead from St. John's-road to Lavender-sweep, Battersea (for Mr. W. H. George).—Agreed.

Wandsworth.—That an order be issued to Messrs. Robertson and Barrie, sanctioning the formation or laying out of a new street for carriage traffic, to lead from Mitcham-road to Bickersteth-road, Tooting.—Agreed.

Wandsworth.—That an order be issued to Mr. W. C. Poole, sanctioning the formation of laying out of a new street for carriage traffic on the Eldon House estate, to lead from Mitcham-road to Woodbury-street, Tooting (for Messrs. Swain and Selley).—Agreed.

Wandsworth.†—That an oredr be issued to Mr. W. Bartholomew, sanctioning the formation or laying out of two new streets for carriage traffic, to lead from Francisan-road to Church-lane, Tooting.—Agreed.

Wandsworth.—That an order be issued to Mr. W. Bartholomew refusing to sanction the formation or laying out for carriage traffic of a new street to lead out of the south-east side of Franciscan-road, opposite Totterdown-street, Tooting.—Agreed.

Battersea.—That an order be issued to Mr. W. A. Large refusing to sanction the formation or laying out of two streets at the rear of proposed buildings on the east side of St. John's-road, between Battersea-rise and Beauchamp-road, Battersea (for Messrs. Jones Brothers).—Agreed.

Means of Escape at Top of High Buildings.

Westminster.—Means of escape in case of fire proposed to be provided in pursuance of section 63 of the Act, on the sixth and seventh stories of blocks D, E, F, G, and H, and the eighth

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story of block F, St. James's-court, Buckingham-gate, Westminster, for the persons dwelling or employed therein (Mr. A. Graham for the Law Guarantee and Trust Society).—Consent.

Strand.—A deviation from the drawings approved on March 31 in respect of the means of escape in case of fire, proposed to be provided in pursuance of section 63 of the Act, on the sixth story of Marlborough-chambers, Nos. 70 and 71, Jermyn-street, and No. 25, Bury-street, St. James's, Westminster, so far as relates to the planning of the fifth story (for Mr. R. Morphew).—Consent.

Buildings for the Supply of Electricity.

St. George, Hanover-square.—A cable drum shed at the generating station, Eccleston-place, Eccleston-street, St. George, Hanover-square (Mr. C. S. Peach for the Westminster Electric Supply Corporation, Ltd.).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

Illustrations.

A CHRISTMAS EVE FANTASY.

THIS drawing, made especially for our Christmas week issue by Mr. A. C. Conrade, recalls some of those naïve conceptions of angels playing on earthly instruments which were so dear to the painters of the early Renaissance. The whole thing, in fact, has something of the simplicity of faith embodied in ancient Christmas carols; below the people, parents and children, enter the church for the Christmas Eve service; above, the angels make music in the air.

The whole idea is the artist's; he was merely asked to make a picture suitable for our Christmas number, and sent in this. We think our readers will agree that it is a very pretty and suggestive fancy.

WINDOWS, PYECOMBE CHURCH.

THESE windows, recently put up in the parish church of Pyecombe, near Brighton, were designed by Mr. Arthur A. Orr, and carried out under his direction in the studio of Mr. A. J. Dix. The drawings from which the illustrations are taken were exhibited in the Arts and Crafts' Exhibition of this year.

ST. BIRINUS, MORGAN'S VALE, WILTS.

THIS church was erected some years ago to serve a district of the parish of Downton. The walls are constructed of bricks made near the site, and the roofs covered with red tiles. The buttresses are built with a straight joint through the walls, so that aisles may be added in the future by setting back the intermediate walls and windows, and leaving the buttresses as square brick piers carrying the elliptic arches now coming over the windows. The nave roof would remain intact, and the flat roofs of the aisles come below its eaves. The nave and chancel have a waggon-head ceiling of plastered panels, and deal ribs painted, carried through, and only broken at the cornice level by the narrowing of the chancel; a constructional screen forms the division between the two parts of the church. A commodious porch of half-timbered work, in oak, gives access to a recess at the west end of the nave, which serves as an inner lobby, and also as a baptistry; a timbered and shingled turret for the bell comes over this, and the vestry is on the north side of it. The organ is placed in a shallow recess on the north of the chancel. As deep foundations were necessary, this has given the opportunity for the coal store to be placed under the higher parts of the chancel. The building is warmed by a Musgrave stove. The whole of the internal woodwork, including the roof, seating, and screen, is painted green, and the inside faces of the walls are lined with picked red bricks. The builder was Mr. Mitchell, a resident of the parish.

The architect is Mr. C. E. Ponting, of Marlborough.

DESIGN FOR CHURCH AT FULHAM.

THIS design, by Mr. E. P. Warren, was submitted in a competition some years ago, and the illustration was overlooked at the time. As a competition drawing it is of course out of date; the inscription on the drawing conveyed the impression that it was an executed building, and we did not learn the contrary from the architect till after it was printed.

However, it is a good specimen of a passage-aisle plan, suitably treated in the design.

FARM BUILDINGS, PORTERS PARK, SHENLEY, HERTS.

THE exterior of the cowhouse is faced with cement roughcast. The walls in the courtyard are built with white flettons with red brick dressings. The roof is of Tilberthwaite slates. The turret, which is of oak, is surmounted by a copper dome with a wrought iron vane and copper finial. The builders were Messrs. Simpson and Son, of 48, Paddington-street, W. The cottages built for farm labourers are constructed of red brick and half timber work, and roofed with handmade tiles. The builders were Messrs. Boff Bros., of St. Albans.

Both were erected from the designs of Mr. C. J. Harold Cooper, and the originals of our reproductions were exhibited in this year's Royal Academy.

Books.

Graphic Statics with Application to Trusses, Beams, and Arches. By JEROME SONDERICKER, B.S., C.E., Associate Professor of Applied Mechanics, Massachusetts Institute of Technology. New York: John Wiley and Sons. London: Chapman and Hall, Ltd. 1903.

WHILE this treatise may be found of service to engineers and engineering students generally, it is of special interest to architects and others concerned with building construction, using this term in its widest sense. In order that graphical methods may be successfully employed, it is absolutely essential that the operator should understand the general principles involved, and should know how to proceed in the construction of the necessary drawings. The author addresses himself to these points in Chapter I. which should be quite sufficient to make plain to anyone possessing knowledge of statics the general methods adopted in this beautiful system of computation. Chapter II. deals with Roof Trusses, but there is more in this section of the treatise than might be supposed from so simple a title. Briefly defined, a roof consists of two main parts, the covering and the framework. The nature of the covering can be settled according to the character and intended use of the building which it protects, and requires little or no calculation. On the other hand, the framework may be of elaborate construction, and in any case the stresses must be determined with the utmost accuracy. Mr. Sondericker applies himself to the task of demonstrating the necessary procedure with a delightful ease which evidently results from long experience in such work. Having disposed of a few preliminaries he settles down in Section 2 to the determination of the reaction of roof supports. Three cases are taken, applying to simple roof trusses, case i., where the truss is fixed in position at both supports; case ii., where one end is supported so as to provide for expansion; and case iii., where the truss is supported on columns. The general methods of determining supporting forces are contained in the previous chapter, but for the purpose of demonstrating their application to the cases chosen, the author gives a few examples to indicate suitable solutions, after which the use of algebraic methods of solution is exemplified. This is very desirable, for the student should be able to determine reactions algebraically, and to employ algebraic methods in connexion with graphical methods in order that the latter may be applied to the best advantage. Section 3 deals with the determination of stresses in roof-trusses. The method of joints here adopted is certainly the most suitable for roof-trusses, and in applying it the polygon of forces is constructed at any joint where only two stresses are unknown. When these are determined the construction is repeated for the other joints until the stresses in all the members have been computed. One very excellent piece of advice given in this section of the chapter is the recommendation that the reader should "study trusses with the view of understanding the purpose and action of their various members independently of the stress diagrams." If this be done, the student will learn to identify loads tending to deflect rafters, to see how deflection is prevented by other members, to understand the nature of the stress so caused, and to recognise further consequences in still other members. A little thoughtful examination of this sort will do more to make clear the design of trusses than much hard labour of a purely mechanical kind. In Section 4, counterbracing and double systems of bracing are adequately treated, and in Section 5 we come to an interesting exposition of methods to be used in connexion with the three-hinged arch, a form of construction in which the outward thrust at the ends may be resisted by the abutments or by a tie-rod joining the ends. This section will well repay perusal. Section 6, the last in Chapter II., is noticeable for the development of a general method of dealing with frames in which bending stresses as well as tensile and compressive stresses are found. In this section case iii. mentioned in the earlier part of the chapter is more fully discussed.

Chapter III., on Beams, is a short one relating to the usual methods of constructing shear and bending moment diagrams, and a less usual method of constructing elastic curves from which the deflection at any point may be measured off with approximate accuracy. The last chapter in the book is devoted to masonry arches, abutments and piers, and the reader will probably regret that the admirable treatment of such structures was not developed at somewhat greater length. Three double-page plates are added at the end, containing diagrams of larger size than those in the body of the volume. Mr. Sondericker's work is one of the best treatises we have seen on the department of graphic statics, and we feel sure that it will be welcomed by those interested in the subject. The general usefulness of the book to professional men is somewhat impaired by the absence of an index, a detail which, if we may judge by other works issued by American publishers, appears to be less popular in the United States than in this country.

Designing Ironwork. Second Series, Part IV. By HENRY ADAMS, M.Inst.C.E., M.I.Mech.E., F.S.I., Professor of Engineering at the City of London College. London: Published by the Author, 60, Queen Victoria-street, E.C. 1903.

WE have already reviewed the preceding numbers of this serial work, to which the present part forms a useful addition. The general title is not altogether suitable, for it does not convey an adequate idea of the varied classes of work discussed by the Author. In the part now before us, rolled steel joists, compound girders, concrete, and fire-resisting materials are taken up. Rolled steel joists form the subject of some concise and practical notes, and the methods of calculation given are quite sufficient for all ordinary conditions. We quite agree with the remarks made by Professor Adams as to the unreliability of some tables of strength issued by merchants, and the following paragraph on p. 19 is worthy of particular consideration:—

"Tables of strength, even when correct, will not enable an architect to design his own structural ironwork unless he has a special knowledge of the subject. There are so many matters for consideration that affect the safety of the structure, only known to the expert, that some of them are apt to be overlooked, especially with built-up stanchions and connexions generally. When the designing is left to the manufacturer and there is no competition, he will of course keep himself safe by putting in plenty of material; but when he is submitting a competitive price he will naturally sail as near the wind as possible, and the result may be ultimate disaster."

The views here expressed are to some extent in agreement with those we have repeatedly urged, that architects ought to qualify themselves for dealing with steel construction as efficiently as with other details of the buildings they design.

A few notes are given relative to joists embedded in concrete, and others as to reinforced concrete. The latter subject, however, can scarcely be dealt with satisfactorily in a fragmentary or incidental manner.

Under the heading of fire-resisting materials, various forms of construction and appliances are mentioned, including fireproof partitions, armoured glass, fire alarms and sprinklers, and fireproof floors. The pamphlet constitutes a most serviceable collection of miscellaneous notes for architects, engineers, and builders.

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Electric Lighting and Power Distribution. Vol. II. By W. PERREN MAYCOCK, M.I.E.E. London: Whittaker and Co.

THIS volume completes the author's manual of electrical engineering, and we can recommend nearly all of it to students and electricians. It contains over 400 illustrations, some of which explain the ordinary windings of armatures, switchboards, connexions of meters, etc., very clearly. Practically the whole book refers to the most modern type of apparatus, and the student will find explanations of the machines which are in everyday use. A good many of the diagrams and descriptions we were familiar with from makers' catalogues, but every one has not access to these catalogues, and Mr. Maycock has made a judicious selection of those only which have an educational value. In order to get an unbiassed opinion on the book, we got the opinions of an electrical student, who has distinguished himself in University examinations, of a chief assistant in an electrical test-room, and of a laboratory demonstrator. They all praised the book, and said that they had learnt something from it. The student, however, pointed out several errors in the chapter on alternating current theory, and said that he could not understand why an Aron meter measured watt hours. Personally, we think that the book might easily be considerably improved by deleting and rewriting parts of the chapter on alternating currents. We are not objecting to Mr. Maycock's simple explanations of complex phenomena. Useful work can be done in translating scientific equations into simple language, but it is absolutely necessary that no erroneous conceptions be thereby introduced.

On page 129 we are told that reactance varies as inductance divided by capacity. Now this is utterly wrong, as this would imply that reactance varied as the square of resistance. It was quite unnecessary to introduce the word reactance at all, and the equation on the next page containing it explains nothing, and is erroneous.

It must hopelessly confuse beginners to come across virtual, total, ohmic, and spurious resistances within the space of four lines.

The explanations sometimes given are no explanations at all. On page 141 we read that "clearly those wires which are nearer the centre, and, consequently, completely surrounded by neighbouring wires, will have stronger reverse E.M.F.s set up in them." But, surely, the opposite of this is the truth. The E.M.F.s induced in a wire by two wires, one on each side of it, will cancel one another. "Some writers aver that the effect just dealt with is due to capacity as well as inductance." The unknown writers must have been ignorant of the elements of this problem, which has been investigated very fully by Heaviside.

Mr. Maycock defines "effective" and "virtual" volts on page 147 in a somewhat special manner. What he defines as "effective" is ordinarily called the "resultant," and what he calls "virtual" is known as "effective." The definition given of "wattless" current is not scientific. The wattless current is that component of the effective current which differs in phase by 90 deg. from the applied volts.

There is a tendency throughout the book to use highly technical terms without explaining them. This might be permissible in an advanced treatise, but it is not in an elementary manual. For example, dielectric hysteresis is dragged in unnecessarily, as this phenomenon, if it exists at all, must be of very little importance. "The rapidly alternating charges in a condenser connected up in an alternating current circuit may be said to cause alternating polarisation of the dielectric, and consequent heating and loss of energy." This sentence conveys no meaning to us, although it would doubtless impress the beginner.

In conclusion, however, whilst advising electricians to think before accepting Mr. Maycock's theoretical explanations of alternating current phenomena, we can recommend the book as a useful one for reference, and as a real help to electrical students.

The Modern Carpenter, Joiner, and Cabinet Maker. Vols. V. and VI. London: The Gresham Publishing Co.

VOLS. V. and VI. of this treatise are greatly superior to those which have preceded them. It is clear at once that the subject of practical carpentry, with which they deal, is one in which the author is deeply interested and thoroughly well versed. The entirely successful treatment of such intricate problems as those of panelled ellipsoidal domes or fan-tracery vaulting would require a genius for exposition which the authors of this work cannot be said to possess; but the fact that these and every other conceivable form of roof and ceiling should be described and illustrated at all indicates a very real enthusiasm, and the illustrations are usually so excellent as to need little description.

It is the business of a text-book, doubtless, to provide information rather than to express opinions or preferences; yet, in a work written by an architect upon practical carpentry, some distinction might surely have been drawn between those constructions which are, and those which are not, permissible in buildings of a properly architectural character. In the case of roof-trusses, for instance, several interesting and difficult questions arise. Trusses otherwise of wood, but with iron tension members, are, of course, legitimate only in structures of a temporary or purely utilitarian kind. But if an iron tie is not to be resorted to in the case of those spans which are too large for the convenient use of a wooden tie-beam, the question arises whether a wooden truss for such a span can be designed at all which shall be safely independent of buttresses. In most of the attempted solutions of this problem—as, for instance, the collar-beam and the hammer-beam truss—the tendency of the truss to spread exposes certain of its members to a very great transverse stress; and although the ultimate resistance of these members to the stress in question may be amply sufficient, it is not always remembered that their initial resistance, or the stress to which they may be subjected without sensible deflection, is extremely small, and that in a stone or brick building equilibrium is therefore maintained, not so much by the strength of the elastic truss as by that of the rigid wall. In the case of Westminster Hall, which presents one of the finest examples of the hammer-beam truss in existence, buttresses are accordingly used; but this most significant fact is not mentioned in the volumes before us, though the roof is otherwise described at length. Of trusses without a tie-beam that are not elastic, the scissor-beam truss, with a vertical strut in the upper quadrilateral, and the scissor-beams run through into the eaves of the roof, is the simplest and most elegant form; and there is probably no truss in which the tension joints may be more easily managed without the use of those iron straps and brackets by which timber roofs at the present day are so generally disfigured; but this truss is not available for much greater spans than one in which a tie-beam is used. The laminated arcs of Emy and De Lorme, even if they were inelastic, as it is impossible that they should be, would be mechanical rather than architectural solutions of the difficulty; and the ideal timber roof for a large span remains, for the architect who still cares to solve a given problem in a given material, one of the most interesting upon which he can exercise his ingenuity.

The Home Mechanic. By JOHN WRIGHT. London: John Murray.

IF its premisses be granted this is a good book. The author assumes that the amateur should not only learn to use, but as far as possible should actually make his own tools, including a couple of lathes. Life is short, and on this assumption art would indeed be long; but even for a reader who does not aspire to so ideal a self-sufficiency the book contains much pleasant and instructive reading. It covers, though in rather a desultory way, a wide range of interesting subjects in wood and metal work, and the descriptions given of these and of the tools required are generally clear and good; it has even a certain literary charm, in which, as a rule, the modern text-book is hopelessly deficient. Especially in the author's more general advice to the young craftsman there is much humorous irony and kindly but practical common sense; in the advice, for instance, that he should keep any tool that he has been unlucky enough to spoil for the purpose of lending to his friends; and that he should never "attempt to mend any small article that has been bought; it is almost certain to have been so badly made that it will fall to pieces so soon as he tries to mend it." The need for economy is one of the lessons that is chiefly insisted upon. When the amateur wants a carpenter's square "he will not" buy it—the author always shows an extraordinary degree of confidence in what, according to his own directions, the amateur "will" or "will not" do—but he will make it himself out of the pieces of an old cigar-box. "Let it be assumed that the amateur has an almost unlimited supply of timber; for instance, three or four empty cigar boxes, an old blacking-box, and a few odd pieces of other old boxes or packing-cases." Obviously, here is matter and manner of which the average compiler of text-books is quite incapable; and from a strictly practical point of view the instructions given are generally reliable enough.

The author strongly and rightly insists, not only on the use of sound methods and the production of the best possible work, but also that the amateur should secure the full credentials of his craft by learning to hold and handle the tools in a minutely professional way. He is guilty, however, of occasional serious errors or inconsistencies. The making of a chamfered oak post and pediment is described as an example in the use of the "long thin chisel." The instructions for the actual operation are elaborate and exact, but what are we to say of policy such as this? The oak tree was taken out of a ditch, where it had been lying for some years, and was therefore "well-seasoned." Within one week of the time when the post was sawn out of the tree it was finished and standing in the room. The work, in fact, must be finished quickly, because "if there be long delay after finishing one face true it will twist, and there will be nothing true from which to mark or work the other faces." But if the post is so inevitably to twist after it is cut, why, we might ask, is so much trouble to be taken in getting it true in the first instance? A good workman should know, and the amateur should surely be told, that a tree which has been "lying in a ditch," for whatever number of years, cannot possibly be "well-seasoned," though it may very likely be rotten. The good workman, moreover, even if the post had been sawn out of a dry tree, would allow it to stand for some weeks, or even months, in a warm or well-ventilated place before attempting to work it. This doing of a piece of work in a hurry, so that the ill-seasoned wood may not have time to misbehave itself until after the job is finished, is doubtless not an infrequent practice in third-rate modern workshops, but we never before heard it seriously advanced as a principle of the craft. It is a doctrine which should hardly have been followed up by the otherwise delightful gibe at architects and journeymen workmen immediately ensuing.

This is probably the worst mistake in a rather desultory but otherwise useful and charming book; but to the underlying hypothesis of the whole, already referred to, we have this further objection. Even if the amateur has time and patience to make his own lathes and his own tools, which is very unlikely if he wishes also to use them, such a procedure will almost certainly incline him, as it has apparently inclined the author, to regard his tools as an end in themselves rather than as a means to the production of useful or beautiful things. It would seem, for instance, that the amateur is to turn a candle-stick because he has made the lathe, not that he should make the lathe in order to turn the candle-stick. The first object of all private handicrafts at the present day should consist, surely, in that honest creative work of which, as Mr. Wright seems to realise, our modern factory and commercial system is quite incapable.

Metal Working: A Book of Tools, Materials and Processes for the Handyman. Part I. Edited by PAUL N. HASLUCK. London: Cassell and Co., Ltd.

THIS work, which is to be issued in twelve monthly parts, will deal with metal working in all branches of practical handicraft. In the introduction we find a conveniently-arranged table, showing the physical characteristics of all metals, as well as the derivations of their names and dates of their discovery. The greater portion of the present issue is occupied with Foundry Work. This chapter appropriately deals with small work only, and should be welcomed by the class of readers addressed. Among the metals considered are bronzes of various kinds, bell metal, brass, fusible alloys, German silver, and iron. Numerous types of furnace are simply described and illustrated by sectional drawings, full directions are given for moulding, casting, and other foundry operations, and a large number of wood-cuts is given, which afford a very

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good idea of the appliances and tools required. Towards the end of the Part a Chapter on Smith's Work is commenced. If the standard now set be maintained to the end, the volume will be a most useful contribution to literature of the class indicated.

Pumps: Their Principles and Construction. By J. WRIGHT CLARKE. Second Edition, Revised. London: B. T. Batsford. 1903.

THIS edition is a very great improvement upon the original issue, which was evidently printed from the same type used in the pages of our contemporary, "The Plumber and Decorator," wherein the subject matter appeared in the form of articles. The book is now published in larger type, set up in appropriate style, and the illustrations have been re-drawn. Moreover, the author has taken the opportunity of re-arranging the whole of the matter, and of making thorough revision where necessary. In its new form, the volume is quite worthy of the theoretical and practical information conveyed. The author evidently possesses the advantage of being practically familiar with his subject, and we fully believe that his treatise will now have an enlarged sphere of usefulness among students, workmen, and employers to whom adequate knowledge relative to simple forms of pumps may be necessary.

Gas and Oil Engine Management. By M. POWIS BALE, M.I.Mech.E., A.M.Inst.C.E. London: Crosby Lockwood and Son, 1903.

THIS book, intended for the guidance of users and attendants, consists of notes on the selection, construction, and management of gas and oil engines. Such motors are now coming into use so freely that information of the kind given by the author ought to be generally appreciated. So far as selection is concerned, we consider Mr. Bale is wise in recommending untechnical readers to be guided by the advice of a competent engineer instead of attempting to decide for themselves as to the merits of any particular type of engine.

After briefly discussing the fixing of a gas engine together with the water cooling and gas supply pipes and apparatus, and explaining the principle of working and other matters connected with a gas engine, the author devotes two chapters to notes upon failures and defects and to a series of similar notes upon valves, ignition piston rings and other working parts. This matter is conveniently arranged in paragraph form for ready reference, and is of an essentially practical nature. Oil engines are treated in the same way in the next chapter, and the volume concludes with a collection of useful rules and tables.

Geometry for Technical Students. By E. H. SPRAGUE, A.M.Inst.C.E., Assistant in the Engineering Department, University College, London. London: Crosby Lockwood and Son. 1904.

IN days gone by many of us wrestled at school and at college with Euclid undiluted and unreformed, unwillingly acquiring what we were told was mental discipline, and attaining some proficiency in mastering the dark sayings of those who were mathematicians first and experts in the English language second. In the present day people seem to want geometry made easy, and there is a flowing tide of books on "practical" geometry, some good and others bad. Euclid is the Bible of the engineering student so far as geometry is concerned, and we cannot help feeling that most of the books to which we refer very much resemble parallel works intended to familiarise children with Scripture history and teachings. The little book written by Mr. Sprague may be very useful in its way, and as a sort of "child's guide to knowledge" it may be recommended to beginners. Mr. Sprague deals with 48 selected propositions in a clear and lucid manner, giving in some cases illustrations showing how the principles involved may be applied in engineering practice, and he concludes with some problems in plane geometry likely to be found useful in drawing. The author believes that the student may find in it "an easier guide to his requirements than our ordinary text-books," a suggestion that we are quite prepared to endorse, but we do not recommend his work as a substitute for standard treatises on the subject.

Double Entry, or The Principle of Perfect Book-keeping. By ERNEST HOLAH, Member of the Institute of Chartered Accountants. Fourth Edition. London: Effingham Wilson.

THE author of this little work has managed to compress within its seventy pages a large amount of information and instruction upon a very important subject to all business men. While the information is generally useful, it applies to the mercantile world rather than to a business such as building, in which the items are of so varying a nature, and the accounts of so complex a character, that the author might easily have taken the whole of the pages for the purpose of dealing with the book-keeping of the trade with which we are more particularly identified. He takes the tea trade as being a peculiarly troublesome one to deal with in book-keeping, but we are inclined to think that those who have to deal with the keeping of builders' books as they should be kept—but not always are—will think that the tea trade is by no means the most troublesome.

The work is well worth studying by anyone interested in book-keeping, the descriptions and examples given being very clearly set forth; but our readers will turn instinctively to Section X, "Minute Book and Prime Cost Book," which gives a somewhat slight outline of the books and forms necessary for a contractor's or engineer's business. This section might with advantage be much amplified, and a few examples would greatly add to the usefulness of the work, which at present applies to a mercantile or selling business rather than to one such as a builder's, where the accounts and balance sheets have to be made up from so many different sources.

Rating: Principles, Practice, Procedure. Second Edition. By PHILIP MICHAEL FARADAY. The legal matter revised by A. F. V. SCHUTER. London: Estates Gazette; Sweet and Maxwell. 1903.

THIS is a full and useful book, but we have one fault to find—that the decisions of the Courts are set out at too great length, and should in many cases have been epitomised. The most important of the recent decisions which is referred to in this edition is that of the House of Lords in Cartwright *v.* Sculcoates Union, which has an important bearing on the rating of public houses, and is to the effect that the Court should have before it evidence of the trade done, and that the best evidence is gathered from the books which show the earnings of the house. We can thoroughly recommend this new edition, even if it might have been somewhat shorter.

The "Practical Engineer" Pocket-book for 1904. Manchester: Technical Publishing Co.

SEVERAL alterations and additions have been made in the present edition of this useful handbook, which, as many of our readers are aware, is more especially addressed to mechanical engineers. The additional matter includes descriptions of the Stirling water-tube boiler and the Daimler motor, and the revisions cover a re-written section on Patents and Patent Law. All the information given appears to be well up to date, and the book quite keeps up its reputation as a reliable pocket companion for the engineer.

The "Practical Engineer" Electrical Pocket Book for 1904. Manchester: Technical Publishing Co.

THE fifth annual edition of this well-known pocket-book contains some additional facts in reference to conduit wiring, and descriptions of some new types of electrical instruments. There are a good many misprints, such as "Bastain" for "Bastian," "Schallenberger," for "Shallenberger," "Thompson" for "Thomson," etc., still, we have not been able to detect any serious errors, and the book will be found useful by electricians.

The Business Encyclopædia and Legal Adviser. By W. S. M. KNIGHT, Barrister. Vol. VI., "Commercial and General Gazetteer of the World." London: The Caxton Publishing Co.

THIS volume appears to be a kind of offshoot of the original idea, and to have been suggested by the Fiscal controversy. The places are arranged alphabetically, and their principal products and business features are shortly but clearly pointed out.

DIARIES AND ALMANACS.

WE have received from Messrs. Hudson and Kearns (83, Southwark-street, S.E.) some of their neat and useful diary blotting pads. On several previous occasions we have referred to the excellence of these productions, and we can again recommend them to our readers. No. 8a and the Bankers' pads (7s. and 8s. respectively) are particularly useful and convenient pads, each including a diary interleaved with blotting paper, and a tear-off date remembrancer. No. 8a also contains space for memoranda of appointments. No. 4 is a convenient and neatly-arranged portfolio pad.

Messrs. Waterlow Bros. and Layton, Ltd. (Birchin-lane, E.C.) have sent us their well-known architects', surveyors', and auctioneers' diary and almanac for 1904. The work is published at 3s. 6d. and 6s., and the present issue, which contains a great deal of information which is always useful to architects and surveyors, is the 23rd year of publication. The work is well-bound and neat, and the information it contains is up-to-date and reliable as far as we have been able to test it. This is one of the best diaries issued.

Sprague's Pocket-Diary and Architects' and Surveyors' Memorandum Book for 1904 has just been issued from East Harding-street, E.C. The usefulness and the value of the contents of this diary are well known to most of our raders, and we need do no more than call attention to it. Messrs. Sprague have also sent their Pocket Diary and Pocket Purse or Letter Case—a well-made and useful article.

The City Diary and Almanack for 1904 (Messrs. W. H. and L. Collingridge, Aldersgate-street, E.C.), is the 41st annual issue of a well-known and useful little diary. It is published at 1s., and the diary portion, giving three days to a page, is interleaved with blotting-paper. This is an excellent little work, the information in which makes it especially useful to City people.

"*Knowledge* Diary and Scientific Handbook for 1904" (326, High Holborn) contains, in addition to an admirable diary, the following interesting articles: "The Camera Applied to Science, in Natural History, Microscopy, and Astronomy," by Messrs. R. B. Lodge, M. I. Cross, and E. Walter Maunder, F.R.A.S.; "Practical Meteorology," by Mr. William Marriott, the Secretary of the Royal Meteorological Society; "Physics," by Mr. Edwin Edser, A.R.C.Sc., F.Ph.S.; "Practical Work with a Small Telescope," by Mr. E. Walter Maunder, F.R.A.S.; "Some Uses of the Microscope," by Mr. M. I. Cross; and "Variable Stars," by Col. E. E. Markwick, F.R.A.S. It also contains an astronomical summary and account of celestial phenomena for the year. The work contains a portrait of Charles Darwin, and is published at 3s. net.

Messrs. Dargue, Griffiths, and Co., Ltd., Warming and Ventilating Specialists, of Liverpool, have sent us a copy of their Annual Appointment Book—a useful little diary, suitable for the waistcoat pocket.

Messrs. Bemrose and Sons, Ltd., (Snow-hill, E.C.), have again issued their Shakespearean, Poetical, and Proverbial Daily Calendars. They are arranged to open out and stand upon a table or they can be hung upon a wall. The calendars, which are published at 1s. each, are useful and artistic.

Calvert's Mechanics' Almanack and Workshop Companion for 1904 (J. Heywood, Manchester and Shoe-lane, London) contains practical and technical information for artisans and handicraftsmen and others. It is illustrated with diagrams, and the price is 4d.

"The Gloucester Diary and Directors' Calendar for 1904," is published for the Gloucester Railway Carriage and Wagon Co., Ltd., by Mr. Brooke, of Gloucester. It is the ninth year of issue, and gives a list of the stations and junctions attended by the company's wagon repairers.

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Messrs. Stephens and Carter, ladder, barrow, etc., makers, Green-street, Paddington, have issued to the trade a date indicator, which will be of use.

The Campbell Gas Engine Co., Ltd., Halifax, have sent us a neat little diary, suitable for the waistcoat pocket.

TRADE CATALOGUES.

We have received from the Edison and Swan Electric Light Co., of Queen-street, London, four of their November leaflets describing novelties which they are putting on the market. The Ediswan "Liliput" arc lamp for indoor use ought to prove useful for lighting halls, etc. The low price and high efficiency of these lamps should make them popular. Other novelties described are a three-plate ceiling rose specially adapted for use on high voltage supply circuits and various cheap forms of ammeter and voltmeter for testing batteries. We notice also that they make a new form of lamp for use in electric radiators. The flange cap is ventilated and secured by extra hard cement, and a small inspection window of clear glass is now provided in the obscured glass.

Mr. Robert Iles (Walham-green) sends a catalogue of iron buildings, hay sheds, small warehouses, drill halls, small hospitals, schools, cottages, roof principals, corrugated pale fencings, etc. The catalogue is accompanied by three short specifications showing what work is put into the different classes of buildings, time required for completion, and other useful particulars.

We have received from the Electric and Ordnance Accessories Co., Ltd., of the Stellite Works, Birmingham, a catalogue of their Central Battery Telephone Systems. It is claimed that the system is perfectly secret, and, if desired, it can be made so that even the operator cannot possibly overhear conversation. The method of operating seems particularly simple, and it is said that one operator can deal with 200 lines. Interesting descriptions are given of telephone outfits for offices and other large buildings. The cost of an installation on a central battery system can easily be estimated approximately from the data given in this catalogue.

Correspondence.

MODERN CHURCHES.

SIR,—As you have given publicity to Mr. Bidlake's notes on Mr. C. A. Nicholson's paper on "Modern Churches," perhaps you will allow one who is not in complete agreement to give his reasons for differing, not only from their author, but, which is more serious, from yourself. Is it not probable that what Mr. Bidlake rightly calls "the inveterate conservatism of the clergy" in insisting that churches shall "continue to be built after the Mediæval-English model" may arise from some conviction on their part that a church is not built primarily for seeing and hearing; that it is not a lecture-theatre or concert-hall (where these are the main requirements), but a place of worship?

The feasibility of the condition "that all shall be able to see and hear the preacher" depends entirely upon how many the "all" are presumed to be. If they are 3,000—as in the Liverpool conditions—it becomes an absurdity; except in a galleried and comparatively low hall the articulate speaking voice cannot be heard by so many persons at once. If these be practical requirements, by all means let us be unpractical; and when we set ourselves to think out a church do not let us be scared by Mr. Bidlake's towering spectre of the three-decker, looming in full view across the well-ventilated, comfortable auditorium. No doubt the steel stanchion is less obstructive than the massive pier, and wood blocks are warmer and quieter than marble, but there are other and incompatible qualities far more important than those called by a false opposition "practical." Anything, rather, which tends to influence the emotions in the right direction is practical in a church, be it height or heaviness, gloom or brightness, complication or simplicity, austerity or richness, or any other quality of noble building.

Perhaps the most valuable of the qualities that go to make a church devotional is mystery; but if the aiseleless parallelogram is to be the ideal church plan, it is difficult to see how any effect of mystery is to be obtained without that subdivision by screens and so forth which upsets the very *raison d'être* of the plan in question.

In conclusion, let me quote Mr. Bidlake's final paragraph, which I most heartily endorse: "Repose in structure and decorations; mass and strength; depth and shadow, vastness and unity; distance and mystery; these qualities, inherent in the building, unconsciously impress the worshipper; the noisy world is left outside, and the thoughts are directed to the world beyond."

F. C. EDEN.

*** We are not nearly so much in disagreement with Mr. Eden as he supposes. We have always said that a church is not an auditorium; Mr. Bidlake's sentence quoted above exactly expresses our own feeling. What we object to is the clinging to and reproducing of the Mediæval type of church, as if nothing better or more suitable to modern worship were possible. Even in a purely architectural sense, the narrow "crossing" of the Mediæval plan is its weak point. An extended central area is both finer and more practical. But the question, as we hinted before, depends partly on differences in religious sentiment, which could not suitably be discussed in our columns.—ED.

VENTILATION OF THE BIRMINGHAM GENERAL HOSPITAL.

SIR,—In the discussion following upon the paper on the Royal Victoria Hospital which I read at the meeting of the R.I.B.A. on the 14th inst., Sir John Holder referred to Mr. Key as the engineer who installed the "Plenum" ventilation at the General Hospital, Birmingham, but in the report appearing in your last issue the name is unfortunately given as that of Mr. Keith. As there is a Mr. Keith who does heating and ventilation work, the error, if uncorrected, might be prejudicial to Mr. Wm. Key, who was the first in this country to make "Plenum" ventilation practicable.

WILLIAM HENMAN, F.R.I.B.A.

The Student's Column.

CONCRETE-STEEL.—XXV.

COLUMNS *(continued)*.

RESUMING the discussion of hooped concrete, we will now deal with further experimental data obtained by M. Considére, throwing valuable light upon the elastic behaviour of concrete-steel columns reinforced in the manner indicated.

For our present purpose we take the results afforded by the testing of three specimens. In all these the concrete was in the proportions of 840 lbs. of cement per cubic yard of aggregate, the form of cross-section was octagonal, the diameter 5.9 in., the length 4.27 ft., and the reinforcement consisted of longitudinal rods and helicoidal spirals. Further details of the reinforcement are given below in tabular form.

Specimen No.	Spirals.		Longitudinals.	
	Diameter.	Spacing.	Diameter.	No.
7	0·25 in.	0·79 in.	0·3125 in.	8
8	0·25 in.	0·79 in.	0·3125 in.	8
9	0·25 in.	0·79 in.	0·2760 in.	20

In the conduct of the tests the specimens were first loaded up to a certain point, pressure was then relaxed, and the specimens were again loaded.

Table XXX. shows the loads in pounds per square inch, and the consequent shortening in decimals of an inch.

TABLE XXX.—Effect of a Repeated Loading on Hooped Concrete (Considére).

First Loading and Unloading.				Second Loading and Unloading.			
Load. lb. per sq. in.	Shortening, inches.			Load. lb. per sq. in.	Shortening, inches.		
	No. 7.	No. 8.	No. 9.		No. 7.	No. 8.	No. 9.
1,053	·0047	·0173	·0118	1,850	—	·0540	·0335
1,850	·0095	·0176	·0205	3,300	·0449	·0642	·0406
2,375	·0130	·0330	·0264	4,490	·0540	·0745	·0540
3,330	·0168	·0437	·0350	4,893	·0645	·0772	·0583
3,825	·0262	·0567	·0437	5,150	·0662	·0934	·0630
4,490	·0480	·0709	·0449	5,420	·0685	·0945	·0760
3,825	·0480	·0658	·0445	5,600	·0827	—	·0875
3,302	·0378	·0615	·0400	6,210	·1356	—	—
2,375	—	—	·0354	6,740	·1940	—	—
1,850	—	·0496	·0335				
1,053	—	·0480	—				
0	·0146	·0248	·0102				

In the first place, these experiments demonstrate the general unreliability of results calculated on the basis of the coefficient of elasticity, and the extreme variability of concrete, even when made with more than usual care. They show, further, that if the results aimed at by a designer are to be adequately realised, measures must be adopted to obtain concrete possessing physical properties approximately similar to those assumed for the purpose of calculations. Otherwise the most precise determination and adjustment of the reinforcement will be of comparatively small practical value.

From a general study of the deformation curves of these and other specimens of concrete-steel, it was observed that a marked change of inclination takes place beyond a certain stage of the loading, and the point corresponding with this change may be regarded as indicating the elastic limit, although, strictly speaking, concrete has no true elastic limit.

Specimens of similar concrete appear to show far less irregularity with regard to the

RUBEROID ROOFING.

SIR,—Referring to the paragraph which appeared in the *Builder* of November 28 last, regarding Ruberoid roofing, would say that we do not claim that this material is fire-proof but fire-resisting, inasmuch as it is made of wool with which every fibre is thoroughly saturated with a non-inflammable compound, resembling rubber. Ruberoid has been employed for some years in this country for buildings of all kinds, and we have not heard of a single instance of a conflagration occurring, although covered on roofs such as engine sheds, foundries, chemical works, etc.; but in America many fires have taken place in adjoining structures to that which Ruberoid has been covered, and the owners have attributed the saving of their buildings to the use of Ruberoid roofing. Others report that the only portion of plant not totally destroyed was that part covered with this material.

The R. I. Technological Trade Museum of Vienna tested Ruberoid on a small trial roof, and it withstood the flames for one hour and a quarter. They have, therefore, designated Ruberoid as being fire-proof. The Board of Buildings of Manhattan, New York, have approved its use provided for in section 94 of the Code, also the City Ordnance of Savannah Buildings Department of Paterson, the South-Eastern Tariff Association, Atlanta, City Ordinances of New Haven, etc.

The way to test Ruberoid roofing for fire-resisting qualities is either on the top or bottom of the material, and not at the sides. If a lighted match is persistently applied to it, the ensuing blaze quickly splutters and dies out.

Ruberoid will run at about 250 deg. Fahr.

ROBERT W. BLACKWELL AND CO., LTD.,
Per Chas. Brock.

*** We presume Mr. Brock means that Ruberoid will not burn when fixed down close on a roof surface. This may be so; but as to its being steeped in a non-inflammable compound, we can only say that a strip cut from the specimen sent to us, and applied to a flame, burned like a torch. In many respects it seems, however, a good roofing material.—ED.

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elastic limit than to the coefficient of elasticity. Thus, the elastic limit of specimens 7, 8, and 9 was not found to vary to a greater extent than between 4,830 lbs. to 5,400 lbs. per square inch, while, as already stated, the coefficients of elasticity for Nos. 7 and 8 were widely divergent. Further, the elastic limit depends very much upon the proportion of cement in the concrete, a factor which has little influence on the coefficient of elasticity.

Other observations of considerable practical utility are to be made from examination of the results afforded by the same tests. In the first place permanent deformation is caused by the first loading, as might be anticipated, and the deformation increases with the second loading but in smaller and decreasing measure. Consequently an appreciable increase in the value of the coefficient of elasticity takes place with repetitions of the load. In the second place, it appears that the coefficient of elasticity increases with the pressure in the reloading instead of decreasing with increasing pressure as it does during the application of the first loading.

The latter point is of much practical importance to the designer of columns. In actual practice columns are of such length in proportion to their transverse dimensions that the stresses due to flexure are the main points for consideration. Hence it is an unfavourable circumstance that in concrete, steel, and other materials of construction, the coefficient of elasticity should decrease with the increase of the load. This condition applies equally to concrete-steel, however reinforced, under the first loading; but, as we have seen, it does not apply to hooped concrete which has already been subjected to a first loading, providing the second load does not exceed the first in value. So far as we are aware, this fact has never been observed in connexion with any other variety of material. The phenomenon is of such importance that we think it well to give some results obtained by M. Considére at the laboratory of the Ponts et Chaussées. The tests were conducted upon a specimen in which the concrete was mixed in the proportion of 1,000 lbs. of cement to 32 cubic feet of gravel, varying from 0.2 in. to 1 in. diameter, and 10.7 cubic feet of sand passed through a sieve with 0.2 in. holes. The form of cross-section was octagonal, the diameter 4.3 in., the length 51.18 in., and the reinforcement consisted of eight longitudinal rods 0.17 in. diameter, and helicoidal spirals of 0.17 in. diameter wire spaced 0.82 in. centres, the average diameter of the coils being 3.75 in.

In Table XXXI. will be found the shortenings consequent upon three repetitions of load.

TABLE XXXI.—Effect of Several Repeated Loadings on Hooped Concrete (Considère).

First Loading and Unloading.		Second Loading and Unloading.		Third Loading and Unloading.		Fourth Loading and Unloading.	
Load. lbs. per sq. in.	Shortening. inches.	Load. lbs. per sq. in.	Shortening. inches.	Load. lbs. per sq. in.	Shortening. inches.	Load. lbs. per sq. in.	Shortening. inches.
128	·0	1,180	·0504	1,620	·2790	1,620	·553
441	·0047	1,620	·0544	3,170	·3105	4,720	·614
810	·0142	1,990	·0615	4,720	·3400	6,340	·638
1,180	·0205	2,360	·0693	5,530	·3580	7,100	·658
1,620	·0299	3,170	·1028	6,340	·3982	7,525	·669
1,990	·0457	3,992	·1560	7,525	·4550	7,910	·684
2,360	·0630	4,720	·2200	7,910	·4600	8,710	·708
1,620	·0606	5,530	·3600	7,525	·6575	10,290	—
1,180	·0590	5,100	·3530	7,100	·6580	9,200	·900
810	·0528	4,720	·3386	6,340	·6540	7,910	·950
441	·0394	3,170	·3245	4,720	·6410	6,340	·934
128	·0249	1,620	·2480	1,620	·5830	128	·795
—	—	128	·2410	128	·5480	—	—

The concrete surrounding the spiral reinforcement was removed before the experiments were commenced because difficulty was anticipated in determining the precise value of the effects produced thereby. Consequently as the outer concrete was cut away so that the circumference of the resulting cylinder passed through the centres of the reinforcing coils, the net diameter of concrete was 3.37 in. As will be seen from Table XXXI., the first load attained the maximum value of 2,360 lbs. per square inch, and the three succeeding loads amounted to 5,530 lbs., 7,910 lbs., and 10,290 lbs. per square inch. The shortening was measured, with one exception, under each pressure during the loading and unloading, the only exception being in the case of the 10,290 lbs. load, when flexure prevented the measurement from being taken. The coefficients of elasticity corresponding with the various pressures of each loading were carefully calculated, and were found to confirm the conclusions previously stated. Even after the pressure of 10,290 lbs. per square inch had been imposed and taken off, it was ascertained that the test specimen possessed a coefficient of elasticity equal in value to that determined after the imposition of the lightest loads. It was found, further, that the imposition of a first load had the effect of improving the concrete proportionately to its original deficiency of resistance.

Summing up the conclusions drawn from the foregoing and similar experiments, we find:—

1. That the imposition of a first load on a specimen of hooped concrete, however high may be the value of the load, has the effect of raising the elastic limit up to the value of that load.

2. That the coefficient of elasticity developed by the hooped concrete under all variations of load between the lowest and the previously applied load is higher than the highest coefficient of elasticity possessed by the specimen before the first loading, and which even then corresponded only with low pressures.

3. That the increase in the value of the coefficient of elasticity after the first loading is inversely proportionate to the richness and original strength of the concrete. That is to say, the increase of value is greater for poor and weak concrete than for rich and strong concrete.

The properties observed by M. Considére resemble those exhibited by iron and steel in respect of increase in the value of the elastic limit, but they are quite novel in so far as they relate to the increasing values of the coefficient of elasticity under loads of smaller value than the first load imposed.

It should be particularly noted that in this respect hooped concrete behaves quite differently from reinforced concrete in tension, as in the latter case the coefficient of elasticity decreases with deformation, and the greater the deformation the greater is the decrease in the value of the coefficient.

Having ascertained the remarkable properties possessed by hooped concrete, the next thing attempted was to find some means of making the discovery useful in practice. It is quite evident that this was by no means an easy task, owing to the almost infinite variations in the proportions of the concrete and the metal one to the other, and to equally infinite variations of the intrinsic strength possessed by the materials used.

Some further experiments were conducted with the object of throwing light upon the laws governing the elasticity and resistance of hooped concrete. Two methods were adopted for the purpose of ascertaining experimentally the effects of hooping. The first was to prepare two specimens as nearly identical as possible, and to correct for differences. The second was to test a specimen with its spirals and afterwards without them.

In applying the first method, two specimens were carefully made of the same proportions and dimensions. These were first tested to ascertain the differences in their elastic behaviour so as to afford data for correction in the results obtained. The exterior sheathing of concrete was then removed from each specimen, and tests were made, one upon a specimen so prepared and one upon the other specimen after removal of the spiral coils.

In applying the second method three specimens were made, and each of them was subjected to seven successive loadings and unloadings. Afterwards the concrete core, stripped of its spirals, was tested in a similar manner, and, making due allowances for the different conditions, the results obtained by the first method were practically confirmed. After comparison and correction of the results, it was found (1) that the increase in the value of the coefficient of elasticity due to hooping was equal, for a first loading, to 90 per cent. of the coefficient of elasticity of longitudinal rods having the same weight of metal, and (2) that the increase in the value of the coefficient of elasticity due to hooping was equal, for a subsequent loading or subsequent loadings, to nearly double the value of a similar weight of metal applied in the form of longitudial reinforcement.

It was observed, further, that the hooping did not produce its normal effect on the elastic behaviour of the concrete until the load approached the value of about 220 lbs. per square inch, and that of the total deformation due to the first loading a permanent bulging of the concrete was left, after unloading, between the coils. This was sufficient to cause an effective contact between the concrete and the spirals, so that the latter were able to exercise their full effect during subsequent loadings.

These facts appear to account for an important difference between the influence of spiral and longitudinal reinforcement. We have previously stated that in air-hardened concrete the longitudinals are compressed by shrinking of the concrete, and consequently the elastic limit of the metal is soon reached. In the case of steel this point is reached when the load has caused a longitudinal shortening equal to 0.06 per cent. of the length of the test specimen. On the other hand, the hoops compressed by the setting of the concrete must first be relieved of compression before they can be subjected to tension, and tensile stress only reaches a critical value when longitudinal shortening has passed beyond 0.06 per cent. of the length.

Consequently we come to the conclusion that the spirals only begin to suffer serious stress under the first loading of specimens hardened in air after the longitudinals have not only passed their elastic limit, but have almost reached their ultimate strength.

Extension of the metal forming the spirals results simply from lateral bulging of the concrete. This is comparatively small, being only about 0.3 to 0.4 of the longitudinal shortening. Notwithstanding the comparatively slow development of stress in the spirals, these produce most important effects, which account for the exceedingly great deformation that may be caused in hooped concrete without injury to the reinforcement or to the concrete itself.

In concrete-steel hardened in water the concrete expands, causing tension in the hoops and the longitudinals. Hence the former will at once begin to take tension on the application of load, and the latter will first be relieved of tension before suffering compressive stress.

These considerations suggest than advantage may be derived from keeping hooped members in water or moist air for a sufficient period of time before exposing them. We have seen that the efficiency of the hoops is most marked after a preliminary loading, and it is probable that a similar result might be obtained by hardening the concrete either in water or in a humid atmosphere. This is a point to which the attention of our readers may usefully be directed.

The last experiments to which we will refer had for their object the determination of the elasticity of the concrete in hooped members. To effect this, the necessary measurements were made upon the same specimen when hooped and after the hoops had been removed.

One fact evidenced by these experiments is that the compressive resistance of concrete, which has been hooped, after having reached a certain maximum value remains constant within wide limits, notwithstanding the increase of deformation. A similar phenomenon, it may be mentioned, is also exhibited by concrete-steel in tension and subject to elongation exceeding the elastic limit.

Another point worthy of notice in connexion with the same experiments is that while the resistance of concrete cores tested after the hooping had been removed reached the value of 1,565 lbs. per square inch, the same quality of concrete which had not been hooped gave a

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resistance varying from 832 lbs. to 1,170 lbs. per square inch.

Hence we may conclude that preliminary loading in conjunction with spiral reinforcement has the effect of increasing the resistance of concrete by 50 per cent. or more.

FROM the foregoing discussion the following assumptions may be derived as the basis of computations relating to the practical strength of hooped concrete columns:—

1. For a first loading, the coefficient of elasticity of a hooped concrete column is equal to the sum of the coefficients of elasticity of the concrete, of the longitudinal reinforcement, and of imaginary longitudinal reinforcement with a volume equal to 90 per cent. of the actual spiral reinforcement.

2. For a second loading, in which the pressure is less than the maximum pressure of the first loading, the coefficient of elasticity of a hooped concrete column is equal to the sum of the coefficients of elasticity of the concrete as increased by the first loading of the longitudinal reinforcement, and of imaginary longitudinal reinforcement with a volume equal to double that of the actual spiral reinforcement.

3. For a first loading, the elastic limit of a hooped concrete column is equal to the original elastic limit of the concrete plus the resistance of the reinforcement, computed on the basis of a shortening of from 0.08 per cent. to 0.13 per cent., this shortening representing the range of the practical elastic limit of hooped concrete.

4. For subsequent loadings, the value of the elastic limit is not an important consideration, for we have already seen that it can be raised at will, even to the ultimate compressive strength of the concrete.

5. The compressive resistance of a hooped concrete column is fully equal to the sum of the original resistance of the concrete at the elastic limit of the longitudinal reinforcement, and of the resistance at the elastic limit of imaginary longitudinal reinforcement with a volume equal to 2.4 times that of the actual spiral reinforcement.

It is well known that in calculating the strength and proportions of practical columns their resistance to flexure must be taken into account, as well as their resistance to direct compression. We do not propose to enter fully into a discussion of the laws governing the strength of columns, as this subject has already been considered at length in a previous series of articles.*

Any reliable column formula may be used for determining the ratio of length to transverse dimensions necessary for insuring adequate strength and stability. Practically, all trustworthy column formulæ are based more or less directly upon Euler's well-known equation for long columns, but these formulæ are so disguised and so qualified by empirical coefficients that at first sight it is sometimes difficult to recognise their common origin, and to account for the extremely variable results they give. One of the most rational formulæ is that evolved by Mr. Moncrieff, and this is to be found in the series of articles mentioned above. We may remind our readers that there are two general forms of this rule—one applying to the failure of round-ended and fixed-ended columns by compression, and the other to the failure of flat-ended columns by incipient tension. In ordinary building construction it is extremely doubtful whether the condition of fixity is ever attained in a measure sufficient to justify the application of the formula for columns with fixed ends. In concrete-steel construction, however, the condition of fixity is comparatively easy of attainment, and should be attained in most cases, as a concrete-steel building, when properly designed, is a monolithic structure. Hence, under these conditions, the formula for fixed ends may be used with safety.

This consideration in itself points to one reason for the relatively great strength of concrete-steel columns, and for the comparatively small proportions that are necessary.

M. Considère, in communications to the Congress on Methods of Construction, 1889, and to the Commission on Methods of Testing, 1892, showed that Euler's formula was correct for iron columns of any dimensions if the coefficient of elasticity were taken at the value possessed by a column under flexure, and not at the value corresponding with light loads. Such a variation of Euler's rule will not directly give the resistance (which we will here denote by the symbol S) of a column, because the value of the coefficient of elasticity E is itself a function of the unknown quantity S. The formula can be used, however, to determine the usual ratio $\frac{r}{l}$, as stated by M. Considère in the form—

$$\frac{r}{l} = \frac{1}{\pi}\sqrt{\frac{S}{E}}.$$

It then gives the value of the ratio $\frac{r}{l}$ (where l=length and r=radius), that will ensure the resistance S of the column. In applying this formula any value for S can be introduced with its corresponding coefficient of elasticity, and by a succession of calculations a table or diagram can be constructed for general reference.

This variation of Euler's formula is based on the assumption that a loaded column has an indefinitely small curvature, and further that it is in equilibrium under the action of an axial load. This implies equilibrium between the moment of resistance and the bending moment. The moment of resistance consists of two component parts, one represented by the increase of pressure on one side of the axis, and one by the decrease of pressure on the other side of the axis, such decrease being due to the relief afforded by flexure.

For one component part the value of the coefficient of elasticity of the column is that of the material under a first loading, and for the other part the value is that for a decreasing load. These two values of E are practically equal under light loads, but they vary in proportion to the increase of load, and when the elastic limit is passed the divergence is very considerable.

M. Considère gives a rule by which, when the ratio m, of the two different values for E is known, the correct proportional value may be calculated for insertion in his variation of Euler's formula, and when m is near to unity he says that the average value of the coefficients E may be introduced. It is quite evident that the use of his formula involves more information as to the properties of hooped concrete than is generally available at the present time, and for this reason no useful purpose would be served by giving numerical examples. We may add, however, that after discussing his method of calculation, M. Considère considers the question of the factor of safety to be used for hooped concrete columns, coming to the conclusion that a factor of from 3 to 3.5 will be found ample. From examples worked out according to the formula, we find that for a first loading a factor between these limits would involve stresses of about 1,000 lbs. per square inch on the concrete in hooped columns, and that for subsequent loadings a similar factor would involve stresses of about 1,900 lbs. per square inch on the concrete in hooped columns previously tested at the place of manufacture. These figures are high, but they seem to be justified by the remarkable results obtained in the course of the investigation to which we have already referred at some length.

Even if architects and engineers entertain the opinion that it is not prudent to apply the niceties of M. Considère's rule in the course of ordinary practice until further data are available, the results already obtained by M. Considère are sufficiently clear as an indication that considerably higher values may be set on some of the factors employed in formulæ of the usual kind. For the purpose of comparison we have calculated a series of columns by M. Considère's rule and by the rule given by Mr. Moncrieff; and, although the forms of calculation and the modes of applying the factor of safety differ essentially, the results are fairly comparable.

M. Considère has undoubtedly rendered a great service by his long and conscientious investigation, and it is to be hoped that experimental and practical engineers in this country will pursue the subject further.

So far as the calculation of ordinary concrete-steel columns is concerned, the maximum compressive strength to be taken into account is represented by the resistance of the concrete plus the resistance of the reinforcement, and ordinary column rules may be employed for computing the requisite proportions. Professor Brik recommends the calculation of long columns by a modification of the Gordon formula—

$$P = \frac{fs}{I + a\left(\frac{l}{d}\right)^2}$$

For columns of square cross section the value for the coefficient a is given as 0.0003, which is practically the same as the value usually taken in the same formula, for wrought iron.

The building rules of some German cities provide for the proportions of concrete-steel columns, which are assumed generally to be constructed with longitudinal rods and transverse ties as in the Hennebique system.

For instance, the Berlin code says that to prevent the buckling of Hennebique columns the concrete must have dimensions sufficient to guarantee the avoidance of dangerous stresses. The columns must be calculated with due regard to flexure as well as to direct compression, and the following equations are to be used:—

For axial loads .....$I = 60Pl^2$.
For slightly eccentric loads ...$I = 100Pl^2$.

Where I = the least moment of inertia of the column section in centimetres, P = the load in metric tons, and l = the unsupported length in metres.

Similar rules are in force at Dusseldorf and Hamburg, but in Frankfort the employment of concrete-steel columns is interdicted.

In the New York regulations governing the use of concrete-steel it is enacted that concrete-steel may be used for columns in which the ratio of length to least side or diameter does not exceed twelve. The reinforcing rods must be tied together at intervals of not more than the least side or the diameter of the column.

These stipulations must be read in accordance with others which specify the composition and proportions of the concrete, the quality of the steel, and which limit the extreme fibre stress to 350 lbs. per square inch on concrete in direct compression. The permissible compressive stress on steel is not stated, but as tensile stress in steel is limited to 16,000 lbs. per square inch, we presume the intention is that this limit shall also apply to compression. Finally, the provisions are subject to the general clauses making it incumbent on engineers to file detailed drawings for approval, and to carry out any required tests showing that the construction is capable of carrying, without any sign of failure, a load equal to three times the calculated amount. It will be seen, therefore, that the New York rules give a considerable amount of latitude to the officials of the Building Department, but they are not so precise in directions for the guidance of designers as might be desired.

Conclusion.—We have now dealt with the main characteristics of concrete-steel, and discussed at sufficient length the design of two main classes of members entering largely into all building construction.

The subject is a very large one, and it would be easy to fill another series of articles with particulars relative to the design and construction of walls, roofs, and other details, and of complete concrete-steel buildings. Even these would not exhaust the subject, for concrete-steel is admirably suited for the construction of bridges, subways, canals, sewage and water conduits, tanks, reservoirs, water towers, factory chimneys, and numerous other classes of building and engineering work.

To all these classes the principles we have attempted to elucidate are generally applicable, and our hope is that the articles now concluded may have the effect of stimulating interest in a new material that should appeal to architects as one entirely within their province, and as possessing the recommendations that it is particularly suitable for fire-resisting construction, and lends itself to the development of architectural designs in thorough and complete accordance with the established canons of the profession.

FIRE STATION, STREATHAM.—Mr. Edward Smith (Chairman of the Fire Brigade Committee of the London County Council) opened on Saturday afternoon a new fire station in Mitcham-lane, Streatham. The tender of Messrs. Potter Brothers, amounting to 10,000*l.*, was accepted for this station, and the buildings were put up under the supervision of the Council's own architect, the clerk of the works being Mr. Cusden. There are twelve sets of quarters, and accommodation for eleven men and a station officer, besides stables containing four stalls.

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* Vide *The Builder*, vol. lxxviii., pp. 404-6, 425-6, and 447-9.

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GERMAN BUILDING AND ENGINEERING TRADES' SCHOOLS.

Dr. Frederick Rose, British Consul at Stuttgart, following up a series of reports he has sent home during the last three years on the facilities provided in the ten technical universities of Germany for advanced instruction in applied science, has now prepared a special report dealing with the facilities provided for those degrees of technical instruction which, for the purpose of brevity and simplicity, may be termed secondary and lower technical instruction. Dr. Rose remarks that "to make use of and extend a figure of speech much in vogue in England at the present moment, if it is the province of higher technical education at the technical universities to provide captains of industry, it is none the less the province of secondary and lower technical education to provide the subaltern officers and rank and file of the industrial army. . . The secondary schools are very numerous, important, and comparatively unknown in the United Kingdom, where they are sometimes confounded with the technical high schools, or, as they should henceforth be termed, the technical universities, which stand on a higher level." The author then proceeds to give an exposition of the aims, organisation, and equipment of the so-called "Baugewerkschulen," or building and engineering trades' schools. These are very numerous in Germany, and play a most important part in secondary technical education. As their name implies, the instruction they originally afforded was confined to building operations. In course of time, however, other courses of instruction were added—for example, mechanical engineering, electrical engineering, surveying, hydraulic engineering, and ground engineering (Tiefbau); their designation, therefore, as building and engineering trades' schools is at the present time more accurate than the former one of building trades' schools. These different branches of secondary technical instruction have been combined together at one school partly from motives of economy and partly because the preliminary instruction in mathematics, natural science, and drawing are similar, or nearly so. The German building and engineering trades' schools are in some cases State schools, in others municipal or provincial schools; sometimes State and municipal or provincial combined. The instruction is given both in winter and summer in some schools, in others during the winter months only. It varies to a certain extent at the various schools both as regards duration and extent. For example, Prussian schools possess four classes of one half year each for building, whilst Nuremberg possesses five, and Stuttgart and Karlsruhe six classes for the same purpose. After giving a list of the fifty-two German building and engineering trades' schools Dr. Rose gives some account of those of Stuttgart, Karlsruhe, and Nuremberg as typical of the rest, and treats the twenty-two Prussian schools (which are all organised on one plan) in the form of a brief account of their foundation, development, and present condition.

Of the fifty-two building trades' schools in Germany, that of Stuttgart is one of the most flourishing and important. This was evidently recognised by the authorites of South Kensington Museum, who, after having inspected the school, invited its participation at the Health Exhibition held in London in 1884. At this exhibition the school was awarded two diplomas, one for a series of scientific school work and one for the excellence of its curriculum. About seventy years ago there were no cheap facilities for the further education and instruction of skilled building workmen except the expensive method of taking lessons from private teachers, foremen or architects. This disadvantage was also experienced keenly by those who wished to devote themselves solely to technical callings, or to become subordinate technical State officials, and who were consequently compelled to limit their studies or to attend technical schools in France or Austria-Hungary. For these reasons the Stuttgart Trades' School was founded in 1832, following the example of the technical schools which were founded in Germany at Karlsruhe (1825), Munich (1827), and Dresden (1828), and of the polytechnic schools founded in Austria-Hungary at Prague (1806) and Vienna (1815). In 1840 the Stuttgart Trades' School was raised to the level of a polytechnic, but as in course of time it became evident that, owing to the peculiar conditions then prevailing, the curricula for advanced and secondary technical education could not exist together in one institution, a new building trades' school was founded in 1845 for secondary technical education, and entirely separated from the polytechnic school, which was converted later into the technical university, and devoted exclusively to advanced technical education. For a period of twenty years, until 1864, the school was only opened in the winter months, as the majority of the pupils were engaged in practical building and other work during the summer, and was for this reason generally known as the Winter Building Trades' School. During this time the school had made such rapid progress, and proved itself of such great importance, that in 1865 summer classes were opened, the whole school was placed under the immediate supervision of the Ministry of Education with the title of "Royal Building Trades' School," and a special building erected at a total cost of 30,000*l*. In 1900 two new wings were added to the original building at a cost of 12,000*l*. The aim of the school is the instruction of so-called "Techniker" of the second degree in—

(1) Building: (a) practical master builders (Bauwerkmeister); (b) subordinate building officials for districts and towns (Oberamtsbaumeister and Stadtbaumeister); (c) road inspectors; (d) street inspectors; (e) fire prevention inspectors; (f) railway inspectors; (g) hydraulic engineering Techniker, who are entitled to give expert opinions for the construction of waterworks, for the settlement of disputes regarding water regulation and supply, and so forth.

(2) Mechanical Engineering: (a) Mechanical engineers of the second degree; (b) managers of mechanical workshops and factories; (c) overseers, machine draughtsmen, mill-owners, etc.

(3) Surveying: (a) Public surveyors (Geometer); (b) drainage and irrigation Techniker.

The organisation of the instruction is peculiar and differs materially from that of the technical high schools, inasmuch as facilities are provided in the lower classes for preliminary instruction in German, drawing, mathematics, and elementary science before the study of the special technical branches is commenced in the higher classes. This does not apply, however, to students of surveying and drainage and irrigation, whose preliminary educational qualifications are generally of a higher nature than those studying building and engineering. The teaching staff consists of twenty-nine professors and thirty-two assistant-professors, masters for special subjects, and assistants—total, sixty-one. After giving full details of the subjects of instruction in the three departments, Dr. Rose mentions that the general technical instruction given in the lectures and drawing classes is supplemented and assisted by the following:—

(1) Excursions for purposes of instruction or practical work to factories, buildings, and various places; duration of the same, two hours, half a day, or two to eight days. The expenses of travelling are defrayed by the school.

(2) Competition in the upper classes for prizes given for the best building designs; public exhibition of competitors' work.

(3) Annual public exhibition of all work done by pupils during the year.

(4) Permanent exhibition of the best work done by pupils at the school.

(5) School library, valued at 5,000*l*.

(6) Collections for instructions in building, mathematics, construction, mechanical and electrical engineering, chemistry, physics, surveying, freehand drawing, painting in water colours and oil, models, etc., the whole valued at 3,000*l*.

Examinations are held annually in each department. The fees of the pupils are upon an extremely moderate scale, amounting to only about 5*l*. per annum; they are partially or wholly dispensed with in the case of talented or industrious pupils who can produce officially attested papers certifying to their indigent circumstances. A certain number of small scholarships are contributed by the King of Würtemberg and the Freemasons' Lodge. The great majority of students live in extremely moderate circumstances, their annual expenditure for fees, drawing materials, books, board and lodging, and other matters averaging only about 50*l*. per annum. In the departments for building and engineering all pupils before entering must have completed their fifteenth year, and those who have served a term of apprenticeship must have attended an evening industrial improvement school for the attainment of some proficiency in drawing. Experience in practical work is not required for the general preparatory class and preparatory Classes I. and II., but it is absolutely necessary, however, for further study in the upper classes commencing with III., for building and engineering, in which the special technical instruction commences, and for Class I. in the surveying department. The minimum limits of practical work have been fixed as follows:—Building department, three building summers; engineering, two years; surveying, two years under the supervision of a public surveyor, of which one year for cadastral measurements. In this manner all the pupils of the technical departments for building and engineering commencing with Class III., and all the pupils of the surveying department commencing with Class I. are in possession of a sound preliminary education in mathematics, drawing, and elementary natural science, and have undergone a suitable period of practical work before beginning their special studies in the technical departments. This question of the acquisition of adequate preliminary educational qualifications before commencing to study either advanced or secondary technical science is, Dr. Rose points out, one of the most salient features of scientific technical education in Germany. The number of pupils in the Stuttgart school in the winter term 1901-2 was 1,049, whose callings or occupations were:—Certificated master builders and hydraulic engineering Techniker 31, masons and stone hewers 458, carpenters 165, no handiwork 33, engineering Techniker 283, surveying and irrigation and drainage Techniker 46, joiners 13, modellers 8, miscellaneous 12. The ages of the pupils were as follows:—Between 14 and 16, 72; between 16 and 18, 174; between 18 and 20, 285; between 20 and 25, 377; between 25 and 30, 135; above 30, 6. Dr. Rose remarks that "the large number of pupils between 20 and 25 is a very significant fact, and worthy of attention. As it may be safely assumed that a very large percentage of these pupils support themselves, either wholly or partially, their attendance shows what great value they attach to their further education." The amount of State aid given to the Stuttgart School in 1902 was 10,844*l*. "This school, therefore," remarks Dr. Rose, "one of fifty similar schools in Germany, situated in a town of less than 200,000 inhabitants, and organised for secondary technical instruction, receives no less than half the annual aid which it is proposed to grant to the London 'Charlottenburg,' the one school of its kind, situate in the richest and largest city of the world, and organised for advanced technical instruction." State aid on a like generous scale is granted to all technical schools in the Kingdom of Würtemberg.

The Karlsruhe Building Trades' School was founded in 1878, as a State institute. It contains no department for surveying as at Stuttgart, but provides, on the other hand, facilities for the acquisition of railway technical science, and for the training of future masters at industrial schools. The theoretical instruction is given with special reference to actual technical and industrial needs and objects. The classes last one half-year each, and may be attended, according to the personal circumstances of each pupil, either regularly and consecutively, or only during the summer or winter terms. As a rule the pupils of the mechanical, engineering, and masters' training departments attend the courses regularly and consecutively, whilst the pupils of the building department generally attend the winter courses only, and are occupied with practical building work during the summer terms. The school contains four departments—(1) for building, (2) for railway building and management, and for ground works or engineering, (3) for mechanical engineering, and (4) for the training of future masters at industrial and technical schools; a department for electro-technics will be shortly added. The school is under the supervision of the Ministry of Justice, Education, and Public Worship; it is managed by a director, who is appointed in permanency, with the assistance of the school council, which is composed of the principal professors and masters, of whom, including their assistants, there are 36. The fees are only £3 per annum. The instruction is only given during the day, as a rule from 8 a.m. to noon, and 2 to 6 p.m. in the winter, and from 7 to 11 a.m. or noon and 2 to 6 p.m. in the summer. The summer holidays last nearly three months, and are generally utilised for practical work; a week is given at Christmas and Whitsuntide, the latter week being often utilised for excursions, under the guidance of a professor, for the inspection of buildings, engineering works, and so forth. By far the greater number of pupils at German building trades' schools live in extremely modest circumstances; many of them earn the necessary money for study by alternating one term of study with one term of practical work as engineers, building foremen, or draughtsmen. The average expenditure of pupils during the winter term, which lasts about four-and-a-half months, is from 16*l*. 5*s*. to 21*l*. 5*s*. The number of pupils in the building department for the scholastic year 1901-2 was 134 in the summer term and 305 in the winter term.

The Nuremberg Building Trades' School differs to some extent from the Stuttgart and Karlsruhe schools, as the instruction is only given in the winter months—from November 2 to May 31—the remaining time being entirely devoted to practical work in building, engineering, and surveying operations, and in the mechanical workshops. It is, moreover, connected with an evening school, where, during winter and summer, three evening classes per week are held for those who are unable to attend during the day. The school is divided into three departments—(1) for building, with a course of five winter terms, (2) for mechanical engineering, with a course of three winter terms, and (3) a department for locksmith work, with a course of three winter terms. Generally speaking, only full pupils, that is to say, only

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pupils who devote themselves to all the subjects of instruction in the departments, are admitted to the school; exceptions, however, are allowed where the space available permits of this being done. The lowest age for entrance to Class I. of all three departments is fixed at fifteen; pupils entering higher classes must be of an age corresponding to the classes in question. A previous period of practical work is absolutely necessary; the minimum period for pupils of the building department amounts to one building summer for those wishing to enter Class I., and to two building summers for those wishing to enter any higher class. The certificate proving the completion of this work must state expressly that the pupil has been engaged in manual work. During the further building summers manual building work is not insisted upon, but the pupils are expected to occupy these periods by practical building work as draughtsmen in building offices or as assistant-overseers in building operations. The fees amount to 1*l.* 16s. per term, and 3s. entrance-money; the necessary expenditure for writing and drawing materials does not exceed 1*l.* 10s. to 2*l.* per term. The expenditure of the school in 1900 was 5,891*l.*, which was supplied as follows:—Income from fees, 816*l.*; State aid, 1,400*l.*; Provincial aid, 1,400*l.*; Municipal aid, 2,241*l.*; various, 34*l.* There are twenty professors and twenty masters; the number of pupils in the winter term of 1900 was 478.

The building trades' schools in Prussia, twenty-two in number, are all alike, each having the same conditions of admittance, the same courses of instruction, and the same number of classes. About the year 1877 the attention of the Prussian Government was drawn to the necessity of reorganising the then existing building trades' schools and of founding others in suitable towns. Prussia possessed at that period ten such schools. Of these one (Nienburg) was a State school founded in 1853 by the Government of Hanover, four were municipal schools, which had been originally founded on private schools, and the remaining five were art and building trades' schools, under provincial management, with facilities for the instruction of building workmen in drawing and modelling. In the circular dealing with this question the Prussian Government laid stress upon the following points:—That there existed a great scarcity of building workmen with the necessary degree of scientific technical instruction; that the majority of builders and building foremen and overseers were either unwilling or unable to give the workmen and apprentices any other than a purely manual instruction; that the latter were therefore compelled to acquire the necessary scientific instruction and facility in drawing at special building trades' schools in preference to the provincial industrial schools, at which latter the courses of instruction in building matters were necessarily incomplete; that, finally, the public building trades' schools in Prussia were unable to receive all the pupils desirous of entrance, and that therefore the foundation of new schools was a matter of necessity. In the course of the circular it was further remarked that although several private building trades' schools existed, it was by no means desirable to leave this important branch of secondary technical instruction in the hands of private speculation, as the result of the work emanating from the latter source had not always been of a satisfactory nature. The degree of proficiency required to be attained by pupils leaving the new schools was defined as the ability to design and construct, without extraneous aid, those buildings and structures generally met with in the country districts and in smaller towns. Taking into consideration the indigent circumstances of most pupils of building trades' schools, the many personal sacrifices which their desire for improved technical instruction entails upon them, and the great diligence and hard work necessary for the completion of the full course of instruction, the Government desired that the internal organisation of the schools should be subordinated to their just wishes and requirements, and that, above all things, the number of pupils in each class should be strictly limited, and only such masters appointed as were capable of blending theoretical instruction with practical knowledge. The results of the interest thus taken by the Prussian Government in the improvement and furtherance of the building trades' schools have been most beneficial. Twelve further building schools were either newly founded or developed from other schools, and the greater number of the already existing commercial building schools were placed under joint State and municipal control. In the course of time, however, this joint control was abandoned, and the building schools converted into State institutes, this change having been rendered necessary in the interests of uniform organisation and management, and by the increased facilities thereby afforded of training and procuring suitable and capable masters. It is worthy of mention, however, that in spite of this conversion many of the municipal authorities have continued to contribute their annual financial grants. The departments of building and ground engineering each contain four classes of one half-year each, so that two years' study are necessary for the completion of the full course. In the original plan of organisation the question of the advisability of arranging a course of four or three classes was left open, and was decided a few years later in favour of the course of four classes, owing to the representations of the Association of German Master Builders, which body had appointed a Commission for the purpose of studying the question. This Commission came to the conclusion that a course of three classes was inadequate for the needs of the special practical-theoretical instruction afforded by the building trades' schools, being too short for the pupils to attain any degree of proficiency in the designing of buildings. It recommended, therefore, the addition of a fourth class, deprecating at the same time any intention of enlarging the scope of instruction or of encroaching upon the province of the higher technical instruction afforded by the technical universities. The first two conditions of entrance are the completion of the sixteenth year and of a period of practical work of not less than two building summers in building or ground engineering operations. Great importance is attached to the completion of a previous period of practical work, and the pupils' attention is repeatedly drawn to the fact that the more extensive and thorough their degree of practical knowledge the more benefit will they derive from the instruction given at the schools. Where it is possible they are advised to acquire first a good scholastic education, then to complete the full course of manual practical work in their special line, and then finally to attend the four classes at the school without any interruption. Those pupils who prefer, for personal or other reasons, to alternate practical work with attendance at the school, are advised not uselessly to increase the intervals of time between the attendance of the four classes, and, if possible, to avoid an interval between the attendance of the third and fourth classes. The fees of the Prussian schools are higher than those of other German building schools. They amount to 4*l.* per winter or summer term, or for the preparatory classes. A further fee of 1*l.* per term is levied for the use of drawing boards and materials, books, etc., and for medical treatment during illness. *Foreigners are required to pay five times more than Germans.* The State expenditure for 20 of the Prussian building and engineering trades' schools is very heavy; it amounts to about 75,000*l.* annually, and includes the salaries of 19 directors and 320 professors and masters. The number of pupils attending the schools in the winter terms during the undermentioned years was:—1892, 2,165; in 1893, 2,276; in 1894, 2,459; in 1895, 2,618; in 1896, 3,009; in 1897, 3,129; in 1901, 4,695; in 1902, 4,986.

OUR MINERAL OUTPUT.

THERE has just been issued from the Home Office Mr. C. Le Neve Foster's general report relating to the output and value of the minerals raised in the United Kingdom in the year 1902. The total value is stated at 107,134,854*l.*, being a decrease of 8,000,000*l.* compared with the preceding year owing to the reduced prices paid for coal. We subjoin a summary of those portions of the report which most nearly concern the building and allied trades:—*Chalk:* A little chalk is raised from mines, but the total quantity is insignificant compared with the output of the open quarries. Kent is by far the most important chalk-yielding county, and many of the quarries produce more than 100,000 tons annually. Much of the chalk in Kent and Essex is employed in the manufacture of Portland cement at works on the banks of the Thames and the Medway. The total quantity raised during the year was 4,395,673 tons, valued at 193,757*l.* *Clay:* Many of the workings for clay and brick earth are less than 20 ft. deep, and so escape the operation of the Quarries Act, under which returns are compulsory. The figures given below do not, therefore, include the output of the shallow workings. There are few counties in England which do not produce minerals employed in the manufacture of bricks, and the strata from which they are dug belong to very various geological ages. Beginning with the coal measures, we have mines and quarries producing fire-clay on a very extensive scale. Permian strata are likewise largely worked, as well as various beds in the Triassic, Jurassic, and Cretaceous rocks. The Tertiary beds of the South of England afford much clay for making bricks, tiles, and pottery. The China clay of Cornwall and Devon is derived from granite decomposed *in situ*. The total quantity raised in the year was 15,304,136 tons, valued at 1,758,884*l.* *Copper Ore:* Copper mining is an industry which is rapidly decreasing in importance in Britain. In 1863 the production of copper ore and copper precipitate amounted to upwards of 210,000 tons, valued at over a million sterling, whereas in 1902 the production was only 6,112 tons, valued at 18,280*l.* Cornwall and Devonshire are the main sources of supply of this ore, and copper precipitate is being obtained from cupreous water pumped up from the old mines on Parys Mountain in Anglesey. The value of the 480 tons of metallic copper obtained by smelting in 1902 was, according to the mean of monthly prices of "best selected" British copper in the London market, 27,321*l.* *Gravel and Sand:* Total quantity raised, 2,067,745 tons; value, 158,051*l.* *Gypsum:* The principal gypsum deposits worked in the United Kingdom are those of Cumberland, Nottinghamshire, and Staffordshire, where the mineral occurs in irregular seams and in spheroidal and lenticular masses in the Keuper division of the Trias. The gypsum of Derbyshire and Westmorland occurs in rocks of the same age, whilst the seam worked in Sussex is considered to belong to the Purbeck beds. Quantity, 224,669 tons; value, 78,969*l.* *Igneous Rocks:* Under this head are grouped together various kinds of igneous rocks, such as granite, syenite, diorite, basalt, etc., principally used for making road metal and paving stones. Leicestershire, with its large quarries in Charnwood Forest, is by far the greatest producer of granitic rocks. Aberdeenshire and Cornwall are both remarkable for their granite, which is employed for building and monumental purposes. Carnarvonshire contributes important supplies of diorite, quartz-porphyry, and augite-porphyry. Shropshire and Staffordshire have extensive basalt quarries at Clee Hill and Rowley Regis respectively. Warwickshire has a large output of diorite from quarries at Atherston and Nuneaton. Total in 1902, 5,466,964 tons; value, 1,400,266*l.* *Iron Ore:* The principal iron-producing districts at the present time are Cleveland or North Yorkshire, yielding nearly 5,500,000 tons annually; Lincolnshire, Northamptonshire, and Leicestershire together, yielding 4,333,333 tons; and Cumberland and North Lancashire, with an output of over 1,500,000 tons. The Cleveland ore occurs in the form of a bed about 10 ft. thick in the Middle Lias, and is worked by true underground mining; it contains on an average about 30 per cent. of metal. The bed of brown iron ore in Lincolnshire, Northamptonshire, and Leicestershire forms part of the Inferior Oolite, and the workings are mainly open. The percentage of iron on an average is about 31. In Cumberland and Lancashire the ore is a red hematite which occurs in the form of huge irregular masses in the carboniferous limestone; this is the richest ore of the country, yielding more than 50 per cent. of metal. The ore worked in Scotland is chiefly Black Band Ironstone. Total ore in 1902, 13,426,004 tons; value, 3,288,101*l.*; pig iron obtainable, 4,399,814 tons; value, 14,244,937*l.* *Lead Ore:* Lead ore was obtained last year from no less than seventeen counties and from the Isle of Man. The most productive mines at the present time are Mill Close in Derbyshire, Halkyn in Flintshire, and Foxdale in the Isle of Man. The lead ore, which is almost entirely galena, occurs in veins of rocks of different ages, but especially in those of the carboniferous epoch. Foxdale, however, is an instance of a highly productive lead vein in granite. Much of the galena contains enough silver to enhance its value. The amount of lead obtainable in smelting has been reckoned as 95 per cent. of the amount indicated by the dry assay; thus in the case of an ore containing 80 per cent. of metal by dry assay the actual yield has been taken as 76 per cent. Total dressed lead ore in 1902, 24,606 tons; amount of lead obtainable in smelting, 17,704 tons; amount of silver obtainable from the lead, 145,873 ounces; value of the ore at the mines, 175,962*l.* The value of the 17,704 tons of metallic lead obtained, according to the mean of monthly prices of common pig lead in the London market for the year, was 198,875*l.*; the value of the 145,873 ounces of silver obtained from the lead was 14,663*l.* *Limestone (exclusive of chalk):* Limestone is very widely distributed throughout the United Kingdom; it is quarried in three-fourths of the counties of England, half the counties of Scotland, and in nearly every county of Wales and of Ireland. Even without taking chalk into account, it is one of the most important minerals which is quarried in this country. Total in 1902, 12,172,851 tons; value, 1,362,132*l.* *Ochre, Umber, etc.:* Under this heading are placed the oxides of iron and manganese used as pigments, lubricants, etc. Some of the ochre of Anglesey is obtained from a native earth dug up from shallow pits, and a considerable amount is deposited by the ferruginous water from the copper precipitation pits, when exposed to the action of the atmosphere in shallow ponds. Total in 1902, 16,963 tons; value, 22,406*l.* *Sandstone:* Under this heading are included all indurated sedimentary rocks, which consisted originally of particles of siliceous sand, such as ordinary sandstone, grit, quartzite, "ganister," and also some

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"flagstone" and "freestone." They are obtained from strata of various geological ages from the Cambrian period upwards. The counties of Lancaster, York, Glamorgan, Dumfries, and Lanark are the chief producers. Quantity raised, 5,483,130 tons; value, 1,798,879*l*. *Slate and Slate Slabs:* North Wales furnishes most of the slate; speaking roughly, rather more than three-fifths of the Welsh slate is produced from open quarries and nearly two-fifths from mines—that is to say, true underground excavations. The two largest open workings are the Penrhyn quarry, near Bangor, and the Dinorwic quarry near Carnarvon; the largest underground workings are those belonging to the Oakeley Slate Quarries Company, Ltd., at Festiniog, with an output of 44,613 tons. It is necessary to remark that the figures to follow refer to argillaceous slate, and do not include the thin slabs which are sometimes split from certain limestones and sandstones for roofing purposes, and are known locally as "slate"; these fissile stones are now included under the headings "limestone" and "sandstone" respectively. Total in 1902, 517,363 tons; value, 1,501,789*l*. *Tin Ore:* Practically speaking, all the tin ore is obtained from Cornwall. The ore occurs both in granite and the overlying slate. No alluvial deposits are worked at the present day; the so-called "stream-works" are merely works for extracting the ore still remaining in suspension in the muddy water flowing away from the dressing floors of the mines. The largest tin mine in Cornwall is Dolcoath; it produced during the past year 1,828 tons of dressed tin ore, or nearly one-quarter of the total output of the county. During the year the output of tin ore rose nearly 4 per cent., whilst the prices of English tin remained almost the same. Total dressed tin ore for 1902, 7,560 tons 3 cwt.; amount of tin obtained by smelting, 4,391 tons 14 cwt.; value of the tin ore at the mines or works, 513,872*l*. According to information supplied by experts in tin-smelting in Cornwall the average percentage of metallic tin obtainable is now reckoned at 60 in the case of ordinary ores and 42½ in the case of the produce of the so-called "stream-works." The value of the 4,391 tons 14 cwt. of metallic tin obtained, according to the mean of monthly prices of English block tin in the London market for the year, was 532,292*l*. *Zinc Ore:* This is almost entirely blende, and is obtained from veins in the Palæozoic rocks, principally in Cumberland, Wales, and the Isle of Man. The loss of zinc in smelting British ores by the ordinary methods has been estimated at 15 to 24 per cent. of the amount of metal in the ore. Messrs. Brunner, Mond, and Co., Ltd., are now extracting zinc from blende by Hoepfner's electrolytic process. Total yield, 25,060 tons; value of the ore at the mines, 91,207*l*.; amount of zinc obtained by smelting, 9,129 tons; value of same, 175,125*l*.

ROYAL COMMISSION ON LONDON TRAFFIC.

At the resumed sitting of this Commission on Thursday of last week evidence was tendered by Mr. A. J. Hopkins, the late Chairman of the Works Committee of the St. Marylebone Council, on behalf of a Conference of the Metropolitan Borough Councils of Hampstead, Kensington, Paddington, St. Marylebone, and St. Pancras. Witness stated that the Conference was of opinion that tramways should not be allowed in busy thoroughfares, even if they formed part of a great main road. They had considered the question of tube railways, and advocated a standing committee, mainly composed of Metropolitan members of Parliament, to consider all new schemes of tubes or underground railways affecting the Metropolis.

On Friday Mr. T. W. L. Emden, J.P., Mayor of Westminster, was called, and submitted classified particulars of the number of persons and vehicles passing various points in the City of Westminster. In regard to the congestion which existed at many of those points, witness said the only remedy his Council could see was that proposed by Sir John Wolfe-Barry, the construction of bridges over the streets at crossings, and the only objection to the construction of such bridges was the expense involved. Dealing with the question of street widenings and improvements, witness said that there would be a much greater inducement to the Metropolitan Borough Councils to make improvements if the existing law in relation to such improvements were amended. At present a street improvement could be made compulsorily only under Michael Angelo Taylor's Act, or by a special Act of Parliament. Under Michael Angelo Taylor's Act a great amount of expense was put upon the public shoulders, because only such property as was actually required for the improvement could be purchased, and the Act gave the owner and lessee a right of pre-emption of retention of the remainder of the property. Consequently, although a street might be greatly improved and the abutting property become of sufficient value to recoup all or a considerable portion of the cost of the improvement, by reason of the original holder's right of pre-emption, the Council would be precluded from retaining the remaining back land, and thus helping to reduce the cost of the improvement. Witness then went on to deal with specific causes of congestion, and mentioned among other causes the discharging of passengers from railway stations. Such stations should, he considered, be located, as far as possible in side streets. Coming to the question of subways, witness exhibited a model of a section of a street 54 ft. in width, showing subways for electric, gas, and water mains, and a shallow tramway subway underneath the centre of the street. The roadway itself in the case of a street of that width would be 20 ft., with sidewalks of 12 ft. In the case of wider streets there might be two subways for trams. The overhead system of traction would be used for such trams. He had noticed that a previous witness had suggested that it would be necessary in main thoroughfares to purchase the vault rights from the frontagers along the streets. That would add greatly to the cost, and was not contained in his suggestions for subways originally made some fifteen years ago. A system of arches for the construction of the subway was not in witness's opinion the best method. He would rather suggest a system in which railway construction was made use of. Immediately next the vault would be a pier, and at a convenient distance from that pier another pier would be placed, leaving between the two piers a sufficient space for a gangway and shelves, upon which would be the various tubes. Beyond the second pier a sufficient space would be left for the running of two trams. Then there would be another pier, a gangway, and a pier against the vault on the other side. The four piers would support the girdering of deep corrugated iron, such as was used in the construction of heavy railway bridges. The corrugations would be filled with concrete upon which wood block would be laid to form the roadway. Such a form of construction would be strong enough to carry any street traffic which might have to pass over it. Witness described various modifications in construction. The construction of such a street, with subways for tramways, etc., including stations for the stopping of the trams at intervals of one-eighth of a mile, such stations being 100 ft. in length, would cost inclusive of tramways, 440,800*l*. per mile.

In reply to Sir G. T. Bartley, witness said that in Westminster about four miles of such street construction would be required. He was merely taking the length from east to west; the direction in which the main stream of traffic went. There would be no necessity to have such subways in every street, nor would it be necessary to have subways for pipes in every street.

Questioned by Sir John Wolfe Barry: He would, if necessary, connect up the tramways north and south of the Thames by carrying them under the river in a tunnel. He had made no estimate of the probable cost, and there would not in his opinion be sufficient traffic directly north and south to make such a connexion pay. The main trend of traffic was from all parts of the suburbs to the central parts of London. He was opposed to the construction of a line of surface tramways along the Embankment, as it would greatly impede the traffic, and the Embankment was the only quick route for a carriage or cab from Westminster to the City.

Mr. John Hunt, the Town Clerk of Westminster, was then called, and at some length dealt with the obstruction of the streets by various public companies. In Westminster, besides the General Post Office and the London County Council, there were fourteen undertakers or companies who had statutory powers of opening up streets and appropriating their subsoil and surface. He disagreed with the suggestion of the Clerk to the London County Council, that that body should be the Road Authority to sanction and supervise all opening of the public streets. It would lead to endless friction and more expense to the ratepayers would result, as the staff would have to be increased. The County Council had not local knowledge, nor had they the care of the roads, and the result from their control would be more circumlocution. Witness then put in a table showing the more recent street improvements carried out in Westminseter, and also local improvements carried out by the City Council. Dealing with the question of subways, he said that the few feet of widening which had been carried out in the Strand had taken a longer period than the construction of a shallow subway for electric traction from Hammersmith to Bishopsgate would have taken.

The Committee adjourned until the 7th of January.

GENERAL BUILDING NEWS.

Church, Landore.—The new Church of St. Paul's, Landore, situate in the parish of Llangyfelach, was consecrated recently. The church is designed to seat 600 adults, and consists of a nave 79 ft. long by 11 ft. 8 in. wide; north and south aisles, each 76 ft. long, by 11 ft. 8 in. wide; chancel, 36 ft. 6 in. long by 25 ft. wide; organ chamber and clergy vestry. The site being on the side of a hill and sloping eastwards, the under space is utilised for a choir vestry, schoolroom, and classroom, approached from the nave level by a stone staircase. The rooms are also entered by a doorway on the south side at the schoolroom level. There are five lofty arches to the nave arcades, with a clearstory pierced with five three-light traceried windows. At the west end there are three two-light windows. The chancel is divided from the nave by an archway. It has a waggon-shaped roof of pitch pine. There is a five-light traceried window at the east end. The choir stalls are executed in oak, unpolished. The nave roof is 46 ft. high, and is constructed of pitch pine, open to the apex. Externally, the east gable reaches a height of 61 ft. to the cross, and the roof of the octagonal bell-turret reaches some 20 ft. higher. The wood and stone carving was done by Mr. William Clarke, of Llandaff, and the work has been carried out by Messrs. Weaver Brothers, of Swansea, under the supervision of Mr. Bruce-Vaughan, of Cardiff. The heating arrangements were installed by Messrs. E. E. Hampton and Co., Abergavenny and Cardiff.

Church, Hucknall Huthwaite.—On the 12th inst., the new church at Hucknall Huthwaite, which is situated on the Common-road, facing Sutton-road, and is dedicated to All Saints, and was consecrated by the Bishop of Southwell. The structure is now complete with the exception of the upper part of the tower. The site was given by Messrs. Unwin and Heathcote, and the walling stone by the New Hucknall Colliery Company from their local pit. The building is entirely of the colliery stone, with Mansfield Woodhouse dressings. The building will seat over 500 people, and the cost, including all oak furniture, chairs, etc., will be about 3,600*l*. The builder was Mr. Clarke, of Nottingham. The carving and oak work were carried out by Messrs. Braithwaite, of Worcester, and Mr. Harry Hems, of Exeter; the brass work by Messrs. Blunt and Wray, of Holborn. The entire church, including the embroideries, furniture, and fittings, have been designed by Mr. C. Ford Whitcombe, architect, London.

Grammar School, Bury, Lancashire.—The new buildings of Bury Grammar School, which have just been completed, have been erected from the designs of Mr. W. V. Gough, architect, of Bristol. The buildings comprise only part of the whole design which the Governors of the school hope in due course to carry out. This design shows a quadrangle, embracing separate schools for the respective accommodation of 350 boys and 200 girls; but the completion of the work is not at present feasible, and only two sides and a half of the quadrangle have been erected. The cubic contents of the contemplated schools were stated at 877,456 ft., and the estimated cost was put at 19,280*l*. In the centre of the quadrangle there is to be an assembly-hall, capable of seating about 600 persons. This, and the portion of the school to be allotted to girls, have, however, not yet been proceeded with, and the scheme of the boys' school itself has not yet been wholly realised. The site of the school, with playing fields, covers about twelve acres. At the main entrance to the buildings there appear on a panel the arms of Roger Kay, founder of the Grammar School, and the dated stone of the original school buildings has been inserted in the central gables of the main frontage.

Police Buildings, Kirkcaldy.—The new Kirkcaldy Police Buildings have just been completed. The building, which is expected to cost between 20,000*l*. and 25,000*l*., faces St. Brycedale-avenue, and forms one side of the new street between St. Brycedale-avenue and Hunter-street. The main entrance is from St. Brycedale-avenue, and passing through a vestibule lined and floored with marble, a wide corridor is reached, with Barrhead stone pillars supporting the roof. From this corridor entrance is gained to the rooms occupied by the various officials. A wide stairway leads to the court-room, which is a large hall, panelled to a height of 8 ft., the roof being of fibrous plaster. On the same flat is a gymnasium for the policemen, also a reading-room and library. The prison quarters are behind the main building. In one wing there are eighteen cells for male prisoners, the cells being on two flats, the upper part being reached by an iron stairway and overhead iron passage. In the female section there are nine cells. Each of the cells is fitted with an electric bell, which rings in the charge room, a semaphore falling to show the officer which of the prisoners requires his attention. At the rear

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of the building are exercise yards for both male and female prisoners. The building is lighted throughout with electricity. Mr. William Williamson, Kirkcaldy, was architect for the works.

SCHOOL, ATTERCLIFFE.—New school buildings which have been erected in Leeds-road, Attercliffe, for the Sheffield Friends were opened recently. Mr. J. D. Webster is the architect.

BUSINESS PREMISES, BRISTOL.—New business premises have been erected in Wine-street, Bristol, for Messrs. Hodder and Co. The architect for the work was Mr. W. S. Skinner.

NEW THEATRE, GREENOCK.—A new theatre is about to be built on a site fronting Argyle-street, Greenock. The new building will have a pit and two tiers above, with sitting accommodation for 2,000 persons. Mr. David Barclay, of Glasgow, is the architect.

SCHOOL EXTENSION, IPSWICH. — New Science Laboratories have been erected at Ipswich School, under the supervision of Mr. Munro Cautley, of the firm of Messrs. Bisshopp and Cautley, architects. The contract for the building was given to Mr. W. H. Death, and for the benches and fittings Mr. Robert Girling was selected.

UNITED METHODIST FREE CHURCH AND SCHOOLS, SEVEN KINGS.—The competitive designs submitted by Messrs. George Baines and R. Palmer Baines, Clement's Inn, Strand, W.C., have been adopted for this church and schools, and the first portion of the building, which embraces the nave of church, including tower and temporary apse, etc., is to be proceeded with at once; also the school-room and two classrooms, forming a portion of the scheme. The estimated cost of this first portion is 3,641*l.* The materials are to be:—Facings in red brick, dressings in Bath stone. The tower, which is a square one, surmounted by open traceried parapet and spire, forms a feature of the design.

STAINED GLASS AND DECORATION.

NEW WEST WINDOW, EXETER CATHEDRAL.—The progress of the work on the great west window of Exeter Cathedral is such that the careful observer who looks up from the outside can see the signs of approaching completion. The munificence of one principal contributor has enabled the whole of the money contributed for a memorial in the Cathedral to Archbishop Temple to be devoted to the new stained glass, which, under the supervision of Mr. G. F. Bodley, R.A., is being prepared by Messrs. Burlison and Grylls. The condition of the tracery of this great window was found to be deplorable. Nearly all the external surfaces of mullions and tracery were deeply decayed, though fortunately the substance of most of the window was sound at the core. Whatever could be kept in place has been so kept, and all new work, except where bonding was necessary, has been built on to and solidly attached to the sound work behind it.—*Western Morning News.*

FOREIGN.

FRANCE.—The Lheureux prize has been awarded this year, by the Architectural Council of the City of Paris, to M. Pascal, architect of the Charles Garnier Monument and of the new buildings of the Bibliothèque Nationale. He received 12 votes, against 8 given to M. Nénot. ——The subterranean work begun ten months ago in the Place de l'Opéra for the three superposed underground lines of the Metropolitan, is now completed, and the impediments to traffic will be cleared by the end of the year.——The prize offered by American architects has been adjudged, by a jury of the Ecole des Beaux-Arts, to M. Bouchot, a pupil of M. Scellier de Gisors and M. Defrasse.——An exhibition of lace is to be held at the Galliera Museum in the spring, organised by the Fine Art Department of the Municipality of Paris, with the assistance of all the large lace-making firms in France, besides very important loans promised by distinguished private collectors.——The new buildings at the Bourse, carried out from M. Cavel's design, have just been opened.——The General Council of the Seine has commissioned M. Enders to decorate the Mairie of Romainville; M. Pierre Vauthiers is to undertake that of Thiais; and M. H. Bouvet is to complete the decoration of the Mairie of Asnières by executing the ceiling of the grand staircase. M. G. Roussel is to paint, for the new Mairie of Ivry, a large decorative picture on the subject, "The Takers of the Bastille received by the National Assembly."——M. Bernier has been commissioned by the Government to carry out the new building for the French Embassy at Washington, and M. Chédanne is to carry out the new French Embassy at Vienna.——M. Denys Puech has just completed the monument to the celebrated Egyptologist, Mariette Bey, which is to be erected at Cairo.——The Chamber of Deputies has voted for the establishment of a canal from Marseilles to the Rhone, and one from the Rhone to Cette. The cost of the two operations is estimated at about 37 million francs.——The Tour de Carbonnière at Aigues-Mortes has been classed as a "Monument Historique."——Parliament has decided on various works for the improvement of the harbour of Nantes, at an estimated expenditure of 22 million francs.——A large Maison de Santé is to be built at Biarritz; and the Hôtel Palais at the same place is also to be rebuilt from the design of M. Dourgnon, the architect of the Museum of Egyptian Antiquities, in collaboration with M. Niermans.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—Mr. George Jackson, Surveyor, has removed his office from 31, Charing-cross to Cheam-road, Sutton.——Mr. Huon Matear, architect, the Temple, Dale-street, Liverpool, has entered into partnership with Mr. Frank Worthington Simon, and the practice will be carried on under the style of Huon Matear and Simon.

WORKPEOPLE'S DWELLINGS, MANCHESTER.—An inquiry was held at the Manchester Town Hall on the 15th inst. by Mr. Percy Boulnois, on behalf of the Local Government Board, into an application of the Manchester Corporation for sanction to borrow 11,500*l.*, for the erection of workmen's dwellings. Opposition was offered by Mr. C. F. Brierley, secretary of the Manchester and Salford Property Owners' Association, and by Mr. J. Hartley. Mr. H. Price, City Architect, described the plans.

CHURCH BUILDING SOCIETY.—The Incorporated Society for Promoting the Enlargement, Building, and Repairing of Churches and Chapels held its usual monthly meeting on the 17th inst., at the Society's House, 7, Dean's-yard, Westminster Abbey, S.W., the Rev. Canon C. F. Norman in the chair. Grants of money were made in aid of the following objects, viz.:—Building new churches at Chandler's Ford, St. Boniface, near Ampfield, Hants, 100*l.*, and Southwick, St. Thomas, near North Bradley, Wilts, 125*l.*, in lieu of a former grant of 100*l.*, and towards enlarging or otherwise improving the accommodation in the churches at Ciliau Aeron, St. Michael, Cardiganshire, 25*l.*; Westcliffe-on-Sea, St. Alban, near Southend, Essex, 100*l.*, making in all 150*l.*; Winterton, All Saints, near Doncaster, 25*l.*; Reading, St. Bartholomew, Berks, 125*l.*, in lieu of a former grant of 100*l.*; and Toynton, All Saints, near Spilsby, Lincs., 20*l.*, in lieu of a former grant of 10*l.* A grant was also made from the Special Mission Building Fund towards building a mission church at Chilham Lees, near Canterbury, 25*l.* The following grants were also paid for works completed:—Skegness, St. Matthew, Lincs., 20*l.*; Ranworth, St. Helen, near Norwich, 40*l.*; Shotton, St. Saviour, near Castle Eden, Co. Durham, 50*l.*; Dale, St. James, near Milford Avon, Pembs., 15*l.*; Ettington, Holy Trinity, near Stratford-on-Avon, 75*l.*; Landore, St. Paul, near Morriston, Glamorganshire, 300*l.*; Sandiway, St. John the Evangelist, near Northwich, Cheshire, 65*l.*; Newton, St. John, Ebbw Vale, Mon., 10*l.*; and Aldrington, St. Philip, near Hove, Sussex, 50*l.* In addition to this, the sum of 130*l.* was paid towards the repairs of eight churches from trust funds by the Society.

BUILDERS' EXCHANGE, SHEFFIELD.—On the 16th inst. a meeting was held at the Builders' Exchange, Sheffield, under the auspices of the Northern District of the Incorporated Institute of British Decorators, when Mr. W. H. Gaskell, of Wigan, read a paper on "Thoughts and Suggestions on Decorative Subjects." Mr. E. M. Gibbs presided. The lecturer said he did not think a decorator need be a designer; he was more concerned in the methodical arrangement of accessories. There was sometimes a mistaken conception of artistic requirements. Decoration should be the development of the architectural plan, and the tendency and style of embellishment of a building should be a part of the fulfilment of the structure. Decoration should be consistent with the type of architecture, and he advised the collaboration of the decorator and the architect as far as possible. He spoke of the necessity of study on the part of those who joined the craft, and gave some practical suggestions with reference to the artistic decoration of houses in order to get harmonious surroundings. He did not know why a drawing-room should be done light and a dining-room dark. A dining-room should preserve a certain amount of dignity, but to suggest that a drawing-room should be of flimsy lightness seemed to be absurd. It was a room used primarily for comfort. He laid emphasis on the necessity of organised study, and the continuance in decoration of the architectural plan. Alderman Smith proposed a vote of thanks to the lecturer, and Mr. T. Foster, secretary of the northern district of the Institute, in seconding, dwelt upon the effect that artistic decoration had upon people's lives, and expressed satisfaction at the improvements which were to be seen in this respect in some modern school buildings. The motion having been carried, the meeting closed with a vote of thanks to the chairman.

EDINBURGH BUILDING TRADES' EXCHANGE.—The directors of the Building Trades' Exchange, Edinburgh, last winter inaugurated a series of lectures on technical subjects of interest to those engaged in the building trades. The opening lecture this winter was given in the rooms of the Exchange, 26, George-street, on the 17th inst., by Mr. John Ritchie, engineer, and the subject was "Electric Cranes and Lifting Appliances," Mr. W. Graham Yooll presiding. The lecturer gave a description of the application of electro motors to cranes, showing the great saving effected by the use of electric cranes over those worked either by hand or steam. He pointed out that to work a hand crane all day long the cost was at the rate of five shillings per horse-power per hour; whereas electric power was supplied from the Corporation mains at slightly under one penny per horse-power per hour. An instance was given of an electric crane which lifted all the material for a large building at the West End of Edinburgh, and the cost of current from the Corporation mains was only four shillings per week. The cost of coal for a steam crane doing similar work was from twenty shillings to twenty-five shillings per week. The lecture was illustrated by models and lantern views, numerous examples of varied types of cranes being shown, all driven by electro motors and designed and constructed at the works of Mr. Ritchie, including twenty at work in workshops and stoneyards in Edinburgh and Leith.

INTERNATIONAL SOCIETY OF SCULPTORS, PAINTERS, AND GRAVERS.—At the annual general meeting of this Society on the 15th inst., Mr. Lavery, Vice-President, who occupied the chair, read a letter from Mr. Rodin, who has been elected President in succession to Mr. Whistler, regretting his unavoidable absence, and expressing his appreciation of the honour conferred upon him by his election. The chairman having paid a tribute to the memory of the late President, Mr. W. Webb, the Hon. Treasurer, produced his balance-sheet, and the Hon. Secretary, Mr. J. Sauter, made his annual report, and stated that an exhibition had been held in Budapest, where two gold medals had been awarded to members of the society and four pictures had been purchased for the National Gallery; that at present an important exhibition was being held in the principal centres of Art in America, including St. Louis, where it would run contemporary with the Great Exhibition; and that in January the London Exhibition would open in the New Gallery. Arrangements had also been made for an Exhibition in Düsseldorf in the spring, and already 8,000*l.* have been raised by the Düsseldorf authorities for the purchase of works of Art. The following gentlemen were elected to serve on the Hanging and Selecting Committee for the next year:—Messrs. George Henry, J. Pennell, Bertram Priestman, E. A. Walton, H. Wilson, W. Strang, Derwent Wood, and C. H. Shannon.

APPOINTMENT OF SANITARY OFFICER.—The Local Government Board has sanctioned the appointment of Mr. R. H. Bew as Sanitary Inspector in Hackney, in place of Mr. F. W. Morley, deceased.

TIME-RECORDER FOR WORKSHOPS.—Messrs. T. C. Thompson and Son (Manchester) send us a description and illustration of their "Tell-tale time-recorder" for workshops. In working it, the employé, by means of a rubber stamp, impresses his number on a paper ribbon, or writes his initials, name, or number with pencil. He then pulls down a lever, which movement impresses the exact time on the paper ribbon above the name. The lever moving back to its original position, carries the record inside the box where it cannot be tampered with or withdrawn.

WHITEWASH SPRAYING MACHINE.—Messrs. Wallach Bros. send us a description and illustration of their new form of machine (style "K") for spraying whitewash. This is a self-contained portable machine, made of heavy galvanised iron, the pumping apparatus being of solid brass. It contains an agitator, which keeps the liquid in motion. One man can work it, pumping with one hand and directing the spray with the other.

LONDON WATER AWARDS.—The arbitration tribunal which is deciding the amounts to be paid by the London Water Board for the purchase of the undertakings of the London water companies have announced two further awards, as follows: — Grand Junction: Claim, 4,863,195*l.*; award, 3,349,500*l.* West Middlesex: Claim, 4,305,245*l.*; award, 3,524,000*l.* In the event of an appeal the award to the Grand Junction Company may be increased by 200,000*l.*

RULES FOR SCHOOL PLANNING.—The Board of Education has just issued a code of rules to

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be observed in planning and fitting-up public elementary schools. The maximum number of children who may be accommodated under one roof is 1,200, and it is suggested that a large school in three departments might be conveniently divided in the following proportions:—Boys, 360; girls, 360; infants, 380. For departments of this size, it is pointed out, the most suitable plan is that of a central hall with classrooms grouped around it. Every staircase must be fire proof and external to the halls, corridors, or rooms. Triangular steps or "winders" must not be used. The number of staircases must be sufficient not only for daily use, but also for rapid exit in case of fire or panic. For any upper floor accommodating more than 250 a second staircase is held to be essential.

THE TOWN HALL, HOUNSLOW.—This building will shortly be offered for sale by the owners, the Town Hall Company. It has been occupied during some while past as their offices by the local School and Burial Boards, and by the Heston and Isleworth U.D.C., who, however, are about to erect larger and more suitable buildings for their own purposes. The Town Hall was built in 1857, after plans and designs made by Nelson and Innes, by the aid of a public subscription that amounted to 3,000*l.*, and was subsequently taken over by a limited liability company. In 1888-9 an extensive enlargement of the structure was carried out by Mr. Hiscock, of Hounslow, contractor, from Mr. H. O. Cresswell's designs. The additions and improvements included an enlargement of the entrance-hall and of the big hall, a new board-room on the ground floor, a new stage, with retiring and dressing-rooms on the first floor, a new principal staircase and vestibule entered from the front, with two new staircases at the rear, and a rearrangement of the existing offices for the then Local Board, etc. On August 3, 1889, we published an illustration of Mr. Cresswell's designs for the alteration, showing the interior of the large hall.

TIMBER IN THE TRANS-CAUCASUS.—Writing to the Foreign Office on the condition of agriculture in the Trans-Caucasus, Mr. Consul Stevens notes with satisfaction that a certain inclination to turn some of the extensive virgin forests of the Trans-Caucasus to use is perceptible at the present moment, and with this object in view he understands that in one or two instances capital has been raised for the purpose of exploiting several large forests situated in Gouria. Hitherto the total absence of roads and the frequent boulders that are met with in mountain rivers prevented the timber from being carted or floated down stream to the centres of consumption, and served as barriers against the development of the lumber industry in the Caucasus. As there now appear to be people who are prepared to meet the expenses connected with the making of roads and the removal of such obstacles, there is every reason to expect that some at least of the vast forests of the Caucasus which contain trees of every variety, will shortly be exploited to the mutual advantage of the working classes of the district in which the industry is being created, and those persons who have had the courage to embark in the enterprise.

BUILDING AND SANITARY REGULATIONS.—The Local Government and Taxation Committee of the London County Council brought up the following report at last week's meeting of the Council:—"The Council, on January 21, 1902, directed us to consider and report what action could be taken with a view of requesting the Local Government Board to arrange that the rules and practice applying to sanitation, building construction, and laying out of streets in the several districts bordering on the county of London should be framed upon a common basis, and made adequate to prevent the construction of slum areas. On December 16, 1902, we reported that much information had been collected with regard to the enactments and by-laws in force within and without the county of London, and the Council authorised an expenditure not exceeding 70*l.* for printing a return. This return, which has been prepared by the statistical officer, is now complete, and gives in a convenient form abstracts from the principal regulations, whether by-laws or statutory provisions, in force in London and in 29 outside districts. It compares those in the county of London with the model by-laws issued by the Local Government Board as a guide to urban district councils, and with the by-laws actually in force in the sanitary districts bordering on the county. It also shows the principal additions to, and variations from, the model by-laws in the by-laws of the several authorities. The urban and rural district councils appear to have framed their by-laws for the most part in accordance with the model series issued by the Local Government Board, a fact which tends to show that some approach has been made towards the adoption of a uniform basis. The return, however, shows that important variations occur in the by-laws in force in several out-counties with respect to various matters affecting sanitation, building construction, and the laying out of streets. As the results brought out by the return will be very valuable for many purposes, we think that it should be published, and that copies should be sent to the Local Government Board. We recommend that the return showing abstracts from the by-laws, rules, and regulations applying to sanitation, building construction, and the laying out of streets in the county of London, and the districts bordering on the county, together with abstracts from the model by-laws of the Local Government Board, be published and placed on sale; and that copies of the return be circulated to the Council and sent to the Local Government Board."

CAPITAL AND LABOUR.

EMPLOYMENT IN THE BUILDING TRADES.—The *Labour Gazette* for December states that:—According to returns furnished by 87 Employers' Associations whose members are estimated to employ about 96,000 workpeople, and by Trade Unions with an aggregate membership of about 194,000, employment in the building trades remains dull and is rather worse than a year ago. The state of employment continued to be adversely affected by bad weather. The returns from Employers' Associations show that employment was good with 11.0 per cent. of the workpeople reported on, fair or moderate with 17.6 per cent., and dull or bad with 71.4 per cent. The corresponding figures for a year ago show that employment was then good with 11 per cent., fair or moderate with 20 per cent, and dull or bad with 69 per cent. Employment with bricklayers is dull, and about the same as a month ago and a year ago. With masons it is moderate. With carpenters and joiners, painters, plasterers, and plumbers it is dull generally, and worse than a month and a year ago. The percentage of unemployed Trade Union carpenters and joiners at the end of November was 6.1, compared with 5.6 at the end of October, and 4.4 at the end of November, 1902. For plumbers the percentage of unemployed Trade Union members in November was 7.2, as against 6.6 in October and 5.7 in November, 1902. Slaters and tilers report employment fairly good, and better than a month ago and a year ago. Some distress is reported among builders' labourers in certain districts."

LEGAL.

DREDGING NEAR THE THAMES TUNNEL.

THE case of the East London Railway Company and others *v.* the Commissioners of the River Thames came before Mr. Justice Farwell in the Chancery Division on the 16th inst., on a motion by the East London Railway Company and six other railways holding leases from the former for an interim injunction, restraining the defendants until the trial or further order from dredging the bed of the river within 150 yards of the Thames Tunnel, either above or below it, or from dredging, etc., in such a way as to endanger the tunnel. Mr. W. H. Upjohn, K.C., for the plaintiffs, said that there was a very serious question to be tried, and he understood that defendants were willing to give an undertaking until the trial.

Mr. Eldon Bankes, K.C., said, on behalf of the defendants, that the dredging formed part of an important work for the improvement of the channel of the river. Some 30,000*l.* had been already spent on the works, and the whole of that would be thrown away if the works could not be completed by removing the bars in the river.

His Lordship said it seemed to him that any damage done to the tunnel would be irreparable, whereas the railway companies could pay any damage occasioned to the defendants by delay.

Mr. Bankes said that after that expression of opinion he would give an undertaking not to work within 150 yards of the tunnel, upon the plaintiffs giving an undertaking in damages.

This was agreed to, and the trial was ordered to stand over until January 20.

APPEAL BY A WHITEWASHER.

THE case of Crowther *v.* the West Riding Window Cleaning Company came before the Court of Appeal, composed of the Master of the Rolls and Lords Justices Mathew and Cozens-Hardy on the 16th inst., on the appeal of the applicant (*in forma pauperis*) from the refusal of the County Court Judge of Bradford to award him compensation under the Workmen's Compensation Act, 1897.

Mr. J. J. Wright appeared for the appellant, and Mr. Compston for the respondents.

Mr. Wright said that the respondents were the contractors for whitewashing a large shed over 30 ft. in height, and the work was carried out by means of machines. These machines were worked by two men, one man working a pump and the other directing the nozzle at the end of a tube to the part that was to be whitewashed. When the appellant was attempting to repair a hole in one of the tubes, some whitewash spurted in his eye, causing the injuries in respect of which compensation was claimed. The question for decision in the case was whether the applicant was engaged in repairing a building "by means of scaffolding" within the meaning of the Act. The evidence showed that in the process of whitewashing the shed two ladders supplied by the respondents were used. It was further proved that for a short time the applicant stood on an old box which was in the building in order to better direct the nozzle of the machine, while some of the men sat upon planks which rested on beams which formed part of the roof of the building. In these circumstances, it was contended that scaffolding was being used, but the learned County Court Judge declined to accept this view, and gave judgment for the respondents. Hence the present appeal of the applicant. The learned counsel contended that this was scaffolding within the meaning of the Act, and cited the case of Newton *v.* Hoddinott and Chambers, in support of his contention.

The Master of the Rolls, without calling upon Mr. Compston, in giving judgment said he thought there was evidence to support the finding of fact of the learned County Court Judge. He was not prepared to say that in no sense could a ladder be scaffolding, but in this case he thought the learned County Court Judge was quite entitled to form his conclusion of fact upon it.

The Lords Justices concurred, and the appeal was accordingly dismissed.

WORKMEN'S COMPENSATION ACT.

JUDGE LUSH-WILSON, K.C., as arbitrator in the case of Dyer *v.* Lapthorn, gave his award in Plymouth County Court on the 10th inst. This was a case under the Workmen's Compensation Act, heard at the November County Court, in which William Dyer, plasterer, of 1, Morley-place, Plymouth, claimed compensation against Messrs. Lapthorn and Co., contractors, of Clarendon Building Yard, Citadel-road, Plymouth, in respect of personal injury resulting from an accident on January 20 last. The applicant alleged that he was totally incapacitated for work as a result of the accident, and claimed 17s. 8d. a week, being 50 per cent. of his average weekly earnings prior to the accident. The respondents, who had paid compensation up to June 12 last, did not deny their liability, but pleaded that the applicant was not totally incapacitated for work; that they had offered him light employment at wages of 10s. a week, which, in their opinion, he was capable of earning, and that the average weekly earnings prior to the accident were not as stated by him. Mr. Shelly (Shelly and Johns) for the applicant; Mr. Wilcocks (Bickle and Wilcocks) for the respondents.

His Honour, in giving his award, stated that it was proved that the applicant was aged 62, employed by the respondents during the period from January 1 to January 20, 1903 (with the exception of Sundays), at a rate of pay of 8d. per hour. By the trade custom of the respondents, the employees were paid once every Friday up to Thursday in each week. He found that the employment, however, was not a weekly employment; it was either an hourly or a daily employment. The payments per week and the balance of week worked out as follows:—For week ended January 2, 8s. 4d.; for the week ended January 9, 1*l.* 11s.; January 16, 1*l.* 11s. 4d.; and for the week, or portion of the week, ended January 23, 13s. 4d., making a total sum paid of 4*l.* 5s. He found on the evidence that the applicant so far recovered as to be capable of earning 10s. a week. The respondent by letter of May 29, 1903, also at the trial, offered this employment to the applicant. The question argued was, What on the above facts were the average weekly earnings of the applicant? His Honour quoted several cases, and said he based his decision on the fact that in this case the evidence of trade weeks was given. The average weekly earnings were 1*l.* 1s. 3d. One-half of that was 10s. 7½d. Now, having regard to the fact that applicant was able to earn 10s. a week, that the incapacity was partial, he fixed the sum of 7s. 6d. as the weekly payment to be paid by respondents to the applicant.—The question of costs was allowed to stand over.—*Western Morning News.*

BUILDERS' LIABILITY UNDER THE WORKMEN'S COMPENSATION ACT.

THE case of Sharman *v.* Holliday and Greenwood, Ltd., came before the Court of Appeal, composed of the Master of the Rolls and Lords Justices Mathew and Cozens-Hardy, on the 18th inst., on the appeal of the applicant from a decision of the Judge of the Lambeth County

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Court in proceedings under the Workmen's Compensation Act, 1897.

In this case the applicant was in the service of the respondents, a firm of builders and contractors, and as a result of an accident which occurred to him in August, 1901, he became totally incapacitated for work, and on December 3 of that year an agreement was filed in the County Court under which the respondents were to make the workman a weekly payment of 15s. during incapacity. The respondents, on December 11, 1902, filed a request for a review of the weekly payment on the ground that the applicant was not suffering from any result of the accident, but was able to work and earn full wages. The arbitration was heard on January 21, 1903, when the County Court Judge, after hearing medical evidence on both sides as to the condition of the applicant, reduced the weekly payment to the applicant to 1d. per week. On April 24 the applicant filed a request for a further review, asking that the weekly payment might be increased to 15s., alleging that he had sought employment and had been refused on the ground that he was not able to do it, in consequence of the injury to his leg. That second arbitration was heard on June 23 last, when on behalf of the respondents it was contended that the matter was *res judicata*. The learned County Court Judge decided that as he had held on January 21 that the earning powers of the applicant were not at that time diminished, and as the present application was again on the ground of total incapacity, the matter was *res judicata*, and also that there were no facts alleged showing any alteration in the circumstances of the case since the hearing on January 21. Hence the present appeal of the applicant.

At the conclusion of the arguments of counsel, their Lordships held that the doctrine of estoppel did not apply to such a matter as this, and that the learned County Court Judge was justified, having regard to the change in the circumstances, in reviewing his previous decision.

Mr. Reginald Bray, K.C., and Mr. W. M. Thompson appeared for the applicant, and Mr. Shakespeare for the respondents.

RICHMOND BUILDING DISPUTE.

THE hearing of the case of the Attorney-General and London Property Investment Trust, Ltd., *v.* the Mayor, Aldermen, and Burgesses of the Corporation of Richmond and Gosling and Sons, concluded before Mr. Justice Swinfen Eady in the Chancery Division on the 17th inst.—an action by the plaintiff Company claiming (1) a declaration that the erection of certain proposed buildings in Richmond, Surrey, by the defendants Gosling and Sons was a derogation from the grant by the defendant Corporation to the plaintiff Company, and was a breach of the conditions and stipulations of an alleged building scheme; and (2) an injunction restraining the defendants, Gosling and Sons, their servants, etc., from raising their proposed buildings on lots 3 and 4 higher than the maximum heights prescribed by the building scheme with regard to such lots, and to restrain the Corporation from permitting such erection. The Attorney-General claimed an injunction restraining Gosling and Sons, their servants and agents, from erecting on Golden-square or the site thereof, any building so as to prevent its use as a public highway.

The facts were shortly these:—In 1898 the Corporation obtained compulsory powers to acquire certain land to enable the widening of George-street, Richmond. After the street was widened they put up the surplus land for sale by auction on June 17, 1902, subject to conditions of sale and building stipulations. Condition 8 provided that the purchaser of each lot should within three Calendar months of the date of the sale submit to the Corporation for its approval the plans and specifications for new buildings to be erected upon such lot, these plans and elevations to be in addition to the plans and sections required to be deposited under the by-laws of the Corporation with respect to new streets and buildings, and such plans, elevations, and specifications were to comply in all respects with the by-laws and with the building stipulations set out at the foot of the conditions. The condition also stipulated that the purchaser was to make such modification in the said plans, elevations, and specifications as the Corporation, or the Borough Surveyor, might reasonably require, and that no purchaser should be entitled to possession of the lot purchased by him until such elevations and specification should have been approved by the Corporation in writing under the hand of the Borough Surveyor. Condition 9 provided that the conveyance was to be in the form of the draft already approved by the Corporation, and subject to the covenants and conditions in such draft contained. This condition also provided that the plans, elevations, and specification to be referred to in the conveyance should be the plans, elevation, and specification approved by the Corporation under condition 8. The stipulations provided that each building should cover the entire frontage of the lot upon which it was erected, should comply in all respects with the by-laws, and not be of less than certain specified values. By stipulation 14 the Corporation reserved the right to waive or alter any of the stipulations as to any land not sold at the sale or (with the consent of the purchaser) as to any land so sold. At the auction the plaintiff Company purchased lots 5 and 6, and the defendants Gosling and Sons, lots 3 and 4. The defendants, Gosling and Sons, subsequently to the sale, acquired certain adjoining land, which enabled them to put up buildings of different dimensions to what they could have done if they had been confined to building only on the land purchased by them at the auction, and the Corporation consented to the plans being modified. The plaintiff Company contended that the land was sold subject to a building scheme.

Mr. Geo. Baxter, Managing Director of the plaintiff Company, said that at the sale he asked the auctioneer as to the height of the buildings to be erected on the lots, and he (the auctioneer) read out the heights as follows:—Lot 1, 46 ft. 6 in.; lot 2, 37 ft. 9 in.; lot 3, 32 ft. 6 in.; lot 4, as to one-third, 32 ft. 6 in., and as to the remaining two-thirds, 35 ft. 6 in.; and lots 5 and 6, 32 ft. 3 in. The proposed buildings of Gosling and Sons materially interfered with their premises, and they had lost a tenant in consequence.

Mr. W. Newton Dunn, architect and surveyor, said that the new plans of defendants Gosling and Sons increased the height of the building from 32 ft. 6 in. to 49 ft. The alteration in height made a serious difference so far as the plaintiff Company's premises were concerned.

For the defence, Mr. Senior, the Town Clerk, was called, and said that, as far as he was aware, Golden-square was private property, and only used by the persons whose houses backed upon it.

Similar evidence was given by Mr. Snow, a member of the defendant firm of Gosling and Sons.

At the conclusion of the arguments of counsel, his Lordship held that the plaintiffs had no right as against the Corporation and Gosling and Sons to prevent the new buildings, which were in conformity with by-laws, from being put up, and on this part of the case the plaintiffs failed. On the second part of the case, viz., where the Attorney-General claimed an injunction to restrain Gosling and Sons from erecting any building on Golden-square so as to prevent its use as a public highway, his Lordship held that Golden-square was not, and never had been, a public highway. For these reasons the plaintiff's action wholly failed, and was dismissed with costs.

Mr. Macnaghten, K.C., and Mr. Mulligan appeared for the plaintiffs; Mr. Vernon Smith, K.C., and Mr. Cann for the Richmond Corporation; and Mr. Micklem, K.C., Mr. W. Barnard, and Mr. F. H. Walker for the defendants Gosling and Sons.

INJURY TO HOUSE BY VIBRATION.

THE case of Calwell *v.* the St. Pancras (London) Borough Council came before Mr. Justice Joyce in the Chancery Division on the 17th inst., on an application by the plaintiff for an injunction in respect of a nuisance alleged to have been caused by defendants' electric lighting plant in Great College-street, N.W., the nuisance being by vibration, noise, smell, and dust, the dust coming from a refuse destructor. Mr. Hughes, K.C., for the plaintiff, said that the only solution of the difficulty was for the defendants to buy the plaintiff's house out. They had bought all the private houses in Great College-street between the works and Platt-street. The nearest point of the generator station from the plaintiff's house was only 40 ft. or 50 ft. away. When the works were put in operation in May last complaint was at once made, but plaintic delayed taking proceedings from time to time on the representations of defendants that the nuisance, if it existed, would be put an end to.

Mr. Younger, K.C., for the defendants, said that his clients were trying to perform their statutory duty with the least possible inconvenience to the public. If the vibration did not cease as the result of what the defendants were doing, certain of their engines would be taken away.

In the result it was decided that it was a case for an early hearing, and the trial was fixed for January 19.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

25,462 of 1902.—G. COTTON: *Hot-water Boilers.*

A hot-water circulating boiler, with its walls, grate, flue, and other heat absorbing surfaces formed hollow, and each forming part of the circulating system (separately or collectively) and provided with heating chambers in one or more parts, and so arranged as to produce a zigzag passage for the smoke, etc., through which chambers the water also circulates.

25,926 of 1902.—W. W. HOWE: *Water-waste Preventers.*

This invention is designed chiefly to prevent the apparatus from continuing to siphon after the measured supply is exhausted, to prevent the liability to bursting of the tank occasioned by freezing, and further to enable the down-pipe union to be attached to the siphon connexion by means of a brass connexion instead of having brass to iron as heretofore. The apparatus is constructed of wrought iron, copper, or zinc, and riveted under the well is a malleable iron ring or strengthening plate, through which the union of the siphon passes and is tightened to the plate by a brass back nut.

26,145 of 1902.—B. A. SLADE: *Flues and Chimneys for the Prevention of Down Draught and for Increasing the Up Draught.*

The combination with an arrangement of an opening leading from the interior to the exterior of a ventilation flue, smoke flue, or similar chimney or other flue adapted to be fitted therewith, of a valve or valves normally suspended more or less perpendicularly in the opening and adapted to normally close it, means to prevent the valve or valves opening inwardly into the flue or chimney, while the valve or valves are adapted to radially open outwardly, and thereby permit egress from the interior of the flue or chimney through the opening to the exterior atmosphere.

27,905 of 1902.—T. F. SHILLINGTON and J. A. HANNA: *Stables or Similar Outhouses for Horses and other Animals.*

According to the invention the floor of the building is provided with one or more surface drains, comprising channels or depressions, having the same longitudinal inclination as the floor, and having sloping sides provided with ribs or corrugations adapted to give a good foothold to the horse, the ribs or corrugations being preferably curved in the direction in which the liquid matter or débris is intended to flow or to be swept, so as to offer little or no obstruction to the thorough cleansing of said surface drain or drains. The building is also provided with a tying-pin or fastening device intended to permit of a more smooth and easy working of the halter strap through the slot or opening provided for its reception in the manger.

28,954 of 1902.—A. DUMAS: *Cooling and Heating Apparatus.*

This invention relates to improvements in cooling and heating apparatus. The system consists of sheets of corrugated metal with corrugations of uniform size or of increasing size, the said sheets being separated by sheets or plates and adapted to be wound round a central pipe or tube or placed (after having been wound round a rod) in a tube. These tubes are used in the construction of generators, refrigerators, condensers, radiators, and the like.

1,254 of 1903.—W. MARSHALL: *Hinged Joints of Window Casements and the like.*

In the hinge or pivot joints of swinging window casements and doors, the employment of an interposed ring of balls or equivalent anti-friction devices between the fixed and movable parts of such hinges for reducing friction between the working part and providing firm support for the swinging frame, means being provided in conjunction with the said joints or hinges for adjusting the interposed bearings.

1,342 of 1903.—J. J. CRESSWELL: *Chimney Pots, Exhaust Ventilators, Street Lamp Chimneys and the like.*

A series of plates or vanes surrounding at the sides and above and below the discharge mouth of the flue, except for the space occupied by the flue in entering the coil, such plates or vanes having an open space between them, and every portion, or the greater portion, of the surface of such plates or vanes inclining in one direction to radial lines drawn from the centre of the cowl or from the centre of the discharge mouth of the flue, so that wind passing from any direction from the outside into the cowl between or over the plates or vanes shall be deflected always in one direction round an axis passing through or near the centre of the discharge mouth of the flue, causing thereby an eddy round the same.

2,143 of 1903.—E. WHITWELL: *Siphon Water Waste Preventers.*

This consists in arranging the parts of the cistern connected with the discharge pipe in such a manner that when the cistern is filling with water, it imprisons a certain amount of air, which, on being released by a small air-cock constructed for the purpose, as occasion demands, allows the water to flow into the discharge pipe, creating a siphonic action.

* All these applications are in the stage to which opposition to the grant of Patents upon them can be made.

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2,060 of 1903.—E. Chaudoir and F. G. K. Caston: *An Automatic Electric Lift Gate Lock.*

In lift doors or gates, for guarding and closing the openings to lifts and lift wells, and sliding horizontally, collapsible or otherwise, the provision of an automatic lock to each door, or gate, with mechanism for electrical and mechanical operation contained in the one casing, controlled electrically and adapted so that the cage moving in said lift well or space can only be actuated or moved, if all the said gates or doors are closed, and that either of the said gates or doors can only be opened when the lift cage is opposite to the said gate or door.

4,295 of 1903.—J. Angus: *Hinges.*

This invention relates to hinges for use mainly in hanging doors on their frames, and it has for its object to lessen the weight and cost of the hinges, while facilitating the securing of them on the doors and door-posts or frames. In lieu of making such hinges of two leaves or plates which turn upon their pivot pin to fold flat against each other, they are formed from a single leaf which is cut transversely, or has portions of it cut to fold upon the pivot pin, the cut parts when brought together being in one plane, and the screw-nail holes are suitably counter-sunk so that when the parts of the leaf are folded out, the main plate of the leaf or certain parts of it may be properly attached by screw-nails to the door-post, and the other parts cut from the leaf may be attached to the edge of the door so that the door may be swung in the usual way.

4,809 of 1903.—A. Tomkins: *Traps for Sink Wastes.*

The method of fixing and supporting traps, directly under sink bottoms, by means of two or more screws which pass through a grating or other metallic construction placed over the sink hole, engaging in lugs formed upon the inside of said traps.

17,099 of 1903.—W. Wicherski and M. Robinski: *Apparatus for the Manufacture of Tiles.*

An automatic formation of ribs in roofing tiles which are delivered in the form of a hollow contact stream, comprising three or more tiles, from a nozzle, and characterised by the orifices which are provided in the nozzle or die plate for the formation of the ribs, being covered up during the delivery of the tiles and being kept apart for the required length of time when the ribs are to be formed.

21,505 of 1903.—A. A. Terry: *Door Stop or Door Holder.*

A door stop, consisting of a cam flattened at the bottom and rounded at its lower corners, capable of sliding vertically on a pin, a pin on which the cam moves, a box in which the cam operates, stops on the cam and in the box to prevent the cam from revolving too far, a chain connecting the cam with a vertical lever fitted on the handle of the door.

22,520 of 1903.—J. D. Bennet: *Standards for School Desks, Seats, and like Furniture.*

This invention, which relates to standards for school desks, seats, and like furniture, has for its object to provide for attachment of the vertical post of a standard to its base plate without the use of screws or other fastenings which are liable to work loose. To that end the base plate is formed with a dovetailed slot or recess, the length of which is slightly less than that of a correspondingly dovetailed rib formed on the underside of the vertical post of the standard, and the base plate is shrunk in attaching it to the post by heating the base to expand it, and enlarge the opening so that the rib on the post may freely enter, after which a wedge or fitting strip is driven in and the base cooled by water or otherwise so that it firmly grips the post as if made integral with it.

22,521 of 1903.—J. D. Bennet: *School Desks and Seats.*

This invention relates to school desks and seats which are adapted to be telescoped or raised and lowered and adjusted to suit pupils of different age, and it has for its object to so construct the end standards that the desks or seats may be rigidly supported at any one of a number of different heights without the necessity of permanently bolting together the telescoping parts of the standards.

22,522 of 1903.—J. D. Bennet: *Hinge Bracket Supports for Desks and Seats.*

This invention has for its object to provide a noiseless hinged or pivoted bracket for supporting top of a school desk or a seat which permits of the hinge desk top or seat being swung from an approximately horizontal to a vertical position or vice versâ without risk of crushing the fingers of pupils seated at a desk or engaged in lifting the desk top or seat.

23,553 of 1903.—P. Robinson: *Carpenters' Combination Tools.*

The object of the invention is to produce a tool which will have all the functions of a saw and a try-square, without detracting in any way from the ordinary uses and purposes of each of these tools. In its general construction the invention contemplates forming the rear edge of the saw into a straight edge, graduated so as constitute a scale or measuring rule, and this straight edge constitutes an edge of a try-square, the form of which is inscribed upon the surface of the saw. The measurements of this scale begin from the forward face of the handle of the saw, which face is disposed substantially at right angles to the straight edge or back edge of the saw, and this face is further substantially in alignment with an opening through the saw plate, which facilitates the use of the tool.

26,901 of 1902.—J. Middleton: *Rain-water Pipe Socket.*

This invention consists of an improved rain-water pipe socket for use in repairing broken pipes. When the pipe is broken, the uneven ends are cut off, and the two pieces are fitted into the socket, which has two lugs for enabling it to be fixed in any position on a wall.

385 of 1903.—J. Hall: *Machinery or Apparatus for Manufacturing Pipes of Armoured Concrete.*

This invention relates to machinery or apparatus for making pipes, and tubes for drainage, lining walls and like purposes. The materials employed are stone, brick, burnt earth, burnt clay, waste pottery, furnace clinkers, cinder, or slag, or other like material, broken to the condition of coarse sand and mixed in convenient proportions with lime or cement and water, and used in conjunction with iron or steel wire, wound spirally or reticulated and embedded in the substance of the slab, block, or pipe, the amount of wire varying with the strength required. The action of the machine is as follows:—The external casing or mould being in place and the cylinder lowered so as to have the top level with the rotating table, a mixture of sand and finely broken stone, with water, is poured in, at the same time a cylindrical network or spiral of wire is placed concentrically around the cylinder. The table is caused to rotate rapidly, and at the same time the cylinder rises vertically, the rotation of the table causes the mortar to fly outward to the mould, which also under the same centrifugal influence expands as far as the springs will permit. When the pipe is complete, the speed is reduced, and gradually the pressure of the springs forces the sections inwards, and compresses the plastic mortar between the mould and the cylinder. After being subjected to this pressure for a few minutes the cylinder is withdrawn, and the tube or pipe and the external mould are removed to permit the pipe to set, another external mould being used for the next pipe.

652 of 1903.—A. Nicolson: *Combined Casement and Sash Window.*

The invention relates to the hanging or hinging of sash windows in such a manner as to permit of their being opened like casement windows, and to allow of the sashes being moved up and down when the window is shut or opened. This is accomplished by hanging the frame or case which contains the sashes on hinges attached either to cross pieces at top and bottom, or to a side standard, which may or may not be part of a fixed outer frame surrounding the window frame.

13,218 of 1903.—D. N. Allard: *Levelling Instruments.*

In a plumb level, a bar having a holding mortise and provided with top and side openings in communication therewith, an indicator casing seated within the mortise, and having transparent top and side walls, the top being provided with an indicator or gauge mark and the side walls with degree indicating marks, a plural armed gravity indicator pivotally mounted within the casing and provided with designating marks or notches, those of the central arm co-operating with the indicating marks on the top and both side walls of the casing.

21,012 of 1903.—J. Stott: *Apparatus for Filtering, Humidifying, or Disinfecting Air to be Supplied to Buildings.*

An apparatus for filtering, humidifying, disinfecting, or otherwise treating air to be supplied to buildings, with two or more filtering drums so arranged and positioned with each other that the air to be treated must pass through the filtering medium on each drum before passing to a room or building, one or all of such drums being revolved either in the same or opposite directions, to churn the air during its passage through the drums and thoroughly filter, humidify, disinfect, or otherwise treat the air.

22,294 of 1903.—W. Oates: *Combined Spitting Trough and Life Rail for Swimming Baths.*

The object of this invention is to provide a combined spitting trough and life rail which will be built into the walls of the bath, so as to leave said walls flush and without projections. The invention comprises the employment of a number of longitudinal blocks, preferably composed of enamelled or glazed ware or similar material, to the walls of the bath. The blocks are built into the walls of the bath at about the position the scum channel is usually placed, and they are channelled out or recessed longitudinally in such a manner that a curved surface is presented to direct the spittle down into a longitudinal trough formed by the upwardly projecting longitudinal rim or rail. This rim or rail is of such a section and thickness as to afford an easy grip to a person in the bath. The rail is curved or bent over inwardly to prevent the contents of the trough from washing back into the bath. The front of the rail is level or flush with the surface of the wall beneath, and the trough being formed behind said rail is removed from view. Suitable outlets are provided at intervals to drain or empty the trough, which may be so arranged as to be flushed by the splashing of the water from the bath.

22,842 of 1903.—F. Blivet: *Construction of Floors, Ceilings, Walls, and the like.*

This invention has reference to the construction of floors, ceilings, walls, and the like, and more particularly to arrangements in which blocks or slabs are fitted transversely between iron girders or joists to serve either as a ceiling or flooring, or as a filling or pugging. The main object of the invention is to provide for easily altering the effective widths of the transverse blocks or puggings according to the distance between the joists, so that one size of blocks or pieces will serve, between reasonable limits, for various widths of joists. To this end the blocks or pieces, instead of being simply oblong form, are made in two parts separate from each other on a diagonal line, along which they can be adjusted relatively to each other, or in other words, triangular or wedge-shaped blocks are used, which are fitted to each other in pairs along their longer or inclined sides. The angles at one or both sides are cut away, and the arrangement is such that, by sliding the blocks more or less to the right or to the left within the limits permitted by the cutting away of the angles, the effective length of the said pugging blocks can be varied at will, so as to properly fit and fill the space between the joists.

22,873 of 1903.—H. N. Jasper: *Block for the Construction of Chimneys and similar Structures.*

A block for use in constructing chimneys, consisting of artificial material with a comparatively large central orifice running vertically through it, concave portions on the top and bottom faces extending from the central opening to the outside faces of the blocks, which are arranged to be placed one upon another and to form with each other horizontal joints, the opening formed by the adjacent concave faces of the blocks being capable of being filled with cement.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

December 10.—By Perkins & Sons (at Southampton).

Southampton.—22, Cumberland-pl., f., p.	£1,700
By Willson & Phillips (at Rochford).	
Rochford, Essex.—Market-sq., house and s., u.t. 387 yrs., g.r. nil, q.r. 15l.	330
Back-st., &c., two freehold houses and s., q.r. 31l.	500

December 14.—By J. H. Bethell.

Plaistow.—Pelly-rd., freehold premises and plot of land adjoining, p.	1,000

By Brodie, Timbs, & Co.

Kilburn.—Douglas-rd., f.g.r.'s 119l. 14s., reversion in 82 yrs.	2,950

By Graves & Son.

Bayswater.—48, Talbot rd., u.t. 55 yrs., g.r. 11l., e.r. 70l.	620

By A. Savill & Son.

Somers Town.—26, 27, and 28, Chalton-st. (s.), u.t. 29 yrs., g.r. 60l., y.r. 196l.	1,460
Caledonian-rd.—11 to 17, Charlotte-st., y.r. 222l.; also l.g.r. 11l. 10s., u.t. 38 yrs., g.r. 23l.	2,065
Bowes Park.—17, 19, 21 and 23, Clarence-rd., f., y.r. 102l.	1,650
4, Brownlow-rd., f., y.r. 55l.	525
6 and 8, Brownlow-rd., f., y.r. 87l.	1,175

By Weatherall & Green.

King's Cross.—11, 12, and 13, Manchester-st., u.t. 5¼ and 8¼ yrs., g.r. 22l. 6s. e.r. 142l.	330
Camden Town.—192, High-st., and 4 and 4a, Buck-st. (business premises), u.t. 26¼ yrs., g.r. 17l., y.r. 251l.	2,150
14, and 14a, Buck-st., u.t. 26¼ yrs., g.r. nil, y.r. 92l. 10s.	655
Tooting.—82, 84, and 86, Trinity-rd., f., y.r. 130l.	1,650
Stepney.—1 to 11 (odd), Burdett-rd., u.t. 61¼ yrs., g.r. 80l., w.r. 275l. 12s.	1,800

By Norman & Son (at Stratford).

Leytonstone.—4 to 18 (even), Gladstone-st., u.t. 77 yrs., g.r. 32l., w.r. 166l. 8s.	600
1 to 6, Lavender-gr., u.t. 81¼ yrs., g.r. 19l. 10s., w.r. 98l. 12s.	900
Upton Park.—1 to 19 (odd), Florance-rd., and 41, Radcliffe-rd., u.t. 80¼ yrs., g.r. 43l., w.r. 162l.	460

By Tompkins & Capper (at Abergavenny).

Abergavenny, Monmouth.—12 and 13, Cross-st. (s.), with warehouses in rear, area 602 yds., f.	2,000

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14, Cross-st. (s.), f., y.r. 50*l.* £1,025
Chapel-rd., The Laurels and Inglewood, f., y.r. 55*l.* 900
64, 66, and 68, Park-st., f., y.r. 46*l.* 16s. 660

December 15.—By DAVID BURNETT & CO.

Finchley.—High-rd., Belle Vue and The Limes, f., y.r. 115*l.* 1,650

By HERRING, SON, & DAW.

Brixton.—333, Brixton-rd., u.t. 46 yrs, g.r. 11*l.*, y.r. 90*l.* 1,020

By LEVENS, SON, & HOARE.

Beckenham.—6, Fox Grove-rd., u.t. 52½ yrs., g.r. 1*l.*, p. 1,230

By FREDK. PERKINS.

Clapton.—59 and 61, Clifden-rd., u.t. 61 yrs., g.r. 10*l.*, w.r. 72*l.* 16s. 570
7, Lesbia-rd., u.t. 80 yrs., g.r. 7*l.* 10s., e.r. 31*l.* 330

By REYNOLDS & EASON.

West Smithfield.—22, Cloth Fair (s.), and 1, Red Lion-passage, area 1,038 ft., f. y.r. 116*l.* 16s. 1,300
Somerton.—238, Wick-rd. (s.), f., w.r. 27*l.* 2s. 280

By J. HAXELL & SON (at Mason's Hall Tavern).

Covent Garden.—Bow-st., The Grapes p.-h., u.t. 14 yrs., y.r. 115*l.*, with goodwill 3,350

By MILES, SONS, & DEFFEE (at Mason's Hall Tavern).

Southgate.—Chase Side, The Bell, b.-h., with house, shop, and stabling adjoining, f., y.r. 74*l.* 17s. 560
December 16.—By DAVID J. CHATTELL.
Chislehurst.—2 and 3, Bickley-ter., u.t. 98½ yrs., g.r. 10*l.*, w.r. 62*l.* 4s. 425
1a, Edward-ter., u.t. 95½ yrs., g.r. 4*l.* 10s., w.r. 27*l.* 5s. 295
Bickley-ter., f.g.r. s 26*l.*, reversion in 98 yrs. 200
Wallington.—Bridge-rd., stabling, yard, &c., u.t. 250 yrs., g.r. nil, y.r. 20*l.* 610

By C. RAWLEY CROSS & Co.

Shepherd's Bush.—Devonport-rd., f.g r.'s 19*l.* 10s., reversion in 74 yrs. 370
Thornfield-rd., f.g.r.'s 14*l.*, reversion in 74 yrs. 560
20, Ellerslie-rd., u.t. 61 yrs., g.r. 6*l.* 10s., e.r. 33*l.* 425

By EASTMAN BROS.

Sydenham.—Perry Rise, The Baptist Mission Hall, f., p. 295

By FURBER'S.

Fulham.—1, 3, 5, and 7, May-st., w.r. 119*l.* 12s., also l.g.r. 30*l.*, u.t. 62 yrs., g.r. 34*l.* 450
By FOSTER & CRANFIELD.
Hammersmith.—22, King-st., prodt rental of 70*l.* for 15½ yrs. 1,100

By JOHN STOPHER.

Norwood.—4, Lancaster-rd., u.t. 70½ yrs. g.r. 15*l.*, e.r. 70*l.* 630
By SWAN & WOODCOCK (at Stratford).
Stratford.—78, 82, and 84, Windmill-la., u.t. 47 yrs., g.r. 7*l.* 10s., w.r. 66*l.* 19s. 600
Bow.—22, 24, and 26, Fern-st., u.t. 60 yrs., g.r. 9*l.* 15s., w.r. 71*l.* 10s. 385
Leyton.—99, Grove Green-rd. (s.), u.t. 80 yrs., g.r. 4*l.* 10s., e.r. 40*l.* 365
By ARTHUR BARTON (at Sydenham).
Sydenham.—26, Wells-rd. (s.), f., e r. 35*l.* 295
December 17.—By BEARD & SON.
Notting Hill.—164 and 178, Lancaster-rd., u.t. 60 yrs., g.r. 18*l.*, y.r. 105*l.* 450
198, Lancaster-rd. and 43, St. Mark's-rd. (s.), u.t. 60 yrs., g.r. 8*l.*, y.r. 70*l.* 1,090
224, 228, 230, 234, 236, 238, and 240, Lancaster-rd., u.t. 60 yrs., g.r. 46*l.*, y.r. 360*l.* 725
75, 79, and 81, Lancaster-rd., u.t. 42 yrs., g.r. 3d., y.r. 175*l.* 3,635
Lancaster-rd., l.g.r. 10*l.*, u.t. 42 yrs., g.r. 1d. 2,005
Paddington.—4, Dudley-pl., u.t. 35 yrs., g.r. 10*l.*, e.r. 55*l.* 190
By NEWBON, EDWARDS, & SHEPHARD.
Stoke Newington.—2, Lordship-pk., u.t. 59 yrs., g.r. 12*l.*, e.r. 70*l.* 455
Woodford Green, Essex.—4 and 5, The Ter., u.t. 61¾ yrs., g.r. 9*l.*, y.r. 80*l.* 590
STIMSON & SONS.
Battersea.—Battersea Pk.-rd., f.g.r. 18*l.*, reversion in 62½ yrs. 800
Battersea.—Kilton-st., f.g.r.'s 9*2l.*, reversion in 62½ yrs. 3,105
Culvert-rd., f.g.r.'s 127*l.*, reversion in 60 yrs. ... 3,245
Fulham.—Garden-row, f.g.r. 15*l.* (half-share), reversion in 19 yrs. 200
Rotherhithe.—2 9 and 39, Rotherhithe New-rd. (s.), u.t. 29 yrs., g.r. 17., y.r. 25*l.* 215
Bermondsey.—12, Dockhead, u.t. 28½ yrs., g.r. 24*l.*, y.r. 65*l.* 310
Harringay.—93, Rutland-gdns., u.t. 86 yrs., g.r. 6*l.* 6s., y.r. 32*l.* 270
Brixton.—28, Sudbourne-rd., u.t. 63½ yrs., g.r. 7*l.* 10s., e.r. 40*l.* 435
By WOOD & LOACH.
Edmonton.—4, 8, 12 18, 24, 26, 28, 34, and 36, St. Mary's-rd., u.t. 67½ yrs., g.r. 34*l.*, w.r. 175*l.* 10s. 750
21, 23, and 25, Westoe-rd., f., w.r. 58*l.* 10s. 560
Wood Green.—10 and 11, Dagmar-rd., f., w.r. 80*l.* 10s. 670
By HAMPTON & SONS (on premises).
Maida Vale.—176, Sutherland-av., u.t. 50½ yrs., g.r. 21*l.*, p. 700
December 18.—By H. T. CHEW.
Leytonstone.—459, Grove Green-rd., u.t. 93 yrs., g.r. 5*l.* 5s., y r 25*l.* 250
By STOCKER & ROBERTS.
Lewisham.—68, Limes-gr., u t. 51 yrs, g.r. 5*l.*, e.r. 32*l.* 250
By A. J. SHENFIELD.
Canning Town.—59, Burnham-st., with farrier's s. f., e.r. 30*l.* 355
Poplar.—203, East India Dock-rd. (s.), u.t. 39 yrs., e.r. 42*l.*, y.r. 80*l.* 345

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold gound-rent; l.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops; ct. for court.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles	1 13 0	" " "
Facing Stocks	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 10 0	" at railway depôt
Red wire Cuts	1 13 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire	4 4 0	" " "
Do. Bullnose	4 10 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamfered, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	6 0	" "
Best Portland Cement	80 0	per ton, delivered.
Best Ground Blue Lias Lime	21 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s. 6d. per yard, delivered.
Stourbridge Fire Clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Whraf	2 1	" "
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt
Beer in blocks	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super. "
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes (under 40 ft. sup.)	2 8	per ft. super. "
6 in Rubbed two sides Ditto	—	"
3 in. sawn two sides slabs (random sizes)	1 2	" "
2 in. self-faced random flags	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×10 best blue Bangor	13 2 6	per 1000 of 1200 at rly. dep.
20×12 " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Pertmadoc	12 12 6	" "
16×8 best blue Portmadoc	6 12 6	" "
20×10 best Eureka unfading green	15 2 6	per 1000 of 1200 at rly. dep.
20×12 best Eureka unfading green	17 2 6	" "
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 10 0	" "
18×10 " "	9 10 0	" "
6×8 " "	6 10 0	" "

PRICES CURRENT (*continued*).

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1,000 at rly. depot.
Hip and valley tiles	3 7	per doz. " "
Best Broseley tiles	50 0	per 1,000 " "
Do. Ornamental Tiles	52 6	" " "
Hip and Valley tiles	4 0	per doz. " "
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000 " "
Do. Ornamental Do.	60 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 0	" " "
Best Red or Mottled Staffordshire Do. (Peakes)	51 9	per 1,000 " "
Do. Ornamental Do.	54 6	" " "
Hip tiles	4 1	per doz. " "
Valley tiles	3 8	" " "
Best "Rosemary" brand plain tiles	48 0	per 1,000 " "
Do. Ornamental Do	50 0	" " "
Hip tiles	4 0	per doz. " "
Valley tiles	3 8	" " "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	15 10 0	16 10 0
Deals: best 3 by 9	14 10 0	15 10 0
Battens: best 2½ in by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Danzig or Memel (average specification)	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube	0 3 6	0 4 6
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube	0 5 0	0 5 6
Dry Wainscot Oak, per ft. sup. as inch	0 0 7	0 0 8
¼ in. do. do.	0 0 6½	—
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 9	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	21 0 0
American Whitewood Planks—per ft. cube	0 4 0	—
Prepared Flooring—	Per square.	
1 in. cy 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched	0 14 6	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed boards	0 11 0	0 13 6
¾ in. by 7 in. do. do.	0 14 0	0 18 0
1 in. by 7 in. white do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders, " "	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Fitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

[*See also page 681.*

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CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, &c., supplied by	Tenders to be delivered
Iron Fencing at Playground, Society-row, Garsarbe-rd	Glasgow Corporation	A. B. M'Donald, City Engineer, 64, Cochrane-street, Glasgow	Dec. 28
Iron Swing Framing do.	do.	do.	do.
Timber Appliances do.	do.	do.	do.
Caretaker's Box and Urinals do.	do.	do.	do.
800 lineal yards Wrought-iron Unclimbable Hurdles	Warrington Corporation	T. Longden, Borough Engineer and Surveyor, Warrington	do.
Church, Longmorn	.....	R. B. Pratt, Architect, Town and County Bank Buildings, Elgin	do.
99 Houses, Miskin, Mountain Ash	Miskin Building Club	T. W. Millar, Architect, Mountain Ash	do.
Chapel, Oakland-street, Miskin	Trustees	do.	do.
Residence and Stabling, Hurworth-on-Tees	.....	Clark & Moscrop, Architects, Darlington	do.
Draining, Paving, &c., Maud-street	Levenshulme U.D.C.	J. Jepson, Guardian Chambers, Tiviot Dale, Stockport	do.
Electric Capstan, &c.	Govan Corporation	T. C. Parsons, Borough Electrical Engineer, Govan, N.B.	do.
Furniture & Fittings, Public Library, Lower Kelvin-st	Dublin Corporation	City Architect, Municipal Buildings, Cork Hill, Dublin	Dec. 29
Stores	Oxford Corporation	City Engineer, Town Hall, Oxford	Dec. 30
*Temporary Iron School, Gorton	Urban District Education Comtee.	C. T. Singer, Town Hall, Gorton	do.
Hospital Foundation	Bedlingtonshire U.D.C.	J. E. Johnston, Surveyor, Bedlington	Dec. 31
Disinfectants	Chesterton R.D.C.	J. F. Symonds, 9, Benet-street, Cambridge	do.
Additions to Parish Council Offices, Hopeman	.....	C. C. Doig, Architect, Elgin	do.
Drainage Work, Levelling, &c., Bradley	S. Staffordshire Small Pox Hptl. Bd	G. Green, Town Hall, Wolverhampton	do.
Two Temporary Pavilions & Observation Block, Bradley	do.	do.	do.
400 Brass Condenser Tubes and 100 Ferrules	Hartlepool Port and Harb. Com.	J. D. Hawkins, Engineer, Town Hall, Hartlepool	Jan. 1
2,000 ft. run 6 in. by 10 in. Granite Edge Kerb	Brighton Corporation	F. J. C. May, Borough Engineer, Brighton	do.
4,000 ft. run 12 in. by 6 in. Granite Flat Kerb	do.	do.	do.
4,000 ft. 12 in. by 6 in. Granite Flat Channel	do.	do.	do.
Private Street Works ("Hillside")	Slough U.D.C.	W. W. Cooper, Surveyor to Council, Slough	do.
*Dressed Granite Kerb and Channel	County Borough of Brighton	Borough Engineer and Surveyor, Town Hall, Brighton	do.
*Coastguard Station, Herne Bay	.....	Works Department, Admiralty, 21, Northumberland-avenue, W.C.	do.
Private Street Works	Whitley and Monkseaton U.D.C.	J. Moore, Surveyor to Council, Whitley Bay	Jan. 2
Team Labour for Street and Road Works	do.	do.	do.
Street Works, Parade and West-street	Pontypridd U.D.C.	P. R. A. Willoughby, Eng. and Surv., Dist. Coun. Offices, Pontypridd	Jan. 4
900 yds. Stoneware Pipe Sewers at Pwllgwann, &c.	do.	do.	do.
Masonry, &c., Glyntaff Canal Bridge, Treforest	do.	do.	do.
Steelwork, Glyntaff Canal Bridge. Treforest	do.	do.	do.
Paving, &c., 25 Streets	Salford Corporation	Borough Engineer, Town Hall, Salford	Jan. 5
Renewing Sanitary Appliances, Elm Grove Workhouse	Brighton Guardians	H. S. Reed, Parochial Offices, Prince's-street, Brighton	do.
*Bath & Lavatory Accommodation, Devon-rd. Bromley	Managers Poplar & Sick Asyl. Dist.	J. & W. Clarkson, 136, High-street, Poplar, E.	do.
Cast-Iron Tank, Longford Depot	Warrington Corporation	J. Deas, A.M.Inst.C.E., Bank House, Sankey-street, Warrington	do.
Stable, Hayle Station, Cornwall	G.W.R. Co.	Engineer's Office, Plymouth Station	do.
Sewerage Works	Bedlingtonshire U.D.C.	J. E. Johnston, Surveyor, Bedlington	Jan. 6
Furnishing New Council Room, City Chambers	Edinburgh Corporation	R. Morham, Public Works Office, City Chambers, Edinburgh	do.
Hospital Fittings	Bedlingtonshire U.D.C.	J. E. Johnston, Surveyor, Bedlington	do.
*Supply and Fixing Window Blinds, Brook-street	Lambeth Guardians	Guardians' Offices, Brook-street, Kennington, S.E.	do.
*Fire Escape Iron Staircases, Margate and Leytonstone	West Ham Union	Clerk's Office, Union Workhouse, Leytonstone, E.	do.
Public Convenience, Cook-street	Glasgow Corporation	J. Lindsay, Office of Works, 64, Cochrane-street, Glasgow	Jan. 7
*New Labour Room, Newington Workhouse, Walworth	Southwark Guardians	G. D. Stevenson, 13 & 14, High-street, Cheapside, E.C.	do.
Electric Light, Town Hall and Library	Bo'ness Town Council	Mr. Liddle, Electrical Engineer, 28, Rutland-street, Edinburgh	do.
103 lineal ft. of Stoneware Pipe Sewer, &c.	Tunbridge Wells Corporation	J. Cave, Sanitary Inspector, 10, Calverley Parade, Tunbridge Wells	Jan. 9
Extension of Car-Shed in Oswald-road	Kirkcaldy Corporation	Surveyor, Public Offices, Kirkcaldy	do.
Service Reservoir and Embankment, Greyrig	County of Stirling	Warren and Stuart, Engineers, 94, Hope-street, Glasgow	Jan. 11
Covered Concrete and Granolithic Service at Limerig	Eastern District Committee	do.	do.
*Carnegie Library at Manor Park	East Ham U.D.C.	Engineer and Surveyor to the Council, Town Hall, East Ham	do.
Underground Telephone Pipes	Manchester Corporation	City Surveyor, Town Hall, Manchester	do.
Drainage Work at Tooting Bec Asylum	Metropolitan Asylums Board	A. & C. Harston, 15, Leadenhall-street, E.C.	Jan. 13
*2,700 tons of Granite	Kingston-on-Thames Corporation	Borough Surveyor, Clattern House, Kingston-on-Thames	do.
*Alterations to School Buildings in Bancroft-road	Hamlet of Mile End Old Town G'ns.	J. M. Knight, 35, Bancroft-road, Mile End-road, E.	Jan. 14
Alterations to School, Bancroft-road	Mile End Old Town Guardians	J. M. Knight, Architect, 35, Bancroft-road, Mile End-road, E.	do.
School for 200 Infants, Woodlands, Quaker's Yard	Merthyr Tydfil School Board	J. Llewellin Smith, Architect, 50, High-street, Merthyr Tydfil	Jan. 23
Road Materials and Cartage	Hailsham R.D.C.	E. Catt, Clerk to Council, 17, London-road, Hailsham	do.
Offices, St. Mary's-gate, Derby	Derbyshire County Council	J. Somes Story, County Offices, Derby	Jan. 27
*Additions and Alterations to Victoria Hall	Sunderland Corporation	J. Eltringham, Architect, 62, John-street, Sunderland	Feb. 1
Repairing, &c., Old Parish Ch. of St. John, Beaufort	Rev. D. J. Llewellyn	H. Waters, Architect, Beaufort, Mon	No date.
Additions to Shotton Schools	.....	S. Wilkinson, Architect, Mosley Chambers, Newcastle-on-Tyne	do.
Alterations to 22, Widemarsh-street	Hereford Co-operative Society	W. W. Robinson, Architect, 10, King-street, Hereford	do.
*Heating Apparatus at Pontypool, Mon	Messrs. Swash & Bain, Architects	Midland Bank Chambers, Newport, Mon.	do.
*Office Building in Gt. Smith-street, Westminster	.....	Palgrave & Co., 28, Victoria-street	do.
Furniture, &c.	Hawick Hospital Committee	A. Inglis, Architect, Bridge-street, Hawick	do.
Alterations to thirty-five Dredger Buckets	Hartlepool Port & Harbour Comee.	J. D. Hawkins, Engineer, Town Hall, Hartlepool	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
Building Surveyor	Dublin Corporation	120*l.*	Dec. 26
Resident Electrical Engineer for Tramways	Leicester Corporation	250*l.*	Jan. 1
*Sanitary Inspector	Bermondsey Borough Council	130*l.*	Jan. 4
*Surveyor	Aldershot U.D.C.	200*l.*	Jan. 5
*Surveyor and Water Engineer	Paignton U.D.C.	Not stated	Jan. 14
*Clerk of Works	Hearts of Oak Benefit Society	Not stated	Jan. 21
*Building Inspector	Shanghai Municipal Council	160 Shanghai Taels per month	No date.

Those marked with an asterisk (*) are advertised in this Number.

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PRICES CURRENT (*continued*).

METALS.

	Per ton, in London £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0 ...	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0 ...	8 10 0
Staffordshire "Marked Bars"	10 10 0 ...	—
Mild Steel Bars	8 15 0 ...	9 5 0
Hoop Iron, basis price	9 5 0 ...	9 10 0
" " galvanised	17 10 0 ...	—
(*And upwards, according to size and gauge.)		
Sheet Iron (Black)—		
Ordinary sizes to 20 g.	9 15 0 ...	—
" " 24 g.	10 15 0 ...	—
" " 26 g.	12 5 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g	12 15 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.	14 5 0 ...	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	16 0 0 ...	—
" " 22 g. and 24 g.	16 10 0 ...	—
" " 26 g.	18 0 0 ...	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0 ...	—
" " 22 g. and 24 g.	13 5 0 ...	—
" " 26 g.	14 0 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0 ...	—
Best Soft Steel Sheets, 22 g. and 24 g.	12 15 0 ...	—
" " " 26 g.	14 0 0 ...	—
Cut nails, 3 in. to 6 in.	9 5 0 ...	9 15
(Under 3 in., usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. and up	13 17 6 ...	—
Pipe in coils	14 7 6 ...	—
Soil pipe	16 17 6 ...	—
Compo Pipe	16 17 6 ...	—
ZINC—Sheet—		
Vieille Montagne ton	26 5 0 ...	—
Silesian	26 0 0 ...	—
COPPER—		
Strong Sheet per lb.	0 0 10½ ...	—
Thin "	0 0 11½ ...	—
Copper nails "	0 0 11 ...	—
BRASS—		
Strong Sheet "	0 0 10 ...	—
Thin "	0 0 11 ...	—
TIN—English Ingots "	0 1 3 ...	—
SOLDER—Plumbers' "	0 0 6 ...	—
Tinmen's "	0 0 8 ...	—
Blowpipe "	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2d. per ft. delivered
" fourths	1½d. " "
21 oz. thirds	3d. " "
" fourths	2½d. " "
26 oz. thirds	3½d. " "
" fourths	3d. " "
32 oz. thirds	4½d. " "
" fourths	4d. " "
Fluted sheet, 15 oz.	2½d. " "
" 21 oz.	3½d. " "
½ Hartley's Rolled Plate	1½d. " "
⅝ " " "	2d. " "
¾ " " "	2½d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes or barrels	per gallon	0 1 8
" " " in drums	"	0 1 11
Boiled " " in pipes or barrels	"	0 1 11
" " " in drums	"	0 2 2
Turpentine, in barrels	"	0 3 8
" in drums	"	0 3 10
Genuine Ground English White Lead	per ton	19 0 0
Red Lead, Dry	"	19 0 0
Best Linseed Oil Putty	per cwt.	0 7 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

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TO CORRESPONDENTS.

M. & C. (Amounts should have been stated.)

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We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BINGLEY (Yorks).—For erecting a villa residence, Bromley-road, for Mr. W. R. Dawson. Mr. W. Rhodes Nunns, architect, Bingley, Yorks :—

Masonry.—J. Totty, Bradford	£378 0
Joinery.—S. Town, Bingley	169 0
Plumbing.—A. Bolton, Bingley	81 17
Plastering.—Spurr & Sons, Bingley	39 10
Slating.—W. Thornton, Bingley	33 0
	£701 7

BIRMINGHAM.—For the superstructure of University Buildings, Bournbrook, for Birmingham University. Messrs. Aston Webb and E. Ingress Bell, architects, 19, Queen Anne's-gate, London, S.W. Quantities by Messrs. Corderoy, Selby, & Corderoy, 21, Queen Anne's-gate, London, S.W.:—

Leslie & Co.	£214,751	0	0
McCormick & Sons	209,876	0	0
F. G. Minter	193,892	0	0
Moss & Sons	184,230	0	0
Parnell & Son	183,360	0	0
Longley & Co.	182,779	0	0
Bowen & Sons	180,500	0	0
Willcock & Co.	179,533	0	0
Bunsley & Sons	178,888	0	0
Smith & Pitts	177,400	0	0
Shillitoe & Son	£176,500	0	9
Gowing & Ingram	176,000	0	0
W. & J. Webb	175,987	0	0
Vickers & Son	175,630	0	0
Sapcote & Sons	173,071	0	0
Watt Bros.	170,881	11	6
Kerridge & Shaw	164,800	0	0
T. Rowbotham, Birmingham (amended)*	151,827	0	0

CROYDON.—For making up Carew-road and other streets, for the Urban District Council. Mr. R. M. Chart, F.S.I., Town Hall, Croydon :—

Ellen-avenue, Coulsdon.

W. Hall	£995	Edmund Iles, Mitcham*	£799
Free & Sons	935		

Carew-road.

W. Hall	£557	Edmund Iles, Mitcham*	£506
Free & Sons	510		

DARTFORD.—For drainage work, children's home; and 830 ft. of sewer from Manor Gate to Leyton Cross, for Guardians and Rural District Council. Mr. Harston, A.M.Inst.C.E., 8, Hythe-street, Dartford :—

G. Newton	£997	0	0
W. Bayliss	584	12	7
T. Adams	554	0	0
G. G. Page	525	19	0
Friday & Ling	500	16	9
Spencer & Son	485	0	0
E. Lamble	£418	14	0
W. F. Blay	393	0	0
Ellingham & Sons, Dartford*	384	0	0
W. Y. Logan	359	0	0

ENNIS (Ireland).—For water tower and pump house at the Asylum, for the District Lunatic Asylum. Mr. F. O'Connor, C.E., Ennis Asylum, Ireland :—

Michael McNamara, Quin, co. Clare* £700

HUNSTANTON (Norfolk).—For alterations and additions to dining-rooms, for Mr. S. Stanford. Mr. Geo. Thorpe, architect, Post Office-lane. Quantities by the architect :—

W. H. Brown	£492	R. Shanks	£418
W. A. Leach	455	W. F. Smith	39 9
R. Dye	447	S. Hipwell, Wisbech*	35 0
F. Southgate	423	J. Nelson	32 5

LONDON. — For repairs and redecorations at 64, Avenue-road, St. John's Wood, N.W., for the Trustees of the late Rev. N. Jennings. Messrs. Cowell & Shaw, architects and surveyors, 49, Finsbury-pavement, E.C. :—

Melbourne	£193	0	
Oley	159	15	
Meek	£157	10	
Davies	145	0	

LONDON.—For wiring for electrical lighting of certain car-sheds and sub-stations in connexion with the London County Council Tramways :—

B. Thomas, Ltd.	£4,420	0	
Ellis & Ward	4,023	0	
Sunderland & Co.	3,263	0	
W. J. Furse	3,049	0	
Eckerley & Co.	2,820	5	
Jackson Bros.	£2,539	5	
W. J. Fryer	2,360	10	
Marshall & Co., Leytonstone*	2,208	0	

LONDON.—For the electric wiring and fittings, &c., at Whalebone-lane Higher Elementary School, Stratford, E., and for hot-water apparatus, Shipman-road School, Custom House, E., for the Education Committee, West Ham. Mr. William Jacques, architect, 2, Fen-court, Fenchurch-street, E.C. :—

Electric Light.

	Shipman-road.	Whalebone-lane.
Allin & Son	£630 9 0	—
Bakewell & Co.*	540 4 3	£948 6 6
Burroughes & Son	876 13 6	1,061 8 0
Defries & Son	712 13 0	830 12 0
Donnison, Berlyn, Sillen, & Co.	683 9 6	902 6 0
Durell & Co	776 1 0	973 8 9
Empire Electrical Co.	961 5 0	1,115 6 0
J. T. Halsey	625 11 6	932 7 6
Haselgrove & Brooker	1,200 8 6	1,491 0 8
Murrell Bros.	—	*692 0 0
R. H. & J. Pearson	—	795 0 0
Potter & Son	623 10 6	757 6 0
Reedman & Co.	747 12 0	1,207 7 0
W. Simmons	612 0 3	773 9 0
Tamplin & Makovski	873 0 0	1,104 0 0
Troup, Curtis, & Co.	658 0 0	896 14 0
Weston & Son	548 10 6	715 6 6
J. Wilson	1,076 0 0	—
W. Winn	988 10 6	1,276 0 0

Hot Water Heating.

	Shipman-road.	Whalebone-lane.
Allin & Son	£767 18 0	£834 5 0
Bakewell & Co.	1,209 17 0	1,870 2 0
Brightside Foundry Co.*	558 0 0	*764 0 0
Burroughs & Son	880 0 0	989 0 0
Crittall & Co.	914 0 0	1,448 0 0
Dargue, Griffiths, & Co.	794 0 0	1,069 0 0
Defries & Son	877 19 6	1,251 3 8
J. T. Halsey	595 11 6	850 10 8
Howorth & Co.	—	958 15 0
J. & W. Jeal	—	1,085 0 0
Lancashire Heating Co.	616 0 0	872 0 0
R. H. & T. Pearson	—	1,182 10 0
Potter & Son	852 0 0	1,016 10 0
Reedman & Co.	1,570 7 0	2,094 17 0
Richmond & Co.	668 8 6	944 4 0
W. Simmons	710 0 0	960 0 0
Tamplin & Makovski	924 8 6	1,109 10 0
Troup, Curtis, & Co.	735 8 9	1,047 0 0
Werner, Pfleiderer, & Perkins	820 11 9	971 10 0
Watford Engineering Co.	—	965 0 0

LONDON.—For nine shops, Norwood-road, S.E. Mr. A. L. Guy, architect, 4, Verulam-buildings, Gray's Inn, W.C. :—

Hollingsworth	£9,292	0	0
Renwick	9,162	0	0
Line	8,905	0	0
Kent	8,490	0	0
Pearce	8,000	0	0
Orfeur	7,729	0	0
Hedges	7,695	0	0
Roberts	7,599	0	0
Blyton & Sons	7,400	0	0
Coates	7,246	9	0
Hocking	£7,214	9	6
Smith & Sons	7,186	0	0
West & Richards	6,885	0	0
Pillar	6,875	0	0
Taylor	6,481	0	0
Jas. Watt	6,475	0	0
Richardson & Sons	6,279	0	0
Ellis & Turner, Aldersgate-st.*	6,254	0	0

LONDON.—For 12,500 tons of rails, &c., for the reconstruction of certain portions of the County Council's existing tramways north and south of the Thames, and the construction of certain authorised lines :—

Track Rails, &c.

Jacobs, Bros. & Co., Bessemer acid or basic steel at their option	£50,707 6 0
Steel, Peech, & Tozer, Ltd., acid steel	49,835 0 0
P. & W. Maclellan, Ltd., acid steel	48,899 13 2
Barrow Hæmatite Steel Co., Ltd., acid steel	48,146 8 0
Scott, Ltd., basic Bessemer steel	47,685 5 0
P. & W. Maclellan, Ltd., basic Bessemer steel	44,501 14 2
Bolckow, Vaughan, & Co., Ltd., London, acid steel tendered for *	43,748 9 0
The Lorain Steel Co. ‡	43,389 3 0
White & Co., Ltd., basic Bessemer steel	43,353 1 0
M. Korten, basic Bessemer steel	43,250 0 6
Bolling & Lowe, basic Bessemer steel	42,414 8 2
Penney & Co., basic Bessemer steel	42,065 19 0
P. & W. Maclellan, Ltd., basic Bessemer steel	41,531 17 10
Charles Frere, jun., basic steel	40,418 13 6

Slot Rails, &c.

Earl of Dudley's Round Oak Works, Ltd., acid steel	£49,755 0 0
Jacobs Bros. & Co.	48,500 0 0
P. & W. Maclellan, Ltd., acid steel	48,284 4 2
Barrow Hæmatite Steel Co., acid steel	47,748 10 0
Scott, Ltd., basic Bessemer steel	44,673 5 0
M. Korten, basic Bessemer steel	40,297 17 6
Charles Frere, jun., basic Bessemer steel	38,013 5 0
Penney & Co., basic Bessemer steel	37,035 0 0
Steel, Peech, & Tozer, Ltd., acid steel	36,923 0 0
Bolckow, Vaughan, & Co., Ltd., acid steel	36,871 12 6
Frodingham Iron and Steel Co., Ltd., Doncaster, acid steel *	36,461 15 0
Pennsylvania and Maryland Steel Co., Delivery in quantities given as far as shipments by steamer allow	35,958 10 0
Bolling & Lowe, basic Bessemer steel	34,896 19 2
White & Co., Ltd., acid steel	34,649 10 0
P. & W. Maclellan, Ltd., basic Bessemer steel	34,067 12 6
The Lorain Steel Co. ‡	33,979 0 0

[A tender was submitted by the Shelton Iron, Steel, and Coal Co., Ltd., for a portion only of the slot rails, but this was not considered.]

‡ Will not accept penalty for delay in delivery.

[See also next page.

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LONDON.—For alterations to the entrance from High-street, Clapham, to the second portion of the Clapham car-shed, for the London County Council :—
Kirk & Randall £457 9 5

LONDON.—For new road and sewers, Plumstead, for Mr. H. N. Grenside. Mr. F. E. Windsor, surveyor, 22, Southampton-street, Bloomsbury, W.C. :—

J. Stevens	£2,305 0	Lawrence & Thacker	£1,805 10
Kavanagh & Co.	1,900 0	Killingback & Co.	1,750 0
T. Adams	1,833 0	Pell & Sons, Bromley Common	1,779 0
W. & C. French	1,830 0		

LONDON.—For the erection of the Electrical Standardizing, Testing, and Training Institute at Southampton-row. Mr. G. D. Martin, architect, 3, Pall Mall East, S.W. :—

Howard & Co.	£15,487	Gough & Co.	£14,544
H. Lovatt	15,400	Lawrence & Sons	14,386
F. G. Minter	15,000	Patman & Fotheringham	14,373
Dove Bros.	14,875	Holloway Bros.	14,300
Jerrard & Sons	14,747	J. Carmichael	14,260
Colls & Sons	14,580	Perry & Co.	14,155
C. F. Kearley	14,509		

LONDON.—For the erection of new premises, Gough-square, E.C., for Mr. H. C. Knowles, exclusive of fixtures and fittings. Mr. C. Watkins, architect and surveyor, Glebe House, Sherborne-lane, E.C. :—

Foster & Decksee	£22,660	J. Greenwood, Ltd.	£20,767
Hall, Bedell, & Co.	22,340	Patman & Fotheringham	20,573
Lascelles & Co.	21,948	W. Downs	20,188
Colls & Sons	21,740	Ashby & Horner*	19,957
Lawrence & Sons	21,288		
H. Lovatt	20,900		

LONDON.—For new premises, Fetter-lane, E.C., with two fire-resisting staircases, in accordance with drawings prepared by Mr. C. Watkins, Glebe House, Sherborne-lane, E.C. :—

Colls & Sons	£10,890	Patman & Fotheringham	£10,273
Ashby & Horner	10,888	W. Downs	10,233
Lascelles & Co.	10,765	J. Greenwood, Ltd.*	9,968
H. Lovatt	10,750		

LONDON.—For erecting shop, 29, Rye-lane, Peckham, S.E., with residential flats over, for Mr. E. Swiffen. Mr. E. J. Strevens, architect and surveyor, 246, Camberwell-road. Quantities supplied :—

Falkner & Sons	£2,483	Hooper & Son	£2,145
Little & Senecal	2,474	G. Parker	2,135
Massy & Sons	2,462	W. V. Goad	1,958
Balaam Bros.	2,325	H. Lind	1,917
G. Neal	2,257	J. Ham*	1,899
G. Newton	2,150		

LONDON.—For the supply, delivery, and erection at the Deptford pumping-station of two six-cylinder compound pumping-engines, with all accessories complete, for the London County Council :—

The Thames Ironworks, &c., Co., Ltd.	£30,475
Fullerton, Hodgart, & Barclay, Ltd.	34,275
J. Musgrave & Sons, Ltd.	29,700
Galloways, Ltd.	28,740
Fleming & Ferguson, Ltd.	25,850
Clayton, Goodfellow, & Co., Ltd.	24,430
Richardsons, Westgarth, & Co., Ltd.	23,500
Yates & Thom, Blackburn*	22,698

LONDON.—For making borings along the suggested lines of the additional southern outfall sewer between the Plumstead railway station and the Deptford pumping-station, and of the proposed high-level sewer from Plumstead to Catford, for the London County Council :—

S. F. Baker & Son	£1,038 9 0
T. Docwra & Son	9 3 8 0
Le Grand & Sutcliff*	443 16 6

LONDON.—Foundation for hydraulic engines, southern outfall sewer enlargement, Crossness outfall, for the London County Council :—
J. B. Squire & Co. £260

LONDON.—For temporary screen chamber, southern outfall sewer enlargement, Crossness outfall, for the London County Council :—
Humphreys, Ltd. £107

RAWMARSH (YORKS).—For three beds of Waddel's patent regenerating furnaces, Parkgate, Rawmarsh, for Urban District Council. Mr. E. O. Watson, C.E. Quantities by engineer :—
R. Dempster, Elland* £360

STROOD.—For making up short length of roadway, Meopham, for Rural District Council. Mr. W. Brook, A.M.Inst.C.E., District Surveyor, Strood, near Rochester :—

Tuff & Miskin	£107 15
J. Mills	95 0
Brice & Son, Rochester*	71 0
Surveyors' estimate	100 0

SURBITON.—For the construction of a road, 800 ft. Mr. W. E. Hewitt, surveyor, 22, Buckingham-street, W.C. :—

W. H. Wheeler	£1,187 0 0	Killingback & Cunningham, Co.	£1,018 15 3
Forbes & Co.	1,186 0 0	Kavanagh & Co., Surbiton*	991 13 4
Atkins & Son	1,025 0 0		

WREXHAM.—For the erection of a minister's house, Wern, Minera, for the Welsh Congregational Chapel, Wern, Minera, near Wrexham. Mr. T. Rees Evans, Dinorvic House, Johnstown, Ruabon :—

Robert Roberts	£317 10	T. Llewelyn Davies, Rhos, nr. Ruabon*	287 17
Samuel Moss	298 18		
John Harrison	295 0		

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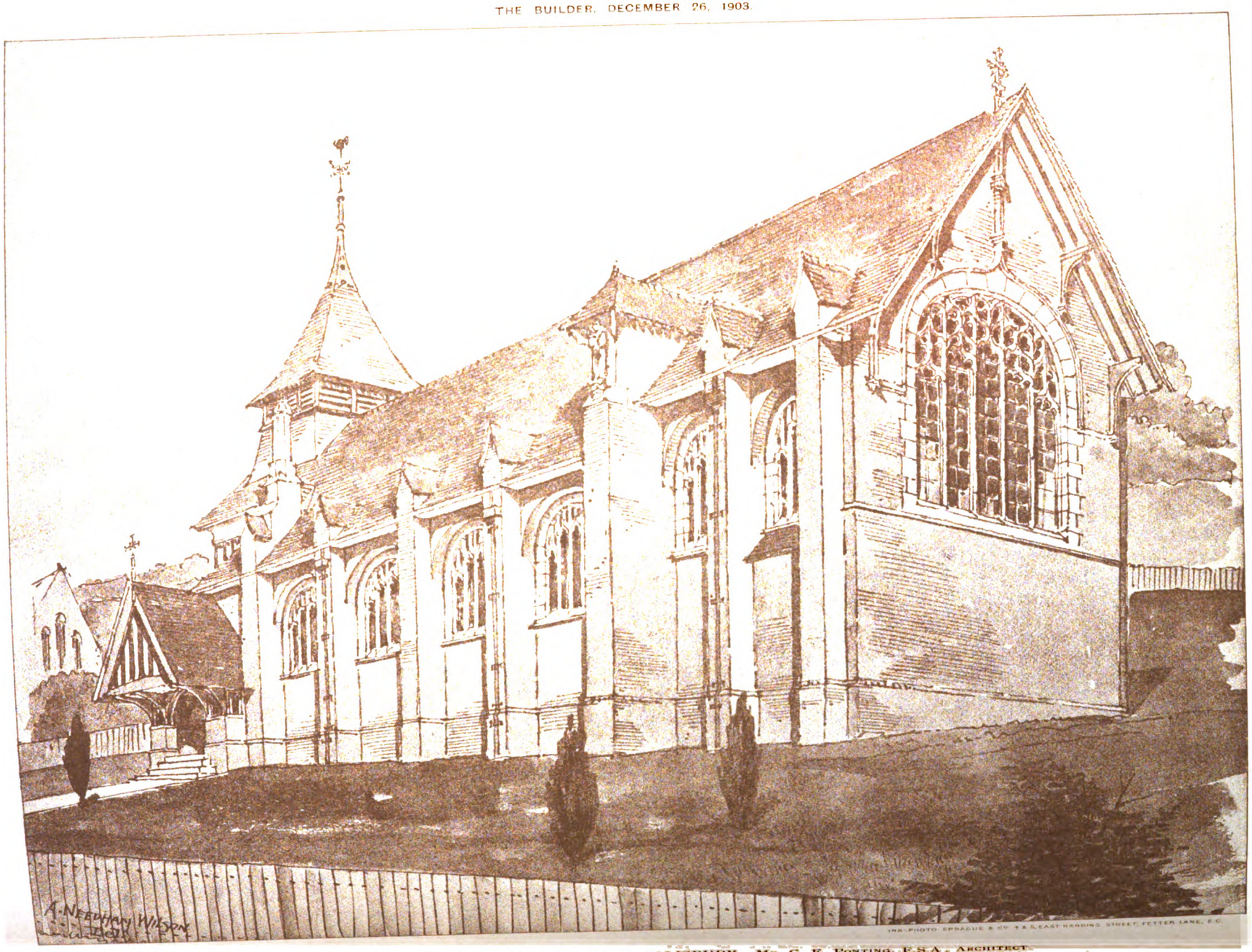

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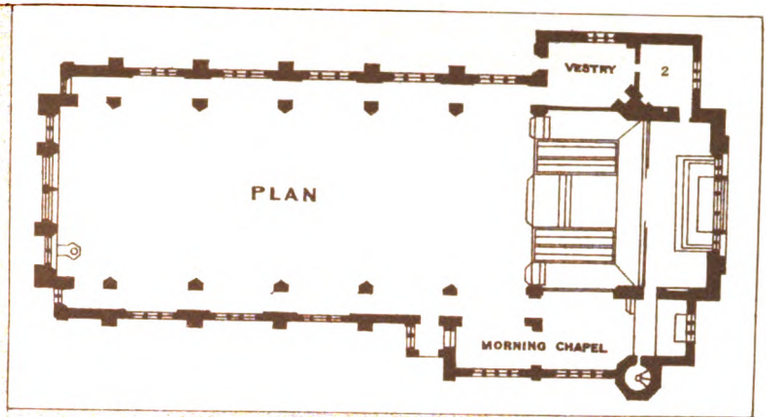

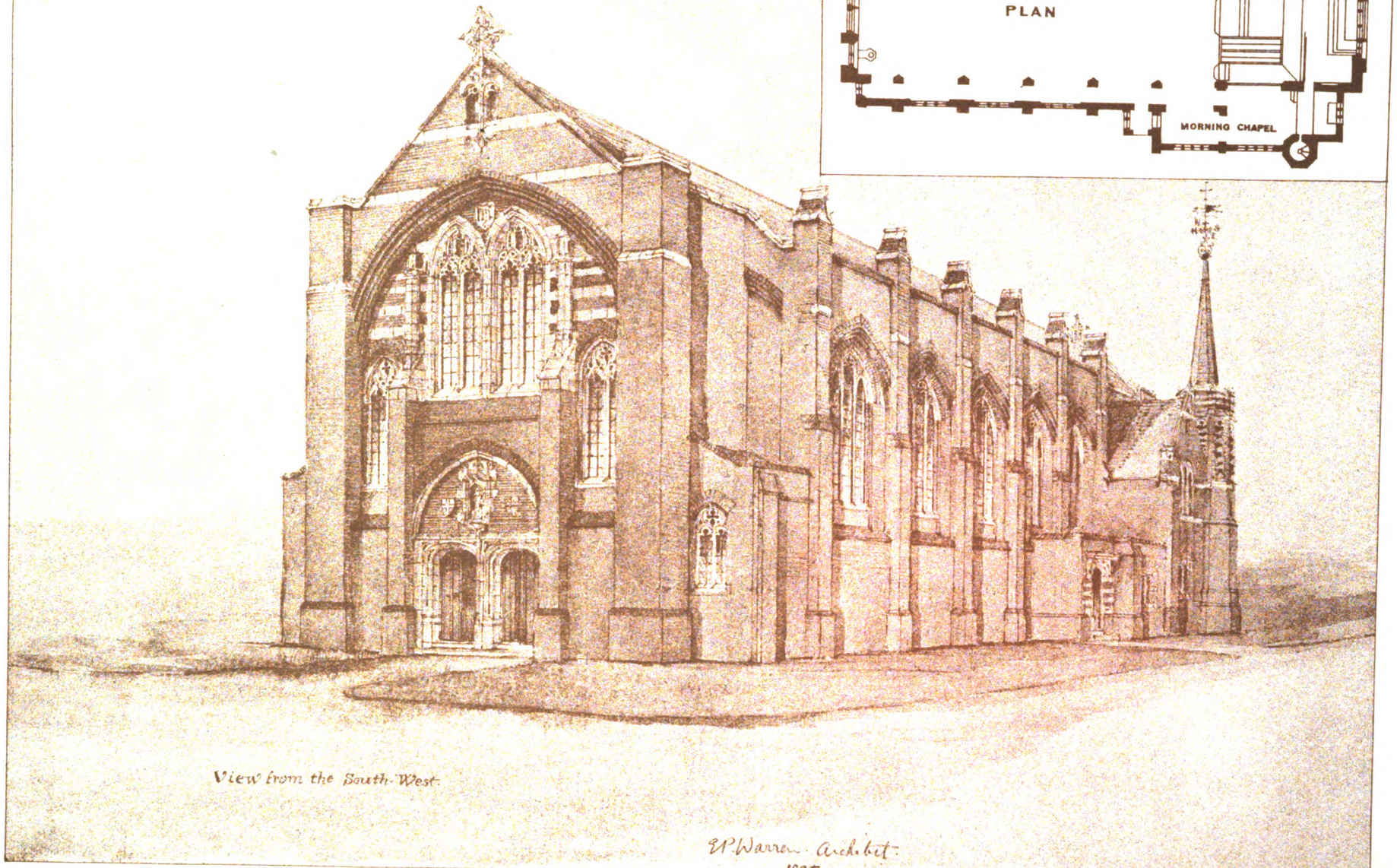

View from the South-West.

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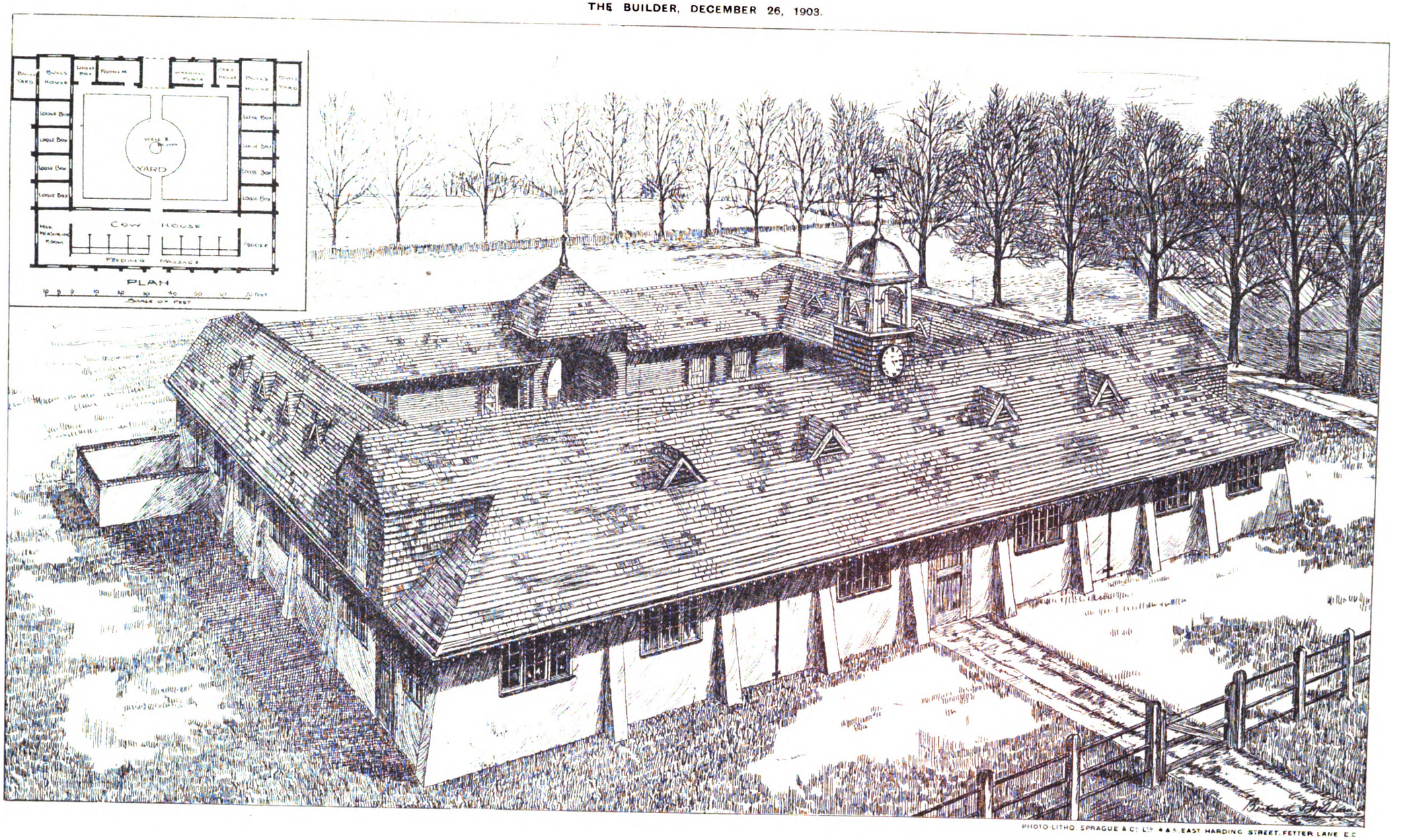

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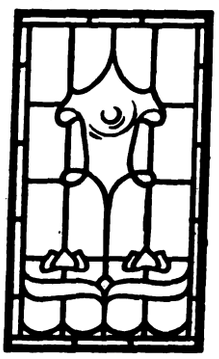

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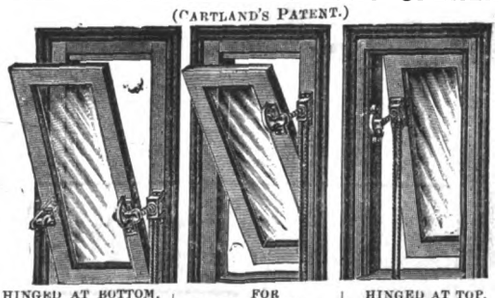

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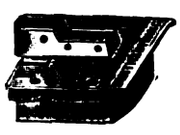

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Copies of the bill of quantities will be supplied on application to this office, and the drawings and specifications may be seen here or at the Coast-Guard Station at Herne Bay.

DIRECTOR OF WORKS DEPARTMENT, Admiralty.

21, Northumberland-avenue, London, W.C.

TENDERS are invited for TAKING DOWN the PRESBYTERIAN CHURCH and MANSE, Market-place, Whitehaven, and for BUILDING a NEW CHURCH.

Plans and specifications can now be seen from NINE a.m. to FIVE p.m. in the School Room, Irish-street, or at the offices of the Architect, 53, Church-street, Whitehaven, where endorsed Tenders are to be delivered not later than NOON on TUESDAY, 5th JANUARY, 1904.

The Committee do not bind themselves to accept the lowest or any Tender.

J. S. MOFFAT, Architect.

53, Church-street, Whitehaven.
December 3rd, 1903.

EAST HAM URBAN DISTRICT COUNCIL.

ERECTION OF CARNEGIE LIBRARY AT MANOR PARK.

The above-named Council invite TENDERS for the ERECTION of the CARNEGIE BRANCH LIBRARY, in the Romford-road, Manor Park, E. in conformity with drawings and specifications, which may be inspected upon application to Mr. ADAM HORSBURGH CAMPBELL, Engineer and Surveyor to the Council, Town Hall, East Ham, E., and from whom bills of quantities may be obtained upon deposit of the sum of 7l. which will be returned on the receipt of a bona-fide Tender for the work.

Tenders to be sent in addressed to "The Chairman, Libraries Committee, Town Hall, East Ham, E." and endorsed "Carnegie Library," not later than TWELVE o'clock NOON of MONDAY, the 11th JANUARY 1904.

The firm whose Tender is accepted will be required to enter into a contract with a surety for the due performance thereof, and will also be required to pay to the whole of the workmen engaged upon, or in connexion with this work, the Trade Union rate of wages, and observe the Trade Union hours of labour, recognised in this class of work.

The Council does not bind itself to accept the lowest or any Tender.

By Order, C. E. WILSON, Clerk to the Council.

Town Hall, East Ham, London, E.
December 15th, 1903.

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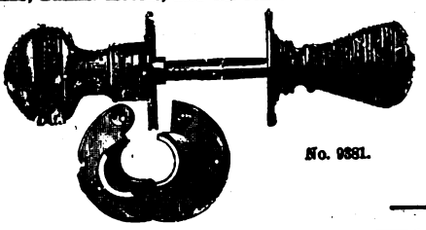

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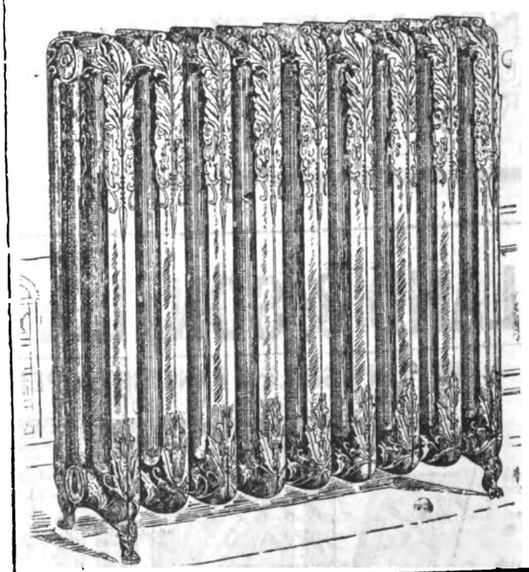
EVERY DESCRIPTION OF SUPERIOR **BUILDERS' IRONMONGERY.**

The LATEST and BEST

RADIATOR



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FOR HOT WATER OR STEAM.

The **THAMES BANK IRON CO.**

UPPER GROUND ST., S.E.

Manufacturers of Heating Apparatus of every description.

The oldest House in the Trade.

Illustrated Catalogue, 1s. Price Lists Free.

Pumps on Fire.

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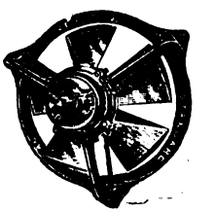

Veritys' Electric Fans.

SILENT RUNNING and EFFICIENT.

Write for Circular.

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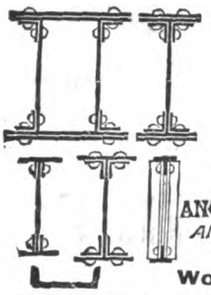
MATTW T. SHAW & CO. LIMITED.

HIGH-CLASS CONSTRUCTIONAL STEEL AND IRON WORK FOR ARCHITECTS, ENGINEERS, ETC.

On Admiralty and War Office special "Manufacturers' List."



Chief Offices—81, CANNON STREET, E.C. Telephone: No. 850 BANK.

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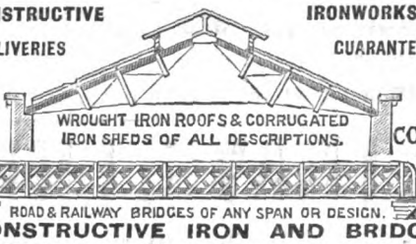
VERY PROMPT DELIVERIES GUARANTEED WHEN REQUIRED.

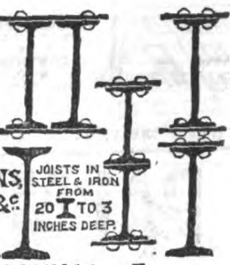


WROUGHT IRON ROOFS & CORRUGATED IRON SHEDS OF ALL DESCRIPTIONS.

ROAD & RAILWAY BRIDGES OF ANY SPAN OR DESIGN.

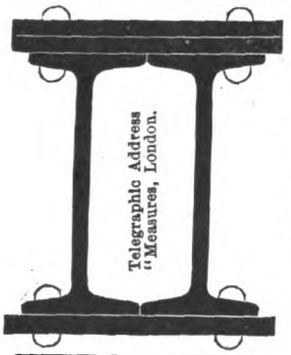
ALWAYS IN STOCK STEEL & IRON ANGLES, TEES, CHANNELS, AND FLITCH PLATES IN ALL SIZES.

CAST IRON COLUMNS, STANCHIONS, TANKS, GUTTERS, &c. ON THE SHORTEST NOTICE.



JOISTS IN STEEL & IRON FROM 20 I TO 3 INCHES DEEP

Works—LONDON CONSTRUCTIVE IRON AND BRIDGE WORKS, MILLWALL, E.



Telegraphic Address "Measures, London.

MEASURES BROS. Ltd. LONDON.

10,500 TONS SIEMENS-MARTIN ENGLISH STEEL JOISTS
BESSEMER FOREIGN STEEL JOISTS

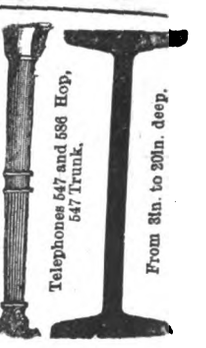
3 to 20 inches deep. *Always in Stock.*

TEES, ANGLES, CHANNELS, CHEQUERED PLATES, CASTINGS, Of Every Description for Building Work.

SECTION SHEETS AND ESTIMATES ON APPLICATION.

Prompt Delivery from Stock.

CORRUGATED IRON ROOFING. IRON DOORS, &c.



Telephones 547 and 586 Hop, 547 Trunk.

From 3in. to 20in. deep.

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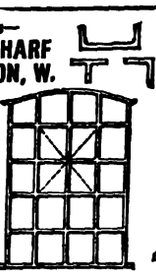
Offices and Works— 15 & 19, NORTH WHARF PADDINGTON, W.

Telephone No. 74, Paddington. Telegraphic Address, "Troughing, London."

RIVETED GIRDERS, BRIDGES, FLITCH PLATES, L's and T's, CAST-IRON COLUMNS, STANCHEONS, TANKS, ROOFS, JOISTS, &c.

PATENT TRUSSED FIREPROOF FLOORS, SASHES, &c.



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THE HORSELEY Co. LD. TIPTON, Staffs.

Passenger Station— DUDLEY PORT.

London Office— 11, VICTORIA-ST.

Makers of ENGINEERS AND IRONFOUNDERS. *Estimates on Application.*

LAMP PILLARS, STEEL ROOFS, STEEL SASHES, STEEL, WROUGHT, & CAST-IRON GIRDERS.

EVERY DESCRIPTION OF BUILDERS' IRONWORK.

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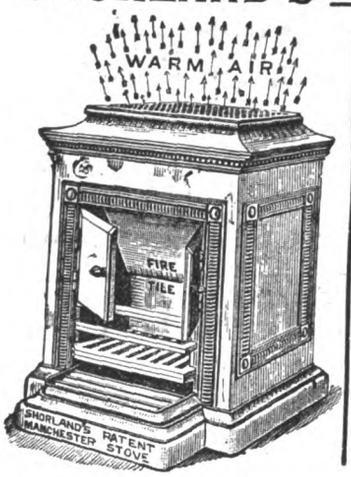

SINGLE and DOUBLE FRONTED.

Largely in use in . .

HOSPITAL WARDS

. . throughout the Kingdom.

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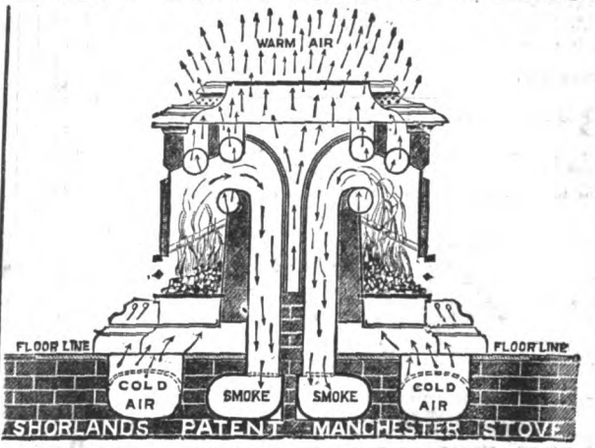
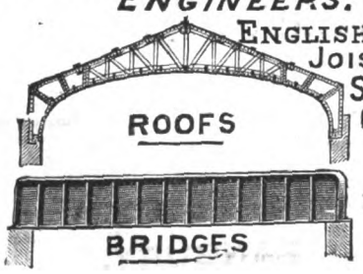


ARCHIBALD D. DAWNAY & SONS, LIMITED

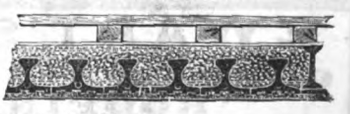
ENGINEERS: 39 VICTORIA ST. S.W.—NINE ELMS LANE S.W.



ENGLISH STEEL JOISTS GIRDERS STANCHIONS CHANNELS ANGLES TEES FLITCH PLATES GIRDERS

ALSO AT THE WALES & WEST OF ENGLAND GIRDER WORKS EAST MOORS CARDIFF AND AT 65. QUAYSIDE NEWCASTLE-ON-TYNE.

FIRE PROOF FLOORS



W. S. TODD, AGENT.

TELEGRAMS "SURVEY NEWCASTLE-ON-TYNE. "DAWNAY LONDON. NATIONAL TELEPHONE HOP 506 "DAWNAY CARDIFF. " " 694

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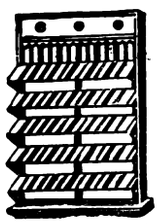


The 'HELIOSCENE' Blinds.

SPECIALLY SUITABLE for HOTELS, as is the only Outside Blind combining free view with perfect ventilation. Messrs. LOWTHER & CO. the original Patentees, now incorporated with the above.

THE KENSINGTON BLIND WORKS, LONDON, W

MANUFACTURERS OF INSIDE AND OUTSIDE

WINDOW BLINDS

of every description, at the Lowest Possible Prices for Best Quality Work.

ESTIMATES AND DESIGNS FREE ON APPLICATION.

ALBERT J. SHINGLETON, 110 and 112, KENSINGTON HIGH ST.

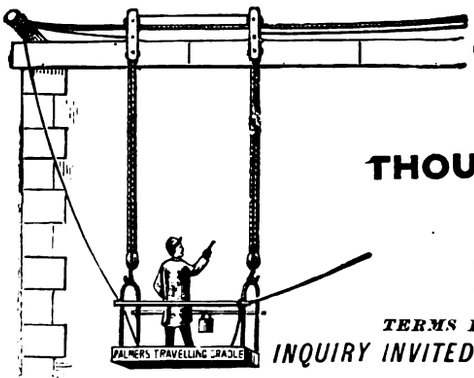
Factory: BRIDGE ROAD and BLACK'S ROAD, HAMMERSMITH, W. LONDON, W.

Telegrams, "Blinds, London."

SPECIALITY Blinds for Offices and Banks.

Largest exclusive Manufacturers in the United Kingdom

PALMER'S TRAVELLING CRADLE.



PATENT WIRE SUPPORTED.

THE SAFEST SCAFFOLD EVER USED.

CAN BE FIXED ANYWHERE.

THOUSANDS OF FIXINGS. NOT ONE ACCIDENT.

Used on most of the large Buildings in London, on the "Tower" and other "Bridges"; also on many Buildings overhanging the Railway and River.

The CHEAPEST and SAFEST Staging for Easy and Simple fixings.
The ONLY POSSIBLE SAFE STAGE for many Awkward positions.

TERMS FOR FIXING AND HIRE QUOTED UPON APPLICATION.

INQUIRY INVITED FOR SPECIAL OR DIFFICULT STAGING. Telephone No. 1156 Hop. Telegrams: "Wireway, London."

PALMER'S TRAVELLING CRADLE, LTD., 250, WESTMINSTER BRIDGE ROAD, S.W.

CONTRACTS (*continued from page* iv.)

COUNTY BOROUGH of SUNDERLAND.

PROPOSED ADDITIONS AND ALTERATIONS TO VICTORIA HALL.

TO BUILDERS AND CONTRACTORS.

The Corporation of Sunderland invite TENDERS from Builders and Contractors for the proposed ADDITIONS AND ALTERATIONS to Victoria Hall.

Drawings and specifications can be seen at the Office of Mr. JOHN ELTRINGHAM, Architect, 12, John-street, Sunderland, by whom bills of quantities will be supplied on payment to him of a deposit of 2l., which will be returned on receipt of a bona-fide Tender.

Sealed Tenders, addressed to the Chairman and Members of the Town Hall Committee, Town Hall, Sunderland, and endorsed "Tender for Proposed Additions and Alterations to Victoria Hall," must be delivered at my office at the Town Hall before FOUR o'clock p.m. on MONDAY, 1st FEBRUARY, 1904.

The Corporation do not bind themselves to accept the lowest or any Tender.

FRAS. M. BOWEY, Town Clerk.

Town Hall, Sunderland,
December 12th, 1903.

TO CONTRACTORS of CORRUGATED IRON BUILDINGS.

The Gorton Urban District Education Committee are about to proceed to the ERECTION of a TEMPORARY IRON SCHOOL to accommodate 400 children in the Mixed Department, and 200 infants, and they are prepared to receive TENDERS for the ERECTION of such a school in accordance with the requirements of the Board of Education.

Tenders to be accompanied by plans and specifications.

Contractors may obtain particulars on application to the undersigned to whom sealed Tenders should be sent on or before the 30th inst. endorsed "Temporary School."

C. T. SINGER, Clerk.

Town Hall,
Gorton.

BOROUGH of KINGSTON-UPON-THAMES.

GRANITE.

The Corporation of Kingston-upon-Thames invite TENDERS for the SUPPLY of 2,700 tons of QUENAST, GUERNSEY, or other GRANITE, suitable for road-making; 2,000 tons to be broken so as to pass through a ring having a 2 in. internal diameter, and the remainder through a 1½ in. ring. The above sizes will be strictly enforced.

The whole of the above to be delivered and unloaded into carts of the Corporation, free of extra cost, at such wharf or towing-path in the said Borough as may be directed by the Borough Surveyor, or at the Kingston Station of the L. and S.W. Railway.

The person whose Tender is accepted will be required to enter into a Contract to be prepared by me.

Tenders to be on forms to be obtained of the Borough Surveyor, Clattern House, where samples must be left.

The lowest or any Tender will not necessarily be accepted.

Sealed Tenders, endorsed, to be delivered at this office on or before WEDNESDAY, the 13th JANUARY.

HAROLD A. WINSER, Town Clerk.

Town Clerk's Office,
Kingston-upon-Thames.
December 22nd, 1903.

ALTERATION and REPAIRS to be executed at 45, 47, and 49, Rhodeswell-road, Limehouse.—Particulars may be obtained of Mr. L. GROSS, 21, Alvington-crescent, Dalston, N.E.

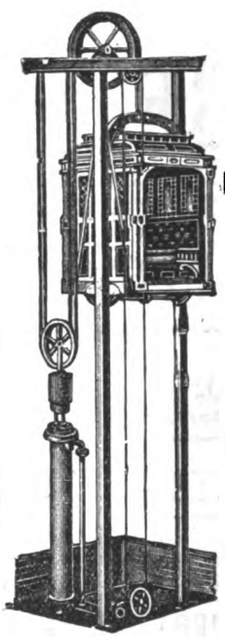
[*See also page* viii.

EWART'S PATENT COPPER ROOFING

Quantities taken from Drawings and Estimates Submitted

346 EUSTON ROAD N.W.

PICKERINGS' LIFTS.



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DINNER LIFTS. WINCHES and CRANES, BY STEAM OR HAND POWER.

PULLEY BLOCKS. PULLEYS and SHAFTING.

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National Telephone, 4,544.

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Globe Elevator Works,

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London Office: 98, LEADENHALL ST., E.C.

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MASON'S PATENT NON-SLIPPING TREAD.

The Only Perfect Stair-Tread on the Market.

Sole Makers—THE SAFETY TREAD SYNDICATE, 15, Barbican, London, E.C. Ltd.,
Telegraphic Address: "Unslipping," London.
Telephone, 5646 Bank.

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BYNG STREET, MILLWALL, LONDON, E.

WROUGHT-IRON TANKS AND CISTERNS

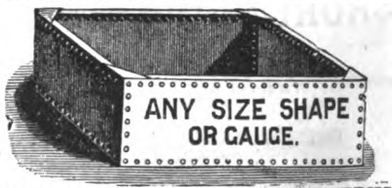
Of any shape or size, for hot or cold water, to drawings and specifications.

IRON DOORS SMOKE-PIPES AND FUNNELLS, TROUGHS, CORN-BINS, &c.

THE LONDON GALVANISED IRON CO.

No. 27, WHARF ROAD, LONDON, N.

Tank Works—Druid-street, Bermondsey, S.E.



WROUGHT-IRON TANKS & CISTERNS GALVANISED AND PAINTED.

to 1,000 Gallons always in stock. Manufacturers of Sanitary Dust-Bins. Every description of Ironwork Galvanised.

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BARROWS & CO. LTD.

Portable Engines, 5 to 25 h.p. always in stock, ready to load up at a moment's notice; also Mortar Mills, Mortar Carts, and Saw-benches.

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BANBURY.

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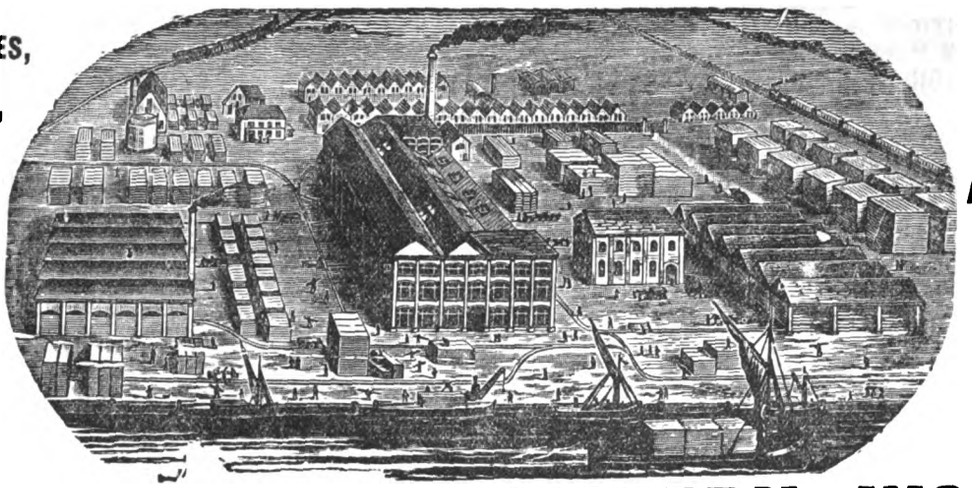
Offices,
Nat. Telephone No. 3055
and 3054 Avenue.

JOINERY.

Telegraphic Address:
"FARQUHARSON,
LONDON."

HIGH CLASS JOINERY IN HARD and SOFT WOOD.

CONSERVATORIES,
GREENHOUSES,
MANTELS,
OVERMANTELS,
STAIRCASES,
DOORS,
AND FRAMES.



SASHES
AND FRAMES,
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BASEPLATES,
SKIRTINGS
TO ANY
DESIGN.

LONDON STEAM JOINERY WORKS

ROLLIN-STREET WHARF, CANTERBURY-ROAD, OLD KENT-ROAD, LONDON, S.E.
City Offices: 85, GRACECHURCH-STREET, E.C. Proprietors: FARQUHARSON BROS. & CO.

Architects' Drawings and Details carried out with the greatest care and precision.
Fittings of every description supplied for Public Buildings, Hotels, Banks, Shops, &c.

MANUFACTURERS OF THE

PATENT INTERLOCKING PORTABLE HOUSES OF ANY NUMBER OF ROOMS.

Suitable for Churches, Hospitals, Shooting Lodges, Contractors' Temporary Offices. Built on an entirely new principle in sections. Can be erected by unskilled labour. No bolts, screws, or nails used. ESTIMATES FREE.

The Works are large and are equipped with the most modern Wood-Working Machinery and Appliances; and, having an extensive and carefully selected stock of Timber under cover (which undergoes the further process of our drying-rooms before manufacture), our customers can rely on seasoned material, good workmanship, and prompt delivery.

OAKEY'S GLASS PAPER.

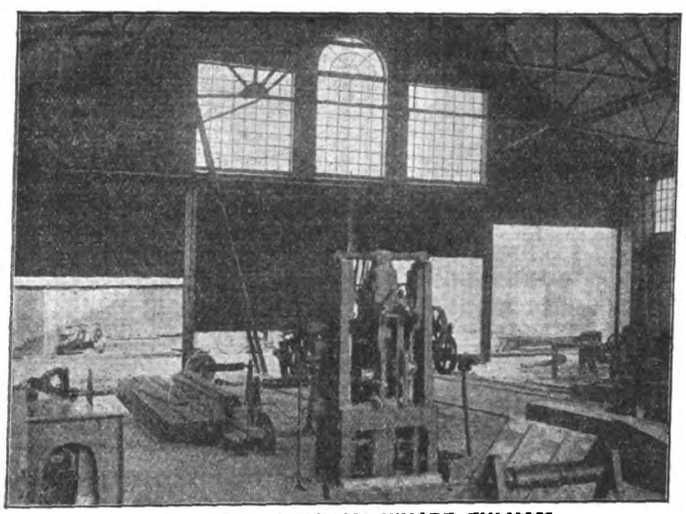
Emery Cloth and Paper, Glass Cloth, and Flint Paper Cloth, Emery Black Lead, Putty-Powder, Snake Stone Second Grit, Polishing Lap for Marble Masons, &c.

FLINT and GARNET PAPER IN ROLLS.

50 yards long by 18 in., 20 in., 24 in., 30 in., 36 in., 40 in., 42 in., and 48 in. wide

"WELLINGTON" EMERY WHEELS.

WELLINGTON EMERY & BLACKLEAD MILLS, Westminster Bridge-rd., London, S.W.



New Saw Mills—IMPERIAL WHARF, FULHAM.

SEVEN KINNEAR STEEL ROLLING SHUTTERS,

As supplied to Tramway Depots, Government and Railway Warehouses, &c., throughout the world.

ARTHUR L. GIBSON & CO.,

19, 20, & 21, Tower St., Upper St. Martin's Lane, LONDON, W.C.

BY HER MAJESTY'S ROYAL LETTERS PATENT.

ESTABLISHED A.D. 1774.

AUSTIN'S NEW IMPERIAL PATENT

SUPERFINE FLAX LINE.

The above article is now being manufactured and sold in large quantities for Greenhouse Sashes, Public-house Shutters, and other heavy work. The manufacturers would recommend it for its strength, and the large amount of wear in it, consequent upon its peculiar manufacture

AUSTIN'S IMPERIAL PATENT FLAX SASH AND BLIND LINES (two Prize Medals awarded). The Manufacturers of the above article particularly wish to call the attention of the trade to their Imperial Patent Flax Sash Lines, of which they are now making six qualities, all of which they can strongly recommend, as they have given unqualified satisfaction to the trade for now over 100 years, and the proprietors continue to give their personal attention to the Manufacture of these goods.

They also invite the particular attention of the Trade to their IMPERIAL PATENT BLIND LINES, which are very superior to anything yet offered.

They can be obtained of all Ropemakers, Ironmongers, Merchants, Factors, and Wholesale Houses, in Town or Country.

N.B.—Please note that all our Goods as advertised above are labelled either inside or outside with the Trade Mark the "Anchor."

FOR THE INTRODUCTION OF FRESH AIR THROUGH AN EXTERNAL WALL.

PRICE LISTS ON APPLICATION.

HAYWARD BROTHERS & ECKSTEIN LIMITED
187 to 193, UNION STREET BOROUGH, S.E.

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ALL MAKES BOUGHT, SOLD EXCHANGED, REPAIRED, and LENT on HIRE. MS. copied.

Twelve monthly instalments of One Guinea will buy a first-class Remington, Barlock, Hammond, or Chicago.

Taylor's, 74, Chancery Lane, London.

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THE BUILDERS' MATERIAL SUPPLY STORES.

ESTABLISHED 1878. R. SHOULER, Manager.

SPECIAL ATTENTION is called to this unique Establishment, the principal features of which are the following Departments, arranged to meet the Builder and Contractor at every point:—

BUILDING MATERIALS. RUBBISH CARTING. SCAFFOLDING. SANITARY GOODS.
MILL MORTAR. LIME AND HAIR.

***SPECIALITIES* as required by Architects.**

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Cartage Depot, Milling, Screening, Hardcore, &c.: Phœnix Wharf, Redhill Street, N.W.

Central Stores and Sanitary Goods Depot: 9, 10, 11, 12, & 13, Hopkins St., Broad St., Golden Square, W.

Railway Depot & Siding: FINCHLEY RD. (L.N.W.R.)

For full particulars and Lowest Prices apply to

Chief Office: **92, BERWICK STREET, OXFORD STREET, W.**

Telephone 5408 GERRARD. *Telegrams: "REORGANIZE, LONDON."*

JOHN P. WHITE · THE PYGHTLE WORKS · BEDFORD

Makers of
INTERNAL JOINERY, CHY: PIECES, CARRIAGE & GARDEN GATES &c.
New Catalogue of simple & inexpensive
Wood Mantelpieces on Application.

LONDON OFFICE & SHOWROOMS 24 MARGARET STREET W.

CONTRACTS (*continued from p.* vi.).

POPLAR and STEPNEY SICK ASYLUM DISTRICT.

BROMLEY ASYLUM.

ADDITIONAL BATH AND LAVATORY ACCOMMODATION.

TO BUILDERS AND CONTRACTORS.

The Managers of the above-named District are prepared to receive TENDERS for PROPOSED WORKS in providing ADDITIONAL BATH and LAVATORY ACCOMMODATION in the Administrative Block of the District Sick Asylum, Devon's-road, Bromley, E., in accordance with plans and specification prepared by their Architects, Messrs. J. and W. CLARKSON, of 136, High-street, Poplar, E.

A copy of the specification may be obtained from the Office of the Architects, as above, between the hours of TEN a.m. and FOUR p.m. upon payment of a deposit of Two Guineas which will be returned upon receipt of a bona-fide Tender.

The drawings may be seen and the printed forms of Tender (which alone will be received) may be obtained at the Office of the Architects.

Tenders, sealed, and endorsed "Tender for Lavatory and Bath Accommodation," addressed to me at the Asylum, Devon's-road, Bromley-by-Bow, E., must be delivered not later than TEN a.m. on TUESDAY, JANUARY 5th, 1904.

The Managers will meet at FIVE p.m. the same day to open and consider the same, when it is desirable for parties tendering, or their representatives, to be in attendance.

Parties tendering will be required to declare in their Tender that they pay the rate of wages and observe the hours of labour that are generally recognised by the trade unions and considered fair in their trade.

The Managers do not bind themselves to accept the lowest or any Tender.

By Order,
WALTER R. FOSKETT,
Clerk to the Managers.

Bromley-by-Bow, E.
December 17th, 1903.

SOUTHWARK UNION, LONDON.

TO CONTRACTORS AND OTHERS.

The Guardians of this Union invite Tenders (a) for the ERECTION of a new LABOUR ROOM at Newington Workhouse, Westmoreland-road, Walworth, S.E. and (b) for providing a BATH ROOM on the ground floor of the same establishment.

The plans, specifications, and conditions may be seen, and forms of Tender obtained, at the Offices of the Architect, Mr. G. D. STEVENSON, Nos. 13 and 14, High-street, Cheapside, E.C. between the hours of TEN a.m. and FOUR p.m.

Tenders, endorsed (a) "Labour Room, Newington Workhouse," and (b) "Bath Room, Newington Workhouse," should be addressed to the GUARDIANS, and delivered at my offices as under by FIVE p.m. on THURSDAY, the 7th JANUARY next, when the Tenders will be opened; but the Guardians do not bind themselves to accept the lowest or any Tender.

The persons whose Tenders may be accepted will be required to sign declarations that they pay the trade-union rate of wages, and observe the hours of labour recognised in the several trades in the London district.

By Order,
HOWARD C. JONES,
Clerk.

Union Offices,
John-street West, Blackfriars-road, S.E.
December 18th, 1903.

PARISH of LAMBETH.

CONTRACT FOR BLINDS.

The Guardians of the Poor of the Parish of Lambeth hereby invite TENDERS for the SUPPLY and FIXING of WINDOW BLINDS at their new Board Room, Offices, and Nurses' Home, Brook-street, Kennington, London, S.E.

The blinds to be equal in quality to the Guardians' sample, which may be seen on application to me, the undersigned, and the fittings to be according to the sketch prepared by their Architect.

A form of Tender, with schedule of windows annexed, together with a sketch of the fittings, may be obtained, and draft contract may be seen on application at these offices any day between the hours of TEN and FIVE.

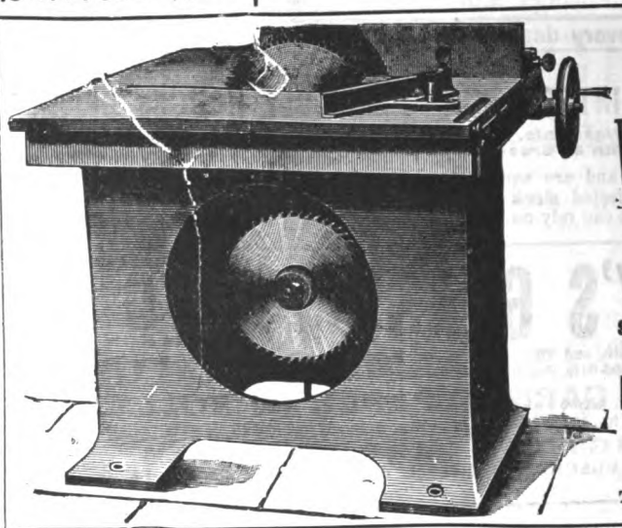
Tenders, sealed and superscribed "Tender for Blinds," and stating date when delivery and fixing will be completed, must be sent to the undersigned on or before TEN o'clock on WEDNESDAY morning the 6th JANUARY, 1904.

The Guardians do not bind themselves to accept the lowest or any Tender.

By Order,
W. THURNALL,
Clerk.

Guardians' Board Room and Offices,
Brook-street, Kennington, S.E.
December 16th, 1903.

[*See also page* x.



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See our NEW Catalogue for 1900.

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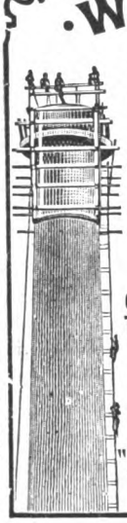
Telegrams: ROEBUCK, LONDON.

W. J. FURSE.



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CHIMNEY SHAFTS BUILT OR REPAIRED WITHOUT SCAFFOLDING.
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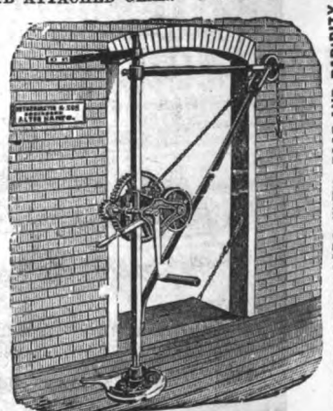

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Is neither difficult nor expensive. The Free Trade Hall and Royal Exchange, Manchester, and the Charrington Large Assembly Hall, Mile End, London, have been effectually warmed with little fuel by **CONSTANTINES CONVOLUTED STOVE**, for many years. *A Contribution to the Science of Ventilation.* After experimenting several years **J. CONSTANTINE & SON** succeeded in Ventilating effectively the Hot Rooms of the Turkish Bath. A constant change of 30 cubic feet of air per minute for each bather in fair or foul weather is ensured.

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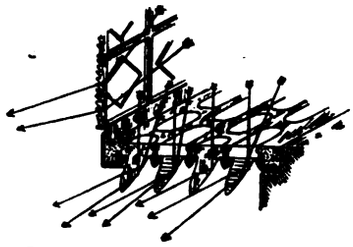

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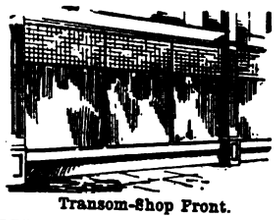

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BY APPOINTMENT.

DENT & HELLYER. SANITARY ENGINEERS.

Telegraphic Address: "ANOSMIA, LONDON."

NOTICE OF REMOVAL.

Messrs. DENT & HELLYER beg to give notice that owing to their premises (21, Newcastle Street, Strand) having been acquired by the L.C.C. for the Holborn-Strand Improvements, their business, established over a century and a half ago, has been removed to

NEW PREMISES. *Offices*:—35, RED LION SQUARE, W.C. *Warehouse and Factory*:—75, THEOBALD'S ROAD, W.C.

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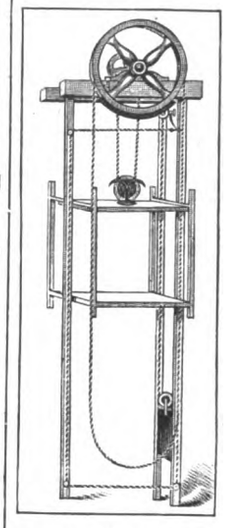

DINNER LIFTS, LUGGAGE LIFTS, PARCEL LIFTS, CHOP LIFTS, STAIRCASE LIFTS, CELLAR LIFTS, &c., &c.

Self-sustaining Gear *from* **30/-**

ESTIMATES & CATALOGUE ON APPLICATION.

Lift complete, includes ***Overhead Gearing or Wood Bearers, Brake Apparatus, Strong Wood Cage, Balance Weight, Hemp Ropes, and Wood Guides.***

No.	Size of Cage.	Load.	Lift exclusive of cage and guides.	Lift complete, ready to fix.
0	1 ft. 6 in. × 1 ft. 1 in.	¼ cwt.	£4 5 0	£6 10 0
1	1 ft. 9 in. × 1 ft. 3 in.	½ cwt.	6 0 0	7 15 0
2	2 ft. 0 in. × 1 ft. 6 in.	¾ cwt.	6 10 0	8 10 0
3	2 ft. 4 in. × 1 ft. 9 in.	1 cwt.	7 16 0	9 16 0
4	2 ft. 9 in. × 2 ft. 6 in.	1½ cwt.	8 0 0	10 10 0
5	3 ft. 9 in. × 3 ft. 0 in.	2½ cwt.	12 0 0	15 0 0
6	6 ft. 0 in. × 4 ft. 0 in.	4 cwt.	26 0 0	33 0 0

Total height 18 feet. Additional height charged extra.

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Wrought-Iron Heating Apparatus Boilers.

Vertical Steam Boilers, &c.

SAVILE BOILER. APPLY FOR CATALOGUE.

CONTRACTS (*continued from p.* viii.).

COUNTY BOROUGH of BRIGHTON.
TO CONTRACTORS AND OTHERS.
Notice is hereby given that the Council of the said County Borough will receive TENDERS from such persons as may be willing to enter into a Contract for the SUPPLY of DRESSED GRANITE KERB and CHANNEL, as under:—
1,000 ft. run 6 in. by 10 in. Granite Edge Kerb.
4,000 ft. run 12 in. by 6 in. Granite Flat Kerb.
And 4,000 ft. run 12 in. by 6 in. Granite Flat Channel.
The specification and form of Tender may be obtained on application at the Office of the Borough Engineer and Surveyor, Mr. FRANCIS J. C. MAY, Memb.Inst.C.E. F.S.I. at the Town Hall, Brighton.
Sealed Tenders addressed to me, and endorsed "Tender for Granite Kerb and Channel," must be left at my office, at the Town Hall, before TEN o'clock in the forenoon, on FRIDAY, the 1st day of JANUARY, 1904.
The Council do not bind themselves to accept the lowest or any Tender.
FRANCIS J. TILLSTONE, Town Clerk.
Town Hall, Brighton.
December 17th, 1903.

HAMLET of MILE END OLD TOWN.
TO BUILDERS AND CONTRACTORS.
The Guardians of the Poor of the Hamlet of Mile End Old Town hereby invite TENDERS for the EXECUTION of certain WORKS in connexion with the making of ALTERATIONS and ADDITIONS at their school building, on the Workhouse premises in Bancroft-road, Mile End-road, London, E.
The drawings may be inspected up to and including FRIDAY, 8th JANUARY, 1904, at the Office of the Architect, Mr. J. M. KNIGHT, No. 35, Bancroft-road, Mile End-road, London, E. between the hours of TEN a.m. and TWO p.m.
Specifications and quantities may be had on application to the ARCHITECT, any day after the 26th DECEMBER, 1903.
Tenders, sealed and endorsed "School Alterations," are to be delivered at the Guardians' Offices, addressed to the undersigned, not later than FOUR p.m. on THURSDAY, the 14th JANUARY, 1904.
No Tender will be considered unless it be on the lithographed form supplied.
The Guardians do not bind themselves to accept the lowest or any Tender.
Persons tendering must state in the Tenders that they pay such rates of wages and observe such hours of labour as are generally accepted as fair in the trades to which the work refers.
By Order,
WILLIAM THACKER, Clerk to the Guardians.
Guardians' Offices, Bancroft-road, Mile End-road, London, E.
December 17th, 1903.

WEST HAM UNION.
The Guardians invite TENDERS for the SUPPLY, DELIVERY, and FIXING complete of
(a) Three FIRE ESCAPE IRON STAIRCASES at their Convalescent Home, Northumberland-road, Margate; and
(b) One similar STAIRCASE at the Workhouse (E. block), Union-road, Leytonstone, N.E.
Firms are at liberty to Tender for either or both of the above sections.
Drawings and a specification may be inspected at the Clerk's Office at the Workhouse between the hours of TEN a.m. and FOUR p.m. where forms upon which Tenders must be made can be obtained.
Tenders, sealed and endorsed, must be sent to me, the undersigned, not later than WEDNESDAY, the 6th JANUARY, 1904, and the Contractor will be required to pay his workmen the trades union rate of wages current in the district.
The Guardians do not bind themselves to accept the lowest or any Tender.
By Order of the Board,
FRED. E. HILLEARY, Clerk.
Clerk's Office,
Union Workhouse,
Leytonstone, N.E.
December 19th, 1903.

CONGREGATIONAL CHURCH, PONTYPOOL, MON.
TENDERS are REQUIRED for SUPPLYING HEATING APPARATUS for the above.
Plan and particulars may be obtained upon application to Messrs. SWASH and BAIN, Architects, Midland Bank-chambers, Newport, Mon.

Refer also to "TOO LATE" *column, page*

NEST of DRAWERS for Double Elephant Paper WANTED. Good second-hand set.—Send particulars and prices to R. and R. Queen's Wharf, Hammersmith.

STONE-BREAKERS, hand, horse, or steam power, also MORTAR MILLS & CONCRETE MIXERS. A few second-hand ones that have been out. FOR SALE, cheap. Also a BRICK-BREAKING MACHINE, DISINTEGRATOR, and ENGINE let out on HIRE, with option of Purchase.—MASON BROS. (late S. MASON and Co.), Stone Breaking and Grinding Machine Manufacturers, Leicester.

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EVERY RECENT IMPROVEMENT
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A LARGE STOCK FINISHED & READY FOR IMMEDIATELY DELIVERY.
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Three minutes from Vauxhall Station, South-Western Railway.

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HIGH-CLASS ENGINES, MORTAR MILLS, HOISTS, CRANES, BRICK CRUSHERS, TRACTION ENGINE, &c.
At Moderate Prices.
REPAIRS AND CASTINGS.
LEWIS & LEWIS, Limited,
Engineers and Ironfounders,
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CLEFT OAK ROOFING SHINGLES.
A large quantity always on hand.
Present stock over 100,000.
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English & Foreign Timber Merchants, etc. Horsham, Sussex.

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SALE or HIRE.
PORTABLE ENGINES, Loco. or Vertical Boilers, 2½ to 30 horse, new or second-hand, ready.
Several MORTAR MILLS, WINDING GEARS, PUMPS.
Boiler Makers sent out for Repairs, etc.
Address, WILLSHER, Forest-hill, S.E.

COMPLETION OF KEW BRIDGE.—FOR SALE, a QUANTITY of CONTRACTOR'S PLANT and MATERIALS, comprising a Suspension Cableway, one 10-ton Steam Derrick Crane with Bogies, one 1-ton Hand Derrick Crane, one 30-cwt. ditto, one 10-ton Overhead Traveller, one Adie Cement Tester, Rockgrab, Barges, Mortar Mill, Tip Waggons, Vertical Boiler, Chains, &c., and Pitch Pine Logs, 13 in. to 14 in. square, ditto Half Timbers.—Apply Contractor's Office, Kew.

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In all sizes, screened or unscreened in any quantity. Delivery any part of London by Vans. Delivery also by Railway in trucks or barges.
CONTRACTORS FOR GAS COKE, RETORT CARBON, AND CLINKER.
Address all enquiries to Chief Office—
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Portable Engines, 6 to 30 h.p.; Mortar Mills, combined or separate; Hoists, Saw Benches, Pumps, Shafting, Pulleys, &c.; Columns, Girders, Stanchions, Manholes, Galleys, Inspection Covers, & Builders' & Contractors' Castings of every description.
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SPECIAL SCREENED SAND
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FLOORING BOARDS and MATCHING (10,000 squares of new) arrived in Surrey Commercial Dock, prices: floor boards, 1¼ in. at 8s. 6d. per sq.; 1 in. at 7s. per sq.; ¾ in. 6s. per sq.; 1 in. matchin, 7s. 6d. per sq.; ¾ in. at 6s. 6d. per sq.; ½ in. at 5s. 6d. per sq.; ¼ in. at 4s. per sq. These goods can be seen at J. DRAPER, 103, Lavender-hill, Clapham Junction. Telephone 36, Battersea.

SEWER CONTRACTORS and Others.—POLING BOARDS 3 ft. to 6 ft. long, good quality, 6d. per fathom. STRUTS, WALINGS, and WHEELING PLANKS at low rates, 12,000 SPRUCE DEALS, 12 ft. long, 3 in. by 9 in. wide, at 8s. 9d. each. DRAPER, Timber Merchant, Clapham Junction. Telephone 36, Battersea.

LARGE QUANTITY of TANKS for SALE cheap—from 50 to 2,000 gallons.
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Five hundred STANDARDS, 3 by 9 (yellow) at 2d. per run.
DRAPER, Este-road, Clapham Junction. Tele. 36, Battersea.

FOR SALE. — ENGLISH OAK BOARDS and PLANKS, prime quality; also WAINSCOT, 15,000 ft. boards, 10,000 ft. planks, from 15 to 36 in. wide, 1 to 6 in. thick; also 5,000 ft. 2 to 3 in. elm boards, cut out from three to four years.—Apply GEORGE RICHES, The Gangway Works, Cromer, Norfolk.

CROGGON & CO.
(LIMITED),
16, UPPER THAMES STREET,
— LONDON, E.C. —
And at LIVERPOOL and GLASGOW.

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PUBLIC BUILDINGS, PRIVATE HOUSES, MANSIONS, FACTORIES, &c.
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Manufacturers of the celebrated Koh-I-Noor Pencils.

WELLS' "UNBREAKABLE" LAMPS.

KETTLE TORCH LAMPS.

Largely used by Contractors, Builders, Corporations, Collieries, &c.

LARGE FLAMING LIGHT.

No. 18, 3 pints, 1¼in. wick, 4s. 6d. each.

No. 28, same shape as above, but having 2 wicks, 6 pints, 9s. each.

No 18a. A Splendid Lamp, fitted with 2in. Wick, 5 pints capacity, 9s. each. Suitable for Sewerage & Drainage Work, &c.

WELLS' OIL GAS GENERATING LAMPS

Light from Kerosene or Petroleum without Wick, Smoke, or Smell at less than one penny per hour.

Perfect Safety.
No Explosive Naptha used.
Thousands Sold.
Unaffected by Wind.

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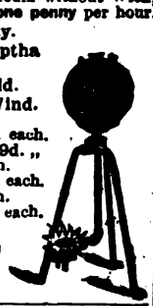
12, 3 hours, 11s 9d. each.
12A, with tripod, 13s 9d. ,,
13, 5 hours, 14s. each.
13A, with tripod, 17s. each.
14, 7 hours, 16s. each.
14A, with tripod, 19s. each.



Extra Burners for above, 2s. each.

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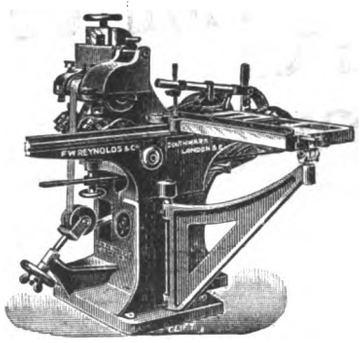
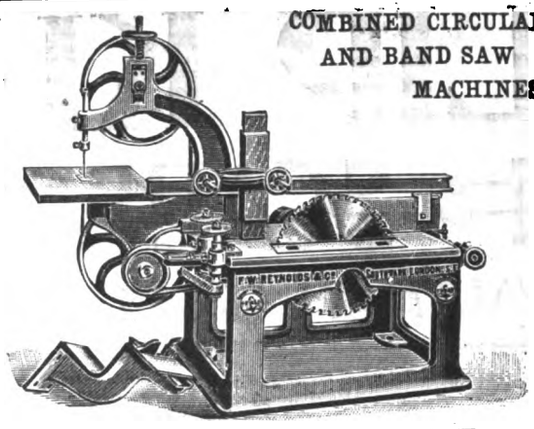
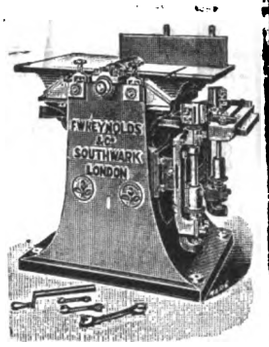


COMBINED CIRCULAR AND BAND SAW MACHINES.



PANEL PLANERS.



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Acorn Works, Edward Street, Blackfriars Road, LONDON, S.E.
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F. W. R. & Co. HAVE JUST ISSUED A LIST OF **SECOND-HAND MACHINES and ENGINES** which have either been taken in exchange for larger machines or returned from hire.

THIS LIST (No. 189) WILL BE SENT FREE ON APPLICATION.

THESE MACHINES, &c., CAN BE SEEN AT ABOVE WORKS.

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Contractors to His Majesty's Government.

NATIONAL TELEPHONE: No. 75 SHIPLEY.

The "CUNDALL" Patent

OIL ENGINES

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SIMPLEST Engines Running.

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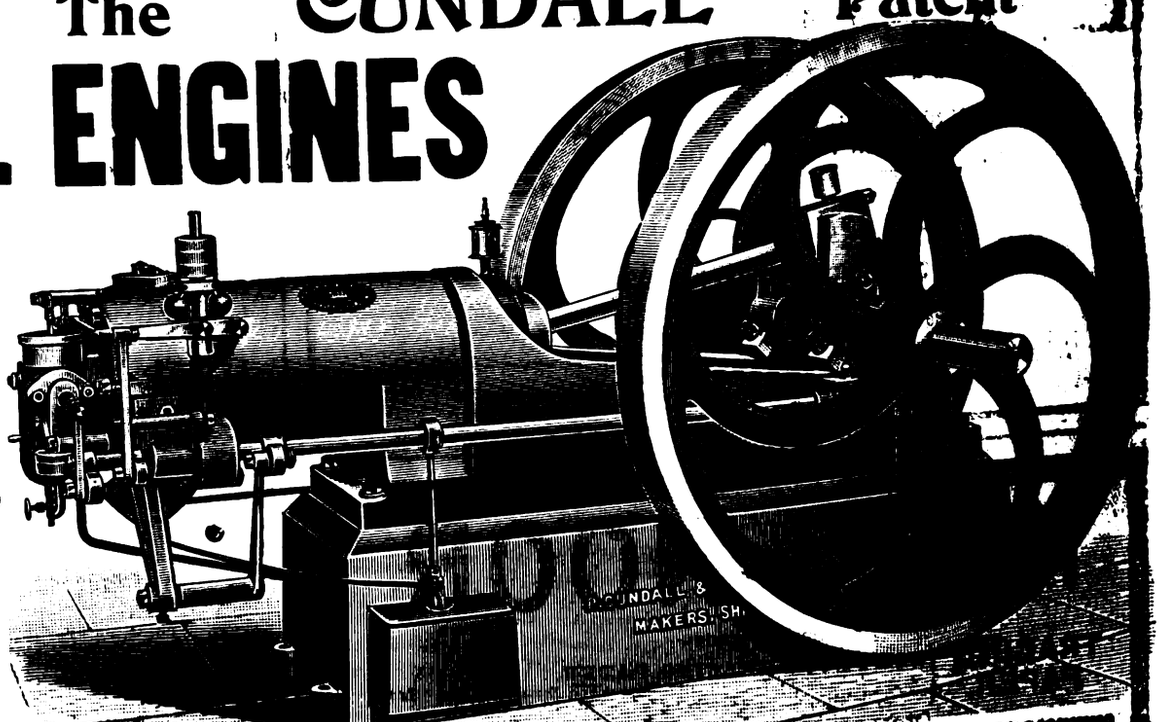

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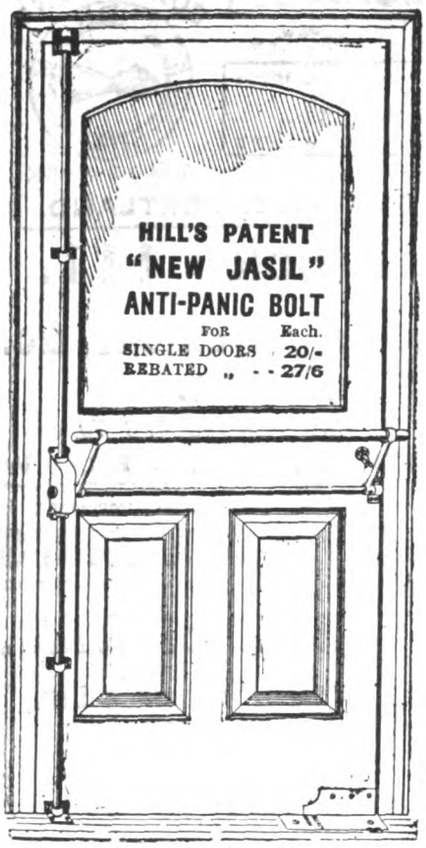

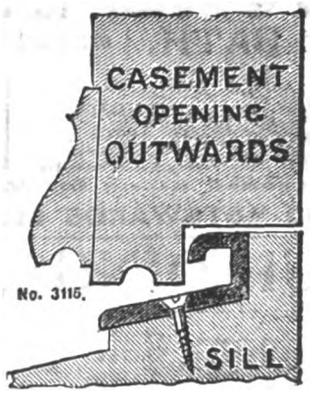

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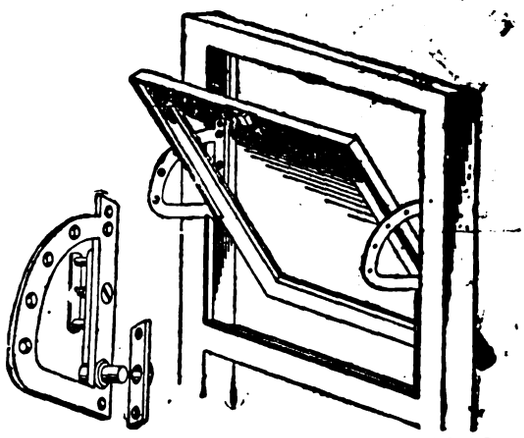

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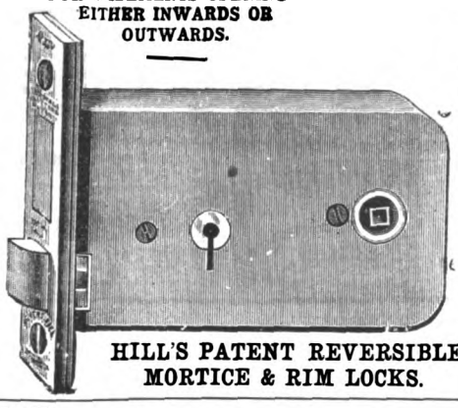

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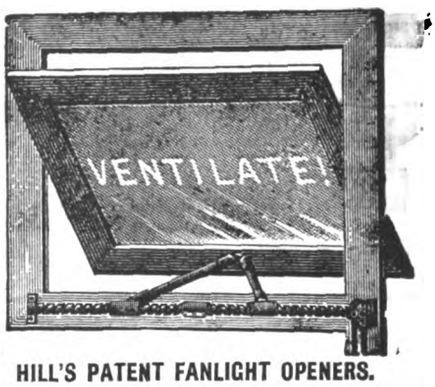

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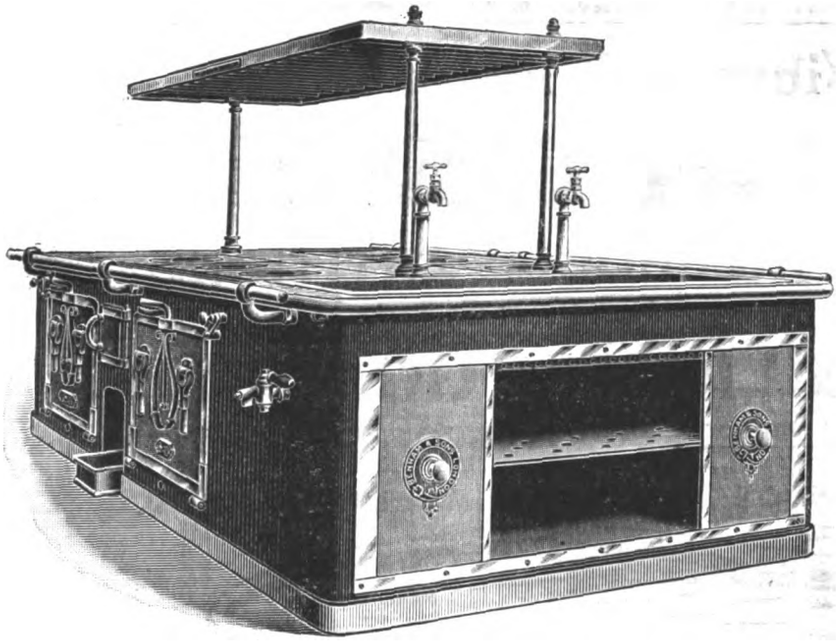

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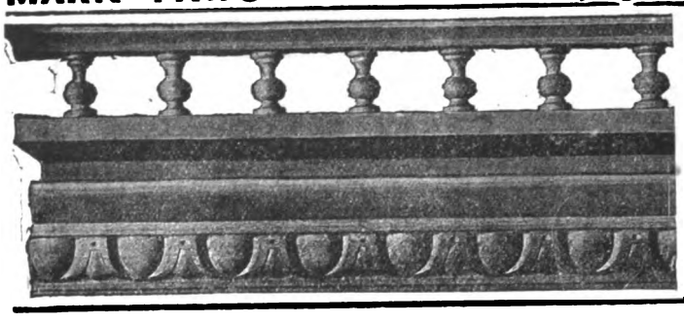

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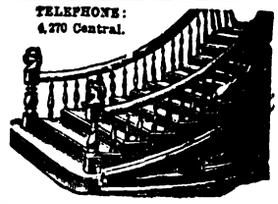

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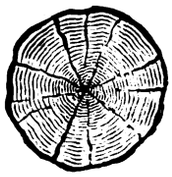

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5. Whitby .. .. .. OCT.
6. Bath .. .. .. NOV.
7. Tewkesbury .. .. .. DEC.
1895.
16. Kirkstall .. .. (out of print).
17. Abbey Dore .. .. APRIL.
18. Selby .. .. .. JULY.
19. Byland .. .. .. OCT.
1896.
24. Melrose. .. .. (out of print).
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26. Tintern .. .. .. JULY.
27. Lanercost .. .. .. OCT.
1900.
32. Dorchester .. .. .. JAN.
33. Bongrove .. .. .. APRIL.
34. Dunstable .. .. .. JULY.
35. Buildwas .. .. .. OCT.
1898.
8. Fountains .. (out of print).
9. Tynemouth .. .. .. FEB.
10. Malmesbury .. .. .. MARCH.
11. Netley .. .. .. APRIL.
12. Bolton .. .. .. MAY.
13. Lindisfarne .. .. .. JUNE.
14. Furness .. .. .. JULY.
15. Romsey .. .. .. OCT.
1897.
20. Great Malvern .. .. JAN.
21. Sherborne .. .. APRIL.
22. Bayham .. .. .. JULY.
23. Pershore .. .. (out of print)
1899.
28. Llanthony .. (out of print).
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Council Offices,
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December 21st, 1903.

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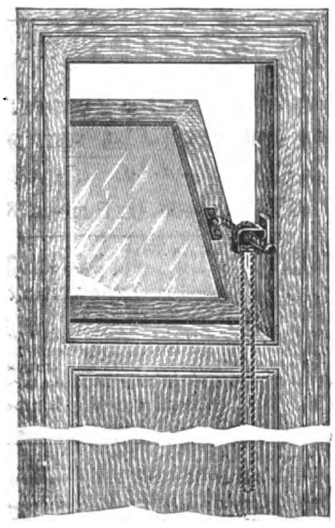
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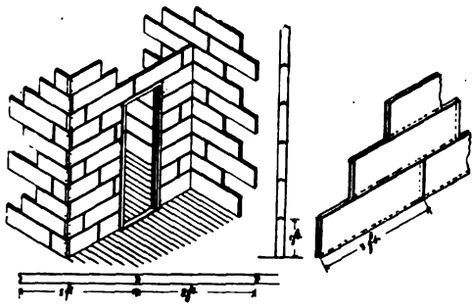

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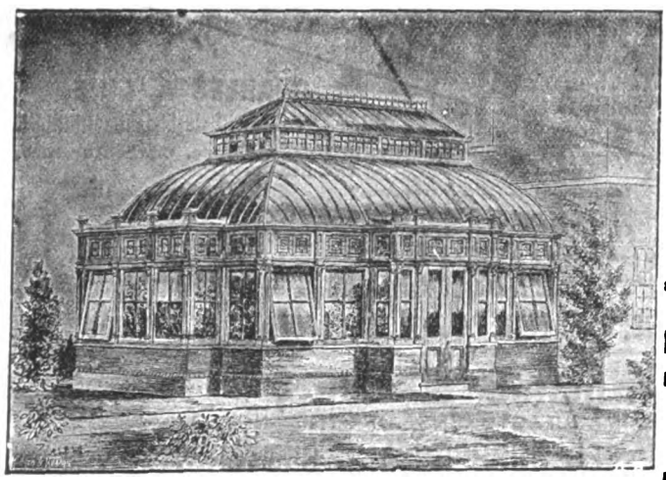

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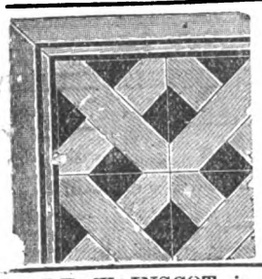

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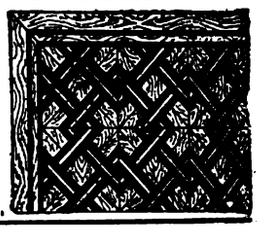

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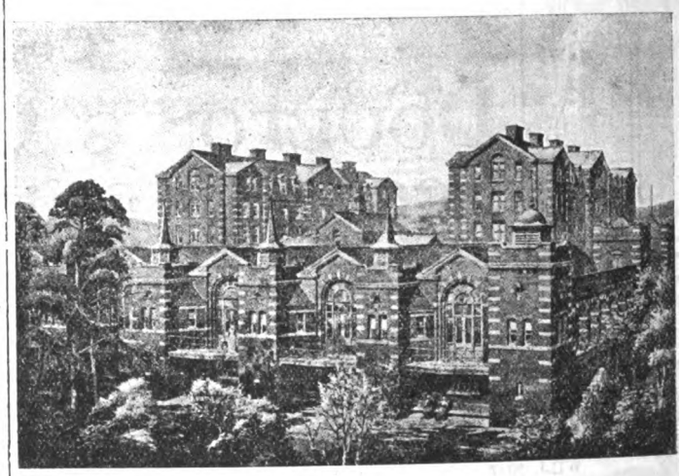

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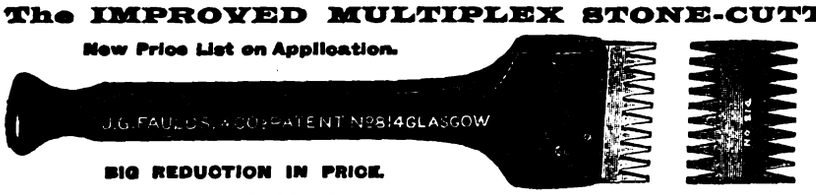

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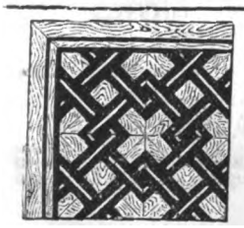

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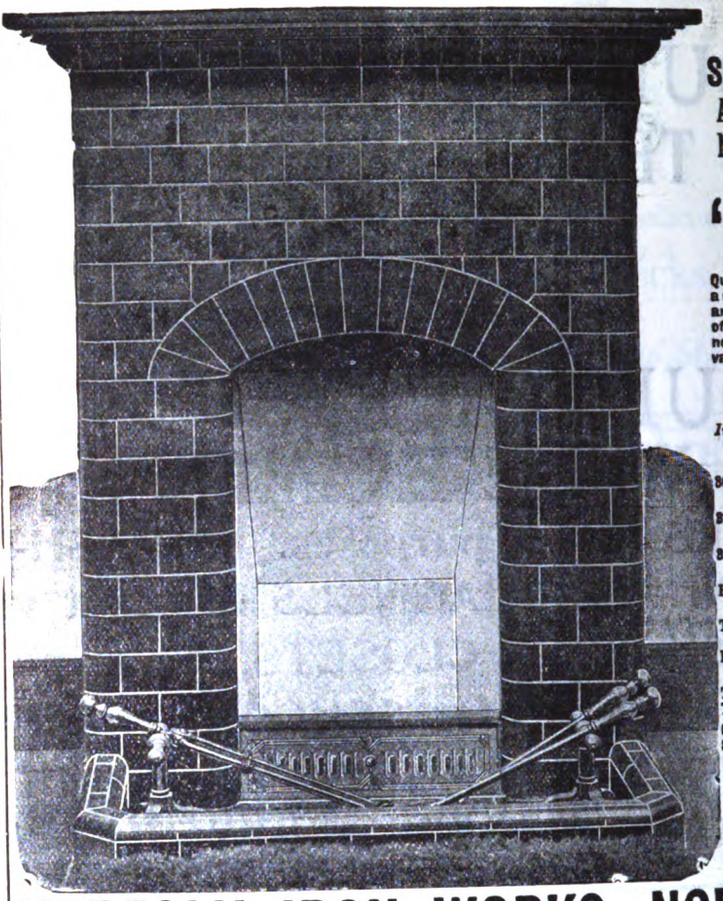

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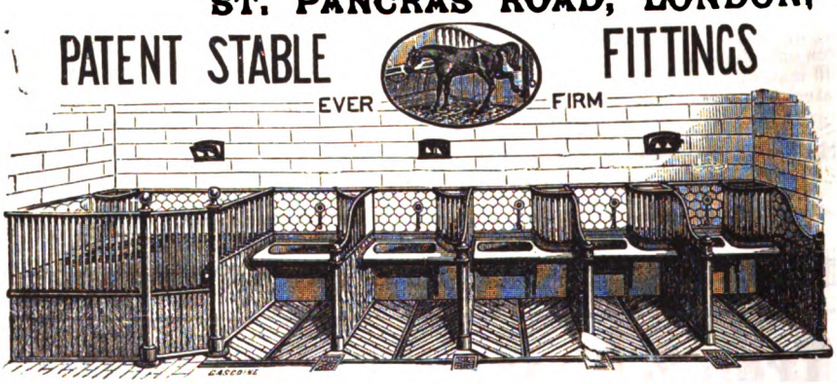

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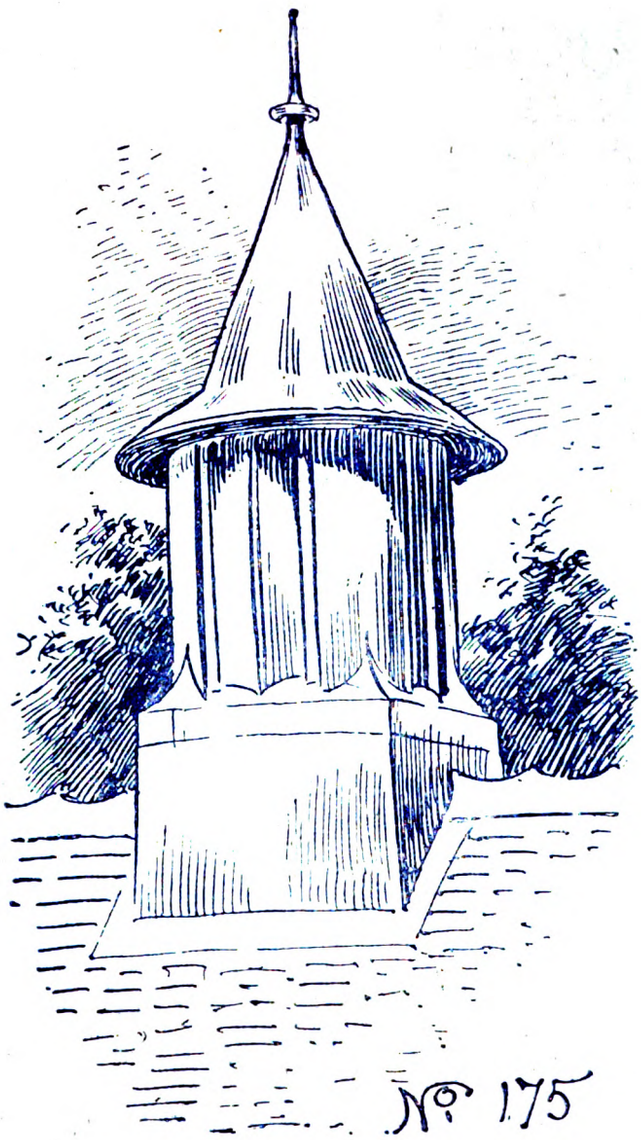

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